

Automatic Obstacle Avoidance Robot based on Artificial Intelligence Detection and Recognition

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Abstract

This paper designs an automatic obstacle avoidance robot based on artificial intelligence detection and recognition, including a shell, and a detection and obstacle avoidance mechanism is set inside the shell; the detection and obstacle avoidance mechanism includes a movable member, a screw, a first electric actuator, a first camera, a gear, a rack and a steering assembly; by setting the detection and obstacle avoidance mechanism, the first camera and the second camera can take pictures of the surrounding environment during the movement of the shell, and when the micro When the computer recognizes the obstacle, it controls the servo motor to run and makes the screw rotate, so that the movable part moves in the direction of no obstacle, and the rack at the bottom of the movable part moves together during the moving process of the movable part, and the gear will be driven to rotate the steering wheel during the moving process of the rack, so that the robot can perform obstacle avoidance operation, and the height of the camera can also be adjusted by adjusting the first electric pusher and the second electric pusher to adjust the By adjusting the first and second electric actuators, the height of the camera can be adjusted to adjust the detection range, making the robot more flexible.

Keywords

Artificial Intelligence; Automatic Obstacle Avoidance; Robotics.

1. Introduction

Robots are machine devices that perform work automatically, which can either accept human command, run pre-programmed programs, or act according to a principle program formulated with artificial intelligence technology. With the continuous development of modern automatic control technology, the requirements for robots are getting higher and higher, such as cleaning robots, transportation robots, etc., which need robots to be able to achieve the function of automatic obstacle avoidance, in order to make Obstacle avoidance robot can detect the surrounding obstacles more comprehensively and avoid them better, the automatic obstacle avoidance robot based on artificial intelligence detection and recognition is proposed.

This paper provides an automatic obstacle avoidance robot based on artificial intelligence detection and recognition to overcome the shortcomings of the prior art, which not only allows the robot to perform more flexible obstacle avoidance, but also adjusts the detection range.[2]

2. Instructions for Use

2.1. Technical Proposal

An automatic obstacle avoidance robot based on artificial intelligence detection and recognition, comprising a housing, a detection and obstacle avoidance mechanism is provided inside the housing; the detection and obstacle avoidance mechanism includes a movable member, a screw, a first electric actuator, a first camera, a gear, a rack and a steering assembly, the steering assembly is installed inside said housing, a movable slot is opened at the top of the housing, a screw is provided inside said movable slot, the movable member is movably connected to the side wall of said screw. The first electric actuator is fixedly mounted on the top of said movable member, the first camera is fixedly mounted on the output end of said first electric actuator, the gear is mounted on the top of said steering assembly, the rack is fixedly mounted on the bottom of said movable member, and the gear engages with the rack. The steering assembly includes a mounting bracket, a connecting shaft, a mounting plate, a first connecting rod, a mounting rod, a second connecting rod, a mounting shaft and a steering wheel, the mounting bracket is fixedly mounted inside the housing, the connecting shaft is rotatably connected inside the mounting bracket, the connecting shaft is fixedly mounted on the bottom of the gear, the mounting plate is fixedly mounted on the side wall of the connecting shaft, the mounting shaft is rotatably connected inside the mounting bracket, the steering wheel is rotatably connected on the side wall of the mounting shaft, the mounting rod is fixedly connected to the mounting plate through the first connecting rod, and the second connecting rod is movably connected to the inside of the mounting rod. The servo motor is fixedly mounted inside the housing, and the screw is fixedly mounted at the output end of the servo motor. There is a second electric actuator fixedly mounted on the top, and a second camera fixedly mounted on the top of the second electric actuator. There is a drive mechanism inside the shell, the drive mechanism includes motor, shaft and drive wheel, the motor is fixedly installed inside the shell, the shaft is fixedly installed at the output end of the motor, the drive wheel is fixedly installed at the side wall of the shaft. The side wall of the shell is provided with a protection mechanism, the protection mechanism includes a spring and a protection cylinder, the spring is fixedly installed in the side wall of the shell, there are several springs, the protection cylinder is fixedly installed in one end of the spring, the protection cylinder is movably connected to the side wall of the shell through the spring.[3]

2.2. Specific Implementation

Referring to FIGS. 1-FIG. 4, in this implementation: an automatic obstacle avoidance robot based on artificial intelligence detection and identification, including housing 1, housing 1 is provided with a detection and obstacle avoidance mechanism inside; detection and obstacle avoidance mechanism includes movable member 5, screw 4, first electric actuator 6, first camera 7, gear 11, rack 10 and steering assembly, housing 1 is opened with movable slot 3 at the top, screw 4 is set inside movable slot 3, screw 4 is set inside the movable slot 3. The movable member 5 is movably connected to the side wall of the screw 4, a servo motor is fixedly installed inside the shell 1, the screw 4 is fixedly installed at the output end of the servo motor, and the screw 4 can be driven to rotate by setting the servo motor, and the movable member 5 can be moved inside the movable slot 3 by rotating the screw 4, the first electric actuator 6 is fixedly installed at the top of the movable member 5, and the first camera 7 is fixedly installed at the output end of the first electric actuator 6. There is a second electric pusher 8 fixedly installed on the top of the shell 1, a second camera 9 fixedly installed on the top of the second electric pusher 8, the second electric pusher 8 and the second camera 9 are set in two groups, respectively located on both sides of the top of the shell 1, a microcomputer based on artificial intelligence is set inside the movable member 5, the microcomputer has functions such as

image acquisition and image recognition, the first electric pusher 6, the first camera 7, the The first electric actuator 6, the first camera 7, the servo motor, the second electric actuator 8 and the second camera 9 are all connected to the microcomputer, the steering assembly is installed inside the housing 1, the gear 11 is set on the top of the steering assembly, the rack 10 is fixedly installed at the bottom of the movable member 5, and the gear 11 engages with the rack 10.

The mounting plate 17 is fixedly mounted on the side wall of the connecting shaft 16, the mounting shaft 21 is rotatably connected inside the mounting bracket 15, the steering wheel 22 is rotatably connected on the side wall of the mounting shaft 21, the mounting shaft 21 is an L-shaped shaft, the mounting rod 19 is fixedly mounted on the side wall of the mounting shaft 21, the mounting plate 17 is movably connected to the mounting rod 19 through the first connecting rod 18, the second connecting rod 20 is movably connected inside the mounting rod 19, the mounting shaft 21, the mounting rod 19 and the steering wheel 22 are provided in two sets, respectively. By installing the connecting shaft 16 at the bottom of the gear 11, when the gear 11 rotates, the mounting plate 17 on the side wall of the gear 11 can be driven to rotate, and when the mounting plate 17 rotates, the mounting rod 19 can be driven to move through the first connecting rod 18, and when the mounting rod 19 moves, the mounting shaft 21 will be driven to rotate, so that the steering wheel 22 can be tilted to one side, thus The steering wheel 22 is tilted to one side so as to play the role of steering.[4]

The side wall of shell 1 is provided with a protection mechanism, the protection mechanism includes a spring and a protection cylinder 2, the spring is fixedly installed in the side wall of shell 1, there are several springs, the protection cylinder 2 is fixedly installed in one end of the spring, the protection cylinder 2 is movably connected to the side wall of shell 1 by the spring, by providing the protection cylinder 2 with the spring in the side wall of shell 1, the body of shell 1 can be protected to prevent The protective cylinder 2 with a spring on the side wall of the housing 1 can protect the body of the housing 1 from damage.[5]

The microcomputer, the first electric actuator 6, the first camera 7, the second electric actuator 8, the second camera 9 and the motor 12 involved in this embodiment can be freely configured according to the actual application scenario, and the microcomputer first electric actuator 6, the first camera 7, the second electric actuator 8, the second camera 9 and the servo motor work using the methods commonly used in the prior art.[6]

The working principle of the robot and the use of the process: by setting the motor 12 can drive the output end of the shaft 13 rotation, through the shaft 13 rotation to make the drive wheel 14 rotation, so that the shell 1 to move, in the process of shell 1 movement of the first camera 7 and the second camera 9 can shoot the surrounding environment, will shoot the image information sent to the microcomputer, when the microcomputer identifies the obstacle When the microcomputer identifies the obstacle, control the servo motor operation, make the screw 4 rotate, make the movable part 5 move to the direction without obstacles, in the movable part 5 moving process movable part 5 bottom rack 10 together, in the rack 10 moving process will drive the gear 11 rotation, when the gear 11 rotation can drive the gear 11 side wall mounting plate 17 rotation, when the mounting plate 17 rotation can drive the mounting rod through the first connecting rod 18 The first electric pusher 6 and the second electric pusher 8 can also adjust the height of the first camera 7 and the second camera 9 to adjust the detection range and make the robot more flexible.[7]

2.3. Beneficial Effects of this Automatic Obstacle Avoidance Robot

By setting the detection obstacle avoidance mechanism, the first camera and the second camera can take pictures of the surrounding environment during the movement of the shell, and send the image information taken to the microcomputer, and when the microcomputer identifies the obstacle, it will control the servo motor to run and make the screw rotate, so that the movable part moves in the direction of no obstacle. In the process of moving the movable part, it will

drive the gear to rotate the steering wheel, so that the robot can perform obstacle avoidance operation, and the height of the first camera and the second camera can be adjusted by adjusting the first electric pusher and the second electric pusher to adjust the detection range and make the robot more flexible.

By providing a protection mechanism including a spring and a protection barrel, the spring is fixedly mounted on the side wall of the shell, and there are several springs, and the protection barrel is fixedly mounted on one end of the spring, and the protection barrel is movably connected to the side wall of the shell by the spring, and the protection barrel with the spring on the side wall of the shell can protect the body of the shell and prevent the shell from damage.[8]

3. Illustration

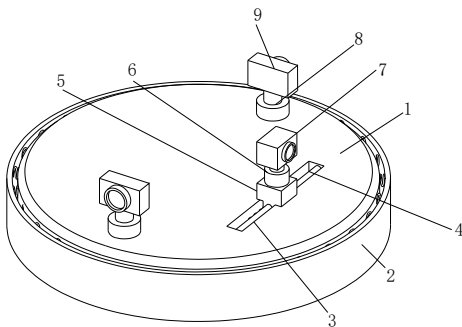


Figure 1. Schematic diagram of robot structure

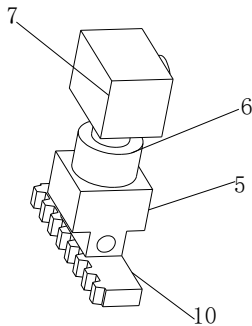


Figure 2. Schematic diagram of movable parts structure schematic diagram

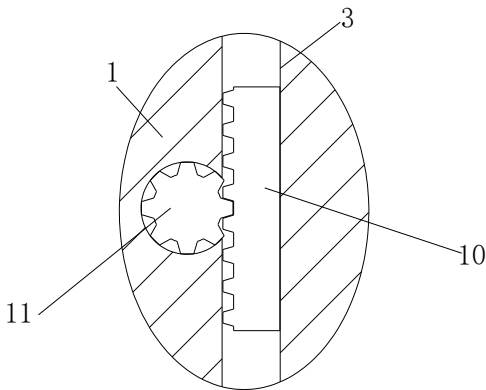


Figure 3. Schematic diagram of partial section view at the movable slot

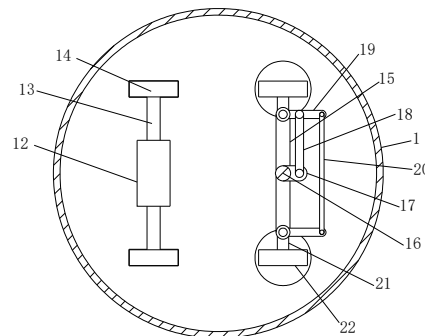


Figure 4. Schematic diagram of the internal structure of the shell

4. Conclusion

In conclusion, the automatic obstacle avoidance robot based on artificial intelligence detection and recognition designed in this paper not only allows the robot to perform more flexible obstacle avoidance, but also adjusts the detection range. Although China's robotics research and development is relatively late, robots are widely used in manufacturing industries, national defense and military as well as public safety fields. For this reason, it is necessary to strengthen the research and development of robotics in China. Thus, it is necessary to enhance the development of high-tech industry in China and make the life of the people more convenient.

Acknowledgments

China Student Innovation and Entrepreneurship Training Program.

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