ALLNAMES:(SIASUN Robot & Automation CO Ltd)

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1. **20150268657** MOVING POSITION CONTROL SYSTEM FOR MOVING APPARATUS US - 24.09.2015

Int.Class G06F 19/00 **Appl.No** 14441084 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** Xuewei Li

A moving position control system for a moving apparatus includes an embedded PC, a position control board, a servo driver, a servo motor, and a barcode scanner. The embedded PC sends a positioning instruction to the position control board, which processes the positioning instruction and then sends a signal to the servo driver to drive the servo motor. The barcode scanner collects absolute positions of the moving apparatus on a moving track thereof. The position control board, the servo driver, and the servo motor form a closed-loop control circuit that includes a position loop control circuit, a speed loop control circuit, and a current loop control circuit. Improved operational efficiency is achieved by locating the position loop control circuit at the position control board.

2. **102554910** ARM MECHANISM OF ROBOT CN - 11.07.2012

Int.Class B25J 9/08 **Appl.No** 201010599482.9 **Applicant** SIASUN Robot & Automation Co., Ltd. **Inventor** Qu Daokui

The invention discloses an arm mechanism of a robot, which belongs to the technical field of industrial robots and comprises a driving unit and two arm components. Each arm component consists of an upper arm, a forearm and an end actuator, synchronous belt pulleys are disposed in the upper arms and the forearms, the upper arms of the two arm components are coaxially arranged, retractable driving shafts of the upper arms of the two arm components are respectively connected with the belt pulleys in the upper arms, shells of the two upper arms are respectively connected with rotation driving shafts of the two upper arms, so that a four-shaft coaxial structure is formed, and the four driving shafts are respectively connected with mutually independent driving mechanisms in the driving unit. The two arm components of the arm mechanism rotate and are retractably driven mutually independently, are arranged in a vertically crossed manner, and respectively rotate and radially stretch and retract around the same rotary shaft in two different rotation planes,

accordingly, the arm mechanism with four degrees of freedom is formed, when one arm takes and places a sheet at one station, another arm can rotate to another station within an unaffected range to prepare for sheet taking and placing operation, and work efficiency is improved.

3. 102568269 CONTROL SYSTEM WITH TEACH BOX FUNCTION

CN - 11.07.2012

Int.Class G09B 9/00 **Appl.No** 201010613690.X **Applicant** Siasun Robot&Automation Co., Ltd. **Inventor** Chu Mingjie

The invention discloses a control system with a teach box function. The control system comprises a core control unit, an interface module, a keyboard module, an LCD (Liquid Crystal Display) module, a power supply module, an emergency stop switch module and a power-on switch module, wherein the core control unit is arranged on the interface module; the interface module is connected with the keyboard module, the emergency stop switch module, the power-on switch module and the LCD module; the power supply module is connected with the LCD module and the interface module; and the interface module is provided with a CAN (Controller Area Network) bus interface, a serial interface and an Ethernet interface. According to the hardware system of a teach box, disclosed by the invention, the functions of robot speed teaching, movement locus teaching, file operation and the like can be finished by pressing keys, various information can be displayed through an LCD screen, and the information can be sent to a host computer through various communication interfaces.

4. 102554939 METHOD AND DEVICE FOR COLLISION PROTECTION OF INDUSTRIAL ROBOT

CN - 11.07.2012

Int.Class B25J 19/06 **Appl.No** 201010615758.8 **Applicant** Siasun Robot&Automation Co., Ltd. **Inventor** Qu Daokui

The invention relates to a method and a device for collision protection of an industrial robot. A robot controller is in communication junction with a motor controller for collecting signals and sending instructions. A power down control signal of the rotor controller is in control linkage with the motor controller through a relay. A display signal of the motor controller is connected to a teaching box. The method includes the following steps: a system is started, after a trail planning module of the robot controller generates a motion trail, the motion trail is sent to the motor controller to control a motor to rotate, and trail points are saved in an expansion random access memory (RAM) module; in case of any collision, trail point information saved in the expansion module is read to control the motor to rotate in a reverse direction; a power down signal of the relay is given after a length of operation in a reverse direction to enable a robot body to be in the state of halt, and collision alarm is displayed on the teaching box. The method and the device for collision protection of the industrial robot are capable of powering down timely when a robot arm collides with an obstacle, protecting the robot body, detecting collision effectively, and further reducing loss caused by collision.

5. 206068814 RADIUM CARVING MACHINE

CN - 05.04.2017

Int.Class B65G 47/248 **Appl.No** 201620878872.2 **Applicant** SIASUN ROBOT & AUTOMATION CO., LTD . **Inventor** LUO ZIKUN

The utility model discloses a radium carving machine for PCB board sculpture, wherein, this radium carving machine include plate turnover and with the relative radium -shine device that sets up of plate turnover, plate turnover includes the base, install in two rotation axises of base, each a rotation axis fixedly connected with conveying subassembly, two the conveying subassembly relative parallel arrangement and the relative both sides of centre gripping PCB board respectively, this plate turnover still includes drive assembly, drive assembly includes the driving medium, drive assembly passes through the driving medium rotates connects two the rotation axis, two the conveying subassembly drives the PCB board and removes, drive assembly passes through

the driving medium with the cooperation of rotation axis drives conveying subassembly and PCB board overturn. The utility model discloses a radium carving machine can automatic carry out two -sided radium carving, and production efficiency is high.

6. 102570895 PIEZOCERAMIC DRIVING POWER SUPPLY

CN - 11.07.2012

Int.Class H02N 2/00 **Appl.No** 201010598491.6 **Applicant** SIASUN Robot & Automation Co., Ltd. **Inventor** Xu Fang

The invention discloses a piezoceramic driving power supply, which comprises a logic control module, a data distribution module, a digital-to-analog conversion module, a voltage and power amplification module and a power supply module. Analog control voltage is output in a grading manner, a plurality of power supplies are adopted to generate a high-voltage DC power supply, and an integrated high-voltage operational amplifier is adopted to enable the output driving voltage to be more accurate and the system to be more stable. In the invention, the digital-to-analog conversion module adopts the method of grading output first and then resynthesis to enable the output analog control signal to be more accurate and have less error. The piezoceramic driving power supply adopts the high-voltage integrated operational amplifier for voltage and power amplification, therefore, compared with a separation element adopted before, the system integration level and reliability are improved, and the discreteness and the uncertainty of the system performance are reduced. The piezoceramic drive power supply provided by the invention has the advantages of simple structure, high stability and low ripple wave.

7. 102566577 METHOD FOR SIMPLY AND EASILY CALIBRATING INDUSTRIAL ROBOT

CN - 11.07.2012

Int.Class G05D 1/08 **Appl.No** 201010611008.3 **Applicant** Siasun Robot&Automation Co., Ltd. **Inventor** Wang Jintao

The invention relates to a method for simply and easily calibrating an industrial robot. The method comprises the following steps of: establishing an industrial robot kinematics model, and solving a robot kinematics pose transfer matrix; extracting a robot end position component, and calculating an error transfer matrix; operating a robot end clamp to contact four side edges of a standard cube, reading a code disc number of each joint of the robot, and calculating a position coordinate; changing the pose of the standard cube, reading the code disc number of each joint of the robot again, calculating the position coordinate, and repeating the step for many times; and listing position coordinate matrix equations with an identification parameter, and arranging the position coordinate matrix equations in a manner of Ax=b, wherein A is of a matrix type, x is a column vector with the identification parameter, and b is the column vector, and if A is not strange, a parameter to be identified is solved, and the original parameter is corrected by using the identification result. The method disclosed by the invention has the advantages of convenience, practicability, lower cost, more simpleness on operations, capability of reaching a higher precision, and unnecessity of buying high-precision equipment, such as a high-precision laser instrument and a vidicon.

8. 102562154 CABLE TUNNEL ROUTING INSPECTION ROBOT

CN - 11.07.2012

Int.Class E21F 17/00 **Appl.No** 201010611296.2 **Applicant** Siasun Robot&Automation Co., Ltd. **Inventor** Zheng Chunhui

The invention relates to a cable tunnel routing inspection robot which comprises a robot main body, an automatic moving device and a mechanical arm, wherein the automatic moving device is installed on the robot main body, and the automatic moving device is suspended to a track and moves along the track; the mechanical arm is installed on the robot main body, and the tail end of the mechanical arm is provided with a cloud deck; and the robot main body is provided with a control device and a power supply device, and the power supply device is electrically connected with a cable connected with an external power supply cabinet in an inductive way. The cable tunnel routing inspection robot has high waterproof and anti-electromagnetic interference grades, safe

power supply way and reliable communication way, the limitations of complex ground environment to the motion ability of the robot can be overcome, all-around image monitoring on equipment in the tunnel can be realized, and the positions of equipment damages and thermal defects and monitoring on the overall environment of the tunnel are detected and positioned.

9. 104635563 STACK MACHINE WITH DOUBLE-POSITION CLOSED-LOOP CONTROL SYSTEM

CN - 20.05.2015

Int.Class G05B 19/042 **Appl.No** 201310576831.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LIU SHICHANG

The invention provides a stack machine with a double-position closed-loop control system. The stack machine with the double-position closed-loop control system comprises a master control system and an executing system, wherein the master control system further comprises a first optical communication module, a master controller, a remote inputting and outputting device, a sensor and a peripheral device; and the executing system further comprises a second optical communication module, a teaching box, a robot controller, a plurality of number control plates, a traveling shaft motor driver, a lifting shaft motor driver, a fork shaft motor driver, a rotating shaft motor driver, a traveling shaft magnetic grid and a lifting shaft magnetic grid. The stack machine with the double-position closed-hoop control system is easy to extend, high-speed running of the clean stack machine can be realized through the double-position closed-loop control system, and position overshooting is reduced. Requirements on a control period of an external loop are reduced owing to an internal loop. Moreover, owing to an external magnetic grid positioner, cumulative errors are eliminated, troublesome regular teaching operation is avoided, and the stack machine with the double-position closed-loop control system has a quite high marketing and application prospect.

10. 104624429 SPRAYING ROBOT FOR SURFACE OF SHIP BODY

CN - 20.05.2015

Int.Class B05B 13/04 **Appl.No** 201310578256.6 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI XUEWEI

The invention discloses a spraying robot for a surface of a ship body. The spraying robot comprises a chassis, a large arm, a small arm and a tail end actuator. The tail end actuator comprises a spraying gun installation base, at least one spraying gun and at least one laser displacement sensor for controlling the pose of the tail end actuator. The spraying robot for the surface of the ship body is used for avoiding influence of harmful gas in spraying and repeating the same operation action tirelessly, and is suitable for replacing manpower to carry out the operation in high pollution and intensity work like ship body spraying. The intelligent spraying robot for the ship body is adopted to complete the spraying work so that the pollution in the spraying process can be reduced, energy can be saved, and the working efficiency can be improved.

11. 104511909 ROBOT ARM

CN - 15.04.2015

Int.Class B25J 18/00 **Appl.No** 201310452332.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI XUEWEI

The invention discloses a robot arm; the robot arm comprises a hand mechanism, and a forearm-hand connecting mechanism; one end of an upper arm is connected with the forearm via an elbow; the other end of the upper arm is connected with a shoulder; the joints of the elbow and/or the shoulder achieve the relative rotations between the forearm and the upper arm, and between the upper arm and the shoulder via belt transmissions. The disclosed robot arm employs the synchronous belt transmission, thus the structure is simple, the weight is light, and an enough wiring space is provided, the appearance design is easy, swing and rotation in four degrees of freedom can be achieved.

12. **104511903** ROBOT REMOTE CONTROL SYSTEM AND METHOD CN - 15.04.2015

Int.Class B25J 13/00 **Appl.No** 201310451767.1 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention discloses a robot remote control system and a robot remote control method. The robot remote control system comprises an obtaining module, a processing module, a signal emitter, a signal receiver and a robot, wherein the obtaining module is used for monitoring the sensor signal value in real time, and obtaining the signal data if the signal value changes; the processing module is used for receiving the signal data sent by the obtaining module, processing the signal data according to preset application logic and converting the signal data into a corresponding control order; the signal emitter is used for a control order sent by the processing module through an interface of mobile terminal equipment and a equipment interface adapter; the signal receiver is used for receiving the control order sent by the signal emitter; the robot is connected with the signal receiver and used for receiving the control order sent by the signal receiver, and performing the control order. The method can be used for enabling the robot remote control equipment to be standard and unified, can be suitable for various mobile terminal equipment, used for reducing the remote equipment production cost, reducing the quantity of equipment under a multi-robot environment, and improving the operation convenience.

13. **104518720** FPGA BASED SERVO DRIVE CONTROLLER CN - 15.04.2015

Int.Class H02P 21/00 **Appl.No** 201310451850.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LIU SHICHANG

The invention provides a FPGA based servo drive controller used for carrying out switch control and closed loop control for a motor; the FPGA based servo drive controller comprises a CAN bus module, a SPI bus module, a UART communication module, a PWM control module, a current filter module, an algorithm module and a processor. The controller realizes servo motor drive FPGA control, a whole hardware structure saves a DSP relative circuit, so a whole servo driver shape and area can be greatly reduced, thus saving hardware cost, optimizing program control speed, and improving precision on motor control aspect.

14. **204439333** ELECTRIC APPLIANCE PRODUCT FATIGUE TEST STRUCTURE CN - 01.07.2015

Int.Class G01M 13/00 **Appl.No** 201520045490.7 **Applicant** HANGZHOU SIASUN ROBOT AUTOMATION CO., LTD. **Inventor** LI ZHENGGANG

The utility model relates to a fatigue test structure, and especially relates to an electric appliance product fatigue test structure comprising an operation rack having an operation table; the operation table is provided with a test slide unit and a robot work bench; the operation rack is provided with a host computer system; the test slide unit is provided with a tested product; the robot work bench is provided with a six-shaft robot; the head of the six-shaft robot is provided with a tool head having a multi-direction mechanics sensor; the tool head having the multi-direction mechanics sensor is arranged corresponding to the tested product; the host computer system controls the test slide unit and the six-shaft robot. The electric appliance product fatigue test structure further improves robot intelligentize level, is high in automation level, and high in testing result precision.

15. **105658010** ROBOT ELECTRICAL CONTROL CABINET CN - 08.06.2016

Int.Class H05K 7/02 **Appl.No** 201410637223.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZHOU NAN

The invention provides a robot electrical control cabinet. The robot electrical control cabinet comprises a frame composed of a front door, a back plate, a base plate, a top plate, a left-side plate and a right-side plate and is internally structured in such a way that a breaker and six servo drivers are placed right in the middle of the electrical control cabinet; a contactor and a miniaturized breaker are placed at the left side of the electrical control cabinet; a DC source and three control boards are placed at the right side of the electrical control cabinet; and a power line connected between the breaker and a power supply heavy-duty connector and a power cable connected between the servo drivers and a power heavy-duty connector are each sleeved by an electromagnetic ring. According to the invention, through the EMC electromagnetic compatibility design on the robot electrical control cabinet, it is ensured that a robot can run well in a reliable manner under the working conditions of severe environment and severe interference.

16. 105643639 METHOD FOR RECOGNIZING LOADS OF INDUSTRIAL ROBOT

CN - 08.06.2016

Int.Class B25J 13/08 **Appl.No** 201410636015.7 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention provides a method for recognizing loads of an industrial robot. The method includes the steps that a dynamical equation is input into a dynamics module in a robot controller, and a real-time moment value is obtained; a theoretical current value is worked out according to the real-time moment value; a measured current value and the theoretical current value are compared; if the measured current value and the theoretical current value do not differ much, a motor controls the robot based on a prior control parameter value; and when the measured current value is increased suddenly, the control parameter value of the motor is changed, and the motor controls the robot based on the changed control parameter value. The method can set the control parameters of the industrial robot to be more reasonably under high precision; accordingly, the problem that the regulation time is too long after loads are increased during application of the industrial robot can be solved, and it is ensured that acceleration of the industrial robot has no jerking movement in the moving process.

17. 106584490 MULTIFUNCTIONAL LINKAGE DEXTEROUS HAND AND ROBOT THEREOF

CN - 26.04.2017

Int.Class B25J 15/00 **Appl.No** 102015000673950 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** HE YUANYI

The invention discloses a multifunctional linkage dexterous hand. The multifunctional linkage dexterous hand comprises a palm; a first finger and a second finger are respectively arranged at two ends of the palm, and both have multiple knuckles; the adjacent knuckles are connected through connecting rods; a first motor, a second motor and a drive are arranged in the palm; the first motor is connected to the first finger, and can drive the first fingers and the knuckles thereof to rotate; the second motor is connected with the second finger, and can drive the second finger and the knuckles thereof to rotate; and the drive controls the first motor and the second motor. The fingers at the same one end are synchronously driven by one motor, so that the whole dexterous hand has two degrees of freedom, is low in driving number and cost, and is simple in structure and control; and the dexterous hand is mounted on an arm of a robot, and can realize the functions of grabbing and carrying objects.

18. 106580632 AUXILIARY DEVICE FOR LIMB REHABILITATION TRAINING

CN - 26.04.2017

Int.Class A61H 1/02 **Appl.No** 201510684460.5 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI XUEWEI

The invention provides an auxiliary device for limb rehabilitation training. The device comprises a base, a rotating mechanism, a lifting mechanism which is used for driving the rotating mechanism to perform vertical motion, and a limb fixing device. The lifting mechanism is arranged on the base. One end of the rotating mechanism is connected with the lifting mechanism, and the other end is connected with the limb fixing device. Through cooperation between the lifting mechanism and the rotating mechanism, the auxiliary device for limb rehabilitation training according to the invention has advantages of large stroke range, simple structure, small space occupation, high suitability for bed bodies with different heights, etc.

19. **206519920** A PICK UP ORIENTING DEVICE FAST FOR TINY THREAD FOOTPATH JUMP RING CN - 26.09.2017

Int.Class B25H 3/00 **Appl.No** 202016001418522 **Applicant** SHANGHAI SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** YANG XIANG

The utility model provides a pick up orienting device fast for tiny thread footpath jump ring, its characterized in that, include: the mounting panel, material picking head sets up in the below of mounting panel, and inside has the piston and holds the district, the piston sets up in the piston holds the district, a plurality of thimbles, fixed mounting arranges along the circumferencial direction at the front end of piston, the material picking head front end has the draw -in groove, and the thimble stretches out from material picking head, around the draw -in groove, resilient element sets up between piston and material picking head, applys the resilience force to the piston. The utility model discloses a pick up orienting device fast for tiny thread footpath jump ring owing to have material picking head, piston and a thimble, can be quick carry out picking and placing to tiny thread footpath jump ring. A serial communication port, the utility model discloses a pick up orienting device fast for tiny thread footpath jump ring's volume is very little, saves space.

20. **206967521** ADJUSTING STRUCTURE OF INDUSTRIAL ROBOT WRIST GEAR BACKLASH CN - 06.02.2018

Int.Class B25J 17/00 **Appl.No** 201720558456.9 **Applicant** HANGZHOU SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI ZHENGGANG

The utility model discloses an adjusting structure of industrial robot wrist gear backlash, industrial robot is last to be equipped with first transmission shaft, the secondary drive axle, the third transmission shaft, a driving motor and the 2nd driving motor, a hypoid pinion is connected in a driving motor and the 2nd driving motor's output difference transmission, the epaxial hypoid gear wheelthat cup joints respectively of first transmission shaft and secondary drive, hypoid pinion and the meshing of hypoid gear wheel one -to -one, cup joint a bevel gear and two umbrella gear engagement on secondary drive axle and the third transmission shaft respectively, first transmission shaft, all be equipped with hypoid gear wheel axial guiding mechanism between the self -corresponding hypoid gear wheel of secondary drive axle and each, the secondary drive axle, all be equipped with bevel gear axial guiding mechanism between the self -corresponding bevel gear of third transmission shaft andeach. The utility model discloses can make things convenient for realizes the regulation of industrial robot wrist gear backlash fast.

21. **206967030** CONSTANT SPEED ACTUATING SHAFT CONNECTION SPARE AUTOMATIC ASSEMBLY DEVICE CN - 06.02.2018

Int.Class B23P 21/00 **Appl.No** 201720658074.3 **Applicant** HANGZHOU SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI ZHENGGANG

The utility model discloses a constant speed actuating shaft connection spare automatic assembly device, including the host computer with remove a festival assembly fixture, the host computer includesthe frame assembly, goes up moving mechanism, middle moving mechanism and moving mechanism down go up moving mechanism, middle moving mechanism and the equal sliding connection of moving mechanism down go up moving mechanism on the frame assembly, middle moving mechanism removes festival assembly fixture and is connected with last moving mechanism and lower moving mechanism

insert a PLC moving mechanism 1 with moving mechanism down in. The utility model discloses can improve the constant speed drive shaft and remove festival assembly automation level, the optimized operation mode reduces themanual work, reduces intensity of labour and manufacturing cost, improves production efficiency, guarantees product uniformity and security.

22. **102543808** WAFER PRE-ALIGNMENT METHOD CN - 04.07.2012

Int.Class H01L 21/68 **Appl.No** 201010612216.5 **Applicant** Shenyang **Siasun Robot** & Automation Co.,Ltd. **Inventor** Qu Daokui

The invention relates to a wafer pre-alignment method. The wafer pre-alignment method comprises the following steps of: driving a wafer to rotate through a rotating table, collecting edge data of the wafer through a CCD (charge-coupled device) sensor to get sampled data on one circle of the wafer; determining an initial estimation position of a lowest point of a gap through a stepping fall method; rotating the gap of the wafer till being in the vicinity of the CCD sensor and performing small-range fine sampling on the edge of the gap; determining the position of the lowest point of the gap of the wafer through the stepping fall method; eliminating the sampled data in the range of the gap of the wafer from the sampled data on the edge of the wafer; fitting the center of a circle of the wafer from the sampled data on the edge of the wafer after eliminating the gap by applying a least square method; and solving the stop position of the rotating table, as well as the deflection angle and the extension distance of a mechanical arm of an IC (integrated circuit) robot and guiding the IC robot to move to an assigned position to take away the wafer. The wafer pre-alignment method disclosed by the invention is not limited by the size of the wafer and the shape of the gap, positioning errors caused by inaccurate setting of a threshold can be avoided, and the data at the gap can be prevented from affecting a fitting result.

23. **103802098** VACUUM ADSORPTION TYPE MANIPULATOR CN - 21.05.2014

Int.Class B25J 9/08 **Appl.No** 201210442345.3 **Applicant** SHENYANG **SIASUN ROBOT** & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention discloses a vacuum adsorption type manipulator which comprises a large-arm shell, a first hollow shaft, a small-arm shell, a second hollow shaft, a lower swing sleeve, an air pipe, a wire protection disk, an air pipe fixing ring, a first air pipe pressing plate, a second air pipe pressing plate, a first air pipe separation frame, a second air pipe separation frame, a third air pipe separation frame and a wire clamp, wherein the air pipe fixing ring, the first air pipe separation frame and the first air pipe pressing plate are arranged in the large-arm shell; the second air pipe separation frame, the third air pipe separation frame and the second air pipe pressing plate are arranged in the small-arm shell; the air pipe enters the shoulder part of the large-arm shell through the wire protection disk, then enters the small-arm shell through the air pipe fixing ring, the first air pipe separation frame, the first air pipe pressing plate and the first hollow shaft in sequence, enters the lower swing sleeve through the second air pipe separation frame, the third air pipe separation frame, the second air pipe pressing plate and the second hollow shaft in sequence and is finally fixed through the wire clamp.

24. **103802089** SINGLE-ARM MANIPULATOR CN - 21.05.2014

Int.Class B25J 9/00 **Appl.No** 201210442410.2 **Applicant** SHENYANG **SIASUN ROBOT** & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention provides a single-arm manipulator. The manipulator comprises a column, a waist seat, a connecting fitting, a first arm, a second arm, an end member, a clamping claw, a first motor and a second motor, wherein the first arm and the second arm comprise butt ends and thin ends; the cylindrical connecting fitting is located in the column; the waist seat is in the shape of a flat plate, and the bottom of the waist seat is fixedly connected with the

connecting fitting; the butt end of the first arm is fixedly connected with the waist seat, the thin end of the first arm is movably connected with the butt end of the second arm, and the thin end of the second arm is movably connected with the end member; the clamping claw which is roughly in a Y-shape is movably connected with the end member; the first motor and the second motor are in coupling motion to drive the first arm and the second arm in common and control the end member to perform rectilinear motion. The single-arm manipulator of the invention is small in occupied space and high in space utilization rate.

25. **103807400** ROBOT STAND COLUMN STRUCTURE CN - 21.05.2014

Int.Class F16H 37/02 **Appl.No** 201210445424.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** DONG JISHUN

The invention discloses a robot stand column structure, which belongs to the field of an industrial robot. A drive part and a harmonic reducer in a robot stand column are connected onto a lift seat, the drive device part is connected with the harmonic reducer through a belt transmission structure, a rotary drum structure is connected to the lift seat in a rotating manner through a bearing fixing part, and the rotary drum structure is connected with the harmonic reducer through a resilient connecting mechanism. The robot stand column structure is low in cost, strong in system rigidness and high in maintainability. The service life of the harmonic reducer can be prolonged.

26. **104511898** TWO-STAGE ELECTRO-HYDRAULIC HYBRID TYPE MOVING PLATFORM CN - 15.04.2015

Int.Class B25J 9/08 **Appl.No** 201310451664.5 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention relates to an automatic operating platform, and specifically discloses a two-stage electro-hydraulic hybrid type moving platform. The two-stage electro-hydraulic hybrid type moving platform comprises a first-stage hydraulic driving moving mechanism and a second-stage motor driving moving mechanism which are connected in series. The two-stage electro-hydraulic hybrid type moving platform has the advantages that the parallel-connected moving mechanisms are connected in series to achieve multi-degree-of-freedom movement operation; the advantages of the serial-connected structure and the parallel-connected structure are brought into full play, the characteristics of hydraulic pressure and electric movement are utilized, and therefore, the movement space is greatly expanded, the precision and rigidity of the system are ensured, and the two-stage electro-hydraulic hybrid type moving platform can be widely applied to an automatic assembling production line.

27. **105643267** MECHANICAL ARM FORCE CONTROL ASSEMBLING DEVICE AND METHOD CN - 08.06.2016

Int.Class B23P 19/12 **Appl.No** 201410632155.7 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** HE WEIQUAN

The invention provides a mechanical arm force control assembling device and method. The mechanical arm force control assembling device comprises a mechanical arm body provided with a complete moving mechanism, a control system, a force sensor, a clamping hand and an assembling platform provided with a clamp. The control system is installed inside the mechanical arm body. The force sensor is installed at the end of the mechanical arm body and connected with the control system. The clamping hand is installed on the force sensor. The assembling platform is arranged on the lateral portion of the mechanical arm body and located under the clamping hand. According to the mechanical arm force control assembling device and method, high-precision assembly of a shaft and a hole is guaranteed through pressure recognition assembly.

28. **105703414** POWER SUPPLY CONTROL DEVICE OF SERVICE ROBOT CN - 22.06.2016

Int.Class H02J 7/00 **Appl.No** 201410706376.4 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention provides a power supply control device of a service robot. The power supply control device comprises a central processing module, a power-on management module, a battery monitoring module, and a communication module, the power-on management module is used for time-sharing power-on of a control power supply and a power supply, the battery monitoring module is used for monitoring current and voltage of charge and discharge and residual electric quantity of a battery in real time, the communication module is used for returning the current states of a board and the battery to a robot controller for post-processing, and the above three modules are connected with the central processing module. According to the device, functions of time-sharing power-on and power-on soft start are realized, the product cost is lowered, and the product reliability is improved.

29. **106584487** DEXTEROUS FINGER WORKING UNDER EXTREME CONDITIONS AND WORKING CONTROL SYSTEM THEREOF CN - 26.04.2017

Int.Class B25J 13/08 **Appl.No** 201510683762.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention discloses a dexterous finger working under the extreme conditions. The dexterous finger comprises a first joint, a second joint and a third joint which are sequentially arranged. The first joint is connected to a palm. The tail end of the third joint is connected to one end of a steel wire rope, and the other end of the steel wire rope is connected to a steering engine. The steering engine can drive the third joint to be bent, and accordingly the second joint and the first joint are driven to be bent and closed so that objects can be grabbed. The dexterous finger is simple in structure, high in reliability and low in cost. Moreover, a working control unit of the finger is arranged in a remote mode, operators can control movements of the dexterous finger in a remote mode, the phenomenon that the operators work in the extreme environment can be avoided, and the working danger level is lowered.

30. **106600923** INTEGRATED BED AND CHAIR CONTROL SYSTEM AND METHOD BASED ON WIRELESS COMMUNICATION CN - 26.04.2017

Int.Class G08C 17/02 **Appl.No** 201510684727.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention relates to the field of wireless communication control, and concretely discloses an integrated bed and chair control system and method based on wireless communication. The method comprises the following steps: acquiring docking requests inputted by users; according to the docking requests, a motor control unit controls a wheelchair to move according to a route planned in advance, and a docking output unit controls a wheelchair to complete docking of a bed body; a first wireless communication module sends control information to a second wireless communication module of a control subsystem at a bed body side; the second wireless communication module receives control information transmitted from the first wireless communication module; control information is parsed, and docking of the bed body and the wheelchair is completed by control of an automatic docking unit according to parsed control data information. Wireless communication technology is used, in order to realize wireless data transmission between the wheelchair side and the bed body side, and information transmission distance is improved.

31. **106580588** BED AND CHAIR INTEGRATED NURSING BED AND BED AND CHAIR BUTT-JOINTING METHOD CN - 26.04.2017

Int.Class A61G 7/015 **Appl.No** 102015000680321 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI SHEN

The invention relates to the field of medical instruments, and discloses a bed and chair integrated nursing bed and a bed and chair butt-jointing method. The nursing bed includes a bed body and a wheelchair; the bed body is used for receiving the wheelchair according to a recessed zone which is opened and formed in the center of the bed body; and the wheel chair includes a laser sensor, a proximity sensor, a crash sensor, a motion fine adjustment command unit, a position detection unit, a navigation motion control unit, a wheelchair motion drive unit, a wheelchair deformation drive unit and an automatic guiding control unit. According to the invention, the bed body and the wheelchair can be separated, when a patient sits on the wheelchair, and the wheelchair can automatically butt-joint the bed body; and the bed and chair integrated nursing bed can bring convenience to nurses and patients, and facilitate promotion and application in the field of medical instruments.

32. **106584093** SELF-ASSEMBLY SYSTEM AND METHOD FOR INDUSTRIAL ROBOTS CN - 26.04.2017

Int.Class B23P 21/00 **Appl.No** 102015000685627 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The present invention relates to the field of industrial robot manufacturing and intelligent applications, in particularly to a self-assembling system for industrial robots. The system comprises a mechanical part and a control part. The mechanical part comprises an assembly robot, a tightening, a bolt-screwing robot, a clamping mechanism, a nail-screwing device and an assembly platform. The assembly robot, the bolt-screwing robot, and the assembly platform are fixed on a same datum plane. The tail end of the assembly robot is provided with the clamping mechanism. The tail end of the bolt-screwing robot is provided with a nail-screwing device. The control part comprises a robot controller, a visual controller, a visual camera, a driver, a motor, a coded disc and a force sensor. The self-assembly system is capable of automatically recognizing posture deviations of assembly parts during feeding and automatically adjusting postures during assembly according to force feedback information such that complicated parts can be intelligently grabbed and flexibly assembled. The self-assembling system for industrial robots can be used for high-precision assembly occasions of diversity of more structures.

33. **107545284** LIBRARY BOOK INFORMATION AUTOMATIC COLLECTION DEVICE AND SYSTEM CN - 05.01.2018

Int.Class G06K 17/00 **Appl.No** 201610488969.7 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** REN TAOLIN

The invention relates to the library book information collection technology field and discloses a library book information automatic collection device and system. The library book information automatic collection device can realize free movement of an RFID reading device in a horizontal direction and a perpendicular direction through a cooperation between a horizontal movement mechanism and a vertical movement mechanism and thus realizes collection of information of books on shelves of the library, reduces the labor intensity of library working staff and improves information collection accuracy. The library book information automatic collection device can realize automatic information collection of books on shelves on two sides of the library through a robot moving platform freely moving in an aisle between library shelves, can realize free movements in the aisle between the book shelves of the library and can maximally improve information collection efficiency and accuracy.

34. **103803248** CONVEYING SYSTEM CAPABLE OF REALIZING AUTOMATIC POSITIONING OF MATERIAL CN - 21.05.2014

Int.Class B65G 23/24 **Appl.No** 201210442602.3 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention discloses a conveying system capable of realizing intermittent retention of a material in required stations. The conveying system comprises a drive, a transmission component and a conveying component, wherein the transmission component comprises a tumbler pulley, a grooved pulley and a transmission shaft, the tumbler pulley is capable of driving the grooved pulley to rotate intermittently, the transmission shaft and the grooved pulley are connected, and the transmission shaft and the conveying component are connected. According to the conveying system, disclosed by the invention, an automatic material transportation mechanism of the existing bin is improved, the tumbler pulley is driven by a motor to drive the grooved pulley, by virtue of the structural characteristics of the grooved pulley, the intermittent retention of stations driven by a chain of a chain wheel is realized, and furthermore, by virtue of the characteristics of the intermittent movement, the material can stay in each station for a fixed time, so as to realize the conveying way of realizing intermittent retention of the material. Compared with the prior art, the conveying system has the advantages of first, capability of realizing automatic conveying and accurate positioning of the material; second, simple control and high transmission efficiency; third, low manufacturing cost; fourth, simple, practical and reliable design of a conveying mechanism.

35. 103811388 TWO-STATION WAFER PRE-ALIGNMENT DEVICE

CN - 21.05.2014

Int.Class H01L 21/68 **Appl.No** 201210445383.4 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention discloses a two-station wafer pre-alignment device comprising a machine base, a clamping jaw assembly, support assemblies and a sensor; a driving device is arranged in the machine base and drives the clamping jaw assembly to rotate or elevate; the at least two support assemblies and the sensor are arranged on the machine base; each support assembly comprises two support contact units arranged in two layers. Compared with the prior art, the two-layer arrangement of the support assembly enables the wafer to be pre-aligned on upper and lower stations, thereby improving efficiency; furthermore, equipment structure is simplified, and driving is reduced.

36. 103812206 CARRYING VEHICLE AC/DC POWER SUPPLY SWITCHING DEVICE

CN - 21.05.2014

Int.Class H02J 9/00 **Appl.No** 201210445447.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention provides a carrying vehicle AC/DC power supply switching device comprising a signal emission module, a signal reception module, a DC power supply module, an AC power supply module, an electric energy storage module, a relay change over switch, a relay coil, a triode controlling connection/disconnection of the relay coil, and a main control chip controlling connection/disconnection of the triode and the relay change over switch; the DC power supply module and the AC power supply module are respectively connected with the relay change over switch. The AC/DC switching device is added in the carrying vehicle, so an automatic switching purpose of cable power supply in non contact power supply on a track and a power supply system in a maintenance room is realized, thereby improving work efficiency; work principle of the system is relatively simple, and the device is easy to realize.

37. 103878758 FEEDING AND DISCHARGING DEVICE OF INTELLIGENT MOBILE ROBOT

CN - 25.06.2014

Int.Class B25J 5/02 **Appl.No** 201210558673.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LIU CHANGYONG

The invention relates to transporting and arranging device of cargoes to be precisely positioned, in particular to a feeding and discharging device of an intelligent mobile robot. The feeding and discharging device comprises a frame, a moving mechanism, a multi-axis motion robot, a grabbing mechanism, a fork lifting mechanism, a fork mechanism and a clamping mechanism. The frame is arranged on rails and is driven to reciprocate on the same via the moving mechanism mounted on the frame. The multi-axis motion robot and the fork lifting mechanism are respectively mounted on the frame, the output end of the multi-axis motion robot is connected with the grabbing mechanism, the fork lifting mechanism drives the fork mechanism to lift, the fork mechanism with a clamping mechanism hidden inside extends out of two sides of a meter box on a wire side rack, and the clamping mechanism extends out of the meter box arranged on the frame. By the feeding and discharging device of the intelligent mobile robot, automatic operation in detecting an electric energy meter is realized, detection reliability and production efficiency are improved, and labor resources are saved. Besides, the feeding and discharging device is high in arrangement position accuracy, wide in application range and applicable to various working places.

38. 104516320 CONVEY CONTROL SYSTEM AND CONVEY METHOD

CN - 15.04.2015

Int.Class G05B 19/418 **Appl.No** 201310451691.2 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention discloses a convey control system and convey method; the convey control system comprises a total control machine respectively in communication connection with a first loading device, a second processing device, a third processing device, and a fourth processing device, and the total control machine controls running states of the said devices; the first loading device processes a workpiece and conveys the workpiece to the second processing device, the second processing device reprocesses the workpiece and convey the workpiece to the third processing device, the third processing device processes the workpiece thirdly and conveys the workpiece to the fourth processing device, and the fourth processing device processes the workpiece fourthly and unloads the workpiece; the system is clear in control frame, reasonable in scheduling strategy, production line reconstruction and upgrading are convenient, thus improving system maneuverability and safety, reducing inconvenience brought by program modification of changed process flow, realizing intelligentize processing, and improving workpiece processing efficiency and accuracy.

39. 104516268 ROBOT CALIBRATE ERROR COMPENSATION METHOD BASED ON FUZZY NERVE NETWORK

CN - 15.04.2015

Int.Class G05B 13/00 **Appl.No** 201310451794.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention discloses a robot calibrate error compensation method based on a fuzzy nerve network; the method comprises the following steps: compiling a homogeneous transformation matrix between adjacent link rods; calculating a kinetics equation and an error equation general formula of a robot end performer according to the transformation matrix; generating a kinetics equation and an error equation of an angle [theta i] according to a geometry parameter nominal value, the kinetics equation and the error equation general formula; compensating a first error compensation for the robot according to the kinetics equation and error equation; applying a fuzzy nerve network model to carry out a second error compensation for the robot; the method can enable the robot error compensation model to be faster, and more accurate with strong robustness.

40. 104512834 CONNECTING ROD TYPE LIFTING DEVICE

CN - 15.04.2015

Int.Class B66F 7/28 **Appl.No** 201310451870.6 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI XUEWEI

The invention relates to the technical field of transmission, and provides a connecting rod type lifting device. The connecting rod type lifting device comprises an upper adapter plate, a lower adapter plate, two connecting rod sets which have the same structure and hinged to each other, and a plurality of hinge pins; each connecting rod set is used for connecting the upper adapter plate and the lower adapter plate and comprises four connecting rods which are sequentially hinged by an end-to-end manner; the hinge pins are used for connecting the connecting rods as well as connecting the connecting rods with the upper adapter plate and the lower adapter plate; the connecting rods are of different length. The connecting rod type lifting device has the advantages and effects that the length and position allocation of the connecting rods are changed to enable the connecting rod type lifting device to be folded during being retracted, and thus the space utilization rate can be greatly increased; meanwhile, the quality of the connecting rod type lifting device can be reduced, and the load of a driving device can be decreased; on the premise that the stability is not influenced, the device has the characteristics of being simple in structure, convenient to mount and high in cost performance, and the applicable scope of the connecting rod type lifting device can be expanded.

41. **104289811** MULTI-BEAM CENTER WIRE FEEDING LASER PROCESSING HEAD AND PROCESSING METHOD THEREOF CN - 21.01.2015

Int.Class B23K 26/00 **Appl.No** 201310303474.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** WANG YUZHI

The invention belongs to the field of laser processing, in particular to a multi-beam center wire feeding laser processing head and a processing method of the multi-beam center wire feeding laser processing head. The laser processing head comprises a wire feeding tube, a wire feeding nozzle and a plurality of identical optical modules, wherein the wire feeding tube and the wire feeding nozzle are located on the center axis of the laser processing head, the optical modules are rotationally and symmetrically distributed around the center axis, each optical module comprises a collimating lens set, a focusing lens set and a reflecting mirror set, lasers are transmitted to the processing head through a plurality of paths of optical fibers, a plurality of laser beams are focused on one point of the surface of a workpiece to form a molten pool after being collimated, focused and reflected by the optical modules, a metal wire is perpendicularly fed into the molten pool on the surface of the workpiece through the fire feeding nozzle, and the laser processing head moves on the surface of the workpiece according to a certain track so that the center wire feeding laser processing process can be achieved. Through the multi-beam center wire feeding laser processing head, center wire feeding in laser focusing light spots in circular symmetry distribution is achieved, and the processing quality consistency is guaranteed when the laser processing head moves in different directions.

42. **104656487** CLOSED-LOOP FORCE CONTROL SYSTEM BASED ON MOTOR CONTROL MODE AND METHOD CN - 27.05.2015

Int.Class G05B 19/042 **Appl.No** 201310577776.5 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention provides a closed-loop force control system based on a motor control mode and a method. Force closed-loop control is realized on the basis of the motor control mode, a pull force can be accurately controlled, the step value of the pull force can be set, the pull force can be displayed in real time, a threshold is set for the pull force to ensure safe operation, and error operation is avoided. Through the system provided by the invention, an operation method can be standardized, safer and more reliable, and medical resources can be saved.

43. **104636156** FIRMWARE UPGRADING METHOD AND SYSTEM CN - 20.05.2015

Int.Class G06F 9/445 **Appl.No** 201310562887.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LIU SHICHANG

The invention discloses a firmware upgrading method and system. The method comprises the steps that an upgrading device with an RFID interface is made to get close to an upgraded device to reach the distance where a RFID can be recognized; a firmware storage device of the upgraded device has the RFID function; the upgrading device provides electric energy for the firmware storage device of the upgraded device through the RFID; the upgrading device conducts firmware erasure and updating on the firmware storage device of the upgraded device through the RFID; upgraded firmware in the firmware storage device is read, and data verification is conducted; if the verification succeeds, upgrading is completed. By means of the firmware upgrading method and system, data cables do not needed to be connected when the firmware is upgraded, the upgraded device does not needed to be electrified, and the firmware upgrading method and system can be conveniently used on occasions with condition limitation or occasions where batched firmware is upgraded.

44. 104626164 MOTOR BAND-TYPE BRAKE CONTROL DEVICE OF INDUSTRIAL ROBOT

CN - 20.05.2015

Int.Class B25J 13/00 **Appl.No** 201310578169.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** YANG QIFENG

The invention provides a motor band-type brake control device of an industrial robot. The motor band-type brake control device comprises a system control module, a manual control module and a motor band-type brake connector. The system control module and the manual control module are connected to a band-type brake of a motor on the industrial robot through the motor band-type brake connector. According to the motor band-type brake control device, due to the adoption of the simple structure and a simple method, the automatic control function and the manual control function on the band-type brake of the motor of an industrial robot body are fused, and the defect that the band-type brake of the motor can not be controlled when an industrial robot system fails is overcome; the product cost is reduced. By means of the motor band-type brake control device, one or more band-type brakes can be connected in an expanded mode, and unified automatic control and independent manual control can be achieved; each motor band-type brake connector has the coil energy releasing function, the response time of the motor band-type brakes is shortened, the probability that the robot is in the uncertain state in the band-type brake opening-to-locking process is reduced, and the stability and the safety performance of the industrial robot system are improved.

45. 105700523 ROBOT CHARGING GUIDING METHOD BASED ON INFRARED SENSOR

CN - 22.06.2016

Int.Class G05D 1/02 **Appl.No** 201410707409.7 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** CHU MINGJIE

Provided is a robot charging guiding method based on an infrared sensor. The method includes: an infrared emission area is established; an infrared receiver arranged on a robot body receives infrared light emitted by an infrared transmitting tube, and a robot walks in a Z manner and gradually approaches a charging station; a four-quadrant detector at the bottom of the robot receives laser signals at the bottom of the charging station, and the position of the robot itself is adjusted; and a laser beam moves to an origin of the four-quadrant detector and moves forward in a straight line, and accurate butt joint of the robot and the charging station is realized. According to the method, the problem of angle deviation of the butt joint or even butt joint failure of electrodes of the conventional infrared guiding robot is solved, the time for electrode butt joint is further reduced, and the butt joint efficiency is improved.

46. 106580589 STEERING ENGINE TYPE INTEGRATED REHABILITATION BED/CHAIR

CN - 26.04.2017

Int.Class A61G 7/015 **Appl.No** 201510683695.2 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention relates to the technical field of rehabilitation beds, in particular to a steering engine type integrated rehabilitation bed/chair, which comprises a mechanical portion and a control portion, wherein the mechanical portion comprises a bed body and a wheelchair part; the bed part comprises an integral

bed body frame, a bed body back frame and a bed body leg bending structure frame; a left side turning-over frame and a back lifting linkage mechanism are arranged on the bed body back frame; a left side turning-over transmission mechanism, a left side turning-over electric push rod, a right side turning-over transmission mechanism and a right side turning-over electric push rod are arranged on the integral bed body frame; a leg bending structure linkage device is arranged on the bed body leg bending structure frame; a right side turning-over frame and a wheelchair-side back lifting linkage device are arranged on the wheelchair back frame; and a wheelchair-side leg bending linkage device is arranged on the wheelchair leg bending mechanism frame. Bed and chair connection and separation can be achieved; and under a connected state, automatic charging is achieved, while under a separated state, actions of lifting a body and putting down calves can be implemented, so that a wheelchair structure is formed.

47. 106610664 MOVEMENT OBSTACLE AVOIDANCE DEVICE AND CONTROL METHOD

CN - 03.05.2017

Int.Class G05D 1/02 **Appl.No** 201510688984.1 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** SUN BINGBIN

The invention relates to the field of robot movement control, and especially relates to a movement obstacle avoidance device and control method. The method comprises the steps of collecting environmental information surrounding the movement obstacle avoidance device when the movement obstacle avoidance device moves; matching the environmental information with a pre-stored environmental map to determine an obstacle in the environment; determining the position, movement speed and direction of the obstacle; calculating whether the obstacle will collide with the movement obstacle avoidance device based on the positions, movement speeds and directions of the obstacle and the movement obstacle avoidance device; and if the obstacle will collide with the movement obstacle avoidance device, planning an obstacle avoidance path according to the positions, movement speeds and directions of the obstacle and the movement obstacle avoidance device; and controlling the movement obstacle avoidance device to move from an original path into the obstacle avoidance path so that the movement obstacle avoidance device does not collide with the obstacle. The movement obstacle avoidance device and the control method of the present invention can avoid collision of the movement obstacle avoidance device.

48. 106595511 ROBOT LASER VISION THREE-DIMENSIONAL MEASUREMENT METHOD

CN - 26.04.2017

Int.Class G01B 11/24 **Appl.No** 201510676647.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The present invention provides a robot laser vision three-dimensional measurement method. The method comprising the steps of acquiring the image of a to-be-measured object by a camera, figuring out the position information of the to-be-measured object in the image acquired by the camera based on the genetic algorithm and the Hausdorff distance-combined image matching method, marking the laser onto the to-be-measured object through moving a robot, reading the laser information in the image of the camera, and measuring the three-dimensional information of the object based on the trigonometric survey principle The method has the advantages of simple structure, high accuracy, low cost, easy operation, and the like.

49. 107546163 WAFER TRANSPORTATION METHOD, WAFER TRANSPORTATION DEVICE AND WAFER TRANSPORTATION SYSTEM

CN - 05.01.2018

Int.Class H01L 21/677 **Appl.No** 201610464530.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** YANG QIFENG

The invention discloses a wafer transportation method, which comprises the steps of traversing the total thickness of wafers at each layer in a first wafer box, wherein the first wafer box comprises multiple layers, and at least one wafer is placed at each layer; determining a wafer with the total thickness being not greater than a first preset threshold to be a single wafer; and transferring thewafer at the layer determined to have a single wafer to a second wafer box. In addition, the invention further discloses a wafer transportation device and a wafer transportation system. According to the wafer transportation method disclosed by the invention, a code disc value of a motor is acquired through a position sensor, state information of a wafer is obtained before a grabbing arm of a manipulator, the detection time is short, the success rate is high, and problems such as wafer damages occurred during grabbing of the manipulator due to dislocation of wafers in the wafer box are avoided.Compared with a wafer transmission detection device in the past, the wafer transportation device performs judgment on the wafer state before transmission, greatly improves the transmission efficiencyof the wafers and greatly reduces the number of broken wafers.

50. 107538494 ROBOT CONTROL METHOD AND ROBOT CONTROL SYSTEM BASED ON TORQUE SENSOR AND ENCODERS

CN - 05.01.2018

Int.Class B25J 9/18 **Appl.No** 201610493680.4 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** SONG JILAI

The invention discloses a robot control method based on a torque sensor and encoders. The robot control method comprises the steps that S1, a measured motor rotation angle theta 1 and a measured output angle theta 2 of a joint torque sensor are acquired through a motor encoder and an output encoder respectively; S2, according to the motor rotation angle theta 1 and the output angle theta 2, an angle difference, namely, a joint flexible deformation quantity delta theta, is calculated through a first formula; S3, according to the motor rotation angle theta 1, the joint flexible deformation quantity delta theta and an input quantity theta d, a control input quantity theta is calculated through a second formula; and S4, the control input quantity theta is input to a motor controller, so that the motor controller can control a rotation angle of a motor conveniently. The invention further discloses a robot control system based on the torque sensor and the encoders. The robot control system comprises the motor, the encoder, the torque sensor and a speed reducer. The robot control method and the robot control system have the beneficial effect that in the robot motion control and force control process, the joint flexible deformation quantity can be measured and be compensated to a joint control quantity, so that the robot joint control and track control precision can be improved.

51. 103802128 MECHANICAL ARM

CN - 21.05.2014

Int.Class B25J 18/00 **Appl.No** 201210442319.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** WANG JINTAO

The invention relates to the technical field of mechanical arms and discloses a mechanical arm. A spiral power delivery cable (20) is arranged at a connection joint of a large arm and a forearm of the mechanical arm. The mechanical arm structurally comprises a shell (13), a bearing (14) and a belt wheel (19), which are sequentially arranged along a transmission axis (16), and also structurally comprises a belt wheel (7), a bearing (3) and a shell (1), which are sequentially arranged along a transmission axis (5). An existing arm structure is strengthened, the bearings are long in service life, the mechanical arm is high in rigidity, the radial space of a transmission structure is high in utilization rate, and routing is facilitated.

52. 103803285 FLAT PANEL HANDLING DEVICE

CN - 21.05.2014

Int.Class B65G 47/52 **Appl.No** 201210445582.5 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZHU WEIJIN

The invention discloses a flat panel handling device, which comprises a frame (1), a guide rail slide block (10), a linear movement unit (13), a rack (14), a surrounding groove (16), a pressing plate (17), a driving part (18), a guide rail slide block (19) and a plate (20), wherein the rack is linearly and slidably connected onto the frame (1) through the guide rail slide block (10), and the static end of the linear movement unit (13) is connected onto the rack (14); the moving end of the linear movement unit (13) is connected onto the plate (20), and the surrounding groove (16) is fixedly arranged on the plate (20); the pressing plate (17) is linearly and slidably connected onto the plate (20), and the fixing end of the driving part (18) is connected onto the plate (20); the telescopic end of the driving part (8) is connected onto the pressing plate (17); a workpiece (21) is clamped or released by the surrounding groove (16) and the pressing plate (17).

53. 104626204 ROBOT AUTONOMOUS CHARGING DOCKING SYSTEM AND METHOD

CN - 20.05.2015

Int.Class B25J 19/02 **Appl.No** 201310576668.6 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention provides a robot autonomous charging docking system and method. According to the robot autonomous charging docking system and device, an infrared emitting module of a fan-shaped infrared emitting array formed by a plurality of infrared emitting tubes alternatively sends infrared pulse signals at intervals, an infrared receiving module comprising a DSP control module collects the infrared pulse signals, the district where a robot locates is parsed out according to the infrared pulse signals, a motion control module controls a motor of the robot according to the district where the robot locates, and the motor drives the robot to adjust the advancing direction to enable the robot to be close to a charging station. The robot autonomous charging docking system and device uses the fan-shaped arranged infrared emitting array, each infrared emitting tube is small in emitting angle and long in emitting distance, so that the emitting array as a whole can be provided with a far emitting distance and a large emitting angle, and therefore the guidable range can be enlarged.

54. 104627825 OVERHEAD CRANE SYSTEM BASED ON OPTICAL COMMUNICATION AND IMPLEMENTATION METHOD OF OVERHEAD CRANE SYSTEM

CN - 20.05.2015

Int.Class B66C 11/00 **Appl.No** 201310578160.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention provides an overhead crane system based on optical communication and an implementation method of the overhead crane system. According to the overhead crane system provided by the invention, signal transmission between a clamp and an overhead crane body is performed by using an infrared signal so as to ensure that the technical bottleneck of adopting load-bearing cables in the prior art can be avoided; compared with a conventional overhead crane, the reliability of the clamp of an automatic material carrying overhead crane can be improved, the maintenance cycle of the automatic material carrying overhead crane can be prolonged, the maintenance cost can be reduced, and the production efficiency can be improved; meanwhile, the function of increasing the flexibility of signal input and output ports can be achieved, and the space for developing new functions of the automatic material carrying overhead crane can be provided; and in addition, because special load-bearing cables are not used, the production cost of a trolley can be reduced, and the competitiveness of products can be increased.

55. 104639236 ROBOT SYSTEM BASED ON OPTICAL COMMUNICATION AND IMPLEMENTATION METHOD OF ROBOT

CN - 20.05.2015

SYSTEM

Int.Class H04B 10/114 **Appl.No** 201310567661.8 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** CHU MINGJIE

The invention provides a robot system based on optical communication and an implementation method of the robot system. The robot system based on optical communication comprises a master control unit, a plurality of robots, a first optical communication module and a second optical communication module, wherein the first optical communication module is connected with the master control unit, the second optical communication module is connected with the robots, and signal transmission between the first optical communication module and the second optical communication module is performed through light. The robot system has the advantages that the signal transmission between the master control unit and the robots is performed through optical communication, cost of cable materials is reduced, maintenance cost is reduced, and equipment use reliability is increased; especially under the condition that many robots are used, the communication of each robot and the master control unit is performed in an optical manner, number of field wiring is reduced, field tidiness is achieved, and maintenance is facilitated.

56. 204346395 AUTOMOBILE BRAKING DISC END FACE JUMPING TEST SYSTEM

CN - 20.05.2015

Int.Class G01B 21/00 **Appl.No** 201420852100.2 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZHANG HONGYU

The utility model relates to an automobile braking disc end face jumping test system. According to the automobile braking disc end face jumping test system, a test frame is horizontally provided with an operation table, the operation table is provided with a rotation pressure loading mechanism, a braking disc positioning device and a braking disc upper end face measuring mechanism, a down-pressing cylinder output port of the rotation pressure loading mechanism is provided with a pressure sensor and is in sliding connection with a floating pressing mechanism, the floating pressing mechanism is arranged above the braking disc positioning device, a driving cylinder of the braking disc upper end face measuring mechanism is in sliding connection with a first displacement sensor used for detecting upper surfaces of workpieces fixed by the braking disc positioning device, the bottom face of the operation table is provided with a braking disc lower end face measuring mechanism, and a sliding table cylinder of the braking disc lower end face measuring mechanism is in sliding connection with a second displacement sensor used for detecting lower surfaces of the workpieces. The automobile braking disc end face jumping test system has advantages of high test precision, high automatic degree, flexible control, convenient operation and strong repeatability.

57. 105690423 ROBOT ZERO POSITION CALIBRATING DEVICE AND METHOD

CN - 22.06.2016

Int.Class B25J 19/02 **Appl.No** 201410705894.4 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZHAO BIN

The invention discloses a robot zero position calibrating device and method. The robot zero position calibrating device comprises a base installation part and a flange installation part. The base installation part is fixedly connected with a base of an industrial robot. The flange installation part is fixedly connected with a tail end flange of the industrial robot. Compared with a traditional calibrating method, the robot zero position calibrating device and method have the beneficial effects of being fast, accurate and capable of adapting to a robot production line; robot calibrating in the short production takt is completed; and a foundation is laid for achieving high-precision operation of the robot.

58. 105657587 MICROPHONE ARRAY COMPONENT

CN - 08.06.2016

Int.Class H04R 1/08 **Appl.No** 201410632189.6 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** TIAN RUIXUE

The invention relates to a microphone array component. The microphone array component comprises a basic disc and a plurality of microphones, wherein the basic disc is provided with a plurality of installation holes; the plurality of installation holes are distributed on the basic disc in a compound-hole manner; two microphones are installed in one installation hole; the microphone array component is that two microphones installed in one installation hole form a small hole; and, because a plurality of small holes are distributed on the basic disc in the compound-hole manner, precise location of a sound source position can be realized only by obtaining data for one time. Compared with the traditional single double-microphone array that position estimation is carried out after multiple sound source continuous data is collected, the microphone array component has the advantage that the location speed of a sound source is effectively increased; in addition, according to the time difference that the sound source reaches the small holes at different positions, position estimation of the sound source is simultaneously carried out by the plurality of small holes; then, a processor locates the precise position according to the position estimation result by the plurality of small holes; and thus, precise location of the sound source position is realized.

59. 106608308 ROBOT

CN - 03.05.2017

Int.Class B62D 57/032 **Appl.No** 201510689396.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** JIANG TIECHENG

The invention relates to the field of intelligent movement, in particular to a robot. The robot comprises a robot body and four moving components located below the four bottom corners of the robot body respectively. The moving components can drive the robot to move. The robot body comprises a first robot main body and a second robot main body which are connected in the forward motion direction of the robot. The first robot main body and the second robot main body are movably connected. The four-foot robot moves faster and faster in practice, motion is smoother and smoother, the obstacle climbing ability is stronger and stronger, and movement performance of the four-foot robot is improved to a greater degree.

60. 106610667 CORRIDOR CLEANING ROBOT CONTROL SYSTEM AND METHOD BASED ON RC CONTROLLER

CN - 03.05.2017

Int.Class G05D 1/02 **Appl.No** 201510689429.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZHOU NAN

The invention relates to a corridor cleaning robot control system and method based on an RC controller, and the system comprises an RC main controller module, a sensor module, a data collection module, and a motor drive module. The sensor module is connected with a data collection module, and the data collection module and the motor drive module are respectively connected with the RC main controller module. The sensor module is used for detecting information of a road surface in real time, and the data collection module is used for collecting the information collected by the sensor module, and transmitting the information to the RC main controller module. The RC main controller module is used for carrying out the comprehensive analysis of the collected information, and generating a reasonable instruction. The motor drive module is used for driving a corresponding motor in a cleaning robot to work according to the received instruction of the RC main controller module, thereby achieving the functions of intelligent path recognition, obstacle avoiding, falling prevention, going upstairs and downstairs, dust collection, and mopping.

61. 106598041 DOUBLE-WHEEL DIFFERENTIAL CHASSIS CONTROL DEVICE WITH WHEEL DIAMETER CORRECTION FUNCTION, AND CONTROL METHOD THEREOF

CN - 26.04.2017

Int.Class G05D 1/02 **Appl.No** 201510683694.8 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** YANG QIFENG

The invention relates to a double-wheel differential chassis control device with a wheel diameter correction function, and a control method of the double-wheel differential chassis control device. The double-wheel differential chassis control device comprises an upper-layer driving controller, a double-axis driving module, a gyroscope and two code discs, wherein a motor A and a motor B are arranged inside the double-wheel differential chassis control device, the upper-layer driving controller and the double-axis driving module realize communication connection; and the double-axis driving module can receive feedback information obtained from the gyroscope, the code discs, the motor A and the motor B, and can automatically modify parameters of wheel diameters in a differential chassis according to the feedback information. The control method is implemented through coordination of the structures. The double-wheel differential chassis control device can automatically detect the wheel diameters of the double-wheel differential chassis, conducts compensation according to the measurement results, and further combines a motor driving control function, thereby improving control precision, reducing peripheral devices and decreasing cost.

62. 106584441 HEAVY LOAD MECHANICAL HAND MECHANISM

CN - 26.04.2017

Int.Class B25J 9/04 **Appl.No** 201510676643.2 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZHAO ZHIGUO

The invention relates to a heavy load mechanical hand mechanism. The heavy mechanical hand mechanism includes a mechanical hand big arm, a mechanical hand small arm, a tray, a vertical column, a big arm drive motor, and a small arm drive motor; the mechanical hand small arm includes a small arm drive connection rod and a small arm driven connection rod; one ends of the small arm drive connection rod and the small arm driven connection rod are connected to the mechanical hand big arm through a drive rotation shaft and a driven rotation shaft respectively; the other ends of the small arm drive connection rod and the small arm driven connection rod are connected to the tray through two tray rotation shafts; the mechanical hand big arm is connected to the vertical column through a big arm rotation shaft; and the small arm drive connection rod rotates to drive the tray to expand and contract so as to achieve transmission of slice boxes. A loading and unloading manner of semiconductors in a large-scale production platform is changed into the mechanical hand tray bearing manner, the working time is shortened greatly, and the production efficiency is improved.

63. 106580587 AUTOMATIC-SEPARATING-AND-DOCKING INTEGRATED ROBOT

CN - 26.04.2017

Int.Class A61G 7/015 **Appl.No** 102015000679347 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LIU GUANGYU

The invention relates to the field of medical nursing and healthcare instruments, in particular to an automatic-separating-and-docking integrated robot which comprises a bed portion and a wheelchair portion, the bed portion comprises a bed integral frame, a bed back frame and a bed bent leg structure frame, a left-side turning-over frame and a back lifting linkage mechanism are mounted on the bed back frame, the wheelchair portion comprises an omnibearing moving chassis, at least one of a laser navigation device and a line patrol navigation device are mounted on the omnibearing moving chassis, and the bed portion is mounted with a corresponding positioning device matched with the omnibearing moving chassis. The automatic-separating-and-docking integrated robot can serve as a nursing bed to realize functions of lying posture adjustment and turning over and can realize functions of automatic separating and docking of the wheelchair portion and the bed portion. In addition, synchronous linkage of part of moving mechanisms is realized through linkage mechanisms, so that a driving device is simplified, and the integrated robot is simplified in structure and simple to control.

64. 206998238 RIVETING NUT AUTOMATIC FEEDING DEVICE CN - 13.02.2018

Int.Class B23P 19/06 **Appl.No** 201720556621.7 **Applicant** HANGZHOU SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI ZHENGGANG

The utility model discloses a riveting nut automatic feeding device, include: first frame, first support, vibrating device, vibrating device involving vibrations coil and directly shake the ware, loading attachment, loading attachment include that baffle box, expeller, the 5th linear motion auxiliary engine construct, the 6th detect sensor, guide device and extracting device, and the export setting to vibrating device is rectified to one of baffle box, the other end setting of baffle box the 5th linear motion auxiliary engine construct go up and with expeller movably connected, the guide device set up the 5th linear motion auxiliary engine construct the below and with the butt joint of expeller intercommunication, the 6th measuring loading attachment 1 is at the feed end of guide device, automatic extracting device, automatic extracting device set up on a little planker vertical fixation board and realize transversely and longitudinal movement through a lateral shifting mechanism and avertical movement mechanism. This riveting nut automatic feeding device realizes the orderly material loading of automation of riveting nut, and degree of automation is good.

65. 102554909 ARM COMPONENT FOR PLANE MULTI-JOINT TYPE ROBOT CN - 11.07.2012

Int.Class B25J 9/08 **Appl.No** 201010589046.3 **Applicant** Shenyang SIASUN Robot & Automation Co., Ltd **Inventor** Qu Daokui

The invention relates to a mechanical body of an industrial robot and particularly relates to an arm component for a plane multi-joint type robot. The arm component for the plane multi-joint type robot comprises a base and at least two groups of five-link mechanisms capable of stretching and rotating, wherein at least two rotating shafts are driven by a driving motor, respectively, and are arranged on the base; one end of each group of the five-link mechanism is connected with a rotating shaft and the other end of each group of the five-link mechanism is provided with an executor for clamping workpieces; the rotating shafts on the base are coaxially arranged; and each group of the five-link mechanism comprises two large arms and two small arms. One end of each of the two large arms is respectively connected with one of the rotating shafts, and the other end of each of the two large arms is hinged with one end of one of the small arms, respectively. The other ends of the two small arms are hinged. The large arms in the each group of the five-link mechanism are arranged at intervals, and an included angle between the two adjacent large arms is an obtuse angle or an acute angle. The arm component for the plane multi-joint type robot has the advantages of a simple and reliable structure, good structure rigidity, fast speed, flexible and reliable movement and the like.

66. 102545733 DOUBLE-MOTOR SYNCHRONOUS CONTROL DEVICE AND METHOD FOR SILICON CHIP CONVEYING MANIPULATOR CN - 04.07.2012

Int.Class H02P 5/50 **Appl.No** 201010614226.2 **Applicant** Shenyang Siasun Robot & Automation Co.,Ltd. **Inventor** Qu Daokui

The invention relates to a double-motor synchronous control device and a double-motor synchronous control method for a silicon chip conveying manipulator. The method comprises the following steps of: planning and computing a trajectory by using a main computer to obtain expected positions of two motor output shafts; reading actual positions of the two motor output shafts through a coder interface circuit; performing proportion integration differentiation (PID) computation to obtain single-shaft position closed-loop control amount, and outputting the single-shaft position closed-loop control amount to a motor driver; according to the actual positions of the two motor output shafts, computing actual speeds of the two motor output shafts; according to the actual speeds of the two motor output shafts, respectively computing the speed difference and position difference of the two motor output shafts; inputting the speed difference and the position difference into a cross-coupling controller, and processing the speed difference and the position difference to obtain cross-coupling control amount; and adding the cross-coupling control amount to the single-shaft position closed-loop control amount,

or subtracting the cross-coupling control amount from the single-shaft position closed-loop control amount, and then outputting a result to the motor driver, so that cross-coupling synchronous control of the two shafts can be realized. By the invention, arm synchronism can be improved in the operation process of the manipulator, the damage to silicon chips is avoided, the asynchronism of the manipulator can be compensated, and the synchronism is improved.

67. 103812392 MOTOR DRIVING CONTROLLER AND DUAL-MOTOR CONTROL METHOD THEREOF

CN - 21.05.2014

Int.Class H02P 5/74 **Appl.No** 201210445603.3 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention discloses a motor driving controller; the method comprises the steps of: outputting a first speed ring target value according to a control instruction, a control parameter and a first position value; outputting a first current ring target value according to the first speed ring target value, the control parameter and a first rotary speed value; outputting a first PWM signal according to the first current ring target value, the control parameter and a first control current, thereby realizing the control of a first motor; outputting a second speed ring target value by a main control chip according to the control instruction, the control parameter and a second position value; outputting a second current ring target value according to the second speed ring target value, the control parameter and a second rotation speed value; outputting a second PWM signal according to the second current ring target value, the control parameter and a second control current, thereby realizing the control of a second motor. The motor driving controller can simultaneously control two motors, thereby reducing system cost.

68. 104511642 FLEXIBLE SHEARING DEVICE

CN - 15.04.2015

Int.Class B23D 15/04 **Appl.No** 201310451616.6 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** CHAI YUAN

The invention discloses a flexible shearing device, comprising a fixing bracket; a horizontal upper support plate and a lower support plate are arranged on the fixing bracket; a fixed blade is arranged on the lower support plate; an adjusting space is arranged between the upper support plate and the lower support plate; a flexible shearing mechanism is arranged inside the adjusting space; the upper support plate is connected with a movable cutter by the flexible shearing mechanism; an upper blade is arranged on the movable blade; and the flexible shearing mechanism adjusts the upper blade to be always in elastic contact with the fixed blade. According to the flexible shearing device, the structure with the fixed blade and the movable upper blade is utilized; the upper blade is always in elastic contact with the fixed blade by means of the flexible shearing mechanism, so that the technical problem of an oversized clearance between two blades is solved and the shearing quality and efficiency are improved.

69. 104626148 ORTHOPAEDIC MANIPULATOR SYSTEM BASED ON PNEUMATIC CONTROL OF FORCE

CN - 20.05.2015

Int.Class B25J 9/16 **Appl.No** 201310576712.3 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention discloses an orthopaedic manipulator system based on pneumatic control of force. The system comprises a DSP core module and a power module, wherein the DSP core module serves as a core control unit and is used for processing man-machine interaction with a touch screen; the DSP core module processes input information of keys of an IO module and a pedal and transmits corresponding output information to the IO module; the DSP core module acquires an output value of a force sensor at the tail end of an AD module and controls the opening degree of an electricity-gas proportional pressure valve through the corresponding output value of a DA chip so that output force can be controlled; the power module supplies electricity to the

system. Due to double closed-loop control over the electricity-gas proportional pressure valve, in other words, a current signal at the control signal input end of the electricity-gas proportional pressure valve serves as inner loop control of feedback quantity, and an acquired pressure sensor signal serves as outer loop control of the feedback quantity. Due to the double closed-loop control, pulling force and traction force can be accurately controlled, and stepping operation is performed on force through the touch screen or the keys.

70. 104511905 ROBOT VISUAL SERVO CONTROL METHOD BASED ON STRUCTURED LIGHT

CN - 15.04.2015

Int.Class B25J 13/08 **Appl.No** 201310451988.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention discloses a robot visual servo control method based on structured light. The robot visual servo control method comprises the following steps: after a target object starts moving, starting a first photographing device and a second photographing device, judging whether the target object enters a projection area, if yes, starting a projector; projecting structured light with colorful stripe codes on the target object through the projector; obtaining a target object image with a structured optical grating; processing the target object image with the structured optical grating, and extracting the colorful stripe codes in the image; decoding the codes, calculating three-dimensional information of the target object through a mapping matrix; and grabbing the target object according to the three-dimensional information through a robot arm. The robot visual servo control method can be used for guiding the robot arm to move through vision of the structured light based on the colorful stripes, so that the operation action of the robot arm is relatively accurate, and the optimization to the robot action speed and the accuracy is realized.

71. 104639587 ROBOT FAULT MONITORING SYSTEM AND METHOD BASED ON INTERNET OF THINGS

CN - 20.05.2015

Int.Class H04L 29/08 **Appl.No** 201310567302.2 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention discloses a robot fault monitoring system and method based on Internet of Things. The system comprises a robot, a local monitoring unit, a server unit and an operating unit, wherein the robot and the local monitoring unit are in communication connection through a local area network, and the local monitoring unit, the server unit and the operating unit are connected through the Internet. By the system, uniform remote control, remote monitoring and remote fault positioning can be performed on a whole robot system visually and conveniently, robot management and maintenance are facilitated, and application of the robot to intelligent factories is accelerated.

72. 104635728 AUTOMATIC CHARGING SYSTEM AND AUTOMATIC CHARGING METHOD FOR ROBOT

CN - 20.05.2015

Int.Class G05D 1/02 **Appl.No** 201310567490.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention provides an automatic charging system for a robot. The automatic charging system for the robot comprises an infrared transmitting tube, infrared receiving tubes, a DSP (digital signal processor) controller, an edge guiding module, an angle compensating module and a charging module; and the infrared receiving tubes are arranged in the front of the robot and at the rear of the robot. According to the automatic charging system and an automatic charging method for the robot in an embodiment, the single infrared transmitting tube is used for transmitting infrared signals, the edge characteristics of an infrared transmitting range are skillfully used, and butt joint guidance on the robot can be implemented by an angle compensation strategy. Because edge angle characteristics of different infrared transmitting tubes are different, when the automatic charging system is used for the first time, a tangent angle of the transmitting angle at a transmitting point requires to be measured manually. Even if an approach angle has deviation due to external

interferences, a charging head is within a range of a charging socket through the angle compensation strategy. Deviation of an inserting angle can be compensated through a mechanical structure of a charging station. In addition, the invention also provides an automatic charging method for the robot.

73. **105654086** ROBOT KEY MEMBER POSE IDENTIFICATION METHOD AND SYSTEM BASED ON MONOCULAR VISION CN - 08.06.2016

Int.Class G06K 9/34 **Appl.No** 201410637167.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI BANGYU

The invention relates to the technical field of robot vision, and specifically discloses a robot key member pose identification system based on monocular vision. The vision system comprises a camera and a vision measurement system. The camera acquires an image; the vision measurement system receives the image, obtains a pose result through image processing and image analysis and sends the pose result to a robot control system; and the robot control system drives a robot according to the pose result. According to the robot key member pose identification method and system based on the monocular vision, through adoption of a secondary positioning scheme, the influence exerted by lens distortion on the image processing due to non-collinearity between the optical axis of the camera and a measured object is reduced; through indirect measurement, accurate positioning of an object to be positioned which cannot be completely acquired by the camera is realized; through binary processing by use of a dynamic threshold, the influence exerted by illumination on the image processing is reduced; and through search for a positioning object by use of a communication domain, the problem of irregular shape after the object is imaged is solved.

74. **106033224** LARGE-CURRENT AC CURRENT SOURCE CN - 19.10.2016

Int.Class G05F 1/12 **Appl.No** 102015000112925 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZHANG XU

The invention relates to a large-current AC current source, comprising a magnetic circuit switching and current output circuit, four paths of SPWM inversion filtering circuits, a driving and alarming protection circuit, a loop control circuit, a logic control circuit, and an interface display circuit. The large-current AC current source is simple to realize and is low in cost. Output current of the current source is good in waveform. Total harmonic distortion is lower than 2%. The current source is wide in output current, and the current range is 200 A to 25000 A. Output current is fast in response time, and output current can achieve a target value in 5 ms.

75. **106585760** MULTI-LEG ROBOT CONTROL SYSTEM AND MULTI-LEG ROBOT CN - 26.04.2017

Int.Class B62D 57/032 **Appl.No** 201510684600.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** YAO CHENGBO

The invention relates to the field of robots, and particularly relates to a multi-leg robot control system and a multi-leg robot. The multi-leg robot control system includes an FPGA module; the FPGA module includes a feedback signal receiving module, a current sampling module, a vector control module and a motor drive module which form a closed-loop control system for driving a motor to run. A single chip FPGA is used as a main control chip to form the closed-loop control system for the motor, and then the multi-leg robot is driven to run, the operation speed of the control system is accelerated, the multi-leg robot can run smoothly, and the cost can be saved.

76. **107547028** METHOD AND DEVICE FOR DETECTING ROTOR ANGLE OF MOTOR — CN - 05.01.2018

Int.Class H02P 21/18 **Appl.No** 201610482806.8 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** WANG HONGYU

The present invention discloses a method and a device for detecting the rotor angle of a motor. The method according to the embodiment of the present invention includes: applying a 0 DEG electrical angle magnetic field before a motor runs to detect and determine the current speed feedback; if not 0, determining that the initial electrical angle of a motor rotor is within a first electrical angle range according to the currently detected speed feedback; selecting a first electrical angle in the first electrical angle range, applying a first electrical angle magnetic field, detecting a current speed feedback, and if not 0, determining that the initial electrical angle is in a second electrical angle range; and continually selecting an electrical angle value in the second electrical angle range, applying the electrical angle to a magnetic field and detecting a current speed feedback until the initial electrical angle is determined based on the positive and negative of the speed feedback.The embodiment of the invention can accurately measure the electrical angle of the rotor, so that the control of the rotor by the magnetic field is optimized, and a reliable guarantee is provided forthe efficient and stable control of the system.

77. **207001672** LADDER MATERIAL LOADING MACHINE BASED ON HIERARCHICAL MECHANISM — CN - 13.02.2018

Int.Class B65G 47/82 **Appl.No** 201720442743.3 **Applicant** HANGZHOU SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI ZHENGGANG

The utility model discloses a ladder material loading machine based on hierarchical mechanism, include: material loading push mechanism, material loading push mechanism include AC motor, pass throughone -level crank push mechanism and second grade crank push mechanism that AC motor drove, one -level crank push mechanism and second grade crank push mechanism connect reverse linkage setting, one -level crank push mechanism on be provided with second order push plate and quadravalence push plate side by side, be provided with first -order push plate and third -order on push plate on the second grade crank push mechanism side by side, first -order push plate, second order push plate, third -order on push plate and quadravalence push plate in proper order side by side and in parallel and the slope set up, feed mechanism is with first -order push plate's upper limit position butt joint pay -off, discharge mechanism is with quadravalence push plate's the upper limit position butt joint ejection of compact. This ladder material loading machine based on hierarchical mechanism adopts the mode ladder of multistage push plate relay to carry the material piece, has improved hoist capacity andwork efficiency to the material piece, it can the reinforce to have the pay -off, characteristics such as the commonality is good.

78. **104635821** ELECTRIC QUANTITY MONITORING DEVICE ORIENTED TO SERVICE ROBOT — CN - 20.05.2015

Int.Class G05F 1/46 **Appl.No** 201310567467.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention relates to an electric quantity monitoring device oriented to a service robot. The electric quantity monitoring device comprises a master control module, a storage module, a current acquisition module, a voltage acquisition module, a battery input interface, a battery charging interface, a battery output interface and a power-on and power-off control module, wherein the storage module stores the remaining electric quantity. The voltage acquisition module acquires the charging voltage value, and the current acquisition module acquires the working current value. The master control module receives a first instruction and a second instruction from a service robot controller. The master control module acquires the first electric quantity value according to the current value based on an ampere hour method and corrects the first electric quantity value according to the voltage value and the remaining electric quantity based on an open-circuit voltage method, and then the second electric quantity value is acquired. The problem of electric quantity monitoring difficulty caused by the frequent change of loads of the service robot is solved in the mode that the ampere hour method is combined with the open-circuit voltage method, accuracy is higher, the requirement for stabilizing the loads is lower, and the requirement for high-accuracy electric quantity monitoring under the load condition can be met.

79. **104637048** SINGLE-CAMERA BINOCULAR VISION SIMULATION SYSTEM AND SINGLE-CAMERA BINOCULAR VISION SIMULATION METHOD CN - 20.05.2015

Int.Class G06T 7/00 **Appl.No** 201310574052.5 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention relates to the technical field of machine vision and provides a single-camera binocular vision simulation system and a single-camera binocular vision simulation method. The single-camera binocular vision simulation system comprises a guide rail, a camera device and a driving device of the camera device. The driving device drives the camera device to move along the guide rail and further used for detecting a current position of the camera device on the guide rail, and two images s are acquired at different positions by the camera device moving along the guide rail. The single-camera binocular vision simulation method includes: step S1, the camera device acquires one image at a first position; step S2, the driving device drives the camera device to move along the guide rail to a second position to acquire the other image. A single camera and the guide rail are adopted for simulation of a multi-view vision system, functions of two camera devices can be realized by adoption of only one camera device, and accordingly cost is saved; in addition, complete uniformity of parameters of the camera device can be guaranteed, technical difficulty is lowered, and product quality, product precision and operation efficiency are improved.

80. **104635562** TOUCH SENSOR, TOUCH SENSING SYSTEM AND INTELLIGENT ROBOT CN - 20.05.2015

Int.Class G05B 19/042 **Appl.No** 201310574461.5 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention relates to a touch sensor, a touch sensing system and an intelligent robot. The touch sensor comprises a touch detection chip, a signal acquisition circuit and a flexible circuit board. A signal acquisition end of the touch detection chip is connected with the flexible circuit board, and a signal output end of the touch detection chip is connected with the signal acquisition circuit. The flexible circuit board serves as a touch sensing carrier, the touch key chip is adopted to achieve a touch sensing detection circuit, and a touch sensing function of the robot can be realized. Compared with an existing touch sensing garment, the touch sensor, the touch sensing system and the intelligent robot have the advantages that flexibility and changeability in shape are achieved, and changing shapes and areas according to practical utilization requirements can be realized; sensitivity can be adjusted accordingly to the thickness of a shell in practical use; the sensing carrier is light and thin and can be simply and conveniently mounted at various places and especially mounted in a shell of the robot without changing appearance of the robot; touch sensing can be realized without extruding deformation in touch.

81. **104626195** GAS GUIDE TUBE ARRANGEMENT OF MECHANICAL ARM AND ATMOSPHERIC MECHANICAL ARM CN - 20.05.2015

Int.Class B25J 19/00 **Appl.No** 201310562914.2 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** HE WEIQUAN

The invention relates to the field of atmospheric mechanical arms, and particularly discloses a gas guide tube arrangement of a mechanical arm and the atmospheric mechanical arm adopting the gas guide tube arrangement. In the gas guide tube arrangement, a gas guide tube is in a spiral winding form in at least one joint of the mechanical arm. The wiring mode of the gas guide tube is improved, through spiral winding, the spiral gas guide tube contracts when the mechanical arm rotates, and therefore the gas guide tube can be prevented from being directly broken, the service life of the gas guide tube is prolonged, and the work reliability is ensured.

82. **103802114** INDUSTRIAL ROBOT SINGULAR POINT PROCESSING METHOD AND DEVICE CN - 21.05.2014

Int.Class B25J 13/00 **Appl.No** 201210444346.1 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention discloses an industrial robot singular point processing method and an industrial robot singular point processing device. The method comprises the following steps of establishing a kinematics model of an industrial robot, and acquiring forward and reverse kinematics of the industrial robot; acquiring a condition value when the industrial robot stays on a singular point according to the forward and reverse kinematics of the industrial robot; judging whether the industrial robot stays on the singular point or not according to the condition value; controlling the industrial robot to pass through the singular point if the industrial robot stays on the singular point. By adopting the technical scheme, the industrial robot can smoothly pass through a singular value of a wrist, so that the working space of the industrial robot is larger, when the industrial robot approaches the singular point of the wrist, the robot cannot stop work, and the flexibility of the industrial robot can be improved.

83. **103802090** DUAL-ARM CARRYING MANIPULATOR CN - 21.05.2014

Int.Class B25J 9/00 **Appl.No** 201210445436.2 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI XUEWEI

The invention provides a dual-arm carrying manipulator which comprises a base, a waist seat, mechanical arms and tail end components, wherein the waist seat is rotatably mounted on the base in a liftable way; one end of each mechanical arms is rotatably connected onto the waist seat, and the other ends of the mechanical arms are rotatably connected with the tail end components; motors, speed reducers and shaft assemblies are fixed in the waist seat, and the roots of the mechanical arms are mounted on the shaft assemblies by bearings. According to the dual-arm carrying manipulator, the speed reducers of the mechanical arms are placed at other positions of the waist seat instead of the roots of big arms in the prior art, the big arms are not in direct contact with the speed reducers and are mounted on the waist seat by at least two groups of bearings and shaft assemblies, and the speed reducers drive belt wheels and synchronous belts to indirectly drive the big arms to rotate. The bearings are used for replacing the speed reducers to bear gravity bending moment, and the anti-bending arm of force of the manipulator is further improved by increasing the distance of the bearings, so that the gravity bending moment of the heavy-load manipulator is balanced.

84. **103811385** MANIPULATOR MECHANISM USED FOR CONVEYING WAFER CN - 21.05.2014

Int.Class H01L 21/677 **Appl.No** 201210445556.2 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** WANG FENGLI

The invention provides a manipulator mechanism used for conveying a wafer; the manipulator mechanism comprises a lifting driving mechanism, a rotary driving mechanism, a horizontal driving mechanism and an end portion execution part; the end portion execution part is driven by the rotary driving mechanism and the horizontal driving mechanism to carry the wafer for making linear motions. The manipulator mechanism used for conveying the wafer can design a load center of the end portion execution part, so the load center can be offset outside a plane formed by a first axis and a third axis; a motion track of the load center and a motion path of a rotary shaft center of the end portion execution part are smartly designed to be two non-overlapping and parallel straight lines; the load center is offset to a bending side of a rotary main arm and a rotary auxiliary arm, so a manipulator occupying space when the manipulator is maximumly bended cannot exceed the motion track of load edge in the horizontal direction, no extra space is occupied, thereby preventing interferences to the operation of other manipulator mechanisms, and optimizing arrangement of manipulator horizontal motion working space.

85. **103810827** WIRELESS RADIO FREQUENCY STRUCTURE BASED ON NO-DRIVER USB TECHNOLOGY, AND SIGNAL TRANSMISSION METHOD THEREOF — CN - 21.05.2014

Int.Class G08C 17/02 **Appl.No** 201210442092.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention discloses a wireless radio frequency structure based on no-driver USB technology. The wireless radio frequency structure is mainly composed of a signal reception master controller (3) and a signal emission master controller (4); the signal reception master controller (3) comprises a 2.4GHZ wireless radio frequency controller (1) and a USB controller (2); the signal emission master controller (4) comprises the 2.4GHZ wireless radio frequency controller (1); control signals emitted by the signal emission master controller (4) are transmitted to the signal reception master controller (3) via a 2.4GHZ wireless network. An overall structure of the wireless radio frequency structure is relatively sample; no-driver USB technology and 2.4GHZ radio frequency technology are adopted in a remote control device of the wireless radio frequency structure; related actions of service robots can be controlled through voice, key, and gesture manners; and controlling of the service robots is more flexible and intelligent.

86. **104512716** BILATERAL EQUIDISTANT CONVEYING DEVICE AND STACKING MACHINE USING THE DEVICE — CN - 15.04.2015

Int.Class B65G 47/74 **Appl.No** 201310451670.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** GUAN LI'NA

The invention relates to the automated conveying technology, in particular to a bilateral equidistant conveying device and a stacking machine using the device; the bilateral equidistant conveying device comprises a driving device, a fixing frame, a bottom support, a middle plate and an upper support plate; the driving device and the bottom support are respectively installed on the fixing frame; a primary driving wheel and a primary driven wheel connected mutually by a primary stroke synchronization belt are installed on the bottom support; the middle part of the bottom end of the middle plate is fixedly connected with the primary stroke synchronization belt by a fixing splint. The quantity of the driving devices of a conveying system is reduced effectively, so that the control of the whole mechanism is facilitated, the control mechanism is simplified and the cost is reduced. The primary stroke mechanism is capable of moving to two ends in the horizontal direction to drive the upper support plate to move, so that objects opposite to each other at two sides of an automatic conveying structure at this conveying station can be conveyed; therefore, the conveying device is increased in motion scope and more flexible.

87. **104517879** CONVEY MANIPULATOR WITH ADJUSTABLE FINGER INTERVAL AND WAFER CONVEY DEVICE — CN - 15.04.2015

Int.Class H01L 21/677 **Appl.No** 201310451911.1 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention relates to the manipulator technical field, and provides a convey manipulator with an adjustable finger interval and a wafer convey device; the manipulator comprises finger units (10) with machinery fingers (11), and link rods (20) fixed with bearings, wherein one bearing is fixed with one finger unit (10), and one side of rear ends of the other finger units (10) is provided with a slot (40) in a machinery finger direction, and the bearing is nested in the slot (40) and moves to form a slider-crank mechanism; the other side of the rear ends of the finger units (10) is provided with a guide rail (60) arranged in a vertical direction, and the finger unit (10) moves along the guide rail (60) through a slide piece (50); one finger unit (10) moves in the vertical direction so as to drive the link rod (20) to rotate around the bearing fixed with the finger unit (10), thus driving other finger units (10) to move up and down along the guide rail (60). The finger interval of the machinery fingers can be effectively adjusted.

88. **104290095** HIGH-ALTITUDE CLEANING ROBOT CONTROL SYSTEM AND METHOD BASED ON RC — CN - 21.01.2015

Int.Class B25J 9/16 **Appl.No** 201310566814.7 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention discloses a high-altitude cleaning robot control system and method based on an RC. The system comprises data acquisition devices and the RC, wherein the data acquisition devices are distributed on a body of a high-altitude cleaning robot and used for collecting environmental data of the high-altitude cleaning robot, and the environmental data are analyzed by a sensor acquisition processing panel card; the RC is used for receiving the data forwarded by the sensor acquisition processing panel card through a controller area network (CAN) bus, comprehensively analyzing and processing the data analyzed by the sensor acquisition processing panel card according to a preset program to generate a reasonable motion planning path and sending a motion instruction to all drivers through the CAN bus to control operation of the robot. According to the high-altitude cleaning robot control system and method, the control system with the RC as the core controller enhances real-time performance during stable running, increases the processing speed and improves working efficiency.

89. **105652726** ROBOT SAFETY CONTROL APPARATUS — CN - 08.06.2016

Int.Class G05B 19/042 **Appl.No** 201410636034.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LUAN XIANYE

The invention relates to the field of intelligent control, and specifically discloses a robot safety control apparatus. The robot safety control apparatus comprises a first signal input module, a first signal processing module, a first signal output module, a second signal input module, a second signal processing module, a second signal output module and a verification module. The first signal input module sends signals to the first signal processing module, the first processing module processes the signals and sends a safety control instruction, and the safety control instruction is sent to an external device through the first signal output module; the second signal input module sends signals to the second signal processing module, the second processing module processes the signals and sends a safety control instruction, and the second signal output module sends the safety control instruction to the external device; the first signal processing module and the second signal processing module communicate with a robot controller; and the verification module determines whether the state of the first signal processing module is consistent with the state of the second signal processing module. According to the invention, by use of independent dual-CPU safety control, the effect of independent safety protection is realized.

90. **106585311** LOW-GRAVITY-CENTER TRAVELLING MECHANISM WITH SHOCK-ABSORPTION FOUR WHEELS AND SHOCK-ABSORPTION CHASSIS — CN - 26.04.2017

Int.Class B60G 11/14 **Appl.No** 102015000676965 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI XUEWEI

The invention belongs to a travelling mechanism applied to a chassis of a service robot, and particularly relates to a low-gravity-center travelling mechanism with shock-absorption four wheels and a shock-absorption chassis. The low-gravity-center travelling mechanism with shock-absorption four wheels and a shock-absorption chassis comprises a chassis mounting bottom plate, driving wheel support assemblies, drive and transmission devices, shock-absorbing devices and driven wheels, wherein the driving wheel support assemblies are mounted at the upper part of the chassis mounting bottom plate side by side through screws, and the drive and transmission devices are parallelly mounted at the upper part of the chassis mounting bottom plate in a stagger manner; and the shock-absorbing devices are mounted at the lower part of the chassis mounting bottom plate through screws, and each of the driven wheels is mounted at the upper part of the corresponding shock-absorbing devices through screws. The travelling mechanism disclosed by the

invention is compact in whole layout, and low in gravity center; shock absorbing springs are coil springs, and are small in occupied in space, and high in coefficient of elasticity; and the shock-absorbing devices are low in height and small in occupied space.

91. **106597913** SILICON WAFER TRANSMISSION PLATFORM CONTROL SYSTEM CN - 26.04.2017

Int.Class G05B 19/042 **Appl.No** 102015000685907 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** DENG DEZHI

The invention relates to a silicon wafer transmission platform control system, which comprises a main controller, a switch, a serial port conversion module, an IO acquisition module and a Devicenet HUB, wherein the serial port conversion module, the IO acquisition module and the Devicenet HUB are connected to the main controller by means of the switch; and the switch is further connected to Ethernet equipment. The combination of the serial port conversion module, the IO acquisition module, the switch and the Devicenet HUB is adopted in the whole control system. The design greatly reduces the size of the whole silicon wafer transmission platform control system, various communication functions are integrated into communication methods of the same type by means of different conversion modules, and the problem of many communication protocols in the existing clean vacuum transmission system can be solved. Compared to the original control system, the silicon wafer transmission platform control system has clearer structure and higher integration level, is simpler in control and scheduling, and greatly improves the simplicity and reliability of the system.

92. **106553131** ROBOT FOR CONDUCTING SECONDARY CLEANING OPERATION ON SHIP HULL SURFACE AND CLEANING METHOD CN - 05.04.2017

Int.Class B24C 3/06 **Appl.No** 201510617284.3 **Applicant** SHANGHAI SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** YANG LI

The invention provides a robot for conducting secondary cleaning operation on the ship hull surface. The robot comprises a vehicle frame, a steering mechanism, a driving mechanism, a welding seam detection device, a cleaning mechanism and a cleaning effect detecting device. The steering mechanism is fixed to the bottom of the vehicle frame and drives the vehicle frame to turn and move. The driving mechanism is fixed to the bottom of the vehicle frame and drives the vehicle frame to move. Positions of welding seams on the ship hull surface are detected through the welding seam detection device, and movement of a vehicle body is adjusted in real time according to the detected positions. After the positions are detected to be correct, the cleaning mechanism starts to clean the ship hull surface. Whether cleaning work of the cleaning mechanism is qualified or not is detected through the cleaning effect detecting device, and according to the detection result, relevant parameters of the cleaning mechanism are adjusted in real time. The robot for conducting secondary cleaning operation on the ship hull surface has the beneficial effects that shot blasting cleaning is adopted; for cleaning work, the cleaning parameters and cleaning effects can be adjusted according to customer requirements; a self-circulation shot blasting device is high in circulation efficiency, multiple times of operation can be completed with one-time loading, the robot is provided with a dedusting device, and no pollution is caused to the environment; by means of an adopted detection module, the welding seams can be detected automatically, and following-up cleaning can be conducted automatically according to the welding seams; and the robot is provided with a cleaning effect detection system, the cleaning effect can be fed back, and relevant parameters of the robot can be adjusted.

93. **107536695** LOWER LIMB TRAINING DEVICE CN - 05.01.2018

Int.Class A61H 1/02 **Appl.No** 201710479430.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI XUEWEI

The invention relates to the technical field of exercise training apparatus, and specifically discloses a lower limb training device. The device comprises a base, a lifting mechanism, a first rotary arm, a second rotary arm, and a lower limb placing mechanism. The first rotary arm is rotatably connected with the lifting mechanism through a first rotation mechanism. The second rotary arm is rotatably connected with the first rotary arm through a second rotation mechanism. The lower limb placing mechanism is rotatably connected with the second rotary arm through a third rotation mechanism. The training device is characterized by large training range, convenient adjustment, simple operation, and compact structure, and can satisfy rehabilitation physical therapy training requirements of hospitals or families.

94. **107544486** CLEANING SYSTEM AND METHOD SUITABLE FOR CLEANING ROBOT CN - 05.01.2018

Int.Class G05D 1/02 **Appl.No** 201610482376.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The present invention provides a cleaning system and method suitable for cleaning a robot. The cleaning system includes a robot and a mobile operating device. The mobile operating device connects therobot, sends control information to the robot, and remotely controls the robot for cleaning. On the one hand, when cleaning a complex environment, the operator uses the mobile operating device for remote control and to operate independently from the complicated environment without any external interference to the operation technology of the operator, thereby improving the working efficiency of thecleaning robot. On the other hand, human-machine separation is realized by the mobile operating device. While the robot is working, the operator can synchronously observe the fine cleaning effect inreal time, thereby improving the working efficiency and controlling the cleaning effect.

95. **102528793** END EFFECTOR OVERTURNABLE MECHANISM FOR CARRYING PLATE-SHAPED WORKPIECE CN - 04.07.2012

Int.Class B25J 9/06 **Appl.No** 201010590092.5 **Applicant** Shenyang Siasun Robot & Automation Co.,Ltd. **Inventor** Qu Daokui

The invention relates to a carrying mechanism of a plate-shaped workpiece, in particular to an end effector overturnable mechanism for carrying the plate-shaped workpiece. The end effector overturnable mechanism comprises end effectors, fingers, a forearm and an upper arm, wherein one end of the upper arm is rotatably installed on a carrying robot, and the other end of the upper arm is a free end; one end of the forearm can be relatively rotatably installed at the free end of the upper arm, and the other end of the forearm is provided with a free end; the fingers can be relatively rotatably installed at the free end of the forearm; the fingers are provided with the end effectors capable of performing linear telescopic motion and overturning motion; and the end effectors, the fingers and the forearm can rotate together with the upper arm. According to the invention, the upper arm, the forearm and the fingers are comprised, the forearm can rotate relative to the upper arm, the fingers can rotate relative to the forearm, the end effectors can realize the telescopic motion, the overturning motion, the lifting and rotating motions, has sufficient working space and has low requirement on the rigidity of the arms.

96. **103808285** CALIBRATION METHOD OF PRE-ALIGNMENT MACHINE AND MECHANICAL ARM RELATIVE COORDINATE SYSTEM CN - 21.05.2014

Int.Class G01B 21/00 **Appl.No** 201210441423.8 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention discloses a calibration method of a pre-alignment machine and mechanical arm relative coordinate system. The calibration method comprises the steps of (1) setting the coordinate system of a pre-alignment machine as an xoy coordinate system and the coordinate system of a

mechanical arm as an x'o'y' coordinate system, [2] using a wafer in the xoy coordinate system to move in a radial way relative to the x'o'y' coordinate system, and determining the attitude of the x'o'y' coordinate system in the xoy coordinate system, [3] rotating the wafer relative to the x'o'y' coordinate system, determining the position of the x'o'y' coordinate system in the xoy coordinate system, which means that the relative position relation of the mechanical arm and the pre-alignment machine is obtained. According to the calibration method, the accurate positioning of a vacuum adsorption type mechanical arm in a vacuum adsorption type pre-alignment machine coordinate system can be realized, and thus the pre-alignment accuracy and transmission accuracy of the wafer can be effectively raised.

97. 104516351 CONTROL SYSTEM FOR GROUND HANDLING TROLLEY AND APPLICATION THEREOF

CN - 15.04.2015

Int.Class G05D 1/02 **Appl.No** 201310452106.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** DENG DEZHI

The invention belongs to the technical field of automation devices, and specifically discloses a control system for a ground handling trolley and applications thereof. The control system comprises a PC104, a communication adapter plate, an IO plate, and a position control board. The PC104 is connected with the communication adapter plate through a 104 bus. The communication adapter plate, the IO plate, and the position control board are connected in sequence through a CAN bus. The IO plate, the position control board, and the PC104 are connected in a bridging manner through the 104 bus. The system integrates various kinds of communication functions and interfaces on the communication adapter plate, solving problems that the number of various communication protocols on a clean handling trolley is high. The system saves cost and reduces volume. A two-axis analog quantity replaces a position control module of a medium-sized programmable controller to control the position control board, reducing volume while improving positioning precision. Expansion performance of the system is the same with that of a PLC, the system can be expanded by increasing of the number of axes. The system has functions of position control, digital value input detection, digital value output control, serial communication, and Ethernet communication.

98. 104512489 CRAWLER WALKING MECHANISM

CN - 15.04.2015

Int.Class B62D 55/08 **Appl.No** 201310452154.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention relates to the technical field of crawler walking mechanisms, in particular to a crawler walking mechanism. The crawler walking mechanism comprises a vehicle body which is horizontally arranged on a driving shaft and a driven shaft of the vehicle body in a penetrating manner, a left crawler walking unit, and a right crawler walking unit, wherein the left crawler walking unit and the right crawler walking unit are symmetrically arranged on both sides of the vehicle body, and respectively comprise two sprocket wheel sets which sleeve the driving shaft and the driven shaft, and a crawler structure which is meshed with the sprocket wheel sets. For the crawler walking mechanism disclosed by the invention, supporting wheels and sprocket wheels form the sprocket wheel sets, so that the crawler walking mechanism has the chain guiding function, and besides, the crawler walking mechanism realizes the support function; and therefore, the abrasion of the sprocket wheels and the chains is reduced. For the crawler structure disclosed by the invention, crawler plates on which supporting parts are mounted are jointed with the chains, so that the crawler walking mechanism has effective transmission efficiency, is suitable for work under adverse environment conditions, and the slippage phenomenon is reduced.

99. 104555810 SELF-ADAPTIVE HOISTING DEVICE OF SKYLIGHT ASSEMBLY PRODUCTION LINE

CN - 29.04.2015

Int.Class B66F 7/08 **Appl.No** 201410326368.7 **Applicant** SHANGHAI SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** WANG SHENGBING

The invention provides a self-adaptive hoisting device of a skylight assembly production line. The self-adaptive hoisting device is characterized by comprising a tray, a hoisting mechanism and a return mechanism; the hoisting mechanism comprises a lifting air cylinder and a lifting platform, the lifting platform is fixed on the lifting air cylinder, and the lifting platform moves up and down along the lifting air cylinder; the tray is arranged on the lifting platform; the return mechanism comprises return air cylinders which are uniformly distributed on the periphery of the lifting air cylinder, located below the tray and used for applying a downward force to the tray. The self-adaptive hoisting device has advantages that a semi-finished product can be rapidly and self-adaptively positioned on a new workstation; the rapid fixation of the semi-finished product after being positioned on the new workstation can be facilitated. By simply improving the mechanical structure, rapid transportation of the skylight semi-finished product between a main production line and a curing production line can be realized; by adding a horizontal floating support, a vertical floating support and the like, the problem that the semi-finished product cannot be rapidly and self-adaptively positioned can be solved, a vibration attenuation effect also can be realized, the installation and assembling quality of the skylight can be greatly improved, and the production efficiency can be improved.

100. 204376749 DOUBLE-MODE INVERTER CIRCUIT

CN - 03.06.2015

Int.Class H02M 7/5387 **Appl.No** 201420835928.7 **Applicant** SHANGHAI SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** YANG LI

The utility model provides a double-mode inverter circuit which is characterized in that the circuit comprises a zeroth capacitor Ca, a thirteenth ultrafast recovery diode D13, a fourteenth ultrafast recovery diode D14, a first circuit which is connected in parallel between the negative pole of the thirteenth ultrafast recovery diode D13 and one end of the zeroth capacitor Ca, a second circuit which is in parallel connection at two ends of the first circuit, and a third circuit which is in parallel connection at two ends of the second circuit.

101. 104638898 SOFT START CONTROL DEVICE SYSTEM

CN - 20.05.2015

Int.Class H02M 1/36 **Appl.No** 201310564393.4 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** YANG QIFENG

The invention belongs to the technical field of electronic circuits, and particularly discloses a soft start control device system which comprises a triode, a single chip microcomputer, an input interface, a current detection module, a metal oxide semiconductor field effect tube, an output interface, a relay and a thermistor. The input interface, the current detection module, the metal oxide semiconductor field effect tube and the output interface are connected effectively, the single chip microcomputer is connected with the current detection module, the metal oxide semiconductor field effect tube and the triode respectively, the thermistor is arranged between the input interface and the current detection module, and the relay is connected with the triode. A soft start mode of hierarchic electrifying of a power source is realized by utilizing the thermistor and the relay, current during starting is limited through the negative temperature characteristic that resistance value of the thermistor decreases as temperature increases, impact on the power source and a rear-end circuit due to overlarge impact current when the power source is electrified is avoided, and the soft start control device system is convenient and flexible to control and low in realization cost.

102. 104626151 MECHANICAL ARM WAFER CENTERING DEVICE AND METHOD

CN - 20.05.2015

Int.Class B25J 9/18 **Appl.No** 201310566847.1 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** CHU MINGJIE

The invention provides a mechanical arm wafer centering device and method. The device comprises high-speed IO collecting circuits, an FPGA module and an embedded type CPU module. The high-speed IO collecting circuits are used for collecting AWC sensor signals and generating high-speed IO signals. The FPGA module is used for outputting high-speed IO signals and serial interruption signals to the embedded type CPU module, and the FPGA module is further used for converting address data of the embedded type CPU module into control signals to a driver and outputting the control signals to correct the position of a mechanical arm. The embedded type CPU module is used for receiving the high-speed IO signals and latching the servo axis position value, working out the deviation of the actual center in the wafer conveying process by the mechanical arm and a demonstration center according to the servo axis position value and outputting control instructions through the address data. According to the mechanical arm wafer centering device and method, the multiple sets of high-speed IO signal collecting circuits are integrated, the structure is compact, fault points are few, and the collecting circuits can be flexible configured.

103. 104635753 PRE-ALIGNMENT DEVICE AND SYSTEM BASED ON LASER DISPLACEMENT SENSORS

CN - 20.05.2015

Int.Class G05D 3/12 **Appl.No** 201310567384.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention discloses a pre-alignment device based on laser displacement sensors. The pre-alignment device for wafer pre-alignment comprises the first laser sensor, the second laser sensor and a pre-aligner controller, wherein the first laser sensor and the second laser sensor are disposed on the periphery of a wafer and user for detecting the position of the wafer; the pre-aligner controller receives the position information acquired by the first laser sensor and the second laser sensor and performs communication and processing calculation. The pre-alignment device has the advantages that the pre-alignment device uses a mechanical arm to serve as a device for driving the wafer to move, the cost of the motor and the driver of the pre-alignment device is saved, and the cost of the pre-alignment device is lowered; wafer exchange between the pre-alignment device and the mechanical arm is not needed, the wafer does not need to leave the mechanical arm during the whole pre-alignment process, and the time of the pre-alignment process is reduced.

104. 104635730 AUTOMATIC CHARGING METHOD FOR ROBOT

CN - 20.05.2015

Int.Class G05D 1/02 **Appl.No** 201310574088.3 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention discloses an automatic charging method for a robot. The automatic charging method includes calculating coordinates, in a robot coordinate system, of all laser points; taking every three laser points as a group, calculating distances among the laser points respectively and combining laser measuring values of the three points; judging whether to perform point set division on the laser points or not; dividing the dividable laser points to acquire grouped point sets; dividing each grouped point set into two groups, and performing least square method fitting on each group of point sets to acquire a linear map collection; judging whether parameters of the point sets and the linear map collections are matched with features of a charging station or not; if a matching result shows that only two straight lines matched with the features of the charging station are reserved, calculating a pose, in word coordinates, of the robot according to equations of the two straight lines and the position, in the word coordinates, of the charging station; performing butt joint between the robot and the charging station according to the pose, in the word coordinates, of the robot. By the automatic charging method, accuracy in robot charging is improved.

105. 105643640 JOINT POSITIONING AND IDENTIFYING SYSTEM

CN - 08.06.2016

Int.Class B25J 13/08 **Appl.No** 201410637325.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI JIAN

The invention relates to a joint positioning and identifying system. The joint positioning and identifying system comprises an information processing unit, an image acquisition unit, a robot control unit and an axle control unit, wherein the image acquisition unit and the robot control unit are separately in data interaction with the information processing unit through a wireless network; the robot control unit and the axle control unit are in communication connection through a CAN bus; the image acquisition unit is used for acquiring fracture digital information of a patient; the image processing unit is used for receiving the fracture digital image sent by the image acquisition unit, and analyzing correct traction position information of the fracture of the patient; the robot control unit is used for sending action command information to the axle control unit according to the correct traction position information; and the axle control unit realizes control on the drive motor. The reliability and the accuracy of positioning the joints of an osteopathic patient are increased.

106. **105652895** MOBILE ROBOT HUMAN BODY TRACKING SYSTEM AND TRACKING METHOD BASED ON LASER SENSOR — CN - 08.06.2016

Int.Class G05D 3/12 **Appl.No** 201410634552.8 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI SHEN

The invention provides a mobile robot human body tracking system based on a laser sensor. The system comprises an object detection unit, an object determining unit and a motion control unit. The object detection unit is used for scanning front data and determining a suspected human body object; the object determining unit is used for determining suspected human body object information and obtaining final human body information; and the motion control unit controls motion of a robot body according to determined human body data information. According to the invention, it is ensured that a robot can well realize automatic following under the condition of indoor interference, and at the same time, the following robustness and the tracking precision are improved.

107. **206382835** TWO -STAGE GUIDER — CN - 08.08.2017

Int.Class B23P 19/10 **Appl.No** 202017000055133 **Applicant** SHANGHAI SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** TIAN LIANG

The utility model provides a two -stage guider, include drive unit, fixed plate, intermediate lamella, movable plate, one -level guide unit and second grade guide unit, drive unit drive movable plate is close to or keeps away from the fixed plate and remove, the intermediate lamella sets up between movable plate and fixed plate, one -level guide unit includes, one -level mounting and one -level slider, the one -level slider moves on the one -level mounting, the one -level slider is fixed on the intermediate lamella, the one end of one -level mounting is fixed on the movable plate, and the other end passes the intermediate lamella, the second grade guide unit include, second grade mounting and second grade slider, the second grade slider moves on the second grade mounting, the second grade slider is fixed on the intermediate lamella, the one end of second grade mounting is fixed on the fixed plate, and the other end passes the intermediate lamella. Its advantage lain in realizing function of little space, big stroke, long direction has not only improved the stability and the reliability of structure, has also improved space utilization greatly, is applicable to multiple occasion.

108. **107355189** RACKING PLATFORM PIPE-ARRAYING ROBOT — CN - 17.11.2017

Int.Class E21B 19/14 **Appl.No** 201610308765.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LIU HAIGANG

The invention relates to a racking platform pipe-arraying work system used in a petroleum service rig and concretely relates to a racking platform pipe-arraying robot comprising a clamping jaw mechanism, a linking arm, a revolution mechanism and a trolley walking mechanism. The revolution mechanism is installed on the trolley walking mechanism; one end of the linking arm is installed on the revolution mechanism and the other end is connected with the clamping jaw mechanism; the clamping jaw mechanism, the linking arm and the revolution mechanism reciprocatingly move on a racking platform along with the trolley walking mechanism; the clamping jaw mechanism and the linking arm reciprocatingly rotate along with the revolution mechanism; and the clamping jaw mechanism can retract along with the linking arm. An automatic pipe-arraying function on the racking platform during service work can be achieved; worker use can be reduced and labor intensity can be lowered; safety coefficient can be improved; and work cost can be reduced and work efficiency can be improved.

109. **103802088** SIX-AXIS WIRING DEVICE AND INDUSTRIAL ROBOT WITH SIX-AXIS WIRING DEVICE APPLIED CN - 21.05.2014

Int.Class B25J 9/00 **Appl.No** 201210441984.8 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI XUEWEI

The invention discloses a six-axis wiring device and an industrial robot with the six-axis wiring device applied. The six-axis wiring device comprises a coiling block assembly, a cable and a six-axis flange. The six-axis flange is installed on six axes, the coiling block assembly is connected with the six-axis flange, and the cable passes through a five-axis support of the industrial robot to wind the coiling block assembly. Compared with habitual using, the six-axis wiring device has the advantages that the restraint of the six axes of the industrial robot is reduced, the six axes are close to the original moving range as mush as possible, and the applicability of the robot is enhanced; in addition, a device needing to be mounted by the robot is installed on a connecting flange of the coiling block assembly, the cable winds a coiling block, and the movement restraint of the six axes is reduced; furthermore, the loosened cable is restrained through a cable shield, and therefore the cable cannot be intervened with an industrial robot mechanical arm or the mounted device.

110. **103802135** CABLE FIXING DEVICE CN - 21.05.2014

Int.Class B25J 19/00 **Appl.No** 201210445422.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** WEN YANXIU

The invention discloses a cable fixing device. A cable is fixed on a robot manipulator; the robot manipulator comprises a small arm and a manipulator four-shaft; the cable fixing device comprises a fixed cable clamp support, a rotary structure inner sleeve, a rotary structure outer sleeve, a movable cable clamp support, a movable cable clamp and a four-shaft movable cable clamp support; the fixed cable clamp support is mounted on the small arm; the rotary structure inner sleeve is fixedly clamped on the small arm; the rotary structure outer sleeve is mounted on the rotary structure inner sleeve; the movable cable clamp support is fixedly connected onto the rotary structure outer sleeve; the movable cable clamp and the movable cable clamp support are movably connected; the four-shaft movable cable clamp support is arranged on the manipulator four-shaft. According to the cable fixing device, on one hand, the tension and torsion at the tail end of a cable are reduced and the service life of the cable is prolonged; on the other hand, the cable is integrally fixed to prevent from colliding with peripheral environment.

111. **103809533** TRACK SWITCH CONTROL PANEL AND CARRYING CROWN BLOCK TRACK SWITCH CONTROL SYSTEM CN - 21.05.2014

Int.Class G05B 19/418 **Appl.No** 201210445543.5 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LIU YIHENG

The invention relates to the automatic control field, and provides a track switch control panel comprising a main control part, a pneumatic track switch transformation control part and an electric track switch transformation control part. The invention also provides a carrying crown block track switch control system. In the prior art, a programming logic device (PLC) serves as a track switch controller, the PLC is large in size and inconvenient in expansion, and the track switch control panel and the carrying crown block track switch control system can solve the problems.

112. **104627841** OBSTACLE AVOIDANCE CONTROL SYSTEM FOR CLEAN CROWN BLOCK CN - 20.05.2015

Int.Class B66C 15/00 **Appl.No** 201310567028.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention provides an obstacle avoidance control system for a clean crown block. An obstacle avoidance sensing module detects obstacle avoidance information of an operating area of the clean crown block, an obstacle avoidance interface module acquires the obstacle avoidance information, a main control logic module acquires the obstacle avoidance information acquired by the obstacle avoidance interface module, a central processing module acquires the obstacle avoidance information acquired by the obstacle avoidance interface module, and sends a corresponding control command in combination with a position value of the clean crown block, an upper communication module receives the control command, and sends the control command to a core controller of the clean crown block, and the core controller adjusts the operating state of the clean crown block according to the control command. Because the obstacle avoidance control system carries out centralized control on all obstacle avoidance sensors, the core controller of the clean crown block is only required to send control commands and position values of the crown block through a communication bus, and an obstacle avoidance system is not required to be subjected to any operation, so that the control structure is simple, the control complexity of the core controller of the crown block is lowered, multiple interface modules are omitted, and the cost and the space are saved.

113. **104638702** PHOTOVOLTAIC CHARGING SYSTEM FOR OUTDOOR ROBOT CN - 20.05.2015

Int.Class H02J 7/00 **Appl.No** 201310563005.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention relates to a photovoltaic charging system for an outdoor robot. The photovoltaic charging system comprises a master controller, a solar panel, a photovoltaic controller, a power module and a power quantity monitoring module. The master controller, the photovoltaic controller and the power quantity monitoring module are in data interaction through a bus. The solar panel converts solar energy into electric energy. The photovoltaic controller controls power quantity of the power module. The power quantity monitoring module acquires power quantity information of the power module. The master controller sends a first control signal to the photovoltaic controller according to the power quantity information. The photovoltaic controller performs overcharge protection or overdischarge protection on the power module according to the first control signal. Through a double-accumulator power supply mode, redundant power supply of a whole robot system is achieved; in addition, high intellectualization of the robot is achieved by the aid of a power supply management and control system based on current tasks and current accumulator capacity software programming, task load of the robot is increased, and reliability in energy control of the robot is improved.

114. **104626207** INTERNAL PRESSURE EXPLOSION-PROOF SYSTEM OF INDUSTRIAL ROBOT CN - 20.05.2015

Int.Class B25J 19/06 **Appl.No** 201310572559.7 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI XUEWEI

The invention discloses an internal pressure explosion-proof system of an industrial robot. The internal pressure explosion-proof system comprises a control system, a first pressure reduction valve, a second pressure reduction valve, a two-way reversing valve, a three-way reversing valve, a flow switch, an overflow valve and a robot body. The control system is connected with the robot body, the two-way reversing valve, a three-way reversing valve and the flow switch, the overflow valve is connected with a robot body, the first pressure reduction valve is connected with the two-way reversing valve, and the second pressure reduction valve is connected with the three-way reversing valve. The internal pressure explosion-proof system of the industrial robot is provided with an air control reversing valve and an air throttle, the air control reversing valve is connected with the three-way reversing valve, the air throttle and the flow switch, and the air throttle is connected with the air control reversing valve and the robot body. Through the air throttle, air in the robot body is thoroughly exhausted within the set time, through a pressure switch, the intermittent compensation inflation mode is adopted, and therefore compressed air does not need to be continuously supplied. Energy is effectively saved, the cost is low, and the internal pressure explosion-proof system is suitable for industrial production.

115. **104637076** ROBOT PORTRAIT DRAWING SYSTEM AND ROBOT PORTRAIT DRAWING METHOD CN - 20.05.2015

Int.Class G06T 11/00 **Appl.No** 201310574206.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI BANGYU

The invention discloses a robot portrait drawing system and a robot portrait drawing method. The robot portrait drawing system comprises a near-infrared light source, a near-infrared industrial camera, a robot and a processing unit. The near-infrared light source, the near-infrared industrial camera, the robot and the processing unit are in communication connection. The near-infrared light source is used for emitting electromagnetic waves to human faces; the near-infrared industrial camera is used for shooting the near-infrared light source reflected from the human faces to complete preliminary acquisition of human face images; the processing unit is used for receiving the generated human face images, extracting human face outlines according to the images and generating human face drawing trajectory data; the robot is used for receiving the drawing trajectory data of the processing unit, and completing portrait drawing according to calculated its corresponding moving distance each time. The system can adapt to external light rays well and can extract the human face outlines stably and accurately during light ray change to enable the robot to complete drawing tasks.

116. **204442082** MOTOR SPEED REDUCER MODULE FOR ROBOT WEIGHT REDUCTION CN - 01.07.2015

Int.Class H02K 7/00 **Appl.No** 201420855273.X **Applicant** HANGZHOU SIASUN ROBOT AUTOMATION CO., LTD. **Inventor** LI ZHENGGANG

The utility model relates to a motor speed reducer module, and particularly to a motor speed reducer module for robot weight reduction. The motor speed reducer module comprises a servo motor and a speed reducer, a drive end of the servo motor is fixedly connected with the speed reducer, the speed reducer is fastened through a fastener outside of the module, the servo motor is connected with the fastener outside of the module through the fastener inside of the module, the outer side wall of the fastener outside of the module is provided with a fixing stop collar, the outer side wall of the speed reducer is provided with an output shaft mounting hole, and a mechanical arm mounting position is formed between the speed reducer and the fastener outside of the module. The motor speed reducer module for robot weight reduction can raise assembling efficiency and simplified operation steps.

117. **204355187** ADAPTIVE CURVED SURFACE TYPE SAFETY PROTECTING WALL-CLIMBING ROBOT DEVICE CN - 27.05.2015

Int.Class B62D 57/024 **Appl.No** 201420852050.8 **Applicant** SHANGHAI SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** YANG LI

The utility model provides an adaptive curved surface type safety protecting wall-climbing robot device which is attached on the wall surface and connected with a falling preventing device. The device is characterized by comprising a frame body which consists of a top layer surface which is far away from the wall surface and a bottom layer surface which is close to the wall surface, driving wheel travelling mechanisms which are symmetrically fixed on the bottom layer surface, two supporting adapting mechanism which are symmetrically arranged at two sides of the frame body and vertical to the driving wheel travelling mechanisms in the same plane, an absorbing unit which is absorbed to the wall surface and fixed on the bottom layer surface, and a rotating falling preventing mechanism which is in rotating connection with the top layer surface of the frame body and connected with the falling preventing device.

118. **106583159** INDUSTRIAL ROBOT FOR AUTOMATICALLY GLUING CN - 26.04.2017

Int.Class B05C 5/02 **Appl.No** 102015000673938 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI XUEWEI

The invention relates to the technical field of robots, and provides an industrial robot for automatically gluing. The industrial robot comprises a mechanical arm and an automatic gluing device arranged on the mechanical arm, wherein the mechanical arm is used for enabling the automatic gluing device to move along a predetermined line; the automatic gluing device comprises a gas source, an electromagnetic directional valve, a speed regulating valve, a pneumatic gluing gun shell and a glue tube, wherein the gas source is used for providing gas pressure; the electromagnetic direction valve is used for controlling the gas source to open/close; the speed regulating valve is arranged at one end, away from the gas source, of the electromagnetic directional valve, and is used for regulating flow speed of gas; the pneumatic gluing gun shell is connected with the speed regulating valve, and comprises a gas inlet opening and an accommodating cavity which communicates with the gas inlet opening; the glue tube is arranged in the accommodating cavity for providing glue; and the glue tube comprises a glue outlet. The industrial robot for automatically gluing has the characteristics of being simple in structure, high in degree of automation and the like.

119. **107543505** THREE-DIMENSIONAL LASER SCANNING DEVICE AND ROBOT CN - 05.01.2018

Int.Class G01B 11/24 **Appl.No** 201610462878.6 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** WANG WENZHAO

The invention relates to a three-dimensional laser scanning device and a robot. The three-dimensional laser scanning device comprises a support assembly, a rotation driving assembly arranged above thesupport assembly, a laser sensor rotation assembly, a GPS positioning assembly arranged above the support assembly, a laser sensor arranged on the laser sensor rotation assembly and a control box assembly arranged below the support assembly, and is characterized in that the rotation driving assembly is used for driving the laser sensor rotation assembly to rotate, and the control box assembly isconnected with the rotation driving assembly and the laser sensor through a cable. According to the three-dimensional laser scanning device, scanning and imaging for a three-dimensional complex environment can be realized, and functions of robot navigation, obstacle avoidance and positioning in the complex environment are realized. In addition, the three-dimensional laser scanning device is compact in overall structure and reasonable in layout; and the support assembly, the rotation driving assembly, the laser sensor rotation assembly, the GPS positioning assembly, the laser sensor and the control box assembly can adopt the modular design.

120. **102541057** MOVING ROBOT OBSTACLE AVOIDING METHOD BASED ON LASER RANGE FINDER CN - 04.07.2012

Int.Class G05D 1/02 **Appl.No** 201010611255.3 **Applicant** Shenyang Siasun Robot & Automation Co.,Ltd. **Inventor** Li Shen

The invention relates to a moving robot obstacle avoiding method based on a laser range finder, which comprises the following steps: building the coordinate system of the robot; with the current location of the robot as a center of a circle, simulating laser transmission at the origin of coordinates to transmit N laser beams of which the directions are determined as candidate directions of the motion of the robot; dividing laser information into groups, selecting an obstacle point in each group, and mapping the obstacle point into the coordinate system of the robot; expanding the robot into a circle with a radius of R, drawing two tangent lines of the circle through one obstacle point, working out the range of the candidate directions in which the robot can go across the obstacle point according to the included angles of the tangent lines and an X-axis, and getting the direction in which the robot can go across the obstacle point; defining a cost function to evaluate all feasible directions, and selecting the optimal direction of the next circle of motion of the robot; and working out the linear speed and angular speed of the robot by using a speed control policy. According to the method, the robot can avoid an obstacle in an unknown environment, and has high performance; and without deeper theoretical foundation, the method is simple, smart, easy to understand and practical, requires small calculation, and is particularly suitable to use.

121. **104627835** ANTI-DROP CLAMPING JAW SYSTEM FOR OHT PLATFORM CN - 20.05.2015

Int.Class B66C 13/18 **Appl.No** 201310567448.7 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention provides an anti-drop clamping jaw system for an OHT platform. The anti-drop clamping jaw system comprises a DSP driver module, a motor, a clamping jaw, an anti-drop arm and a sensor, wherein the DSP driver module is in signal connection to the anti-drop arm and the clamping jaw by virtue of the motor; the sensor is used for detecting the position information of the anti-drop arm and the clamping jaw and feeding the position information back to the DSP driver module; the DSP driver module controls the motion of the clamping jaw so as to grip and release the materials according to the position signal; and the DSP driver module is used for controlling the opening and closing of the anti-drop arm so as to prevent the materials from dropping according to the position signal. According to the anti-drop clamping jaw system provided by the invention, the condition that FOUP is damaged or the staff are injured due to accidental drop of FOUP can be avoided.

122. **104624427** RC-BASED SPRAYING PRODUCTION LINE CONTROL SYSTEM CN - 20.05.2015

Int.Class B05B 13/00 **Appl.No** 201310578222.7 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** CHEN TINGHUI

The invention provides an RC-based spraying production line control system. The RC-based spraying production line control system comprises a data collecting module, a remote IO module, a robot controller and a robot. The data collecting module is used for collecting data of equipment to be sprayed. The remote IO module is used for transmitting the data, collected by the data collecting module, of the equipment to be sprayed to the robot controller. The robot controller is sued for storing and processing the data, transmitted by the remote IO module, of the equipment to be sprayed. The robot is used for executing a control instruction transmitted by the robot controller and carrying out spraying work on the equipment to be sprayed. According to the RC-based spraying production line control system, equipment can be integrated on a spraying production line, the production cost is reduced, and the site occupying rate is reduced.

123. **104552311** ETHERCAT-BASED INTELLIGENT INDUSTRIAL ROBOT BUS MODULE AND OPERATING METHOD THEREOF CN - 29.04.2015

Int.Class B25J 13/00 **Appl.No** 201410730885.0 **Applicant** HANGZHOU SIASUN ROBOT AUTOMATION CO., LTD. **Inventor** LI ZHENGGANG

The invention relates to a bus module, in particular to an EtherCAT-based intelligent industrial robot bus module and an operating method thereof. An EtherCAT bus is connected with an embedded microprocessor; two ends of the embedded microprocessor are connected with a DSP (Digital Signal Processor) operation part and a teaching box respectively; a robot movement module, an I/O (Input/Output) module, a force sense module, a visual sense module and the EtherCAT bus form a topological structure. The operating method comprises the steps of selection of software and hardware, regarding of the embedded microprocessor as an EtherCAT master station, control over an EtherCAT slave station through an ESC (Electrical Safety Circuit), control over the robot movement module, control over the I/O module, control over the visual sense module, control over the force sense module and addition of modules. According to the EtherCAT-based intelligent industrial robot bus module and the operating method thereof, an industrial robot is more intelligent.

124. 104440911 MINIATURE INTEGRATED CLEANING ROBOT CONTROL SYSTEM

CN - 25.03.2015

Int.Class B25J 9/18 **Appl.No** 201410637593.2 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention relates to the field of cleaning robots, and particularly discloses a miniature integrated cleaning robot control system. The miniature integrated cleaning robot control system comprises a robot controller, a rectifying module, an IO control module, a first shaft control module, a second shaft control module, a first shaft driving module, a second shaft driving module, a third shaft driving module, a fourth shaft driving module, an IO switching module and a rear panel integration module. The robot controller is in communication with the first shaft driving module, the second shaft driving module and the IO control module. The IO control module is connected with the IO switching module, and the rear panel integration module is in communication with the IO control module and the robot controller. The first shaft control module controls the first shaft driving module and the second shaft driving module, and the second shaft control module controls the third shaft driving module and the fourth shaft driving module. The first shaft control module and the second shaft control module conducts communication with the rectifying module. The miniature integrated cleaning robot control system can be installed with a robot body integrally, therefore, cost is reduced, and the reliability and the efficiency of the system are improved.

125. 104515502 ROBOT HAND-EYE STEREO VISION MEASUREMENT METHOD

CN - 15.04.2015

Int.Class G01C 11/00 **Appl.No** 201310451831.6 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention relates to a robot hand-eye stereo vision measurement method. A target scene is shot from two different directions through an industrial camera installed on an industrial robot end effector. After camera calibration and image preprocessing, conjugate matching points of the two images are searched, and finally three-dimensional reconstruction is carried out according to the conjugate matching points so as to obtain the three-dimensional coordinate of a workpiece surface point. Compared with the currently common stationary industrial robot hand-eye vision measurement, the method provided by the invention can acquire the three-dimensional information of the workpiece rather than a simple two-dimensional coordinate of the workpiece, greatly expands the application of the vision system in industrial robot assembly, sorting and other systems, and has enormous application value and broad application field.

126. 104510551 HAND CLAMPING MECHANISM

CN - 15.04.2015

Int.Class A61F 5/042 **Appl.No** 201310451702.7 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** HE SHULONG

The invention relates to the technical field of medical instruments for fracture traction restoration, in particular to a hand clamping mechanism. The hand clamping mechanism comprises a T-shaped main fixing plate; the main fixing plate comprises a horizontal part, a longitudinal part, a first fixing plate, a second fixing plate, two symmetrical four-finger clamping part with a cavity for accommodating four fingers; the first fixing plate and the second fixing plate which are symmetrically arranged on the left side and the right side of the horizontal part; and the inner surface of a cavity of a thumb clamping part and the inner surface of the cavity of the four-finger clamping part are provided with flexible compressible layer for providing an interface with high fiction between the mechanism and skin of a patient. The hand clamping mechanism is specially used for thumb fracture traction restoration treatment, can respectively clamp the thumb and the other four fingers and provide different intensities of traction for the thumb and the other four fingers, and the clamping force of the hand clamping mechanism can be adjusted according to the traction force.

127. **104512491** DAMPING MECHANISM OF CRAWLER ROBOT CN - 15.04.2015

Int.Class B62D 55/108 **Appl.No** 201310451749.3 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** JIANG YANG

The invention relates to a damping mechanism of a crawler robot. The damping mechanism comprises a first support swinging rod, a second support swinging rod, a first connecting rod, a second connecting rod and an elastic part, and the robot comprises a robot body, a first bearing wheel, a second bearing wheel and a crawler; the first bearing wheel and the second bearing wheel are meshed with the crawler; one end of the first support swinging rod is connected with the first bearing wheel; one end of the second support swinging rod is connected with the second bearing wheel; the other end of the first support swinging rod is hinged to the other end of the second support swinging rod through a hinge pin; one end of the first connecting rod is fixedly connected with the robot body; one end of the second connecting rod is in transmission connection with one end of the elastic part; the other end of the first connecting rod is hinged to the other end of the second connecting rod through a hinge pin. By adopting the damping mechanism of the crawler robot, damage to the robot body caused by the external impact can be greatly weakened, and the buffer performance is good; the damping mechanism of the crawler robot has a simple structure, is convenient to install, and is low in cost.

128. **104633407** THREE-DEGREE-OF-FREEDOM ROTATING PLATFORM CN - 20.05.2015

Int.Class F16M 11/12 **Appl.No** 201310563004.6 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** BIAN HONGYE

The invention discloses a three-degree-of-freedom rotating platform. The three-degree-of-freedom rotating platform comprises a Z-axis driving module, a Z-axis transmission module, a Y-axis driving module, a Y-axis transmission module, an X-axis driving module, an X-axis transmission module and a base (1) which is used for bearing all the driving modules and the transmission modules, wherein the Z-axis driving module and the Z-axis transmission module are used for driving a rotating platform body (22) to rotate around the Z axis, the Y-axis driving module and the Y-axis transmission module are used for driving the rotating platform body (22) to rotate around the Y axis, and the X-axis driving module and the X-axis transmission module are used for driving the rotating platform body (22) to rotate around the X axis. The X axis, the Y axis and the Z axis are perpendicular to each other in a pairwise mode and are orthogonal at one point as coordinate axes. The three-degree-of-freedom rotating platform has the advantages of being simple in structure, easy to control, and meanwhile capable of meeting the high precision and high efficiency requirements for testing and calibrating of a precise instrument.

129. **105655266** DSP-BASED WAFER ECCENTRICITY ONLINE DETECTION APPARATUS AND METHOD CN - 08.06.2016

Int.Class H01L 21/66 **Appl.No** 201410637193.1 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention relates to the technical field of wafer detection and specifically discloses a DSP-based wafer eccentricity online detection apparatus and method. The online detection apparatus is used for detecting wafer eccentricity and comprises a robot controller, a vacuum manipulator, a first sensor, a second sensor and a working station. The robot controller is connected with the vacuum manipulator; the first sensor and the second sensor are connected with the robot controller, the first sensor and the second sensor are respectively arranged at a front position and a rear position on a transmission path, and the transmission path is a path formed when the vacuum manipulator transmits a wafer to the working station. According to the invention, a method for determining a circle through three points is employed, sensor data is acquired by use of driver IO, the detection time is short, the success rate is high, and such abnormal conditions of wafer damage, severe deviation, wafer dropping on the manipulator and the like can be determined.

130. 105656954 INTELLIGENT COMMUNITY SYSTEM BASED ON INTERNET AND ROBOT

CN - 08.06.2016

Int.Class H04L 29/08 **Appl.No** 201410631576.8 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** DONG ZHUANG

The invention provides an intelligent community system based on Internet and a robot. The system comprises a robot system, a network module and a background service system, wherein the robot system is connected to the network module; and the network module is connected to the background service system through the Internet. The robot system can be taken as a front end to recognize voice and body language of a user accurately, so that the efficient human-machine interaction is realized.

131. 105645156 AUTOMATIC PAPER FEEDING AND CUTTING MECHANISM

CN - 08.06.2016

Int.Class B65H 20/06 **Appl.No** 201410631643.6 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** JIAO NANLIN

The invention relates to the technical field of paper processing, and particularly discloses an automatic paper feeding and cutting mechanism. The automatic paper feeding and cutting mechanism comprises supporting mechanisms (12), a paper feeding mechanism, a paper cutting mechanism and two first pressing mechanisms (3), wherein the paper feeding mechanism comprises a paper tube (1) and a conveyor (2); the paper tube (1), the two first pressing mechanisms (3) and the paper cutting mechanism are arranged between the supporting mechanisms (12) from top to bottom, and the two first pressing mechanisms (3) are close to the paper tube (1) and the paper cutting mechanism correspondingly; the conveyor (2) and the two first pressing mechanisms (3) are arranged on the supporting mechanisms (12) in parallel, and the conveyor (2) is located between the paper tube (1) and the paper cutting mechanism. According to the automatic paper feeding and cutting mechanism, the transmission mode of paper feeding is changed on the basis of an original paper feeding mechanism, so that paper feeding stability is greatly improved; meanwhile, the cutting mode of paper is changed, so that the cutting speed is higher, cuts can be orderly more easily, and the cutting speed is increased.

132. 204314003 MAGNETIC ATTRACTION FORCE MEASUREMENT DEVICE

CN - 06.05.2015

Int.Class G01L 5/00 **Appl.No** 201520013425.6 **Applicant** SHANGHAI SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** YANG LI

The utility model provides a magnetic attraction force measurement device for measuring the magnetic attraction force of a wall climbing robot. The magnetic attraction force measurement device is characterized by comprising a frame body, a motor, a lifting mechanism, a magnet module, a supporting

plate, a tension sensor and a concentrating flux plate, wherein the frame body is provided with an upper layer part and a lower layer part; the motor is fixed in the lower layer part; one end of the lifting mechanism is fixed in the lower layer part and connected with the motor, and the other end is arranged in the upper layer part; the magnet module is fixed with one end, arranged in the upper layer part, of the lifting mechanism; the supporting plate is fixed at the top part of the upper layer part; the tension sensor is fixed at one side, facing the magnet module, of the supporting plate; and the concentrating flux plate is fixed at one side, facing the magnet module, of the tension sensor, and is opposite to the magnet module.

133. **205591852** ANVIL WORKER DEFLECTION MECHANISM CN - 21.09.2016

Int.Class E21B 19/16 **Appl.No** 201620417309.5 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI YANSHENG

The utility model relates to a well equipment is repaiied to the oil, and specifically speaking is an anvil worker deflection mechanism, including lifing arm, deflect hydro -cylinder and slider, be connected with the lifing arm respectively in the both sides of anvil worker main arm, be equipped with the pincers body between the lifing arm of both sides, the lifing arm includes an outer arm section of thick bamboo, an inner arm section of thick bamboo and lifing arm hydro -cylinder, and an outer arm section of thick bamboo is installed on anvil worker main arm, and inner arm section of thick bamboo nestification is in an outer arm section of thick bamboo, and lifing arm hydro -cylinder holding is in an inner arm section of thick bamboo, and the jar pole links to each other with an inner arm section of thick bamboo, the deflect surface of in the lifing arm of a hydro -cylinder installation one side in office outer arm section of thick bamboo, installation deflect in the lifing arm of hydro -cylinder one side the cylinder of lifing arm hydro -cylinder to be passed through the slider and is connected with the hydro -cylinder that deflects, and the cylinder of lifing arm hydro -cylinder is installed on the outer arm section of thick bamboo that inclines in the opposite side lifing arm, the inner arm section of thick bamboo lower extreme of both sides lifing arm is connected with the both sides of the pincers body respectively. The utility model discloses a lifing arm hydro -cylinder is realized the level of the pincers body and is gone up and down, realizes through the hydro -cylinder that deflects that the whole of the pincers body deflects, has realized that the anvil worker breaks out on little rat hole.

134. **106612083** MOTOR ROTOR INITIAL POSITION AND MOTOR ROTOR POSITION DETECTION METHODS AND DEVICES CN - 03.05.2017

Int.Class H02P 6/16 **Appl.No** 201510684653.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI YING

The invention relates to the technical field of motors, and particularly relates to a motor rotor initial position detection method and a motor rotor initial position detection device. The motor rotor initial position detection method of the invention comprises the following steps: determining the angle range of the N or S pole of a motor rotor according to the motor rotor detection result of a Hall sensor; calculating the median of the angle range; and setting the median of the angle range as the initial position of the motor rotor. By using the method and the device of the invention, the initial position of a motor rotor can be estimated without motor running. Furthermore, the position of the motor rotor can be calculated. By providing the accurate initial position of a motor rotor, the accuracy of motor control is improved, and normal operation of the motor is ensured.

135. **106598042** CLEANING ROBOT, GARBAGE GATHERING STATION AND CLEANING SYSTEM CN - 26.04.2017

Int.Class G05D 1/02 **Appl.No** 102015000685599 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention discloses a cleaning robot, garbage gathering station and cleaning system. The cleaning robot comprises a fan, a storage box, a detector, a processor, a mobile apparatus and a docking assisting component wherein the fan is used to absorb the external garbage into the storage box. The detector

is arranged at the garbage inlet part of the storage box to detect whether the garbage inside the storage box reaches the garbage inlet part or not. The processor is used to control the mobile apparatus to move the cleaning robot to the garbage gathering station when the detector detects that the garbage reaches the garbage inlet and further to control the docking assisting component to realize the docking of the storage box with the garbage gathering station so that the garbage gathering station gathers the garbage in the storage box. With the above method, it is possible to automatically clean and automatically dump garbage, therefore, saving the manual cost and increasing the user's use experience.

136. **206967011** DRUM BRAKE JUMP RING AUTOMATIC ASSEMBLY MANIPULATOR CN - 06.02.2018

Int.Class B23P 19/04 **Appl.No** 201720651453.X **Applicant** HANGZHOU SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI ZHENGGANG

The utility model discloses a drum brake jump ring automatic assembly manipulator, including a vertical fixing bottom plate and the 2nd vertical fixing bottom plate, it moves electric jar to be equipped with on the vertical fixing bottom plate to indulge, it is connected with a fixed cross beam to indulge the output that moves electric jar, it is vice to be equipped with linear slide rail on the 2nd vertical fixing bottom plate, the vice sliding connection that goes up of linear slide rail has the fixed cross beam backup pad, the fixed cross beam backup pad links firmly with fixed cross beam,the last sideslip electricity jar that is equipped with of fixed cross beam, the output of sideslip electricity jar even has the cross slide, be equipped with electric jar on the cross slide, the output of electric jar of going up and down even there is mechanical cell -phone core, indulge and move electric jar, sideslip electricity jar, the electric jar that goes up and down is connected in a PLCcontrol system. The utility model discloses can improve drum brake jump ring assembly automation level, the optimized operation mode improves production efficiency, guarantees product uniformity andsecurity.

137. **107536598** BINOCULAR VISION PUPIL LOCATION METHOD AND RELATED DEVICE CN - 05.01.2018

Int.Class A61B 3/15 **Appl.No** 201610494266.5 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention provides a binocular vision pupil location method and a related device. Image processing and binocular vision technologies are used to locate in real time. Combined with an adjusting unit, acquisition devices on various ophthalmological apparatuses can realize to automatically align at a pupil position, to obtain eye special indexes. Manual intervention is not needed in a whole process. Ophthalmological examination equipment combined with the platform do not need to configure special equipment operation personnel, so use cost is greatly reduced.

138. **103802099** MANIPULATOR MECHANISM CN - 21.05.2014

Int.Class B25J 9/08 **Appl.No** 201210445438.1 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention provides a manipulator mechanism. The manipulator mechanism comprises a base and two mechanical arms which are connected to the base, wherein a first shaft, a second shaft and a third shaft, which are sequentially and coaxially nested from inside to outside, are arranged on the base and are driven to rotate by three motors respectively; the second shaft is fixedly connected with the two mechanical arms; the first shaft is fixedly connected with a first fixed belt pulley; the third shaft is fixedly connected with a second fixed belt pulley; the first fixed belt pulley is in transmission connection with a movable driving mechanism of one of the mechanical arms; the second fixed belt pulley is in transmission connection with a movable driving mechanism of the other mechanical arm. The manipulator mechanism has a small turning radius and is high in utilization rate of a horizontal space. The three shafts are driven to relatively rotate in different combination ways, so that the two mechanical arms are driven to simultaneously rotate or either mechanical arm is

driven to be in coupled motion, a series of actions such as grabbing a load, changing a telescoping angle and sending out the load in a narrow space can be achieved, and layout of a horizontal operation space of the manipulator mechanism is further optimized.

139. **104512732** UPPER END SUPPORT AND GUIDING STRUCTURE FOR STAND COLUMNS OF STOCKER CN - 15.04.2015

Int.Class B65G 57/00 **Appl.No** 201310451718.8 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU ZHENGHUI

The invention relates to the technical field of stockers, and particularly discloses a stocker stand column structure, which includes two stand columns, a beam support connecting the upper ends of the stand columns, and a beam arranged on the beam support, and is characterized in that the stocker stand column structure also includes at least one fixed guide pulley structure and at least one adjustable guide pulley structure respectively installed on the opposite sides of the beam support. The stocker stand column structure provided by the invention can achieve the guiding effect when the stocker moves horizontally much safer, reduce swing and shale, and achieve simplified structure.

140. **104476305** MANIPULATOR CN - 01.04.2015

Int.Class B23Q 7/04 **Appl.No** 201410632145.3 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention provides a manipulator. The manipulator comprises a mounting base, a first driving mechanism, a large arm, a second driving mechanism, a small arm, a triangular connecting rod, a connecting piece, a small arm connecting rod and a large arm connecting rod; the first driving mechanism is connected with one end of the large arm; the first driving mechanism is used for driving the large arm to rotate; the second driving mechanism is mounted on the large arm and at the end far away from the first driving mechanism; the second driving mechanism is connected with one end of the small arm; the second driving mechanism is used for driving the small arm to rotate. According to the manipulator, the large arm and the small arm rotatably connected with the large arm are arranged on the mounting base, and meanwhile, the rotatable large arm connecting rod, the triangular connecting rod rotatably connected with the large arm connecting rod, the small arm connecting rod rotatably connected with the triangular connecting rod and the connecting piece connected with the small arm connecting rod and the small arm are arranged on the mounting base, and therefore, the mechanical strength of the manipulator is effectively enhanced. The manipulator is few in parts, relatively simple in structure, and capable of realizing the function of shifting workpieces by driving the large arm and the small arm to rotate by use of the driving mechanisms.

141. **104440060** SCREW GRABBING MECHANISM AND SCREW ASSEMBLING ROBOT INCLUDING SAME CN - 25.03.2015

Int.Class B23P 19/06 **Appl.No** 201410632143.4 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention provides a screw grabbing mechanism. The screw grabbing mechanism comprises a mounting plate, an inner barrel, a connecting outer barrel, balls, a screwing device, a buffer coupling, a screw sleeve and a driving device. According to the screw grabbing mechanism, the driving device can push the connecting outer barrel to make up-down movement relative to the inner barrel, hence, the inner wall of a ball groove can push the ball to conduct locking or external loosening in the direction of the screw sleeve, locking or external loosening is matched with the extrusion to the buffer coupling after a screw enters the inner barrel and the elasticity of the buffer coupling to the screw, and thus the locking grabbing function and the loosening function on the screw are achieved. By means of the screw grabbing mechanism, screw grabbing operation and screwing operation are continuously achieved on the same equipment, in the operation, the screw sleeve is matched with a nut all the time, the situation that the nut cannot be identified accurately in the screwing

process after the screw is placed into a threaded hole is avoided, deviation caused by screwing the screw can be reduced, and the yield of products is improved. In addition, the invention further provides a screw assembling robot including the screw grabbing mechanism.

142. **104626152** ACTIVE COMPLIANT CONTROL METHOD AND DEVICE OF INDUSTRIAL ROBOT CN - 20.05.2015

Int.Class B25J 9/18 **Appl.No** 201310576599.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** SONG JILAI

The invention discloses an active compliant control method of an industrial robot. The method comprises the steps that S1, a track planning module plans a motion track; S2, a kinematic calculation module carries out kinematic decoupling calculation; S3, a motor driving module achieves the kinematic decoupling result; S4, a position and speed detection module detects the actual position and speed; S5, a gravity term calibration module carries out gravity calibration; S6, a dynamic calculation module carries out dynamic term calculation; S7, a force information collection module collects force information between the tail end of a tool and a workpiece; S8, a force information compensation module carries out compensation; S9, a force/position control mode switching module obtains compensation value loading; S10, a damping characteristic conversion module carries out damping linear conversion; S11, a Jacobi conversion module obtains the angular speed of all joints. According to the technical scheme, the corresponding speed of the system is improved, a mode of selecting the matrix is adopted to carry out position control and force control switching on the industrial robot in all directions, and conversion of the force/position control mode becomes simple, convenient and rapid.

143. **104625676** SHAFT HOLE ASSEMBLY INDUSTRIAL ROBOT SYSTEM AND WORKING METHOD THEREOF CN - 20.05.2015

Int.Class B23P 19/00 **Appl.No** 201310578100.8 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention provides a shaft hole assembly industrial robot system which comprises an industrial robot, a shaft hole assembly platform, a force sense sensor, a clamping device, an assembly workpiece, an assembly hole and an assembly shaft. The shaft hole assembly industrial robot system can accurately control contact force and has the obvious advantages for assembly operation with the strict requirements for the small shaft hole interval, high accuracy and shaft hole contact force, the situation that assembly operation fails and even the assembly workpiece is damaged due to the fact that position control accuracy and contact force are not controllable in a position control mode is avoided, the problems of low efficiency and quality and the like caused by manual assembly in certain high-accuracy assembly operation are solved, and the application fields of the shaft hole assembly industrial robot are expanded.

144. **104635718** ROBOT FAULT REPAIRING SYSTEM AND METHOD CN - 20.05.2015

Int.Class G05B 23/02 **Appl.No** 201310562311.2 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention provides a robot fault repairing system and method. The robot fault repairing method is characterized in that a fault detecting module detects the faults of a drive module, an information collecting module and a motion control module and transmits the fault information to a fault processing module, the fault processing module analyzes the faults and judges whether the faults can be self-repaired or not, a fault communication module receives the judging result of the fault processing module and transmits the judging result to a master control module, and the master control module executes fault repair according to the judging result. The robot fault repairing method has the advantages that whether the robot faults can be self-repaired or not are

effectively judged, automatic repairing of the faults is performed, robot intelligence and automation level is increased, workload of robot later maintenance and after-sale technical support, and good market and economic benefits are achieved.

145. **104635649** CLEAN STACK MACHINE CONTROL SYSTEM CN - 20.05.2015

Int.Class G05B 19/418 **Appl.No** 201310564392.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention relates to the field of stack machines, in particular to a clean stack machine control system. The clean stack machine control system comprises an embedded 104 control module, a communication conversion module, a first 2-axis analog quantity control bit control module, a second 2-axis analog quantity control bit control module and an IO module which are sequentially connected, wherein the first 2-axis analog quantity control bit control module or the second 2-axis analog quantity control bit control module is connected to a servo drive module, and the embedded 104 control module is loaded with an embedded Linux operating system. The clean stack machine control system has the advantages that positioning precision is increased while size is reduced, the expansion performance of the system is identical with that of a PLC, and expansion can be performed according to axis number increasing.

146. **105651314** BUMP DETECTION APPARATUS, BUMP DETECTION METHOD, AND ROBOT APPLYING THE APPARATUS CN - 08.06.2016

Int.Class G01D 5/12 **Appl.No** 201410631509.6 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZHU HONGBIAO

The invention provides a robot bump detection apparatus. The apparatus comprises a robot body, and an elastic bump mechanism, a conductive mechanism, a circuit induction mechanism and a control mechanism which are arranged outside the robot body. The elastic bump mechanism is annularly fixed at the periphery of the robot body, is designed in the shape of a U-shaped groove, and is used for extruding the conductive mechanism after bumping into an external object. The conductive mechanism is used for contact with the circuit induction mechanism after receiving extrusion from the elastic bump mechanism. The circuit induction mechanism is used for contact with the conductive mechanism and generating short-circuit signals. The control mechanism is used for receiving the short-circuit signals generated by the conductive mechanism so as to control the robot body to stop after retreating a certain distance according to a reverse direction of previous movement. The robot bump detection apparatus has the advantages of high reliability, fast response speed and the like.

147. **105643657** DRIVING JOINT CN - 08.06.2016

Int.Class B25J 17/02 **Appl.No** 201410632175.4 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** HE YUANYI

A driving joint comprises a transmission shaft, a speed reducer, a power device, a brake and a position sensor, wherein the transmission shaft, the speed reducer, the power device, the brake and the position sensor are all of a hollow structure. The speed reducer, the power device, the brake and the position sensor are sequentially and fixedly arranged on the transmission shaft in a sleeving mode. The power device drives the transmission shaft to rotate. According to the driving joint, the power device drives the transmission shaft to rotate, so that the speed reducer, the brake and the position sensor are driven to rotate jointly, and thus the driving joint can provide driving force for the outside. Cables of all the components and parts are gathered in the transmission shaft and connected to the outside through the tail end of the driving joint. While the requirement that the driving joint is hollow is met, the structure is compact, the space can be utilized sufficiently, and the actual dimension of the driving joint of a robot is decreased, so that the flexibility of the

robot is improved, and the movement range and the movement space of the robot are widened. In addition, the probability that the tail end of an arm is externally connected with the cables is achieved.

148. **205652543** BE APPLIED TO ELECTRIC POWER INDUSTRY STORAGE LOGISTICS SYSTEM'S TRAY CN - 19.10.2016

Int.Class B65D 19/26 **Appl.No** 201620475264.7 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** HAN FENG

The utility model belongs to the technical field of electric power industry automated storage logistics system and specifically relates to a be applied to electric power industry storage logistics system's tray, including tray loading end, tray bearing surface and tray landing leg, wherein the carton is placed on the tray loading end, the length L1 of tray loading end is the same with width L2 be equipped with the steel pipe in the tray loading end, tray loading end below is equipped with multiseriate tray landing leg, and every tray landing leg below that is listed as all is equipped with the tray bearing surface be equipped with the steel pipe in the tray bearing surface. The utility model discloses reduced that carton action time is drawn to the robot pile up neatly and the individual layer carton is torn open, pile up neatly action time to set up a plurality of steel pipes inside the tray, guarantee that the tray bears reliably.

149. **106594454** FLUID PIPELINE DREDGING ROBOT CN - 26.04.2017

Int.Class F16L 55/32 **Appl.No** 201510679048.4 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** MA ZHUANG

The invention provides a fluid pipeline dredging robot which comprises a detachable robot shell, a driving component and a control source. The robot shell is provided with spiral protrusions and spiral grooves. The driving component is arranged inside the robot shell. The control source is used for providing power. The driving component is driven by the control source to move, so that the robot is driven to move forwards rotationally. According to the fluid pipeline dredging robot, the driving component is adopted to drive the robot, the robot shell with the spiral protrusions provides driving force, the robot moves forwards or backwards rotationally, streamline-shaped spherical covers are installed at the two ends of the robot, and advancing resistance can be reduced. The fluid pipeline dredging robot is simple in structure and convenient to operate, the conveying efficiency of a pipeline can be improved, the replacement frequency is decreased, cost is low, and maintenance is convenient.

150. **106612016** FLOOR SWEEPING ROBOT, INTELLIGENT FLOOR SWEEPING ROBOT SYSTEM AND CONTROL METHOD THEREOF CN - 03.05.2017

Int.Class H02J 50/90 **Appl.No** 201510689102.3 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** GAO YUCONG

The invention provides a floor sweeping robot which comprise a robot body and a wireless charging unit. The wireless charging unit charges a rechargeable battery in the robot body when the electric quantity of the rechargeable battery is too low. The invention also provides an intelligent floor sweeping robot system which comprises the floor sweeping robot and a wireless charger, and the floor sweeping robot and the wireless charger cooperate to realize wireless charging. In addition, the invention further provides a control method of the system. The floor sweeping robot uses wireless charging, is smaller in size, can control movement and induction positions automatically needless of butt joint of metal contacts, and is convenient, safe and reliable.

151. **103802113** INDUSTRIAL ROBOT ROUTE PLANNING METHOD BASED ON TASK AND SPLINE CN - 21.05.2014

Int.Class B25J 13/00 **Appl.No** 201210442709.8 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention discloses an industrial robot route planning method based on a task and a spline. The method comprises a robot controller, a kinematics module, a task module and a track planner, wherein the kinematics module, the task module and the track planner input information to the controller. The method comprises the following steps of S1, establishing a kinematics module of the industrial robot, and solving the forward and reverse kinematics of the industrial robot; S2, transmitting position information and gesture information of a task point of the industrial robot through the task module; S3, giving a route planning curve based on the spline through the track planner and the task module of the industrial robot; S4, acquiring the information of a joint space according to the given route curve and the forward and reverse kinematics, and transmitting the information to a drive device of the industrial robot through the track planner of the industrial robot. By adopting the technical scheme, not only can the problem that the industrial robot passes through multiple intermediate gestures in the application be solved, but also no jerking movement in acceleration of the industrial robot can be guaranteed.

152. **104516314** SIMULATION PLC SYSTEM AND CONTROL METHOD BASED ON MACHINE TOOL LOADING AND UNLOADING CN - 15.04.2015

Int.Class G05B 19/414 **Appl.No** 201310451887.1 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention belongs to the automatic production equipment technical field, and specifically discloses a simulation PLC system and control method based on machine tool loading and unloading; the system comprises an industrial control computer simulating a CPU of a PLC, an outer expansion I/O module simulating an I/O of the PLC, and an external power supply module simulating a PLC power supply; the industrial control computer simulating the CPU of the PLC is respectively connected with the outer expansion I/O module simulating the I/O of the PLC and the external power supply module simulating the PLC power supply. The system employs visualization logic to edit loading and unloading scheduling, and a user can simply and fast set the scheduling logic of the machine tool loading and unloading system according to an I/O table and the loading and unloading technology; the system has high scalability, and can add external I/O module to expand system periphery equipment; the scheduling logic can be set, so the loading and unloading system can support a plurality of processing technologies; the control method is simple and easy to operate, and solves the problems that a single PLC is complex in control logic, and poor in scalability.

153. **104512492** CRAWLER BELT SWING ARM AND TENSIONING DEVICE THEREOF CN - 15.04.2015

Int.Class B62D 55/30 **Appl.No** 201310452128.7 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** WANG WENZHAO

The invention relates to a swing arm mechanism of a crawler and particularly relates to a crawler belt swing arm and a tensioning device of the crawler belt swing arm. The crawler belt swing arm comprises an inside bull wheel, a crawler belt, an outside bull wheel, a swing arm, an outside pony wheel, an inside pony wheel and the tensioning device; the tensioning device is mainly composed of a tensioning strip, a swing bearing pedestal, a swing supporting shaft and tensioning bolts; a U-shaped groove is formed in one end of the swing arm; the direction of a notch of the U-shaped groove is outward along the direction of the main shaft of the swing arm; the tensioning strip is installed on the swing arm and is close to the U-shaped groove; the tensioning bolts are connected into screw holes in the tensioning strip through threads. According to the invention, the meshing degree between the crawler belt and a belt wheel is changed, and great convenience is brought to the installation and detachment of the crawler belt.

154. **104510553** HAND CLAMPING MECHANISM AND TRACTION DEVICE CN - 15.04.2015

Int.Class A61F 5/045 **Appl.No** 201310451657.5 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZHANG PENG

The invention relates to the technical field of medical instruments for fracture traction restoration, in particular to a hand clamping mechanism. The hand clamping mechanism comprises a rigid clamping main body; the clamping main body is provided with a cavity and an opening; a hand of a patient can pass through the opening and then enter the cavity; the inner surface of the cavity is provided with a flexible compressible layer for providing an interface with high friction between the mechanism and skin of the patient, so that the hand of the patient can be prevented from sliding in the cavity under the action of the traction. The invention also provides a traction device with the hand clamping mechanism. The hand clamping mechanism can adjust the hand clamping force according to the traction force; and the damage to damage to the hand is minimized in the flexible contact manner.

155. **104634201** DRILLING AND BLASTING ROBOT CN - 20.05.2015

Int.Class F42D 3/04 **Appl.No** 201310578211.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZHENG CHUNHUI

A drilling and blasting robot comprises a vehicle body, running devices, a power device, a drilling device, a drill boom, an actuator containing box, an explosive charging device, a plugging device, actuator replacing devices, a driving device, an electric device, a wireless communication device and a remote control device. The drilling and blasting robot has the functions of hole drilling, explosive charging and drill hole plugging, integrates drilling and blasting, and is capable of completing the actions, namely hole drilling, explosive charging and plugging through controlling the remote control device in a remote distance, so that the potential safety hazard and harm to personnel and equipment in emergency rescue work such as road clearing through blasting and flood discharge for a barrier lake through blasting after occurrence of a geological disaster are fundamentally eliminated, and the work efficiency is effectively enhanced.

156. **104635651** MULTIFUNCTIONAL PROGRAMMING DEMONSTRATION BOX CN - 20.05.2015

Int.Class G05B 19/418 **Appl.No** 201310567064.5 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention discloses a multifunctional programming demonstration box comprising a camera module, a wireless communication module, a microphone module, an audio output module, a USB (universal serial bus) interface module, a keyboard module, a display module and a central processing unit. The camera module is used for shooting. The wireless communication module is used for wireless communication. The microphone module is used for entering voices. The audio output module is used for outputting audio. The USB interface module is used for data interaction. The keyboard module is used for entering control information. The display module is used for displaying. The camera module, the wireless communication module, the microphone module, the audio output module, the USB interface module, the keyboard module and the display module are connected with the central processing unit. The functions such as shooting function, the call function and the Bluetooth function are added to the existing robotic demonstration box, the functionality of the box is greatly enhanced, the more needs of users are met, and the box has good marketing and application prospect.

157. **104626141** INDUSTRIAL ROBOT WITH PARALLEL FOUR-BAR MECHANISM CN - 20.05.2015

Int.Class B25J 9/10 **Appl.No** 201310567312.6 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI XUEWEI

The invention relates to the technical field of industrial robots and provides an industrial robot with a parallel four-bar mechanism. The industrial robot with the parallel four-bar mechanism comprises a base (1), a waist base (2), a drive device, a big arm (5), a forearm (6), a first connecting rod (7), a second connecting rod (8) and a third connecting rod (9). A first additional rotating joint (10) is installed between the first connecting rod (7) and the second connecting rod (8). A second additional rotating joint (11) is installed between the second connecting rod (8) and the third connecting rod (9). A third additional rotating joint (12) is installed between the third connecting rod (9) and the forearm (6). The big arm (5), the forearm (6), the first connecting rod (7), the second connecting rod (8), the third connecting rod (9), the first additional rotating joint (10), the second additional rotating joint (11) and the third additional rotating joint (12) form the parallel four-bar mechanism. The industrial robot with the parallel four-bar mechanism can compensate for non-parallelism of the connecting rods and prevents the mechanism from being stuck.

158. 105703803 ROBOT COMMUNICATION SYSTEM BASED ON ELECTRIC POWER CARRIER WAVE TECHNOLOGY AND METHOD

CN - 22.06.2016

Int.Class H04B 3/56 **Appl.No** 201410697813.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention relates to a robot communication system based on the electric power carrier wave technology and a method. The system comprises a robot, an electric power wire and an electric power carrier wave transformation device, wherein the robot is used for converting a signal source output signal needing transmission into a standard signal, the electric power wire is used for transmitting the signal in a carrier wave mode, the electric power carrier wave transformation device is connected with the robot and is used for receiving the standard signal sent by the robot, the standard signal is modulated at a high frequency carrier wave signal and is then emitted to the electric power wire for transmission, the electric power carrier wave transformation device is further used for filtering the high frequency modulation signal transmitted through the electric power wire from an electric line, and the frequency signal is demodulated into a voltage signal which is sent to a robot controller for remote control. Through the system and the method, use cost of the cable material and maintenance fee in a traditional cable communication mode are saved, and use reliability of the equipment is improved.

159. 105643627 GAIN ADJUSTMENT DEVICE AND METHOD FOR ROBOT MOTION CONTROL

CN - 08.06.2016

Int.Class B25J 9/18 **Appl.No** 201410637185.7 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention relates to a gain adjustment device and method for robot motion control. The gain adjustment device comprises a demonstration teaching device, a control device, a drive device, a motor and a robot, wherein the demonstration teaching device is used for carrying out demonstration teaching operation on the robot; the control device is used for transferring a motion command to the drive device; the drive device is used for completing identification of load inertia according to the motion command, and making load gain adjustment, so that driving for the motor is completed according to the adjusted gain parameters; and the motor is used for controlling the robot to move. For classical robot motion (such as transport work and the like), the invention designs inertia identification and gain adjustment method applied to the robot motion control; and the inertia identification and gain adjustment method can identify inertia of each axle according to an abrupt load change condition in a motion process, so that the gain of each axle is regulated, and the performance of controlling the robot is improved.

160. **106584486** VOICE RECOGNITION BASED INDUSTRIAL ROBOT CONTROL SYSTEM AND METHOD CN - 26.04.2017

Int.Class B25J 13/00 **Appl.No** 201510684694.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention relates to a voice recognition based industrial robot control system and method. The system comprises an RC master controller module, a voice recognition, collection and processing module and a driver module, and the voice recognition, collection and processing module and the driver module are connected with the RC master controller module. The voice recognition, collection and processing module is used for recognizing, judging and collecting voices. The RC master controller module is used for comprehensively analyzing collected voice information, generating a control command and sending the control command to the driver module. Voice recognition and judgment on the voices of people are achieved through the RC master controller module and the voice recognition, collection and processing module, an industrial robot is controlled to complete corresponding robot commands, high intelligentization and real man-machine interaction except for buttons of the robot are achieved, and the production cost of the industrial robot is effectively reduced.

161. **106610665** GPS-BASED AUTONOMOUS TRAVELING ROBOT CN - 03.05.2017

Int.Class G05D 1/02 **Appl.No** 201510689068.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention provides a GPS-based autonomous traveling robot which comprises a navigator, a robot controller, a motor driver and a motor. The navigator is used for guiding directions, planning routes and exchanging information with the outside. The robot controller is used for receiving a command transmitted by the navigator, and transmitting control information to the motor driver according to the command transmitted by the navigator. The motor driver is used for receiving the control information transmitted by the robot controller and communicating with the motor to control the motor to rotate. The motor is used for driving the robot to travel. According to the GPS-based autonomous traveling robot provided by the invention, the robot controller receives the command transmitted by the navigator and controls the motor driver to travel according to the command transmitted by the navigator; the travelling command to reach a destination is issued through the navigator on the robot; and the navigator calculates the best path to reach the destination, and transmits a travelling or steering command to the robot controller to control the robot to travel to the destination.

162. **107562063** SELF-BALANCE ROBOT ATTITUDE CONTROL METHOD AND SYSTEM CN - 09.01.2018

Int.Class G05D 1/08 **Appl.No** 201610499384.5 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

A self-balance robot attitude control method comprises the following steps: a self-balance robot rectifies the center of gravity, and is powered for operation; the self-balance robot initializes system modules; the self-balance robot drives a motor to run; the self-balance robot uses a sensor and a filter to detect the robot attitude inclination angle; the self-balance robot determines whether therobot is in balance or not; the self-balance robot determines to stop or not; the self-balance robot PID attitude controller determines whether to adjust PID parameters or not. The invention also provides a self-balance robot attitude control system comprising a main control module, a motor driven module, a sensor module, a parameter adjusting module and a filter module; the advantages are that the method and system can control the attitudes of the two-wheel self-balance robot with the fixed center of gravity, and can change PID parameters without cutting off power so as to realize the optimal control effect.

163. **107538193** MULTISTATION MANIPULATOR SYSTEM CN - 05.01.2018

Int.Class B23P 19/00 **Appl.No** 201610462863.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention provides a multistation manipulator system comprising a support platform used for supporting at least two stations, a conveyor installed on the support platform and used for conveying workpieces to stations, pallets located on the conveyor and used for carrying the workpieces, and a jacking device installed on the support platform and used for enabling the workpieces on the pallets to enter the stations; spacing for the pallets to pass through is provided between the conveyer and a plane where the workpieces are locate; when the system is in a first state, the pallets are drivenby the jacking device to move to the stations so that the workpieces are placed on the stations; and when the system is in a second state, the pallets are driven by the jacking device to move away from the stations so that the workpieces leave the stations. According to the system, the requirements for operation frequency of manipulators are not high, and the working stability can be improved; andthe system fault tolerance and redundancy are high, and the whole system can still run properly in case a part of manipulators are failed.

164. 107539163 DRIVING DEVICE, DIAGONAL WHEEL DEVICE AND MOTION CONTROL METHOD OF DIAGONAL WHEEL DEVICE

CN - 05.01.2018

Int.Class B60L 15/20 **Appl.No** 201610473526.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention discloses a driving device, a diagonal wheel device and a motion control method of the diagonal wheel device. The diagonal wheel device is on a rectangular motion platform. Two positionson one diagonal are provided with driving wheels with steering motors and driving motors, and follower wheels are installed at two positions on the other diagonal. The control method comprises the following steps that steering of the steering motors and rotating speed of the driving motors at the two positions are controlled by a controller correspondingly so as to control the direction and the wheel speed of the corresponding driving wheels through the steering motors and the driving motors, so that the motion platform is driven to move. By means of the above method, quality distribution canbe coordinated, and a variety of driving control modes are achieved.

165. 104635653 CLEAN VACUUM TRANSMISSION SYSTEM AND CONTROLLER THEREOF

CN - 20.05.2015

Int.Class G05B 19/418 **Appl.No** 201310567349.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention provides a clean vacuum transmission system and a controller thereof. The clean vacuum transmission system controller comprises an IRC main controller, a pulse plate, a user IO board and a system IO board which are sequentially connected through a CAN bus. The clean vacuum transmission system comprises the clean vacuum transmission system controller, an IPC upper computer, vacuum equipment, a vacuum gauge, a heating system, a pump system, a system IO interface board, a user IO interface board, a deviation correcting sensor and a drive system. The clean vacuum transmission system and the controller thereof have the advantages that a bulky medium-sized programmable logic controller is replaced by the controller, expansion performance and operation speed are guaranteed, equality size is reduced greatly at the same time, and weight is reduced.

166. 104626163 INTEGRAL CONTROL SYSTEM OF MECHANICAL ARM IN ORTHOPEDIC DEPARTMENT

CN - 20.05.2015

Int.Class B25J 13/00 **Appl.No** 201310576626.2 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention discloses an integral control system of a mechanical arm in the orthopedic department. A DSP core control board serves as a core control portion, and receives a touch screen signal; the DSP core control board controls a traction mechanism rotary motion module and a traction mechanism linear motion module to rotate; the DSP core control board controls a force control module and is used for achieving traction and pulling. Motor three-loop control is applied, and a traction mechanism rotary motion portion motor and a traction mechanism linear motion portion motor are achieved. A micro type air pump and an air cylinder are applied to providing a power source, the opening degree of an air valve is controlled through voltage, and force control is achieved. In the traditional orthopaedic correction process, traction and pulling of an arm of a patient are achieved, and a doctor responsible for traction and pulling in the traditional orthopaedic operation process can be omitted. The advanced control technology is utilized, so that the control precision of the mechanical arm is much larger than that of a human hand. The mechanical arm can replace the doctor responsible for pulling in the bonesetting therapy process to complete all work, and the mechanical arm can stably and reliably run.

167. 104626175 HUGGING TYPE BOX CLAMPING MECHANISM

CN - 20.05.2015

Int.Class B25J 15/08 **Appl.No** 201310564394.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention relates to clamping mechanisms, in particular to hugging type box clamping mechanism. The hugging type box clamping mechanism comprises a semi-closed annular frame (1), two finger swing rods (3) connected to the two front ends of the semi-closed annular frame (1) respectively and two electric push rods (6) which are connected to the finger swing rods (3) respectively so as to operate the finger swing rods (3) to swing inwards and outwards. The hugging type box clamping mechanism is compact in structure, large in clamping size and stable in clamping.

168. 104635654 LOADPORT CONTROL SYSTEM

CN - 20.05.2015

Int.Class G05B 19/418 **Appl.No** 201310567592.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention provides a loadport control system. The loadport control system comprises a high-speed signal acquisition module, a sensor interface module, a main control logical module, a low-speed IO (input and output) control module, a central processing module and an upper communication module. The loadport control system integrating control interfaces of a grating ruler, a MAPPING sensor, optical communication sensors, an RFID (radio frequency identification) sensor, an electromagnetic valve and a photoelectric sensor is capable of enabling the upper controller to control a loadport in a centralized manner via a main control bus without addition of any external resource. Compared with a loadport control system in an existing scheme, the loadport control system has the advantages that a great quantity of cost and space are saved greatly, and a control framework of a silicon chip production system is simpler and more practical.

169. 104635657 AUTOMATIC LOGISTICS STORAGE GOODS LOCATION STATE ACQUISITION SYSTEM

CN - 20.05.2015

Int.Class G05B 19/418 **Appl.No** 201310578157.8 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention provides an automatic logistics storage goods location state acquisition system which comprises sensors, six-channel signal acquisition modules, a T-shaped compression joint dividers, branch lines, trunk lines, a warehouse keeper PC (personal computer), a robot controller, a goods location connection plate and a direct-current power source. The sensors are connected with the six-channel signal acquisition modules; the six-channel signal acquisition modules are compressed into the branch lines by the T-shaped compression joint dividers; the branch lines are connected into the trunk lines by

the T-shaped compression joint dividers; the trunk lines are connected with the goods location connection plate, and the goods location connection plate is connected with the direct-current power source and the robot controller; the robot controller is connected with the warehouse keeper PC.

170. **102538650** NANOSCALE MICRO-DISPLACEMENT MEASUREMENT DEVICE CN - 04.07.2012

Int.Class G01B 7/02 **Appl.No** 201010611080.6 **Applicant** Shenyang Siasun Robot & Automation Co.,Ltd. **Inventor** Xu Fang

The invention relates to a nanoscale micro-displacement measurement device. The nanoscale micro-displacement measurement device comprises a time sequence and charging circuit, a sensing circuit, an integration and amplification circuit, a differential sampling circuit and a filter circuit which are sequentially connected with each other, wherein the time sequence and charging circuit produces charging impulses required by the sensing circuit and time sequence signals required by the differential sampling circuit; the sensing circuit receives a micro-displacement signal and outputs the corresponding micro current signal to the integration and amplification circuit; the integration and amplification circuit receives the micro current signal and outputs a voltage signal to the differential sampling circuit; and the differential sampling circuit performs differential processing on the voltage signal input by the integration and amplification circuit; and the filter circuit performs filtering processing on the signal subjected to differential processing to obtain a final detection signal. The nanoscale micro-displacement measurement can be realized by a small measurement mechanism, and the nanoscale micro-displacement measurement device is simple in structure, low in cost, stable in performance and high in sensitivity.

171. **103802109** AUXILIARY ROBOT CN - 21.05.2014

Int.Class B25J 11/00 **Appl.No** 201210442579.8 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** CHU MINGJIE

The invention discloses an auxiliary robot, which comprises a data processing unit, a storage unit, a moving unit, an ascending and descending unit, a first motor, a second motor, a voice interaction unit, a first detection unit, a second detection unit and a power supply unit, wherein the data processing unit controls the ascending and descending unit to ascend and descend through the first motor, the first detection unit detects the positions of work personnel, the second detection unit detects the positions of obstacles around the auxiliary robot, the data processing unit controls the movement of the moving unit through the second motor, the voice interaction unit obtains the questions of the work personnel, the data processing unit obtains answer information from data information according to the questions, and the reporting is realized through the voice interaction unit. The auxiliary robot provided by the invention has the advantages that the auxiliary robot can avoid obstacles and can follow the work personnel in real time, the work personnel can realize the interaction with the auxiliary robot to conveniently obtain and know the relevant fault information, one worker can realize fast exclusion and examination on faults, and the goal of reducing the labor cost is achieved.

172. **104460478** MONITORING METHOD AND DEVICE FOR BAND-TYPE BRAKE OF INDUSTRIAL ROBOT CN - 25.03.2015

Int.Class G05B 19/048 **Appl.No** 201410631337.2 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention provides a monitoring method and device for a band-type brake of an industrial robot. Motor band-type brake connectors of all shafts in the industrial robot are connected in parallel, so that a band-type brake detection device is formed, and a band-type brake loop is formed. A current collection device collects the current value of the band-type brake detection device and stores the current value in a storage module as a check value; the band-type brake current value of the band-type brake detection device is regularly detected, and a detection result is sent to a comparison device; the comparison

device compares the band-type brake current value with the current check value in the storage device; a system is correspondingly operated. By means of the motor band-type brake monitoring device and method for detecting the band-type brake loop, the current value generated when the band-type brake is normally released can be automatically collected and recorded, and current values collected each time afterwards can be compared with the normal value. When a motor of the system is replaced with motors of different powers, the monitoring device can be adapted as well without any change. The band-type brake loop is monitored more directly, and therefore the safety of the system is greatly improved.

173. **104517297** ROBOT CALIBRATE METHOD BASED ON PARTICLE SWARM OPTIMIZATION CN - 15.04.2015

Int.Class G06T 7/20 **Appl.No** 201310451916.4 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

A robot calibrate method based on particle swarm optimization comprises the following steps: setting up a fitness function; using particle swarm algorithm to optimize outer parameters; using fitness function and outer parameters to optimize a given particle swarm; specifically: initializing the given particle swarm; determining an initial optimal adaptation value, initializing an individual optimal position [yk1], and initializing a colony optimal position [y1]; updating a position [xk1] and a speed [vk1] of each particle each time an iteration frequency is added by 1, and recalculating an adaptation value of each particle according to the updated xk1 and vk1; comparing the adaptation value of each particle with the initial optimal adaptation value, is the updated value is better, then updating the individual optimal position yk1, otherwise the original value is kept; comparing the updated individual optimal position yk1 of each particle with the initial colony optimal position [y1], if better, than updating the yk1, otherwise keeping the original value; determining whether a maximum iteration frequency is reached or not or a colony optimal position y1 change is smaller than a set value or not, and if yes, then stopping the iteration, thus obtaining the individual optimal position yk1 and the colony optimal position [y1].

174. **205736942** ECCENTRIC STEERING WHEEL OF LOW CLEARANCE CN - 30.11.2016

Int.Class B60K 17/08 **Appl.No** 202016000688598 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZHANG NINA

The utility model belongs to automatic guide car field, specifically speaking is an eccentric steering wheel of low clearance, and driving motor and drive worm worm reducing gear box are fixed respectively on the mounting panel, and driving motor's output is connected with drive worm worm reducing gear box, and it is continuous with the input of right angle reducing gear box that drive worm worm reducing gear box passes through chain drive A, and the output of right angle reducing gear box is connected with the drive wheel, and the drive wheel is rotatory by the driving motor drive, rudder motor and rudder worm gear speed reducer case are fixed respectively on the mounting panel, and the output of rudder motor is connected with rudder worm gear speed reducer case, and the box that rudder worm gear speed reducer case passes through chain drive B and right angle reducing gear box links to each other, and drive right angle reducing gear box is rotatory, and then drive the drive wheel and realize beating the rudder and move. The utility model discloses reduce AGV's whole height, realized the low clearance AGV who has the all direction movement function, extended AGV's use field.

175. **106610666** ASSISTANT ROBOT BASED ON BINOCULAR VISION, AND CONTROL METHOD OF ASSISTANT ROBOT CN - 03.05.2017

Int.Class G05D 1/02 **Appl.No** 201510689428.6 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** ZOU FENGSHAN

The invention discloses an assistant robot based on binocular vision, and a control method of the assistant robot. The assistant robot comprises a binocular vision sensor, a vision processor, and a robot controller. The binocular vision sensor is used for obtaining the image information of a target object, and the

vision processor is used for processing the image information of the target object so as to obtain the position information of the target object. The robot controller is used for planning a motion path according to the position information of the target object, and controls a tail end executor of the assistant robot to move according to the path, so as to obtain the target object. Through the above mode, the assistant robot just needs one binocular vision sensor to serve as the vision sensor so as to assist the assistant robot to complete the recognition and grabbing of the target object, so the cost is lower.

176. 206393166 RIVETING FORMING DEVICE WITH AUTOMATIC PRE -COMPACTION DRESS FUNCTION

CN - 11.08.2017

Int.Class B23P 19/02 **Appl.No** 201621479972.4 **Applicant** SHANGHAI SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LIU WEI

The utility model provides a riveting forming device with automatic pre -compaction dress function, include: the pre -compaction head will be pressed the work piece to impress in the main part work piece, the precompression executor is exerted pressure to the pre -compaction head, riveting mould, cover are made it to produce plastic deformation in the periphery of pre -compaction head to pressing work piece main part work piece on every side to exert pressure, hold -down head, cover are in the periphery of riveting mould, and the front end of hold -down head supports on the main part work piece, main guiding axle is connected with the riveting mould, exerts pressure to the riveting mould, resilience mechanism sets up between main guiding axle and hold -down head, power drive mechanism promotes main guiding axle, and power drive mechanism has two -stage pressure and stroke, wherein, is sliding connection between pre -compaction head, riveting mould and the hold -down head. The utility model discloses a riveting forming device with automatic pre -compaction dress function, the fashioned function of work piece pre -compaction and riveting that has structurally integrateed, but easy loss spare quick replacement such as pre -compaction head and riveting mould.

177. 206569665 AUTOMATIC ROTATORY FEED MECHANISM

CN - 20.10.2017

Int.Class B65G 47/06 **Appl.No** 201720007245.6 **Applicant** SHANGHAI SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** GAO YAN

The utility model provides an automatic rotatory feed mechanism, include: material stock mechanism, rotary mechanism, climbing mechanism, feeding mechanism to and the mounting platform, material stock mechanism includes: the mounting panel rotates with the mounting platform and is connected down, material pole group contains many material poles, and the lower extreme of material pole can be dismantled with lower mounting panel and be connected, rotary mechanism includes: the lower extreme of gear, fixed mounting mounting panel under, the rack is with gear engagement, first cylinder promotes the rack, and climbing mechanism includes: supporting flange with material pole sliding connection, sets up the lower extreme at the material pole, the jacking cylinder sets up on the mounting platform, applys ascending thrust to supporting flange, and feeding mechanism includes: feed cylinder, feeding slideway and slider, feed cylinder front end and slider fixed connection, slider slide and set up in feeding slideway, and open feeding slideway's bottom has the pay -off mouth, and the pay -off mouth is the top to expecting the pole just. The utility model discloses an automatic rotatory feed mechanism has realized that the staff overlaps the function that type automatic feeding snatched.

178. 107538486 JOINT FORCE CONTROL PLATFORM DEVICE, JOINT FORCE CONTROL METHOD AND RELATED DEVICE

CN - 05.01.2018

Int.Class B25J 9/16 **Appl.No** 201610494323.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention relates to the field of machinery, and particularly discloses a joint force control platform device. The joint force control platform device comprises an installation seat, a power unitlocated on the installation seat, a connection rod connected with the output end of the power unit, a joint torque

sensor which is located between the power unit and the connection rod and used for measuring the torque of the output end of the power unit, and a control unit which is used for controlling working of the power unit according to detection information of the joint torque sensor. The control unit is used for carrying out corresponding operation when the detection information of the joint torque sensor exceeds the preset threshold value. According to the joint force control platformdevice, the joint torque sensor is directly connected with the connection rod, the conditions of force applied to all corners of a robot can be detected accurately in time, the collision preventing function of the robot is achieved, and human and robot cooperation is finally realized. Meanwhile, the invention further provides a joint force control method and a manipulator.

179. **206590545** A EJECTION OF COMPACT CARTRIDGE CLIP MECHANISM FOR AUTOMATIC SWITCH -OVER MATERIAL LOADING CN - 27.10.2017

Int.Class B65G 47/82 **Appl.No** 201720015105.3 **Applicant** SHANGHAI SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** PAN SHOU

The utility model provides an ejection of compact cartridge clip mechanism for automatic switch -over material loading, a serial communication port, include: many material poles, circular arrangement, go up the mounting panel, lower mounting panel, many material pole detachable are installed at last mounting panel under and between the mounting panel, the pivot, vertical setting is on last mounting panel, first cylinder sets up in the top of last mounting panel, with the top looks block of pivot, the gear sets up in the pivot, the rack meshes with the gear mutually, the second cylinder is connected with the rack, pushing away the material cylinder, setting up in mounting panel below down, the frock board and pushes away the front end of expecting the cylinder and is connected, and the front end of frock board has the frock groove, and is corresponding with the position of one of them material pole. The utility model discloses an ejection of compact cartridge clip mechanism for automatic switch -over material loading is rational in infrastructure, safe and reliable, easily operate and safeguard, be applicable to the ejection of compact of the little work piece of various annulars.

180. **104635656** VACUUM TRANSMISSION CONTROL SYSTEM CN - 20.05.2015

Int.Class G05B 19/418 **Appl.No** 201310576836.1 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** CHU MINGJIE

The invention provides a vacuum transmission control system comprising an upper scheduling control module, an Ethernet switch, a lower embedded control module and a DeviceNET concentrator. The upper scheduling control module is used for operating upper scheduling software and performing monitoring scheduling on the vacuum transmission control system; the Ethernet switch is used for mounting Ethernet equipment in the vacuum transmission control system; the lower embedded control module is used for centralized control of all components of the transmission control system and provided with an Ethernet interface and a DeviceNet interface; the lower embedded control module performs data transmission with the upper scheduling control module through the Ethernet switch; the DeviceNET concentrator is used for mounting DeviceNET equipment in the vacuum transmission control system and connected with the lower embedded control module. The vacuum transmission control system is not only convenient for equipment maintenance but also less in space occupation.

181. **104637361** LIGHT-LOAD SIMULATION PLATFORM CN - 20.05.2015

Int.Class G09B 9/00 **Appl.No** 201310567458.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** WEI CHUNYU

The invention relates to the technical field of driving simulators and provides a light-load simulation platform. The light-load simulation platform comprises a stationary platform, a moving platform, a main drive component, a first drive component, a second drive component, a first connecting rod, a second connecting rod, a first connecting component and a second connecting component. The moving platform is arranged over the stationary platform; one ends of the first drive component and the second drive component are movably connected to the stationary platform, and the other ends of the first drive component and the second drive component are movably connected to the moving platform; one ends of the first connecting rod and the second connecting rod are movably connected to the stationary platform, and the other ends of the first connecting rod and the second connecting rod are movably connected to the moving platform; the drive components and the connecting rods are connected through slide pairs formed by the first connecting component and the second connecting component; one end of the main drive component is movably connected with the stationary platform, and the other end of the main drive component is movably connected to the second connecting rod. The functions of a simulator can be realized by three hydraulic cylinders and one motor, and elution along a Z-axis is omitted.

182. **102528808** MULTI-NETWORK CONVERGENCE-BASED INTERNET OF THINGS ORIENTED ROBOT CN - 04.07.2012

Int.Class B25J 13/00 **Appl.No** 201010613548.5 **Applicant** Shenyang Siasun Robot & Automation Co.,Ltd. **Inventor** Tan Boyue

The invention relates to a multi-network convergence-based internet of things oriented robot, which comprises a robot core control device, a composite network communication module and a hardware data acquisition module, wherein the robot core control device and a multiple composite network are subjected to network communication through the composite network communication module; the robot core control device is in communication connection with the hardware data acquisition module through an input/output communication interface of the robot core control device; the data acquisition module comprises an internet-of-things thing data acquisition interface, an intelligent household appliance communication network access module and an intelligent home furnishing communication network access module; and the internet-of-things thing data acquisition interface is a digital information identification interface capable of identifying things of the internet of things. By the robot, humans and all the things are linked together through an internet-of-things technology, intelligent identification and management are realized, and human life becomes more convenient. A household intelligent service robot can be brought into the human life more widely in the future.

183. **103809501** TRANSPORTATION CRANE CONTROL SYSTEM CN - 21.05.2014

Int.Class G05B 19/05 **Appl.No** 201210442091.5 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LIU YIHENG

The invention belongs to the technical field of automatic operation control and provides a transportation crane control system which comprises a PC104 board, a communication adapter board, an I/O board and a motion axis simulation amount control bit control board. The I/O board, the motion axis simulation amount control bit control board and the communication adapter board are connected through a CAN bus. A communication function and an interface are integrated by the communication adapter board. According to the control system, on the basis of the improvement of an operation speed, the volume is effectively reduced, the cost is saved, and a variety of communication protocols are supported.

184. **104298233** MOBILE ROBOT SELF-CHARGING SYSTEM CN - 21.01.2015

Int.Class G05D 1/02 **Appl.No** 201310563037.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention relates to a mobile robot self-charging system comprising a main control board, a robot controller, a power supply module, a power monitoring module, a drive control module, a sensor board, a laser sensor, and an infrared sensor. The power monitoring module acquires power information of the power supply module. The robot controller controls the laser sensor to acquire a pulse signal containing charging station position information according to the power information. The main control board establishes a first travel path trajectory according to the pulse signal. The sensor board collects an infrared signal acquired by the infrared sensor. The main control board corrects the first travel path trajectory according to the infrared signal to obtain a second travel path trajectory. The mobile robot self-charging system provided by the invention is an intelligent mobile robot self-charging system composed of a laser scanning modeling technology, an infrared positioning technology and a robot motion control technology. The defect of sole dependence on the laser or infrared technology is overcome. The reliability and accuracy of robot self-charging are improved.

185. **104511387** AUTOMATIC SPRAYING EQUIPMENT FOR HULL SURFACE CN - 15.04.2015

Int.Class B05B 13/04 **Appl.No** 201310452341.8 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI XUEWEI

The invention relates to spraying equipment, in particular to automatic spraying equipment for a hull surface. The hull surface is provided with a slide rail and a gantry crane, wherein the slide rail is arranged on a dry dock; the gantry crane is provided with a stand column; the stand column can slide along the axis of the slide rail; the automatic spraying equipment comprises a sliding rod, an orthogonal slide block set and at least one automatic spraying device; the sliding rod is arranged on the stand column; the sliding rod can slide along the axis of the stand column; the axis of the sliding rod, the axis of the slide rail and the axis of the stand column are orthogonal to one another; the orthogonal slide block set is arranged on the sliding rod and can slide along the axis of the sliding rod; the at least one automatic spraying device is fixedly arranged at the tail end of the orthogonal slide block set. The automatic spraying equipment for the hull surface has a simple structure and is easy to control. The existing gantry crane structure on the dry dock is effectively utilized, and the orthogonal slide block set is combined and used, so the hull surface spraying efficiency, the spraying quality and the operation safety are improved. The automatic spraying equipment is particularly suitable for automatic spraying of the outer surface of a large-sized hull.

186. **204431264** INTELLIGENT INDUSTRIAL ROBOT BUS MODULE BASED ON ETHERCAT CN - 01.07.2015

Int.Class B25J 13/00 **Appl.No** 201420754983.3 **Applicant** HANGZHOU SIASUN ROBOT AUTOMATION CO., LTD. **Inventor** LI ZHENGGANG

The utility model relates to a bus module, in particular to an intelligent industrial robot bus module based on the EtherCAT. An EtherCAT bus is connected with an embedded type microprocessor, and the two ends of the embedded type microprocessor are connected with a DSP arithmetic unit and a teaching box respectively; a topological structure is constituted by a robot movement module, an I/O module, a force sense module, a visual sense module and the EtherCAT bus. By means of the intelligent industrial robot bus module based on the EtherCAT, an industrial robot can be more intelligentized.

187. **204489006** MAGNETIC ADSORPTION TYPE GUIDING SEGMENT DEVICE CN - 22.07.2015

Int.Class B62D 63/02 **Appl.No** 201520010092.1 **Applicant** Shanghai Siasun Robot & Automation Co., Ltd. **Inventor** Yang Li

The utility model provides a magnetic adsorption type guiding segment device which is adsorbed on the wall surface. The magnetic adsorption type guiding segment device is characterized in that the magnetic adsorption type guiding segment device comprises a frame body, a guiding channel arranged on the frame body and adsorbing units, wherein the adsorbing units are arranged on the two sides of the top end of the guiding channel, fixedly connected with the

guiding channel and capable of being adsorbed on the wall surface, the guiding channel is provided with a non magnetic conductive part and a magnetic conductive part, the non magnetic conductive part is parallel to the ground and arranged on the bottom end of the guiding channel, and the magnetic conductive part is arranged between the non magnetic conductive part and the adsorbing units and is connected with the non magnetic conductive part.

188. **105703674** MOTOR SYNCHRONOUS SAMPLING DEVICE CN - 22.06.2016

Int.Class H02P 7/28 **Appl.No** 201410708862.X **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The present invention relates to a motor synchronous sampling device which comprises a host machine, an information processing unit, a motor drive unit, a current sampling unit and a motor. The host machine is used for sending a control parameter to the information processing unit. The information processing unit is used for converting the control parameter into a control signal. The motor drive unit is used for receiving a control signal to control the motor to move. The current sampling unit is used for processing the current which passes through the motor into a voltage signal which is suitable for AD sampling and sends a voltage output signal to the information processing unit. According to the motor synchronous sampling device, TMS320F2812 is used as the master control chip of an information processing module, the synchronous sampling of the motor is realized. Compared with the prior art, the device has the advantages of simple structure, fast response speed, stable control and the reduction of production cost.

189. **106597069** DEVICE AND METHOD FOR ACQUIRING MOTOR CURRENT CN - 26.04.2017

Int.Class G01R 19/25 **Appl.No** 201510684646.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention discloses a device and method for acquiring motor current. The method comprises a step of converting motor current into an analog voltage signal, a step of filtering the analog voltage signal, a step of sampling the analog voltage signal after filtering so as to convert the signal into a digital voltage signal, a step of carrying out FFT transform on the digital voltage signal, and calculating the motor current through the signal power calculation in a frequency domain. Through the above mode, an interference signal can be eliminated, and the current corresponding to control precision is obtained.

190. **103809590** CARRYING APPARATUS WALKING APPARATUS CONTROL SYSTEM CN - 21.05.2014

Int.Class G05D 1/02 **Appl.No** 201210443645.3 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LI XUEWEI

The invention, which relates to the automatic control field, brings forward a carrying apparatus walking apparatus control system comprising an embedded PC, a position control panel, a servo driver, a servo motor and a bar code scanner. To be specific, the embedded PC is used for sending a positioning instruction; the position control panel is used for receiving the positioning instruction sent by the embedded PC and carrying out processing and sending of the positioning instruction; the servo driver is used for receiving a signal from the position control panel to drive the servo motor; and the bar scanner is used for collecting an absolute position of the carrying apparatus at a marching track. The position control panel, the servo driver and the servo motor form a closed-loop control circuit including a position loop control circuit, a speed loop control circuit, and a current loop control circuit; and the position loop control circuit is arranged at the position control panel. According to the invention, problems of slow full closed-loop positioning and inconvenient semi-closed loop positioning according the existing positioning ways can be solved.

191. 104460505 INDUSTRIAL ROBOT RELATIVE POSE ESTIMATION METHOD

CN - 25.03.2015

Int.Class G05B 19/18 **Appl.No** 201410634619.8 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QU DAOKUI

The invention relates to the technical field of computer vision, in particular to an industrial robot relative pose estimation method based on an artificial mark. The method comprises the steps that binarization processing is carried out on an original image by adopting self-adaptive thresholding to obtain a binary image; boundary contour extraction is carried out on the binary image to obtain contours of all foreground targets; shape and topological structure analysis is carried out on the contours, and an outer contour area of the mark is obtained; least square ellipse fitting is carried out on the outer contours; five relative degrees of freedom are calculated through circular deformation analysis; an image moment is used for analyzing a character T to obtain a yaw angle, and a three-dimensional pose of a camera relative to the artificial mark is obtained. According to the industrial robot relative pose estimation method, three-dimensional pose estimation under monocular vision is achieved based on the artificial mark, the depth information at the artificial mark can be obtained through a monocular camera to be used as an industrial robot vision guide, the cost spent for purchasing a binocular camera is omitted, meanwhile, the algorithm efficiency is high, a large number of computing resources are not needed, and implementation is easy.

192. 104635523 NON-CONTACT POWER SUPPLY TYPE FEEDING AND DISCHARGING SYSTEM

CN - 20.05.2015

Int.Class G05B 19/04 **Appl.No** 201310576736.9 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** CHU MINGJIE

The invention provides a non-contact power supply type feeding and discharging system. The non-contact power supply type feeding and discharging system is characterized in that a non-contact power supply method is used to provide direct-current power and direct-current control power, and an IRC main control panel, a pulse board, a system IO board, a user IO board and the like form a whole control system; the system IO board, the user IO board, the pulse board and the IRC main control panel are connected through a CAN bus; an embedded Linux operating system operates on the IRC main control panel; control software suitable for the feeding and discharging system is developed under an embedded Linux environment; the system IO board, the user IO board and the pulse board are connected to the bus interfaces of the IRC main control panel; the system IO board, the user IO board and the pulse board are in bridge connection with the bus of an RC main controller to form the complete control system, and the system is allowed to have functions of 3-axis position control, digital quantity input detection and digital quantity output control of sensors and executive devices, serial communication and Ethernet communication between the main controller and modules and peripherals, and the like.

193. 104622551 CONTROL SYSTEM FOR FOREARM FRACTURE TREATMENT ROBOT

CN - 20.05.2015

Int.Class A61B 17/56 **Appl.No** 201310563001.2 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention discloses a control system for a forearm fracture treatment robot. The system comprises a microcontroller and a clamping platform, wherein the microcontroller is in communication with a motor driving unit and a pneumatic transmission unit, the motor driving unit and the pneumatic transmission unit are both connected with a mechanical executing unit of a fully-automatic orthopaedics department traction robot, and the pneumatic transmission unit is connected with the clamping platform; the mechanical executing unit comprises a gear transmission mechanism and a lead screw drive mechanism, both the gear transmission mechanism and the lead screw drive mechanism are connected with the clamping platform, the front-back position of the clamping platform is roughly adjusted through the lead screw drive mechanism, the defection state of the clamping platform is adjusted through the gear transmission mechanism, the clamping platform generates drawing force and clamping force through the pneumatic transmission unit, and the stress state

of the forearm is adjusted through the pneumatic transmission unit. In this way, flexible control over the clamping force, deflection force and drawing force applied to the forearm is achieved, and bonesetting safety is improved greatly.

194. **104638706** CHARGING SYSTEM CN - 20.05.2015

Int.Class H02J 7/00 **Appl.No** 201310567398.2 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** XU FANG

The invention provides a charging system which comprises a charging device and butting devices. The butting devices are butted to the charging device, the charging device is arranged at a charging station, and the butting devices are arranged on robots. The charging system has the advantages that dustproof assemblies which are used for shielding charging electrodes are arranged on charging assemblies of the charging device, protective assemblies which are used for shielding butting electrodes are arranged on butting assemblies of the butting devices, accordingly, the electrodes can be automatically shielded when the robots are not charged or are completely charged, pollution and corrosion of the electrodes due to dirt or humid environments can be reduced, and excellent connectivity of the electrodes can be guaranteed; the dustproof assemblies and the protective assemblies do not need to be electrically driven, and only various components need to be easily collided and pushed by one another when the butting devices are butted to the charging device, so that electrode protective plates can be opened when the robots are about to be charged.

195. **104516333** CONTROLLER WITH MULTICORE CPU (CENTRAL PROCESSING UNIT) AND MULTIPLE OPERATION SYSTEMS CN - 15.04.2015

Int.Class G05B 19/418 **Appl.No** 201310586092.1 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** QIAN YIZHOU

The invention provides a controller with a multicore CPU (central processing unit) and multiple operation systems. The controller comprises a hardware part and a software part. The hardware part comprises the multicore CPU, a memory module, communication modules and a power source module. The communication modules at least include a bus communication module, a serial communication module and a network communication module and are used for being in communicated connection with an upper computer, external equipment and a motion controller. The power source module is used for powering the controller with the multicore CPU and the operation systems. The software part comprises a hardware driver, the operating systems and application software and is used for supporting drivers and software applications of a Windows master system and a Linux slave system. The controller with the multicore CPU and the operation systems has the advantages that performance advantages brought by the multicore CPU are utilized fully, diversification requirements of robot application are met on the premise of guaranteeing real-time performance, rapid transfer of an existing single-core Linux real-time control system can be achieved, and costs for application development and performance tests can be reduced.

196. **105656953** ROBOT INTERNET OF THINGS SYSTEM BASED ON INTERNET BIG DATA CN - 08.06.2016

Int.Class H04L 29/08 **Appl.No** 201410631436.0 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** LIU XIAOFAN

The invention provides a robot Internet of Things system based on Internet big data. The system comprises a front-end data acquisition module used for acquiring information, a 3G network module used for transmitting data, a database server used for storing and analyzing data and a display terminal used for browsing data, wherein the front-end data acquisition module is arranged in a robot control cabinet and is connected to the database server through the 3G

network module; and the database server is connected to the display terminal through Internet. According to the system, the 3G Internet can be utilized to write the data into the database for a user to analyze.

197. **106425768** ABRASIVE BELT FLOATING POLISHING MECHANISM CN - 22.02.2017

Int.Class B24B 21/00 **Appl.No** 102016000848060 **Applicant** HANGZHOU SIASUN ROBOT AUTOMATION CO., LTD. **Inventor** LI ZHENGGANG

The invention relates to an abrasive belt floating polishing mechanism which comprises supporting wheels, bearings, a bottom plate, connecting rods a, b, c and d, supporting plates, locating pin bosses, springs, spring bearings, hinge pedestals, cantilever shafts, supporting pillars, snap clasps, a connecting plate, an abrasive belt and a cover plate. The two bearings are separately arranged at two ends of each supporting wheel. The bottom plate, the cover plate and the supporting pillars constitute a fixed bracket. The hinge pedestals are fixed on each supporting plate in pairs. The connecting rods a and c and the hinge pedestals on the corresponding supporting plates form a parallel four-linkage structure. The connecting rod b and d and the hinge pedestals on the corresponding supporting plates form another parallel four-linkage structure. Spring hook seats are arranged at the other ends of the connecting rods a and b. The snap clasps are separately fixedly connected with the corresponding spring bearings. Ends of extension springs are connected onto the spring hook seats, and the other ends of the extension springs are connected onto the corresponding snap clasps. The spring bearings are fixed on the bottom plate. The abrasive belt surrounds the supporting wheels. The connecting plate is fixedly connected with the bottom plate. The abrasive belt floating polishing mechanism has the advantages of being reasonable in structure, good in working effect, and high in working reliability.

198. **106580631** ASSIST DEVICE FOR REHABILITATION TRAINING OF LOWER LIMBS CN - 26.04.2017

Int.Class A61H 1/02 **Appl.No** 201510677373.7 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** GUAN LINA

The invention provides an assist device for rehabilitation training of lower limbs. The assist device includes a base, a first rotation arm, a second rotation arm and a lower limb placement device; the first rotation arm is rotatably connected to the base through a first rotation mechanism; the second rotation arm is rotatably connected to the first rotation arm through a second rotation mechanism; and the lower limb placement device is rotatably connected to the second rotation arm through a third rotation mechanism. The assist device for rehabilitation training of the lower limbs is simple in structure, is direct in transmission manner, is low in cost, and can save internal space.

199. **106580474** ARTICULATED THERMAL ABLATION MEDICAL AUXILIARY ROBOT CN - 26.04.2017

Int.Class A61B 34/30 **Appl.No** 102015000684381 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** HE SHULONG

The invention relates to medical auxiliary equipment, in particular to an articulated thermal ablation medical auxiliary robot. The robot comprises a base, an arm, a tail end clamping jaw and a touch control display. The base is provided with a control cabinet and thermal ablation equipment. The arm is formed by sequential connection of a first joint, a second joint, a third joint, a fourth joint, a fifth joint and a sixth joint, and each joint is formed by a corresponding integrated modular motor and a connection part. The tail end clamping jaw is connected to the tail end of the arm. By design of a six-axis high-degree-of-freedom structure, the defect of failure in multi-direction positioning of tail ends of existing products is overcome; by integrated design, the defect of separation of the thermal ablation equipment and a robot body is overcome; due to integrated design of the tail end clamping jaw, requirements of cables on hollowness of the robot body are reduced, internal wiring of the cables is realized, and convenience in mounting and maintenance is achieved.

200. **106598040** AUTOMATIC FOLLOWING SHOPPING CART SYSTEM CN - 26.04.2017

Int.Class G05D 1/02 **Appl.No** 102015000677045 **Applicant** SHENYANG SIASUN ROBOT & AUTOMATION CO., LTD. **Inventor** YANG QIFENG

The present invention provides an automatic following shopping cart system. The system comprises a shopping cart body, a sonar emission terminal, four sonar receivers and a central processing unit. The sonar emission terminal is arranged at the outer portion of the shopping cart body, the sonar receivers are arranged at four corners of the shopping cart body, and the central processing unit is arranged on the shopping cart body; the sonar emission terminal emits the sonar signals, and the sonar receivers receive sonar signals and transmit the sonar signals to the central processing unit; and the central processing unit monitors the relative time difference of receiving sonar signals through the sonar receivers, calculates the signal source direction according to the time difference and controls the process of the shopping cart body. The automatic following shopping cart system emits sonar signals through the sonar emission terminal, and the sonar receivers receive the sonar signals and transmit the sonar signals to the central processing unit; and the central processing unit monitors the relative time difference of receiving sonar signals, calculates the signal source direction according to the time difference and control the process of the shopping cart body; and the conditions are solved that the infrared navigation encounters obstacles and a tracking object is lost.