Problem Solving Project – Extra Credit Opportunities

There are three possible extra credit options. You cannot combine the options and get multiple credits. You need to show your option as part of the project demonstration so that it can be evaluated (partial extra credit is possible if your attempt partly works). It is strongly recommended that you have two sets of code, one for the regular project and another for where you are attempting the extra credit. At the demonstration, you will be asked if you have attempted an extra credit and, if so, be given the opportunity to demonstrate it.

Option 1: (4 points added to Notebook Grade)

You need to set the red and green led lights on the approach and departure gates. When the train goes through the departure gate, the red led on the departure gate should be turned on and the green led off. At the same time the red led on the approach gate should be turned off and the green led on. The opposite should occur when the train goes through the approach gate. On the approach gate, the led pin numbers should be 6 for red and 7 for green. On the departure gate, the led pin numbers should be 8 for red and 9 for green.

Option 2: (10 points added to Notebook Grade)

You need to stop at the train station for 5 seconds +/- 0.5 seconds after passing the railroad crossing. The entire train should be within the silhouette of the station. The flashing lights at the crossing should stop and the gate go up when the train stops. The higher, rural speed, should not begin until after the departure gate.

Option 3: (20 points added to Notebook Grade)

Use the file arduinoXtra.m which you can find within the compressed Problem Solving Project folder. You’ll then need to add the command randomGateLeds(1) to the initialization portion of your code. This will cause random changes of the incoming and outgoing gate leds. If gate lights are changing and you wish to stop them, the command randomGateLeds(0) will turn this feature off. Beginning on the second loop around the track you need to have the train monitor the gate leds and respond. If, when you near a gate, the gate led is red you must stop until it turns green again - both coming into town and exiting. To do this, you need check the status of the leds (digitalRead). The command a.digitalRead(pin#) will return 1 if the corresponding led is on and 0 if it is off. See Option 1 for the led pin definitions.

The led status should be checked at a distance of 2” +/- 1” before the gate. In order to determine when you are at the correct location, you must have the computer calculate the speed of the train using the approach and departure gate times (this will be verified once code is submitted – don’t forget that you already did this in Lab 1). Speeds should be updated every loop in case the performance of the train changes over time. This will allow the computer to calculate the time of arrival at the correct spot and when to monitor.