

## **A Brief Discussion of Project Constraints**

### **Economic Constraints**

Since this project is being personally funded, the budget for acquiring equipment and material for this project is rather limited. The current estimate for the project's budget is no more than \$150. As a result, hobbyist electronics will mainly be used for the project's hardware. The project's software will also use free software to help cut costs. Luckily, there are plenty of options available for both hardware and software that are affordable and extensible. Since this is a personal project, no economic development or benefit will result from this project.

### **Professional Constraints**

This project will require that I employ almost everything I have learned in my career thus far. Since this project is rather all encompassing in nature, it will be a great resume builder.

### **Security Constraints**

Data being sent through the MQTT topics must be authenticated and encrypted. Authentication will prevent unauthorized actors from publishing data to the topics. This helps ensure that the data pipeline operates as intended. Furthermore, encryption will ensure that the data being sent will remain confidential. This is especially crucial when sending source code to the clients for an over-the-air (OTA) update, where the source code will contain private keys and certs.

In addition to using authentication and encryption, JSON Web Token (JWT) authentication must also be used when sending source code for an OTA update via the Update MQTT Topic. This would allow each client to verify that the source code was sent by the system administrator before proceeding. Failure to verify the JWT would result in the OTA update being ignored.

Lastly, having a sign-in page for the web pages being served would prevent unauthorized users from viewing the collected data. However, this is a lower priority vulnerability since these web pages can only view data.