A Cybersecurity Framework for Wireless- Controlled Smart Buildings

Feng Wu, Master
Advisor: Ming Qu
wu1239@purdue.edu

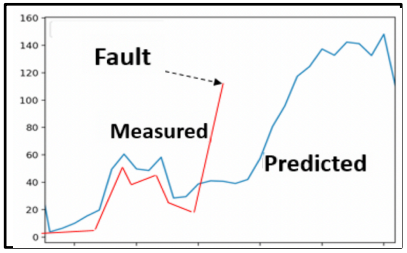
RAY W. HERRICK LABORATORIES

Project Description

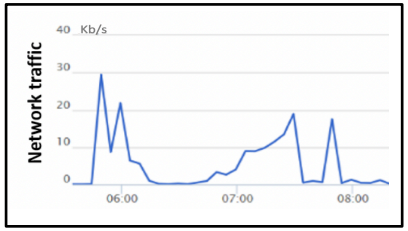
- This research aimed to address the challenges of cyber attacks on buildings by developing an integrated cyber-security framework for smart buildings.
- Wireless-based systems are used as case studies to demonstrate the approach of the framework

Approach

- Model the operation of the physical model
- Predict the trend of system operation by using machine learning
- Observe the data traffic of the wireless network



Model simulation and prediction



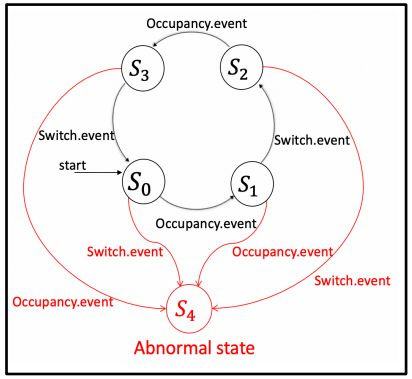
Network traffic observation

Discussion

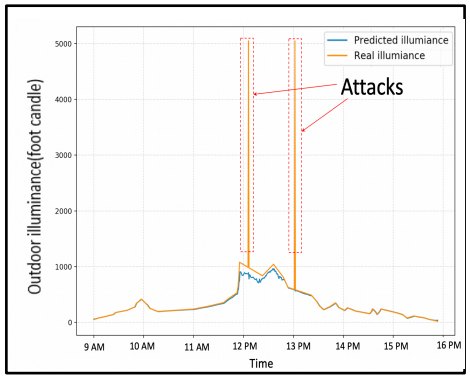
- The framework for two-position control integrated the data from both cyber and physical domain to safeguard the wireless system.
- For continuous control, the developed data-driven model by using the artificial neural network can effectively identify the abnormal measurement of sensors.

Results

- Wireless lighting system and shading system are used as testbeds to implement attacks
- Designed attacks can be identified effectively



Attack detection of lighting system



Attack detection of shading system

Developed frameworks can identify attacks and faults effectively

PURDUE UNIVERSITY