Disaster prevention, evacuation, and mitigation on urban buildings

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Purpose of Research

Japan is at the forefront of seismic technology. Still, the damage from recent earthquakes calls for viable measures for ensuring safety in damaged buildings and cities, going beyond the traditional assumption of the perfect avoidance of seismic damage. The development of an intelligent house in this research applies the concept of IoT so that buildings can sense and report any pain or discomfort.

Summary of Research

We propose a new IoT-based building system that detects, analyzes, diagnoses and notifies human activities and damage from earthquakes. Such an intelligent house features: 1) energy harvesting to supply power to sensor and radio devices, 2) power-saving radio communication network and 3) AI analysis and diagnosis system in order to effectively prevent disaster (seismic design of building), facilitate evacuation (quake diagnosis, life protection, and relief) and mitigate disaster (resilience to ensure rescue and quick recovery of the building).



Schematic illustration of an intelligent house applying IoT





Future Developments

- Consolidation of element technologies based on discussing performance target and on-site research
- · Consolidation of architectural design method for installing an IoT system

Characteristics of Our Intelligent House

- Energy harvesting for powering sensor and radio devices
- Power-saving radio communication network
- Big data analysis with AI

Advantages of Our Intelligent House

- · Quick information of damage and recovery status
- · Quick recovery of affected building

Element technologies for achieving an intelligent house

• Monitoring of children and senior citizens, and protection against crimes, sneak thieves and disasters

What We Expect from Companies

- Joint research on element technologies
- · Proposal of new research fields

Associated System: JST Strategic Basic Research Programs (Sakigake)

- Intellectual Property: Patent application PCT/JP2016/080628
- Prototype: A demonstration unit is available
- Sample: A test building for on-site research can be visited

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