

Comprehensive Road Detection Technology in China

Professor Qingquan Li
President of Shenzhen University
Member of the International Eurasian Academy of Science
Former Executive vice-president of Wuhan University
Chairman of Key Laboratory for Geo-Environmental Monitoring of Coastal Zone of the
National Administration of Surveying, Mapping and Geo-Information
Chairman of Shenzhen Key Laboratory of Spatial Smart Sensing and Services, Shenzhen
University

Abstract

With the rapid construction of transportation infrastructures in the past decade, the China's highway mileage has surpassed 120,000 km. Efficient and automatic maintenance of the highways has become an urgent demand. The research performed at Shenzhen University and commercialized by Zoyon Co. Ltd. has made breakthroughs on the key technologies of high-precision dynamic road testing and measurement, and developed a series of testing equipments with largely improved performance over the competing products. (1) In high-precision dynamic measurement of road bearing capacity, an inversion method is developed to calculate the road deflection by using the deformation velocity captured by laser Doppler sensors. The invention achieves a real-time, non-contact, and dynamic measurement of the road deflection at a speed of 15-90 Km/h, with an accuracy of 0.01mm. (2) In automatic pavement defect detection, laser imaging techniques are employed to model the pavement surface with 3D dense point clouds, and smart computer-vision algorithms are developed to localize and classify the pavement defects such as crack, bump, hole, subsidence, loose and rutting, which improves the efficiency over 20 times, and significantly promotes the pavement defect detection from human interaction to machine automation. (3) In tunnel defect detection, LED arrays are used to solve the problem of poor lighting conditions within the tunnel, and high-precision image-registration algorithms have been proposed to mosaic the adjacent images captured by CCD camera arrays. Assisted by infrared sensors, the invented equipment can effectively detect the tunnel defects such as water seepage, frost damage and cracking. The above research and development have significantly promoted the automation level of China's road maintenance and measurement.

Biography:

Prof. Qingquan Li, was born in Jan. 1965, is the president of Shenzhen University since 2012. He is a valid member of the International Eurasian Academy of Science. Prof. Li entered Wuhan Technical University of Surveying and Mapping in 1981 and got his PhD in 1998. Prof. Li has been working in the engineering surveying field over thirty years. One of his outstanding research achievements is related to intelligent road detecting and measurement.



The research has made breakthroughs in the key technologies of high-precision dynamic pavement detecting and measurement, and developed a series of detection equipments with independent intellectual property rights, which fills the technology gap between domestic and abroad, and achieves a leap from the static to the dynamic with regarding to the precise road engineering measurement. His research interests are GIS-T, three dimensional and dynamic data modeling, location-based services, ITS, and surveying engineering, etc. Prof. Li has published 5 books, around 400 papers, and owns about 35 patents in his research field.