Paper ID: 1570935447

Paper Title: Development of a risk alert system on railroad platform for blind person using VSLAM technology

Authors: Suzuki Seiichi, Hikaru Ugajin, Motohiro Akashi, Christine D.A.P. Wiyono and Motohiro Ohkura (Seikei University, Japan); Akihiro Arakawa (Japanese Council of Social Welfare Facility for Blind Persons, Japan); Shoichi Uchihara (The New Industry Research Organization, Japan)

Email: seiichi@st.seikei.ac.jp

Abstract

A blind support system utilizing VSLAM (Visual Simultaneous Localization And Mapping) technology has been developed to alert individuals to risks on railroad platforms. In Japan, one to two fatal accidents involving blind individuals occur each year, which is ten times higher than the rate for sighted individuals. This poses a significant challenge to the transportation of blind individuals within the community. In order to improve their mobility within the public transportation system, a high-fidelity risk alarm system is required. To address this need, we have been developing a sound alert system using VSLAM specifically designed for detecting risks on railroad platforms.

SLAM, a form of robot vision, enables the creation of a 3D Point Cloud (PC) map by identifying obstacles as distinctive points from video input. The system compares newly captured video images with the PC map and accurately estimates the camera's location within a few centimeters. By marking hazardous points such as the platform's edge on the PC map, the system can provide proximity alerts with a high level of accuracy. The direction and distance to the risk point are communicated through stereo sound, adjusting the intensity and loudness in the left and right channels. When within 90 cm of the edge, a stop warning is announced to prevent accidental falls onto the railway tracks and to ensure the moving direction.

Experiments conducted by blind individuals have demonstrated the system's capability to effectively alert them to potential dangers. However, since blind individuals can also gather information about hazards using a cane on the railroad platform, the significant advantages of the system have not been adequately demonstrated.