

Pittsburgh Light Rail Transit System User Manual

This is the User Manual to reference for help on installation, maintenance, and configuration of the Pittsburgh Light Rail Transit System.

How to Install:

This system consists of Python files for each module as well as APIs for system-wide communication. An IDE which supports Python is required to run this simulation. Python can be installed using the link below. Remember to install Python for a machine that runs on Windows operating system:

<https://www.python.org/downloads/>

Once Python is installed, make sure to download the system executables from the team's GitHub repository linked below:

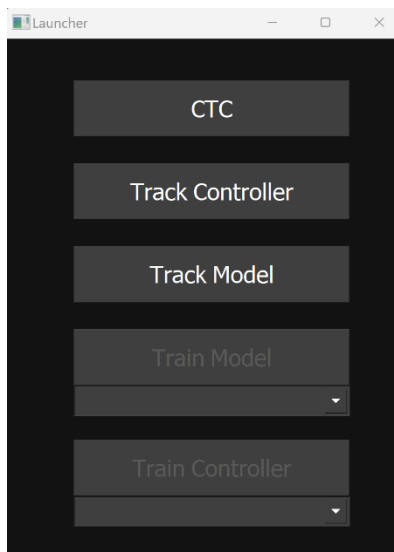
<https://github.com/Tlalvani/ECE1140>

How to Configure:

Each module communicates using APIs. The downloaded system includes all modules, APIs, and test cases necessary to run the system. Each module can be run by clicking "Run" after opening "module_name.py". To run the entire system, the file "launch.exe" can be run.

How to Use: Below are instructions for how to run the simulation and dispatch a train

Step 1: Launch the simulation by clicking "Run" after opening the "launch.py" file. Once the launcher is run, a window shown below will pop up.



Step 2: Open the Track Model and select the appropriate .csv for the line you would like to run. To do so, click the "Track Model" button and wait for the window shown below to pop up:

Dialog

Track Model

☐ Red

☐ Green

☐ Blue

Block Occupancy N/A

Power Failure No

Circuit Failure No

Broken rail No

Infrastructure N/A

Station Side N/A

Block Length N/A

Elevation N/A

Grade N/A

Authority N/A

Commanded Speed N/A

Speed Limit N/A

Acceleration/Decc. Limit N/A

Track Lights N/A

Track Heating Off

Upload .csv ...

OK Cancel

QFileDialog.getOpenFileName()

Source > ECE1140_Trains > ECE1140 >

Search ECE1140

Organize New folder

Name	Date modified	Type
.git	4/21/2023 1:35 PM	File folder
TrackModel	3/17/2023 3:06 PM	File folder
train_system	4/16/2023 3:41 PM	File folder
BlueLine.csv	3/26/2023 10:39 PM	Microsoft Excel CSV file
GreenLine.csv	4/16/2023 11:33 AM	Microsoft Excel CSV file
RedLine.csv	4/14/2023 11:11 AM	Microsoft Excel CSV file

File name: GreenLine.csv

CSV Files (*.csv)

Open Cancel

Dialog

Track Model Track

☐ Red

☒ Green

☐ Blue

Block 1

Switch 1 Position Left

Upload .csv

Block Occupancy	No
Power Failure	No
Circuit Failure	No
Broken rail	No
Infrastructure	
Station Side	
Block Length	0.0621371miles
Elevation	1.64042m
Grade	0.5%
Authority	
Commanded Speed	0
Speed Limit	27.961695 mph
Acceleration/Decc. Limit	5 mph/s
Track Lights	Red
Track Heating	Off

OK Cancel

Step 3: Open the Track Controller and upload PLC code from the “Manual Control” window.

Manual Control

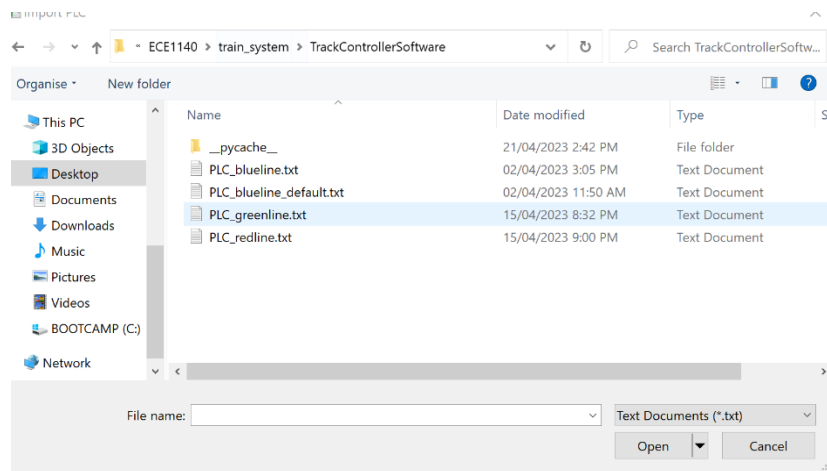
Edit Output PLC

PLC scripts

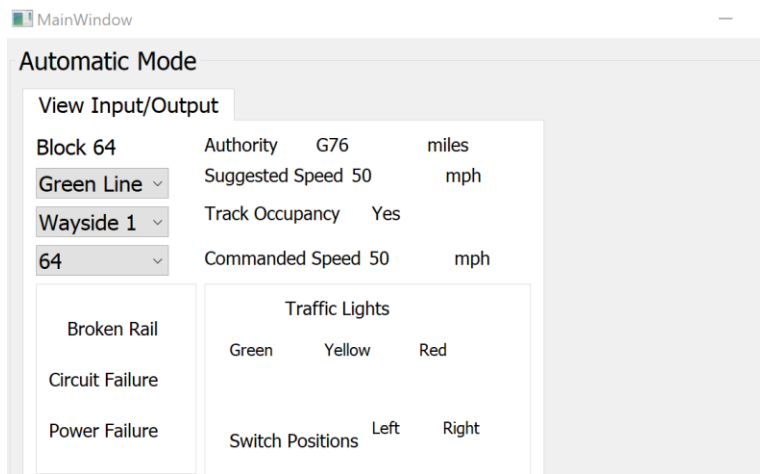
Upload PLC_blueline

Upload PLC_redline

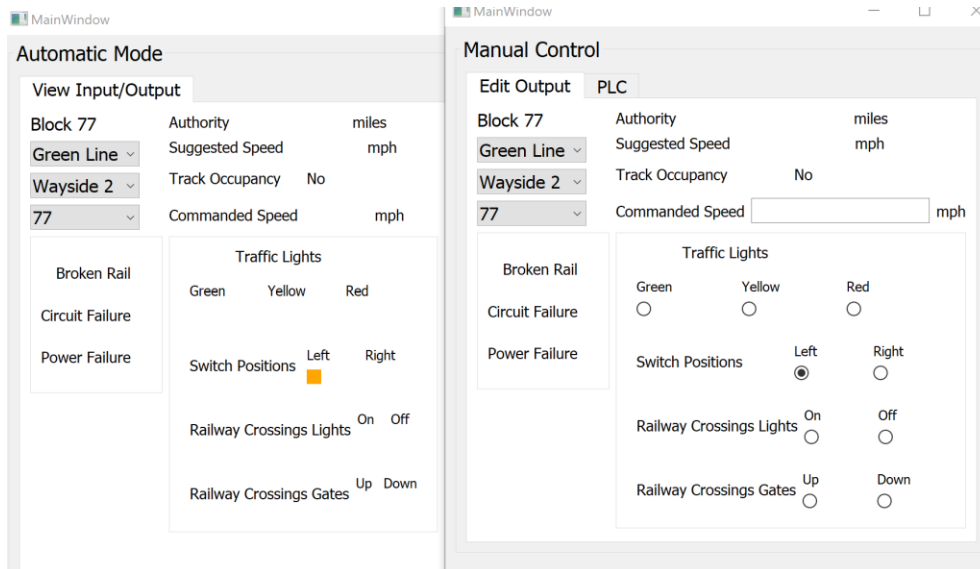
Upload PLC_greenline



After dispatching a train (see next steps), if user wishes to monitor the inputs and outputs changing, go to “Automatic Mode” window and choose a line, a wayside, and a block from the drop-down menus:



If user wishes to manually change the commanded speed, traffic lights, switches or crossings' lights/gates, go to “Manual Mode” window and choose “Edit Output” tab. Choose a line, wayside and block number, and manually set the outputs. The output will automatically change on the “Automatic Mode”.

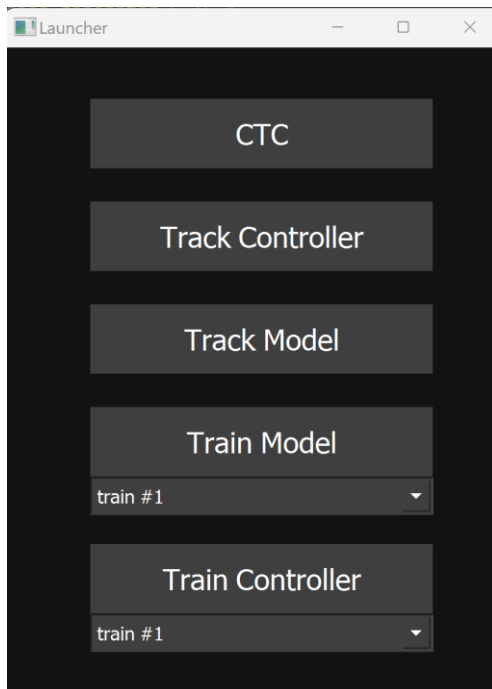


To run the hardware track controller, plug in the Arduino device.

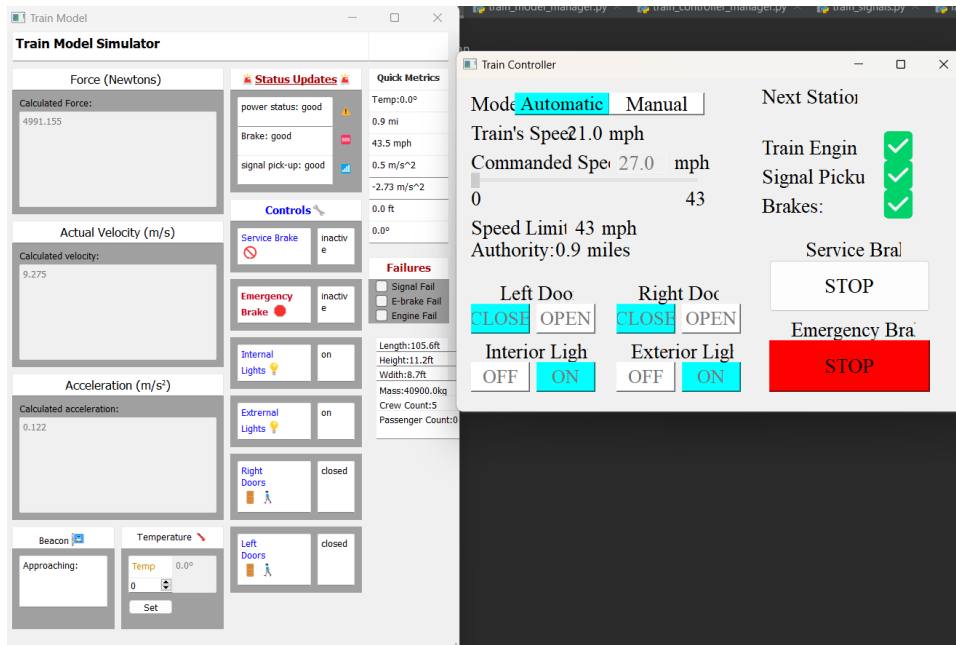
Step 4: Open CTC and dispatch train. Click the “CTC” button from the launcher and wait for the window shown below to pop up. A train can then be dispatched by either uploading a schedule on the automatic tab, or clicking on the “Manual” tab, and then selecting line, station, and arrival time for the train and clicking dispatch in the bottom left to confirm. Moving back to the “Automatic” tab will reflect the newly added train and where it is located.



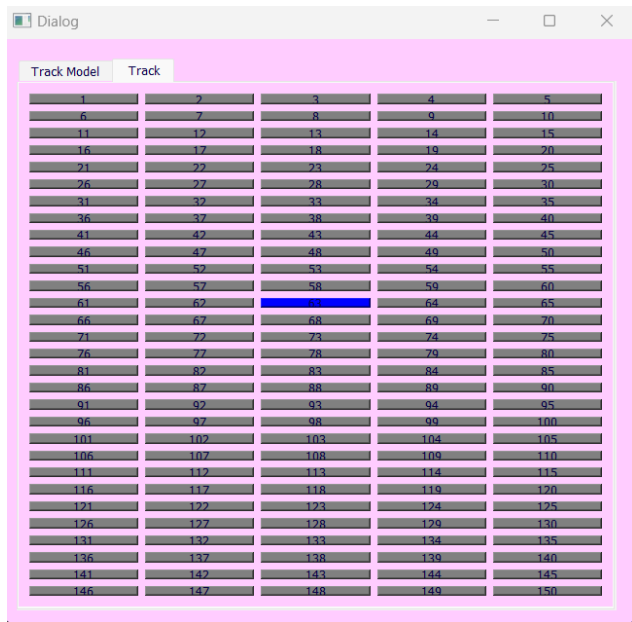
Step 5: Select dispatched train in launcher window to view Train Model or Train Controller. Click the button labeled “Train Model” or “Train Controller” to view the respective module’s user interfaces.



After selecting the appropriate train, the following windows will be displayed for the train model and train controller:



Step 6: Watch the trains move to the destination set in the CTC window. Re-open the Track Model's user interface and select the "Track" tab. The window below shows the trains moving along the blocks of the track. Blocks colored blue denote a train present at that block:



Once the train has gone through the stations, it will return to the yard and disappear from the window and the block will no longer be blue.

How to Maintain:

Make sure to run the most up-to-date code. Check to see if any changes have been made by pulling from GitHub. To pull any recent changes, run this line in the terminal:

`git pull`

Contact Information: If you have any further questions, contact the team via phone or Email.

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