THE HONG KONG POLYTECHNIC UNIVERSITY
香港理工大學

National Rail Transit Electrification and Automation Engineering Technology Research Center (Hong Kong Branch)
國家軌道交通電氣化與自動化工程技術研究中心(香港分中心)

6th International Symposium on Reliability Engineering and Risk Management

Current real-world systems and their environment are characterized by a rapid growth in scale, complexity and interconnection and a significant involvement of diverse human behavior with critical influence, so that uncertainties and risks are involved to a greater extent than ever before. Growth of emerging disruptive technologies may produce unexpected conditions and/or new conditions. Historical trends may be less applicable to our understanding of global risks (economic, geopolitical, environmental, technological, and societal) as many large-scale systems are seeking new equilibria. Expecting the unexpected may be the dominant paradigm in engineering. These issues have great influences on diminishing the resilience of systems. Additionally, changes to control architectures and safeguards are not keeping up with the increase in complexity. These complex systems and networks are the backbone of developed societies. The industrial, economical and societal vulnerability in this context is obvious as disasters such as Fukushima or the financial crisis as well as terrorist activities and cybercrime have shown. In all these cases, seemingly minor issues and events have led to catastrophic risks and dramatic consequences through cascading failures in complex systems. The consequences go beyond the original precipitating event - entire industry can be called into question by the public and trust in decision makers to keep society safe is also eroded. These critical issues and mechanisms are very difficult to identify and cannot be addressed with current technologies. As a result, the records of crises and disasters show an increasing frequency and associated cost.

The theme of this symposium is to stimulate discussions on how resilient and cost-effective solutions could be developed to reduce these vulnerabilities by making our complex systems and networks, and specifically our infrastructure, resilient at a minimum level of risk proneness. The goal is not to preserve existing systems, but to preserve and even enhance critical functions, after an expected or unexpected disturbance. Making critical infrastructures resilient is particularly critical to high-technology financial and economic hubs, where failure consequences can be particularly severe.

Prof. Yi-Qing Ni gives a keynote presentation titled “Compressive sensing and sparse Bayesian learning in structural health monitoring: Applications to large-scale bridges and high-speed rail”.