

## DIGITAL INNOVATION AWARD

### Highly Commended Winner 2016

#### A Real-Time Monitoring, Assessment and Alarming System for Construction-Induced Vibration Impact on Hospital Buildings

##### Research Abstract

Construction projects near existing hospitals present an unprecedented challenge to the construction industry because of small separation distance and extremely stringent vibration limits for ultra-precision medical equipment. In collaboration with Hong Kong's Hospital Authority, the research team developed the first real-time vibration monitoring, assessment and alarming system in Hong Kong by leveraging the recent advances in sensing and software techniques. The System consists of four major components: (a) a sensory network with high-fidelity accelerometers and microphones; (b) continuous data acquisition and processing module; (c) real-time vibration impact assessment module based on a pre-established database of vibration limits; and (d) autonomous alarming module that issues visual and audio alarms and email notifications in case of exceedance of vibration limits.

The System was successfully implemented in an ongoing hospital expansion project in Hong Kong in order to ensure the functionality of a large amount of crucial medical equipment during the four-year construction period. The recent adjustment in construction schedule based on the accumulated knowledge from the System shortened the whole piling period by 2.5 months and saved around 2 million Hong Kong dollars. The interface could enable the System to be conveniently employed in future construction projects supervised by Hong Kong's Hospital Authority.

##### Judge's comments

*"The innovation uses a very effective application of technology to create a warning system for hospitals - and in doing so - fills a material knowledge gap. The innovation's potential to inform future construction work, improve industry standards and health and safety is particularly encouraging."*

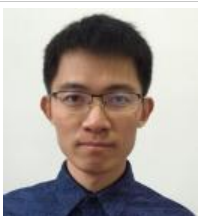
### Winner's Bios



#### Dr Songye Zhu

##### Hong Kong Polytechnic University

Dr. Songye Zhu is an Associate Professor in the Department of Civil and Environmental Engineering at The Hong Kong Polytechnic University. He received his BEng and MSc degrees in Structural Engineering from Tongji University (China) and his Ph.D. degree in Civil Engineering from Lehigh University (USA). He is currently Editor of Advances in Structural Engineering, and President-elect of the American Society of Civil Engineers (Hong Kong Section). His major research interests include vibration monitoring and mitigation, structural health monitoring, and smart materials and structures. He was awarded Takuji Kobori Prize in 2014 from the International Association for Structural Control and Monitoring.



#### Mr Shiguang Wang

##### Hong Kong Polytechnic University

Shiguang Wang is currently a PhD candidate in the Department of Civil and Environmental Engineering at The Hong Kong Polytechnic University. He got his Bachelor degree in Structural Engineering from Shandong Jianzhu University, China, in 2015. His current research topic is on construction-induced vibration assessment and its impact on vibration-vulnerable objects.



#### Mr Gary Hui

##### Chevalier (Construction) Co., Ltd.

Gary Hui is a Project Manager of Chevalier (Construction) Co., Ltd. He obtained a Bachelor of Science degree in Construction Engineering and Management from the City University of Hong Kong. He is also a member of the Hong Kong Institution of Engineers and a Registered Professional Engineer. He is a building engineering profession having 15 years experience in construction management as well as site supervision, design coordination, site logistics and pre-construction planning in relation to foundation works,

ELS works, drainage construction works, pile cap & superstructure works, finishing and fitting-out works, window and curtain wall installation, etc. ranging from government projects to private property development.

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