

Future Resilient Systems

at the Singapore-ETH Centre



Director



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Enhancing the resilience of urban systems by combining engineering, design and social research

The urban environment is a complex system made up of interconnected socio-technical systems, such as transport, energy, and financial systems, as well as human and community networks.

Rapid urbanisation and densification of population and infrastructure have led to the emergence of high-density urban systems, which tend to be vulnerable to disruptions and cascading failure.

Meanwhile, digitalisation has led to the evolution of infrastructure systems into cyber-physical systems. These physical systems have integrated data

acquisition, analysis, and intelligent advisory abilities that interact with users and operators. This calls for new approaches to make these systems more resilient, such as new network models and the development of the digital twin.

Tapping on the availability of sensors and development of data science analytics, researchers will develop tools including a dynamic mobile sensing platform to support decision making and a software that detects weak signals in mobility and social media data.

Improving our sense-making capabilities and understanding of how humans and organisations interact can contribute towards social resilience.

Co-director



Dr Jonas Joerin
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Research modules

Cyber-Physical Systems (CPS) Resilience

- Resilience-Driven Design of Cyber-Physical Systems
- Control, Detection, and Recovery of Resilient Cyber-Physical Systems
- Data Network Resilience in Cyber-Physical Systems
- Digital Twin-Enabled System Resilience

Resilience of High-Density Urban Systems (HD-US)

- Resilience Analysis of HD-US
- Energy Resilience in HD-US
- Climate Resilience in High-Density Cities
- Financial Systems Regulation and Networks

Distributed Cognition for Social Resilience

- Measuring, Modelling and Enhancing Social Resilience
- Dynamic Mobile Sensing Platform
- Automated Hazard Detection for Social Resilience
- Spatiotemporal Analysis for Weak Signals Detection
- Interactions with New Technologies and Financial Systems

Partners

The Future Resilient Systems programme provides a cross-disciplinary and cross-cultural environment, bringing together researchers from engineering, social sciences, and design and planning disciplines from ETH Zurich, Nanyang Technological University, National University of Singapore, and the University of Illinois Urbana-Champaign.

Future Resilient Systems is the second programme of the Singapore-ETH Centre, established by ETH Zurich and Singapore's National Research Foundation, as part of its Campus for Research Excellence and Technological Enterprise (CREATE).

For more information about Future Resilient Systems, visit www.frs.ethz.ch or contact info@frs.ethz.ch.

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