**Master Test Plan (MTP) for Software Track Controller**

**Overview**

Tests for the Software Track Controller will be organized by user type. The three user categories for tests are: CTC, Programmer, and Track Model. Testing will be performed periodically during development.

**CTC Tests**

* **Enforce Authority**
  + Input: CTC sends authority to the appropriate Wayside
  + Expected Output: Commanded speed is set to 0 on blocks without authority
* **Suggested Speed Exceeds Speed Limit**
  + Input: Passing a suggested speed to the appropriate Wayside that exceeds the speed limit in the respective branch
  + Expected Output: The calculated commanded speed will be equal to the speed limit

**Programmer Tests**

* **All Switches to 1**
  + Input: Import a PLC file that switches every switch in a Wayside’s control to their ‘1’ position
  + Expected Output: All switches in the Wayside’s control are set to their ‘1’ position
* **All Crossings to On**
  + Input: Import a PLC file that activates every crossing on a Wayside’s sector
  + Expected Output: All crossings controlled by the wayside are activated
* **Switch with Train Present**
  + Input: Import a PLC file that toggles a switch while a train is in the same block
  + Expected Output: The switch is not toggled
* **Crossing with Train Present**
  + Input: Import a PLC file that activates a crossing while a train is in the same block
  + Expected Output: The crossing is not activated
* **Import Valid PLC File**
  + Input: Import a PLC file that exists and is in the proper format
  + Expected Output: The PLC file runs as intended
* **Import Nonexistent PLC File**
  + Input: Import a filename that does not exist
  + Expected Output: PLC runs, but nothing happens
* **Import Invalid PLC File**
  + Input: Import a non-PLC file
  + Expected Output: PLC runs, but nothing happens
* **Designate Hardware Wayside**
  + Input: Select Wayside 1 to be set as the HW Track Controller in the SW Track Controller UI
  + Expected Output: Wayside 1 is removed from the list of waysides, and the UI for Wayside 1 is closed
* **Create Waysides**
  + Input: Use the SW Track Controller UI to create 5 waysides around the track
  + Expected Output: 5 waysides are created covering equivalent sections around the track, and a UI window opens for each created wayside.
* **Set Switch in Automatic Mode**
  + Input: Use the Wayside UI to set any switch to the 1 position while in Automatic mode
  + Expected Output: The switch does not change position
* **Set Switch in Manual Mode**
  + Input: Use the Wayside UI to set any switch to the 1 position while in Manual mode
  + Expected Output: The switch is set to the 1 position
* **Set Crossing in Automatic Mode**
  + Input: Use the Wayside UI to set any crossing to the on position while in Automatic mode
  + Expected Output: The crossing does not activate
* **Set Crossing in Manual Mode**
  + Input: Use the Wayside UI to set any crossing to the on position while in Manual mode
  + Expected Output: The crossing is set activated

**Track Model Tests**

* **Initialize SW Track Controller**
  + Input: Call constructor of SWTrackController with a given Red Line and Green Line track
  + Expected Output: The SWTrackController is created over the span of the two given tracks
* **Enforce Broken Rails**
  + Input: Send appropriate Wayside information about a rail that has broken
  + Expected Output: Commanded speed is set to 0 on the broken block and adjacent blocks

**Template for Tests**

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

**Test Cases**

| Test Case | Inputs | Expected Output | Pass/Fail | Failure Desc | Tester | Date Tested |
| --- | --- | --- | --- | --- | --- | --- |
| PLC Run | | | | | | |
| PLC Commands Switch to Toggle when a train is on it | 1) Run PLC to switch all switches while a train is on a switch | Switch position under train does not move | Pass | - | Paul | 12/12 |
| PLC Commands Crossing to Toggle when a train is on it | 1) Run PLC to toggle all crossings while a train is on a crossing | Crossing under train does not toggle | Pass | - | Paul | 12/12 |
| PLC Commands Switch to 1 | 1) Run PLC to switch all switches on | All switches are turned on | Pass | - | Paul | 12/12 |
| PLC Commands Crossing to Activate | 1) Run PLC to toggle all crossings on | All crossings are turned on | Pass | - | Paul | 12/12 |
| UI Functionality | | | | | | |
| Designate HW Wayside | 1) Create 3 Waysides  2) Designate Wayside 2 as HW | The Wayside 2 window is closed, and the track segment is put aside for HW | Pass | - | Owen | 12/12 |
| Create Waysides | 1) Create 5 Waysides | 5 Wayside windows are created, with more waysides around the longer track and all dividing their track evenly | Pass | - | Owen | 12/12 |
| Vital PLC Functions | | | | | | |
| Enforce Authority | 1) Receive authority from CTC  2) Run PLC | Commanded speed is set to 0 on blocks without authority | Pass | - | Jarrod | 12/12 |
| Enforce Broken Rails | 1) Receive broken rails from track model  2) Run PLC | Commanded speed is set to 0 on the block of and adjacent to broken rails | Pass | - | Jarrod | 12/12 |
| Suggested Speed Exceeds Speed Limit | 1) CTC sets suggested speed of a block to a value exceeding the speed limit  2) Run PLC | Any suggested speed over the speed limit is cut down to the speed limit | Pass | - | Jarrod | 12/12 |
| Manual/Automatic Mode | | | | | | |
| Set Switch in Automatic Mode | 1) Ensure Automatic Mode on the SWTC Interface is checked  2) Switch any switch to Right | Nothing happens | Pass | - | Paul | 12/12 |
| Set Crossing in Automatic Mode | 1) Ensure Automatic Mode on the SWTC Interface is checked  2) Set any crossing to On | Nothing happens | Pass | - | Paul | 12/12 |
| Set Switch in Manual Mode | 1) Ensure Automatic Mode on the SWTC Interface is not checked  2) Switch any switch to Right | The switch is set to 1, and an alert tells the user it was set | Pass | - | Paul | 12/12 |
| Set Crossing in Manual Mode | 1) Ensure Automatic Mode on the SWTC Interface is not checked  2) Set any crossing to On | The crossing is set to 1, and an alert tells the user it was set | Pass | - | Paul | 12/12 |
| Import PLC | | | | | | |
| Import Valid PLC file | 1) Type name of existing PLC file into the Wayside interface  2) Press Import PLC | The PLC file performs the written actions | Pass | - | Paul | 12/12 |
| Import Nonexistent PLC file | 1) Type name of nonexistent PLC file into the Wayside interface  2) Press Import PLC | The PLC performs no action | Pass | - | Paul | 12/12 |
| Import Invalid File | 1) Type name of a non-PLC file into the Wayside interface  2) Press Import PLC | The PLC performs no action | Pass | - | Paul | 12/12 |