

## **Glass detection and recognition based on the fusion of ultrasonic sensor and RGB-D sensor for the visually impaired**

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### **Abstract**

With the increasing demands of visually impaired people (VIP), developing assistive technology to help them travel effectively and safely has been a research hotspot. Red, Green, Blue and Depth (RGB-D) sensor has been widely used to help VIP, but the detection and recognition of glass objects is still a challenge, considering the depth information cannot be obtained correctly. In order to overcome the limitation, we put forward a method to detect glass objects in indoor scenes in this paper, which is based on the fusion of ultrasonic sensor and RGB-D sensor. Meanwhile, the erroneous depth map of glass object computed by the RGB-D sensor could also be densely recovered. In addition, under some special circumstances, such as facing a mirror or an obstacle within the minimum detectable range of the RGB-D sensor, we use a similar processing method to regain depth information in the invalid area of the original depth map. The experimental results show that the detection range and precision of RGB-D sensor have been significantly improved with the aid of ultrasonic sensor. The proposed method is proved to detect and recognize common glass obstacles for VIP in real time, which is suitable for real-world indoor navigation assistance.

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