10th International Conference and Exhibition on

LASERS, OPTICS & PHOTONICS

November 26-28, 2018 | Los Angeles, USA

Kaiwei Wang

Zhejiang University, China

5 years of implementing light to help the visually impaired at the National Optical Instrument Engineering Technology Research Center

According to the World Health Organization, 285 million people around the world are estimated to be visually impaired and 39 million of them are blind. It is rather challenging for visually impaired people (VIP) to navigate through obstacles and avoid various hazards such as water puddle and approaching vehicles in unknown environments. At the National Optical Instrument Engineering Technology Research Center, a number of revolutionary techniques and apparatus have been explored to address the above problems. An effective approach is studied to expand the detection of traversable area based on an RGB-D sensor, which is compatible with both indoor and outdoor environments. The depth image of is enhanced with IR image large-scale matching and RGB image-guided filtering. A polarized technique is implemented in order to detect traversable areas and water hazards by adequately considering polarization effects. A real-time crosswalk detection algorithm, adaptive and consistency aextraction analysis (AECA), is proposed to detect and remind the position of crosswalks at urban intersections. Compared with existing algorithms, which detect crosswalks in ideal scenarios, the algorithm performs better in challenging scenarios, such as crosswalks at far distances, low contrast crosswalks, pedestrian occlusion, various illuminances and the limited resources of portable PCs. A real-time Pedestrian Crossing Lights (PCL) detection algorithm for the visually impaired is also proposed. Different from previous works which utilize analytic image processing to detect the PCL in ideal scenarios, the proposed algorithm detects PCL using machine learning scheme in the challenging scenarios, where PCL have arbitrary sizes and locations in the acquired image and suffer from the shake and movement of the camera. Up to date, tens of thousands visually impaired individuals are benefiting from these technologies.

Biography

Kaiwei Wang is the Deputy Director of the National Optical Instrument Engineering Research Center at Zhejiang University. He received a BS degree in 2001 and a PhD degree in 2005 both from Tsinghua University. He started Postdoctoral research at the Center of Precision Technologies (CPT) of Huddersfield University, funded by the Royal Society International Visiting Postdoctoral Fellowship and the British Engineering Physics Council. He joined Zhejiang University in February 2009 and has been mainly researching on Intelligent Detection Device for Passive Fiber Components and Visual Assisting Technology for the Visually Impaired since then. With years of hard work, he was awarded the "521 Plan" expert in Hangzhou, owns 34 patents and has published more than 100 research papers.

wangkaiwei@zju.edu.cn

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