

Title: Using deep information and VSLAM to solve the robot's positioning, navigation, obstacle avoidance and interaction

Industrial Applications ■ Intelligent Manufacturing □ Intelligent Driving □ Intelligent Life □ Smart Medicine □ Smart City

Background description

[Overall background]

Because of the emergence of some deep and stereoscopic cameras in recent years, the new market of artificial intelligence vision has been gradually opened. The traditional laser 2D SLAM can not meet the development requirements of robots, unmanned vehicles, UAVs, auxiliary driving ADAS and VR/AR. Therefore, the vision recognition technology and VSLAM technology based on artificial intelligence (AI) rapidly lead the research trend. Based on such a market environment, the innovation of VSLAM and human-machine interaction has become a hot spot.

[Business background]

As the core hardware module of VSLAM technology, the deep sensor based on structural light plays an important role in the development of visual positioning navigation and obstacle avoidance. At the same time, the high quality depth image greatly improves the recognition rate and recognition accuracy of human body movement.

Project description

[Problem description]

At present, the mainstream robots are based on ultrasonic or laser sensors to locate and navigate and avoid obstacles, and the human-computer interaction depends on the external devices such as remote control, flat plate or mobile phone. Because of the high cost and the two-dimensional plane, laser sensors cannot detect obstacles outside the plane. Human computer interaction can interact with peripherals, and the user experience is poor and not intuitive. The use of depth sensor combined with VSLAM can solve the problem of obstacle avoidance and human-machine interaction.

[User expectations]

- (1) Using deep sensor and VSLAM to identify obstacles that obstruct robots and identify them on the map.
- (2) Using the deep image and color image of depth sensor to recognize the limbs / gestures of human body for controlling robot and human-machine interaction.

[Economic effect]

According to statistics, in 2017, the global robot market reached 23 billion 200 million US dollars, the average growth rate of 2012-2017 years was close to 17%, and the Chinese market accounted for 27%. After the application of the scheme, the team's economic benefit is expected to reach US \$30 million.

Task requirements

[Technical path]

Based on the mainstream terminal (Android, PC).

[Technical indicators]

- (1) Recognition rate of obstacles reached 99%.
- (2) Mobile terminal obstacle recognition time is less than 100ms, and PC terminal obstacle recognition time is less than 20ms;
- (3) Recognition rate of limbs / gestures is greater than 90%.

[Standard submission]

Participants are asked to design a set of solutions that meet the needs of the upper development from the perspective of the underlying developers.

- (1) Using VSLAM's output location information and deep images to build a grid map for navigation and path planning.
- (2) Providing navigation functions from A points to B points;
- (3) Accurately identifying the obstacles on the path of the robot, judging whether it is possible to pass it, marking it on the map, and meeting the technical indicators 1,2;
- (3) Accurate identification of body / gesture movement, action type can be customized, through the recognition of the movement, manipulate the motion of the robot (forward, left turn, right turn light), to meet the technical index of 3.

[Task list]

- (1) APK files and exe files that can be installed normally;

Reference information

[Reference tool]

Hua Jie Amy deep sensor hardware, Hua Jie Amy depth sensor software SDK,
Hua Jie Amy VSLAM algorithm SDK, Hua Jie Amy skeleton recognition algorithm SDK.
Kobuki robot chassis.

[Reference data]

[Http://www.hjimi.com/](http://www.hjimi.com/)

[Data interface]

None