

MECOP Final Presentation

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Company History

- Leviton Manufacturing Co., Inc. was founded in 1906 by Isidor Leviton
- A private, family-owned business
- Offers over 25,000 products electrical, lighting, energy management, and data networking products for residential and commercial markets in over 100 countries
- Leviton has 31 locations around the world
- Currently employs almost 7000 people
- Tualatin office specializes in Controls part of Lighting & Controls division

Project 1: Certificate Manager

Set up Lemur, a TLS certificate and key management system, and implemented proof of concept applications to demonstrate its integration with other project components

- Part 2: Tkinter GUI

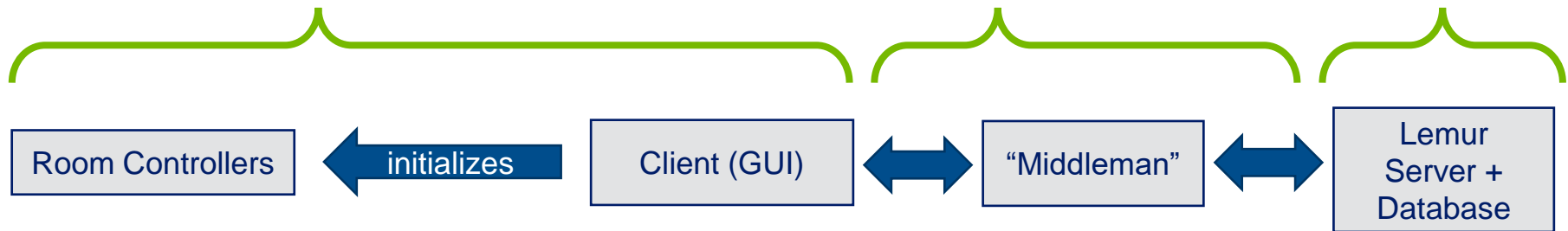
- Make HTTP calls to Lemur API endpoints to create, retrieve, delete certificates and keys
- Download certificates and keys to transfer to lighting system room controllers

- Part 3: Flask “Middleman”

- Extra security layer to enforce user permissions to certain certificates and keys

- Part 1: Set up Lemur

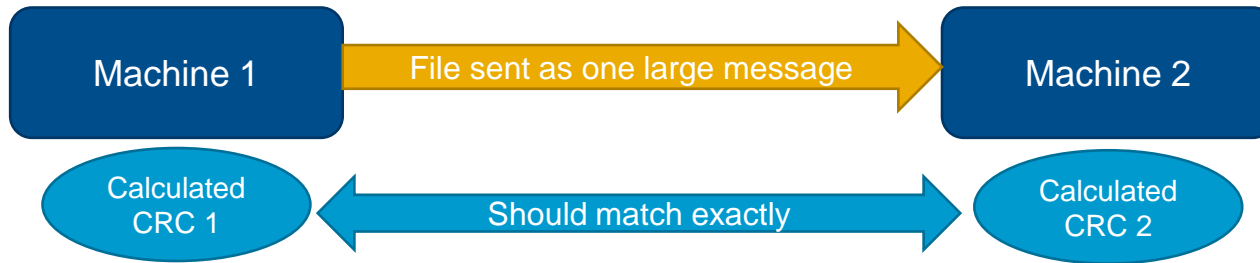
- Open-source certificate management framework maintained by Netflix



Project 2: Room Controller Firmware Update

Implemented a way for room controllers to receive firmware update files using a secure wireless protocol, reducing upgrade process time to under one minute

- Developed this feature in a series of steps:
 - Step 1: Python script to calculate simple CRC on bytes read from local file
 - Step 2: Added wireless transferring code and ran the script from a Raspberry Pi and verified CRC
 - Step 3: Wrote the equivalent code in C to incorporate into room controller firmware



Project 3: Web Vulnerabilities Scanning

Evaluated open-source and commercial trial versions of scanning tools that can find critical vulnerabilities in a web application so developers can increase security before it is deployed

- Option 1: OWASP ZAP
 - Open-source, free
- Option 2: Qualys Web Application Scanning
 - Commercial product
- Option 3: Micro Focus WebInspect
 - Commercial product

All three have fuzzing and penetration testing capabilities.

When evaluated on the same web application, all three found the same critical cross-site scripting vulnerabilities.

Vulnerabilities were patched before the application went into production.

Project 4: ST Time of Flight Sensor AI Exploration

Tried four exploratory approaches to training a machine learning model for person detection using data collected from a time of flight sensor

Edge Impulse

- Low-code, online platform for creating ML models for embedded devices
- Free for developers
- Unsuccessful attempt (data processing issues)

NanoEdge AI Studio

- Low-code, desktop application for creating ML models for embedded devices
- Commercial product offered by STMicroelectronics
- Successfully trained two models
- Models were likely overfitted to the data, but had limited ways to evaluate them

Keras LSTM

- Free Python deep learning library
- Formatted data as time series data
- Wrote Python script to train LSTM model
- Unsuccessful attempt (could not train to accuracy beyond 0.5)

Autokeras Image Classifier

- Free AutoML Python library
- Formatted data as low resolution images
- Wrote Python script to train binary image classifier
- Unsuccessful attempt (could not train to accuracy beyond 0.5)

What I learned

- Firmware engineering development process
- Internet of Things and cloud technologies (AWS, Docker, Raspberry Pi)
- Project lifecycle for products requiring multidisciplinary teams
- How to think big-picture about how a certain project fits into the overall solution
- Small team dynamics
 - More opportunities to work on many parts of a project
 - Greater opportunity to develop expertise in project areas
 - Collaborate frequently with the same people

Thank You