

ENSE 452 Project Description
Intersection Controller
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For my project I'll be doing the Intersection Controller as described in the Project Requirements document:

3.1 Intersection Controller

An Intersection Controller consists of:

1. 4 way lights (R,Y,G,Turn)
2. 4 Pedestrian crossings activated by buttons.
3. Timing cycles for each state.

To get a better understanding of the requirements for the Intersection Controller it is best to observe a live intersection and then model its behaviour.

Console components:

1. Intersection live status (Graphically or textual).
 2. CLI that includes commands like:
 - switch operating mode (Normal, Emergency Vehicle, Maintenance).
 - generate events.
 - configure any system values.
 3. An external button that could indicate an Emergency vehicle or perhaps pedestrian crossing.
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ISRs:

- USART2 ISR for CLI user input
- External User Button ISR that indicates pedestrian crossing

Tasks:

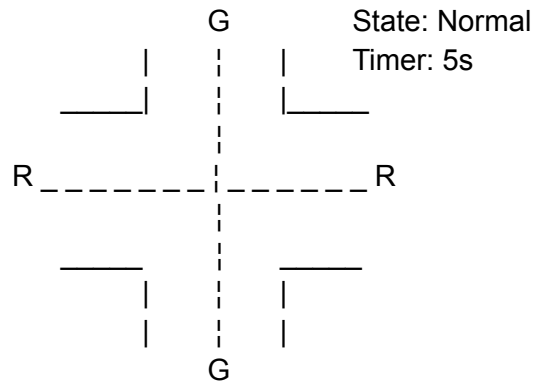
- Traffic Light Controller Task (Main Task):
 - Responsible for managing the state of the 4-way traffic lights.
 - Handles the timing cycles for each state (red, yellow, green, turn)
 - Receives commands to switch between operating modes (Normal, Emergency Vehicle, Maintenance)
- Pedestrian Crossing Task:
 - Manages the pedestrian crossings and responds to push button activations.
 - Coordinates with the Traffic Light Controller Task to handle a pedestrian crossing at one of the corners
- CLI Task
 - Receives user commands from the USART2 interrupt
 - Coordinates with the Traffic Light Controller Task to update the operating modes (Normal, Emergency Vehicle, Maintenance)
- Console Task
 - Handles the display of the intersection
 - Coordinates with the Traffic Light Controller Task to get the state of the intersection

CLI Commands:

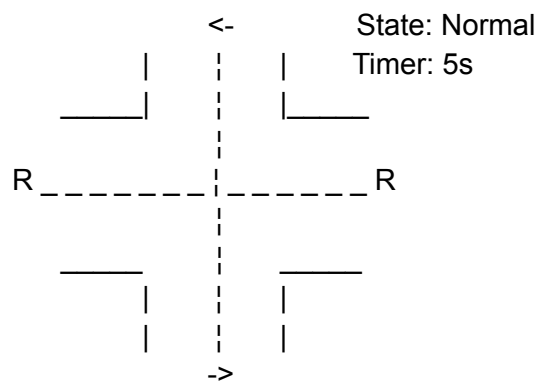
- {'Emergency' or 'E'} - Changes the state to Emergency Vehicle
- {'Maintenance Mode' or 'M'} - Changes the state to Maintenance
- {'Normal Mode' or 'N'} - Changes the state to Normal
- {'Help' or 'H'} - Displays all the available commands, and a short description

CLI Status Display:

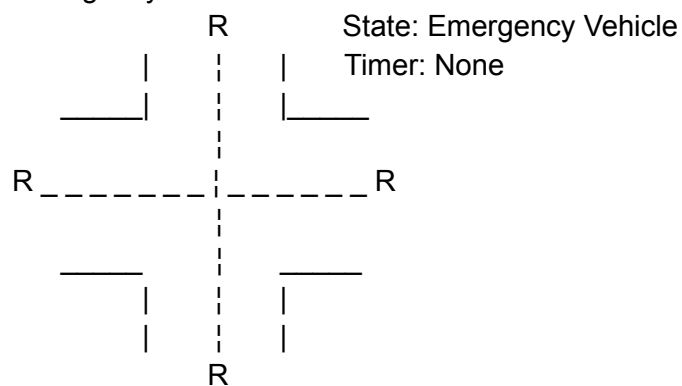
- The status portion of the CLI window will display the intersection, and state
- Examples:



Turn Arrows:



Emergency Vehicle:

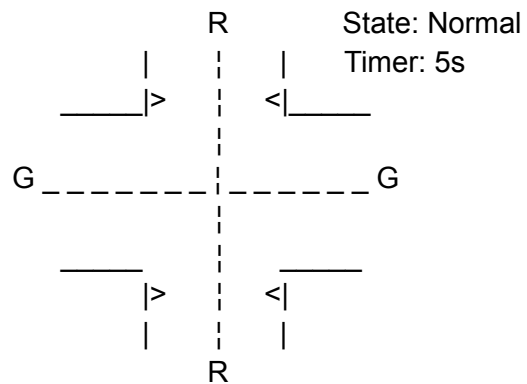


Maintenance Mode will be the same as Emergency Vehicle Mode, except the red lights (R) will blink on and off periodically.

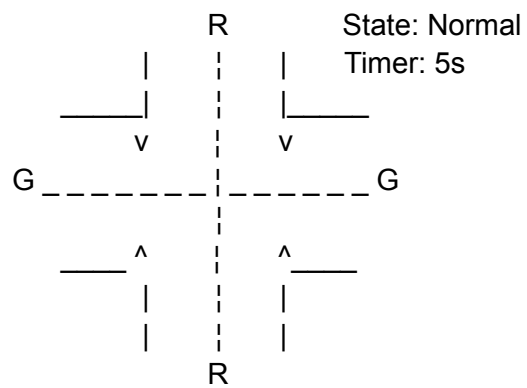
Pedestrian Pressing Button to Cross:

If a pedestrian is crossing from North to South or vice-versa (and for East to West and vice-versa), it will activate the pedestrian crossing on both sides of the intersection, this is commonly how pedestrian crossings work.

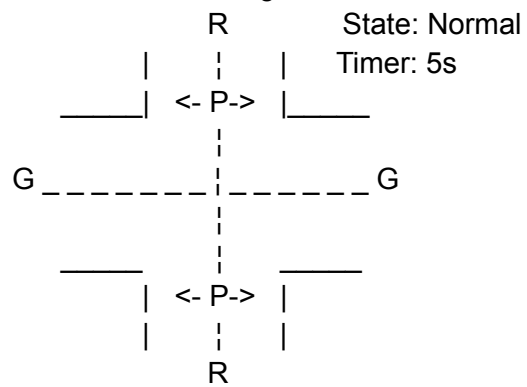
The User Button on the board will cycle between the two states show below



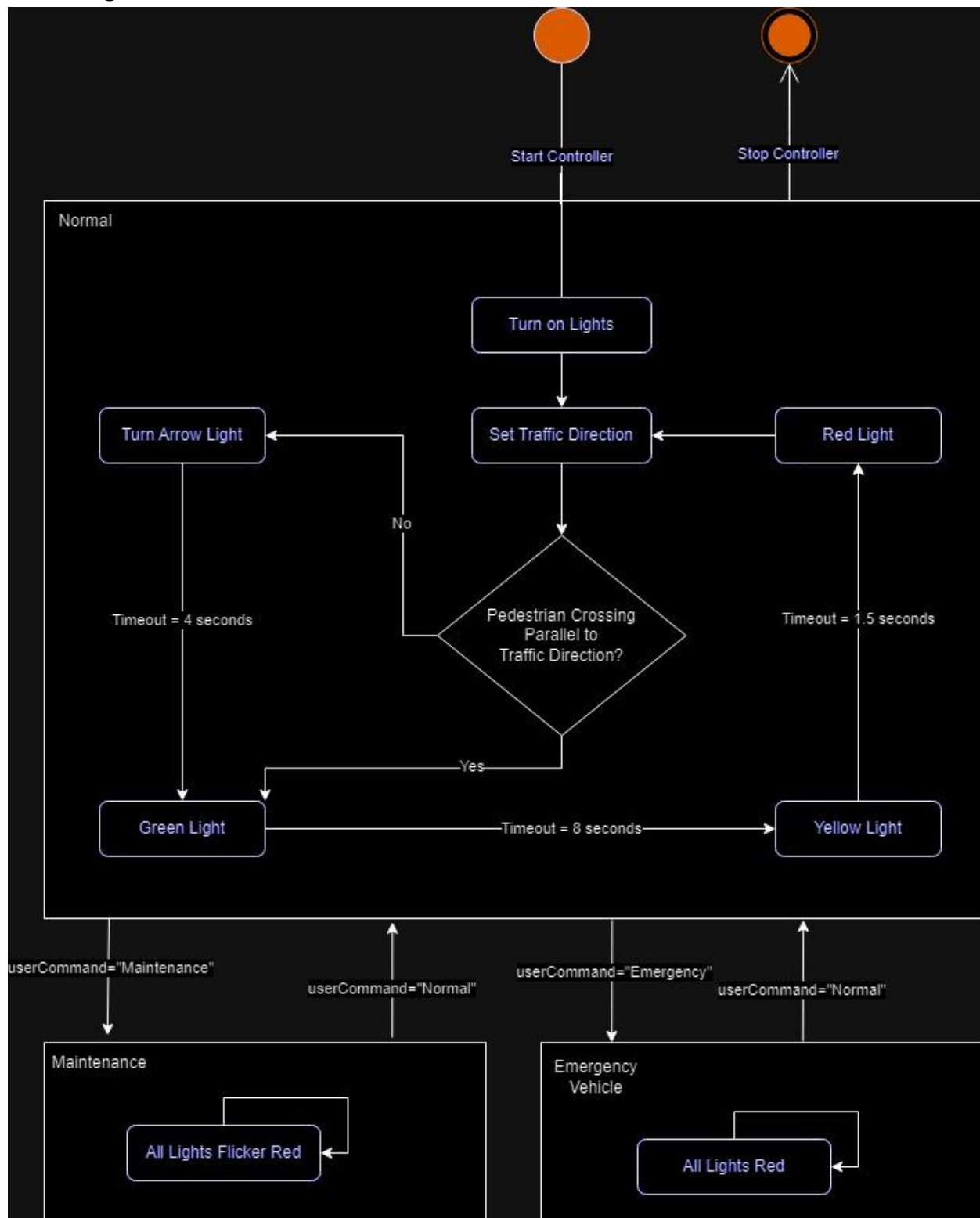
OR



Pedestrian Crossing:



State Diagram:



Task Diagram:

