# Thesis Abstract

**Name:** ISOZAKI Hiroshi  
**Title of Thesis:** Security Platform for Embedded End-point Devices in a Smart Grid  
**Registration Number:** □ "KOU" □ "OTSU"  
**No.** *Office use only*  
**Name:** ISOZAKI Hiroshi

## Summary of Thesis:

In this dissertation, we present a software security platform for embedded end-point devices in a smart grid. Specifically, we propose a method to isolate security-sensitive processes from general-purpose processes utilizing security functions of a commodity embedded processor, identify the functions to be included in the security-sensitive processes, perform a full implementation of a system based on the proposed method, and present evaluation results with respect to both security functions and performance.

The proposed security platform provides secure updatability and high availability as well as satisfying legacy security requirements, such as confidentiality and integrity, to enable a fault-tolerant system with long-term security. In order to keep long-term security, the method provides a function to dynamically load and update a legitimate security-sensitive module only with sufficient robustness against tampering. Since the security-sensitive processes are executed in a secure environment, illegitimate modification and information leakage of the security-sensitive processes can be prevented even if the general-purpose processes are modified or their control is taken over. To keep availability, the system introducing our proposed method monitors the status of the operating system and recovers even if the operating system stops working owing to unexpected behavior or cyber-attacks.

Based on the proposed methods, we further propose an autonomous distributed smart grid architecture by introducing a secure mobile agent system in which the protection-required module of a mobile agent can be executed securely without interference by attackers. The proposed secure mobile agent system is very useful and enables new applications in field area networks of smart grids, such as privacy information protection and pay-per-use software charging.

**Keyword:** Security, Trusted Computing, Embedded Software, Smart Grids, Mobile Agents