Cairo University
Faculty of
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Department of Computer
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CMPN445 – Spring 2021

Traffic Light Controller

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Components:

Microcontroller:

1. Arduino UNO.

Input Devices:

1. Input buttons.
2. Voltage sensor.
3. Keypad

Output Devices:

1. 9 LEDS.

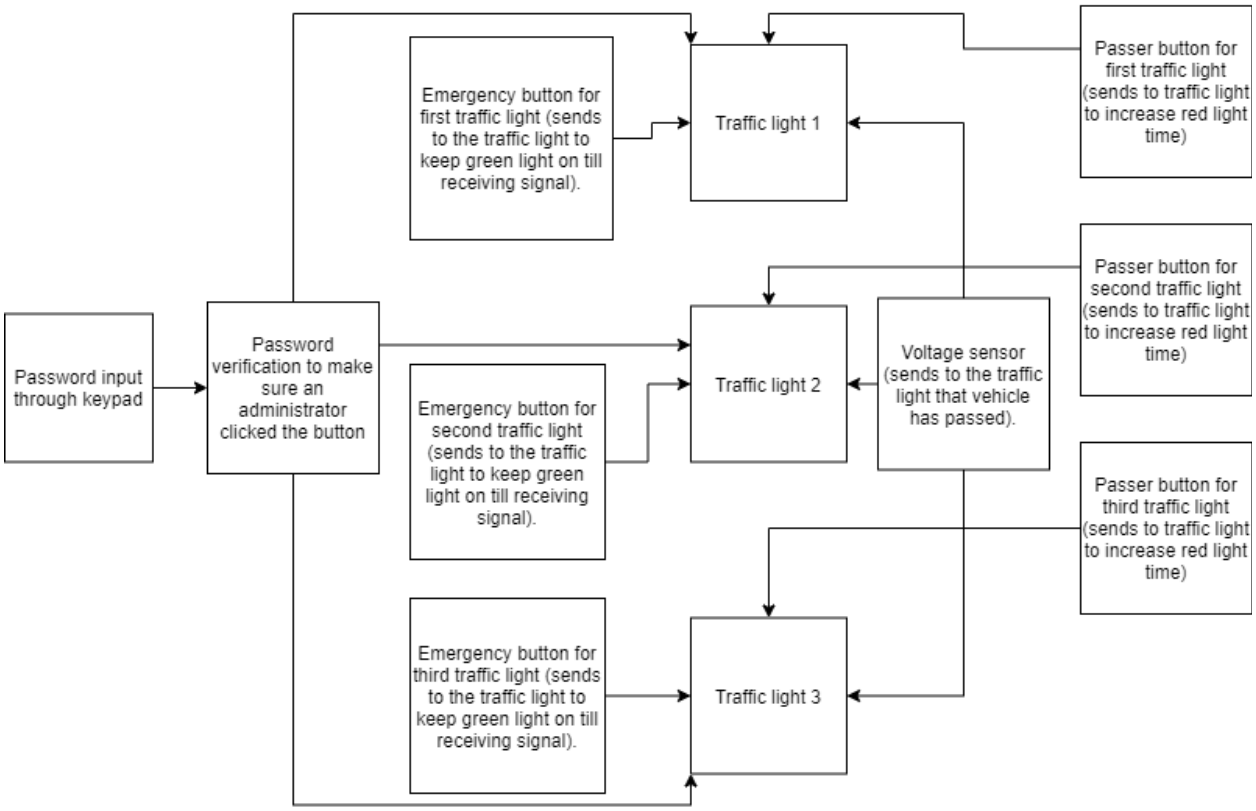
Storage Devices:

1. EEPROM.

Idea Description:

- The system idea is to simulate a three way bidirectional road (T junction) with three traffic lights to synchronize the movement of vehicles through the three ways, such as to prevent any two traffic lights from being on green at the same time.
- The system has a passer passing system that allows passersby to press a button during the greenlight to increase the red light time to allow them passage safely.
- The system also has an emergency button for urgent or emergent situations that require a quick passage allowance (such as an ambulance or a police vehicle). [No password required]
- The button increases the green traffic time to make sure of the passage of the emergency vehicle until the voltage sensor detects that it has passed.
- The system also has a keypad password system which is used for emergent situations to allow quick passage [With password]

System Block Diagram:



Detailed description of all the features that the system offers

- **Passer passage button:**
  Description:
  Allows a passer to increase the red light time.
  Implementation:
  This feature allows the passersby through the press of a button to signal that they want to pass, thus increasing the red light time allowing passers' safe passage.

- **Emergency vehicle passage button:**
  Description:
  A button that allows a traffic coordinator, after receiving a signal or news of ambulance arrival to the road, to keep the green light of the traffic on till it leaves to make sure the vehicle has passed.
  Implementation:

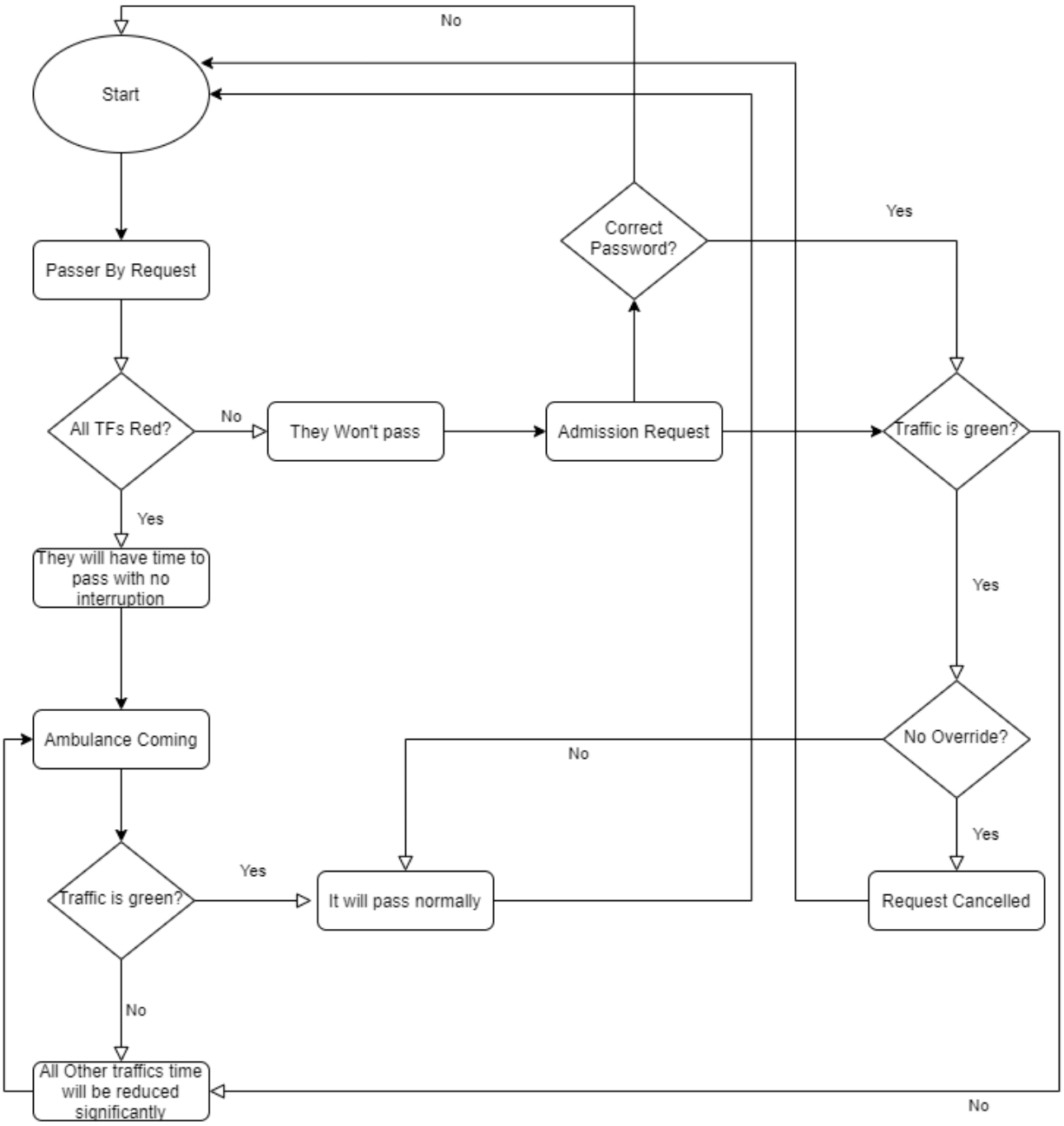
The traffic coordinator can click on the button to keep the green light on until the voltage knob reaches a certain limit to indicate that the vehicle has passed successfully (simulation for the vehicle leaving), then the system returns to normal operating conditions.

- **Administrator button:**
  Description:
  Allows an administrator with a password to keep the green light of the traffic on till the emergency vehicle leaves to make sure the vehicle has passed.
  Implementation:
  The administrator is required to enter a password at the start, after entering the password, the green light is kept on until the voltage knob reaches a certain limit to indicate that the vehicle has passed successfully (simulation for the vehicle leaving), then the system returns to normal operating conditions.

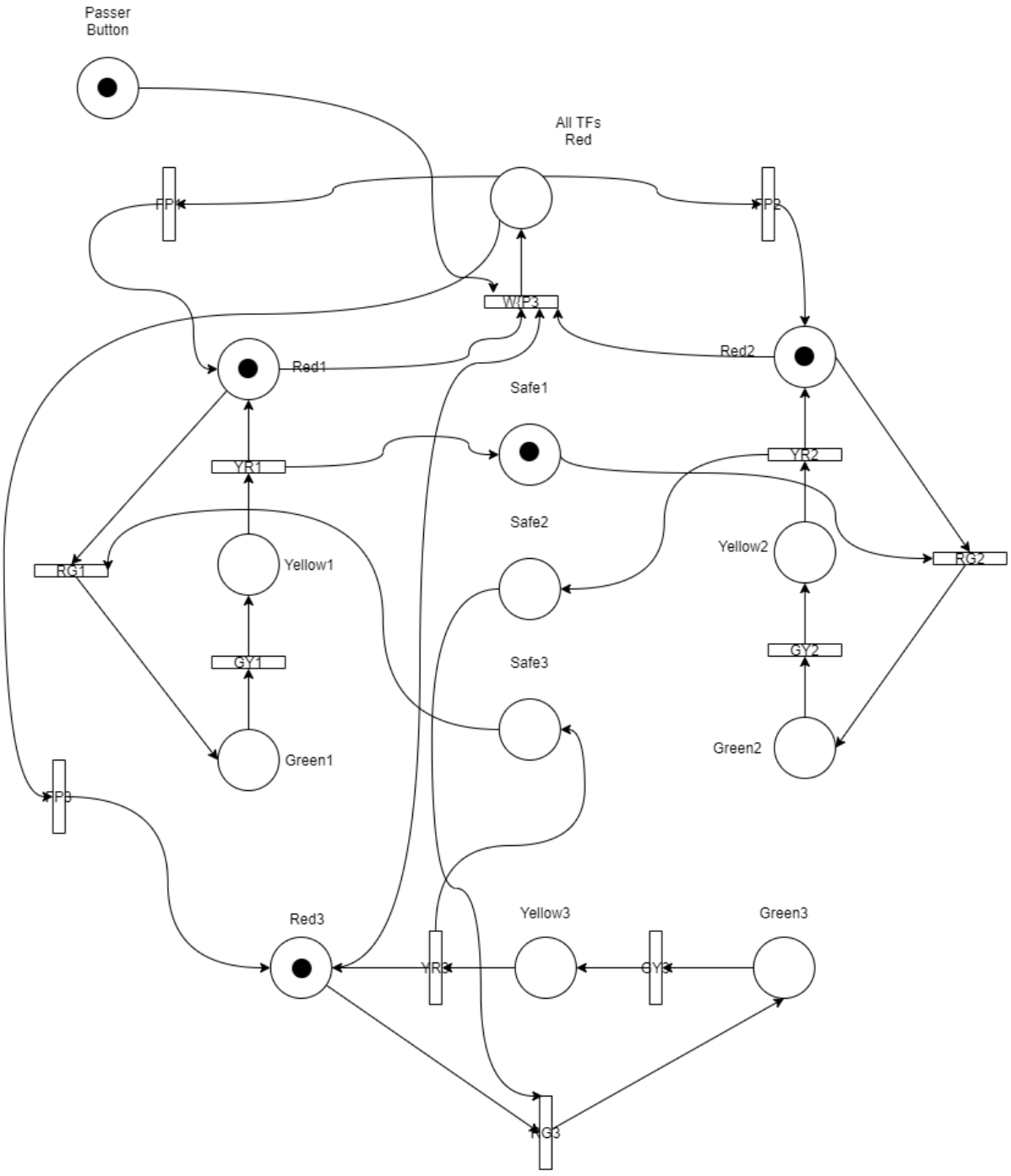
How each component is used to contribute to the system's functionality

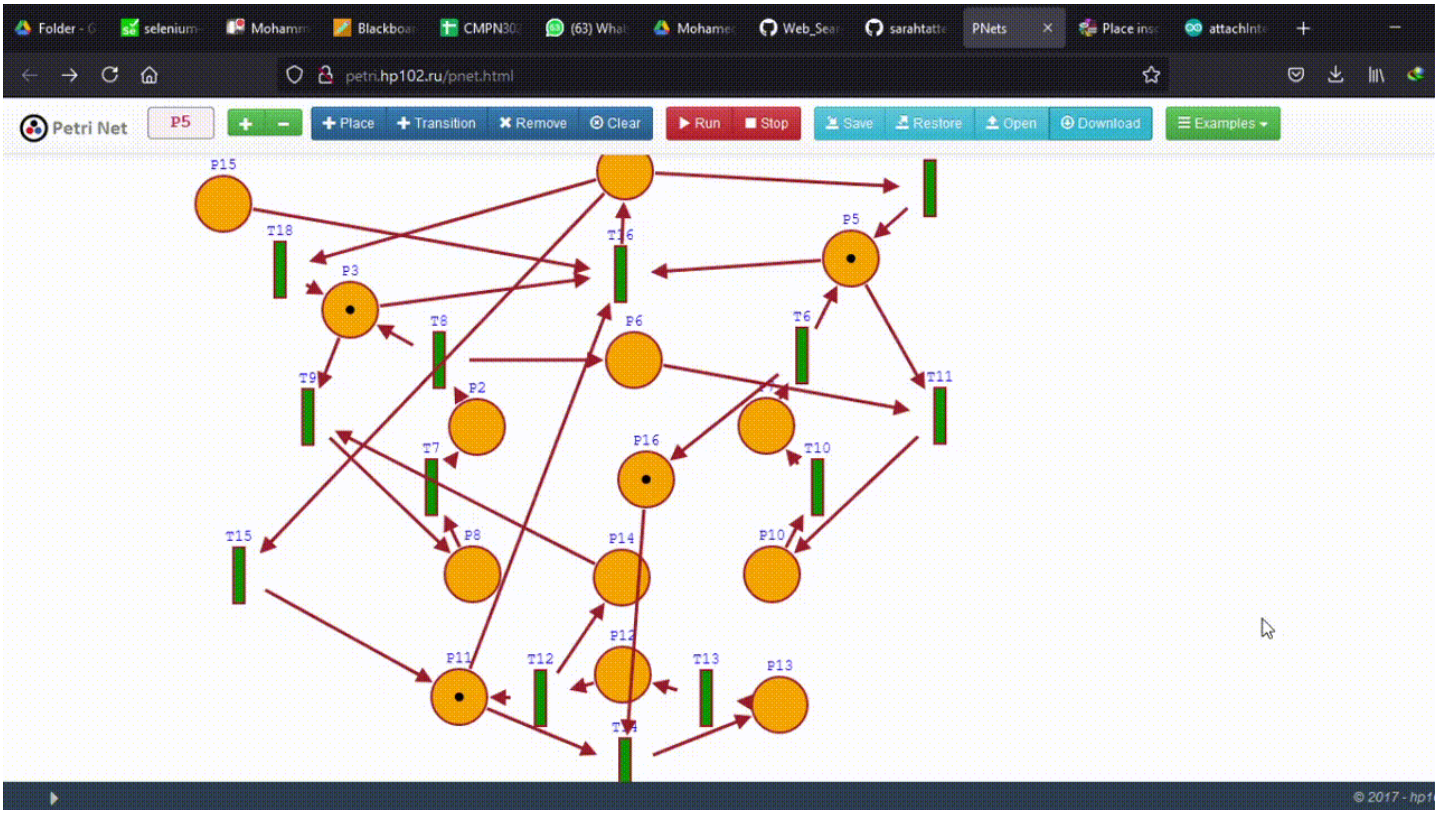
Component	Functionality
Passer buttons	Used to signal to the system that a passer needs to pass to increase red light time for him to pass.
Keypad	Used to enter the password of the administrator, to enforce a certain traffic light to be green for a certain time.
Administrator buttons	Used to signal to the system that an ambulance or emergency vehicle needs to pass.
LEDs	Used to represent the multiple traffic lights.
Voltage sensor	Used to simulate whether the ambulance or emergency vehicle has passed or not.

Control Flow Chart:



Petri net simulation:




PNets
petri.hp102.ru/pnet.html
Petri Net
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Place
Transition
Remove
Clear
Run
Stop
Save
Restore
Open
Download
Examples
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T18
P3
T16
P5
T8
P6
T6
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