**Master Test Plan (MTP) for Hardware Train Controller**

**Overview**

Tests for the Hardware Train Controller will be organized by class. The classes for tests are: Arduino, Serial Port, UI, Train Controller, Signal Handler. Testing will be performed periodically during development.

**Arduino Tests**

* **Calculate Power**
  + Input: Kp, Ki, commandedSpeed, currentSpeed, suggestedSpeed, speedLimit, Authority
  + Expected Output: Successful value for power calculated on the Arduino
* **I/O Devices**
  + Input: Button/Switches pressed for left/right doors, interior/exterior lights, failures, mode, emergency break, passenger break, service break. Joystick operations
  + Expected Output: Boolean values properly computed from button/switch usage and LCD displaying proper data based on Joystick input
* **Transmission**
  + Input: Boolean values and power
  + Expected Output: Successful serial port transmission to computer
* **Receiving**
  + Input: String from computer
  + Expected: Read and parse data to be used in power calculations

**Serial Port Tests**

* Serial Port is connected
  + Input: COM port is selected and connect button pressed
  + Expected Output: Console output stating that Arduino was connected
* Data TX/RX
  + Input: String to be sent/received
  + Expected: Data is sent and received by Train Controller

**UI Tests**

* **Real Time Updates**
  + Input: All boolean values, power calculation, and train information given by the Arduino and Train Model respectively
  + Expected Output: All inputs are displayed on the UI as they are calculated and/or received

**Train Controller**

* **Set Kp/Ki**
  + Input: Type Kp/Ki value into text box (must be digits), then hit the enter button on the UI
  + Expected Output: Kp/Ki is transmitted to Arduino
* **Set Commanded Speed**
  + Input: String in the form “00.00”, must be 5 digits. Then hit enter on keyboard
  + Expected Output: Commanded speed is sent to arduino and used for manual power calculations
* **Decode Track Circuit Data**
  + Input: Encoded Track Circuit Data
  + Expected Output: Decoder can read/parse the incoming information and store them in the proper variables
* **Send Power to Train Model**
  + Input: Current speed
  + Expected Output: Power is sent to the train model

**Template for Tests**

* Templates for each test will contain the outcome of the test (Pass or Fail), the specific outcome expected versus what happened, when the test was performed and which user requested it. This data will be given as a text output in several lines of text after a test.

| **Test Case** | **Inputs** | **Expected Output** | **Pass/Fail** | **Failure Description** | **Tester** | **Date Tested** |
| --- | --- | --- | --- | --- | --- | --- |
| **Arduino** | | | | | | |
| Calculate Power | Kp, Ki, commandedSpeed, currentSpeed, suggestedSpeed, speedLimit, Authority | Successful value for power calculated on the Arduino | Pass | none | Justin | 12/12 |
| I/O Devices | Button/Switches pressed for left/right doors, interior/exterior lights, failures, mode, emergency break, passenger break, service break. Joystick operations | Boolean values properly computed from button/switch usage and LCD displaying proper data based on Joystick input | Pass | none | Ethan | 12/12 |
| Transmission | Boolean values and power | Successful serial port transmission from arduino | Pass | none | Ethan | 12/12 |
| Receiving | String from computer | Read and parse data to be used in power calculations | Pass | none | Justin | 12/12 |
| Serial Connection | | | | | | |
| Serial Port is connected | COM port is selected and connect button pressed | Console output stating that Arduino was connected | Pass | none | Ethan | 12/12 |
| Data TX/RX | String to be sent/received | Data is sent and received by Train Controller | Pass | none | Ethan | 12/12 |
| UI Compatibility | | | | | | |
| Real Time Updates | All boolean values, power calculation, and train information given by the Arduino and Train Model respectively | All inputs are displayed on the UI as they are calculated and/or received | Pass | none | Matt | 12/12 |
| Set Kp/Ki | Type Kp/Ki value into text box (must be 5 digits including a decimal ie. 1000 = 01000) then hit enter | Kp/Ki is transmitted to Arduino | Pass | none | Patrick | 12/12 |
| Set Commanded Speed | String in the form “00.00”, must be 5 digits. Then hit enter on keyboard | Commanded Speed is sent to arduino and used in power calculations | Pass | none | Patrick | 12/12 |
| Decode Track Circuit Data | Encoded Track Circuit Data | Decoder can read/parse the incoming information and store them in the proper variables | Pass | none | Patrick | 12/12 |
| Send Power to train model | Current speed | Power is sent to the train model | Pass | none | Ethan | 12/12 |