Smart ball picking trolley

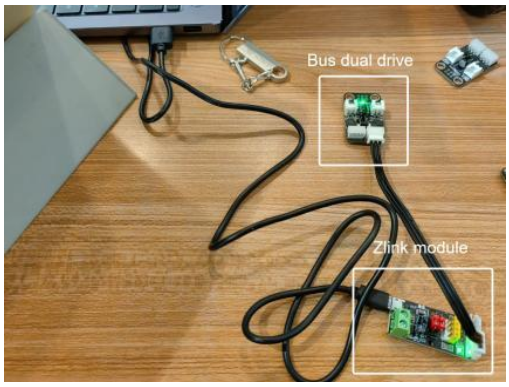
In the practice of table tennis service technology, a large number of shots are required, which can be thousands or even tens of thousands of times. For table tennis players, the technical training of table tennis is very physical exertion, and the need to pick up the table tennis balls dropped randomly in various places of the venue undoubtedly increases the physical consumption of table tennis players. For beginners of table tennis, to some extent, it will also erase their passion for this sport.

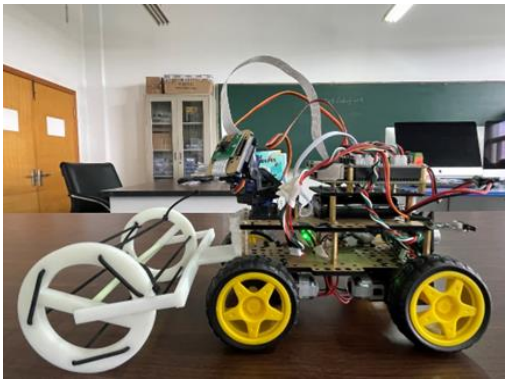
Our project is an intelligent ball pickup cart. To improve the automation and reliability of the ball pickup cart system, our team will divide the ball pickup cart system into a hardware part and a software part. Among them, the hardware part mainly includes the body structure, Raspberry Pi 4B control module, motor drive module, sensor detection module, gimbal servo module and camera module. The software part determines the control scheme of the ball picker by analyzing the functions to be achieved by the ball picker and its working principle. The ball pickup cart uses Python as the development language and the open source OpenCV vision library to complete the programming and debugging of the ping pong ball recognition, automatic obstacle avoidance, ball pickup and damage warning modules. It achieves innovation in the writing of the ping pong ball recognition program with its own originality and can break through the limitations of existing OpenCV provided methods. The operation mode of the ball pickup trolley is designed in automatic mode and infrared mode.

After completing the above research, the built hardware circuit is combined with the software to produce a physical ball pickup robot and to conduct experimental verification. The results show that the system is stable and reliable in operation and can meet the actual demand, but the cost is slightly high, there are certain limitations, and the performance needs to be further improved.

Component list

1 x Raspberry Pi 4B, 1 x extension board of Raspberry Pi, 2 x body stent, 2 motor drive module, 4 x TT dual-shaft DC gear motor, 4 x tire, 1 x The 2s High-rate rechargeable battery, 1 x harrowing wheel, 1 x harrowing wheel stent, 1 x connection shaft, 1 x pan-tit, 1 x Official high-definition vision camera, 2 x Gimbal Servo, 2 x a micro switch, 1 x ultrasonic sensor, 1 x Infrared module, 1 x Remote control, Dupont wires, screws and nuts





Video link：

[Smart picking trolley.mp4 (sharepoint.com)]