

Passive and Active Vehicle Safety - Technologies towards Autonomous Driving –

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Abstract

The number of vehicle crashes started to re-increase in proportion to the use of smart phones. It is imperative that the vehicles are protected from collision in both passive and active ways. This talk will present technologies that the speaker developed for passive and vehicle safety. In the passive safety, the ability of vehicles to measure in-crash deformation is developed. Particular developments include the deformation measurement of the toeboard and main frame. The toeboard measurement is achieved by implementing a stereo camera and an inertial sensor unit. A camera facing downward is additionally installed for global localization. The mainframe measurement is performed by multiple high-speed cameras in the underground pit. The incorporation of sensor fusion and recursive Bayesian estimation allows the measurement of partially unobservable structures. Technologies covered on active safety include the computer-vision based three-dimensional road measurement capability. The technique allows accurate three-dimensional measurement though the problem is highly ill-posed by the lack of depth information.

The talk will also cover other robotics related researches the speaker is conducting, including work on Mohamed Bin Zayed International Robotics Challenge.

Biography

Tomonari Furukawa is Professor and Zinn Faculty Scholar at University of Virginia. He received B.Eng. in Mechanical Engineering from Waseda University in 1990, M.Eng. in Mechatronic Engineering from University of Sydney in 1993 and Ph.D in Quantum Engineering and Systems Science from University of Tokyo in 1996. He worked at University of Tokyo, University of Sydney, University of New South Wales and Virginia Tech as faculty before joining University of Virginia. His research work focuses on inverse analysis and optimization methods in robotics and experimental/computational mechanics where he currently has his particular interests in Bayesian estimation and control of autonomous systems, multiphysics modeling, simulation and measurement and stochastic material characterization and structural health monitoring. He has published over 300 technical papers and won various career and paper awards including Young Investigator Award from International Association for Computational Mechanics. He has also led teams in several renowned international competitions including Virginia Tech's Team VALOR in the DARPA Robotics Challenge in 2015 and Team VICTOR in MBZIRC in 2017. He was also Chair of 5th FAST-zero '19 held in Blacksburg, VA on September 9-11, 2019, which is one of the major international conferences on active vehicle safety and autonomous driving.

