Member

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Overview/Goal/Purpose

In this project, we aim to build a smart traffic light intersection monitor system. This system, enabled by it's sensors, will be able to detect vehicles speeding or running red lights. And upon detection, it will trigger a buzzer alarm and take a picture of the vehicle. In a real-world scenario, this system could reduce the workload of law enforcement and benefit the safety of the road.

Also at this moment, we are just considering a simple one-way, one-lane system, depending on our progression speed we will try to make it compatible with more complex traffic stop systems.
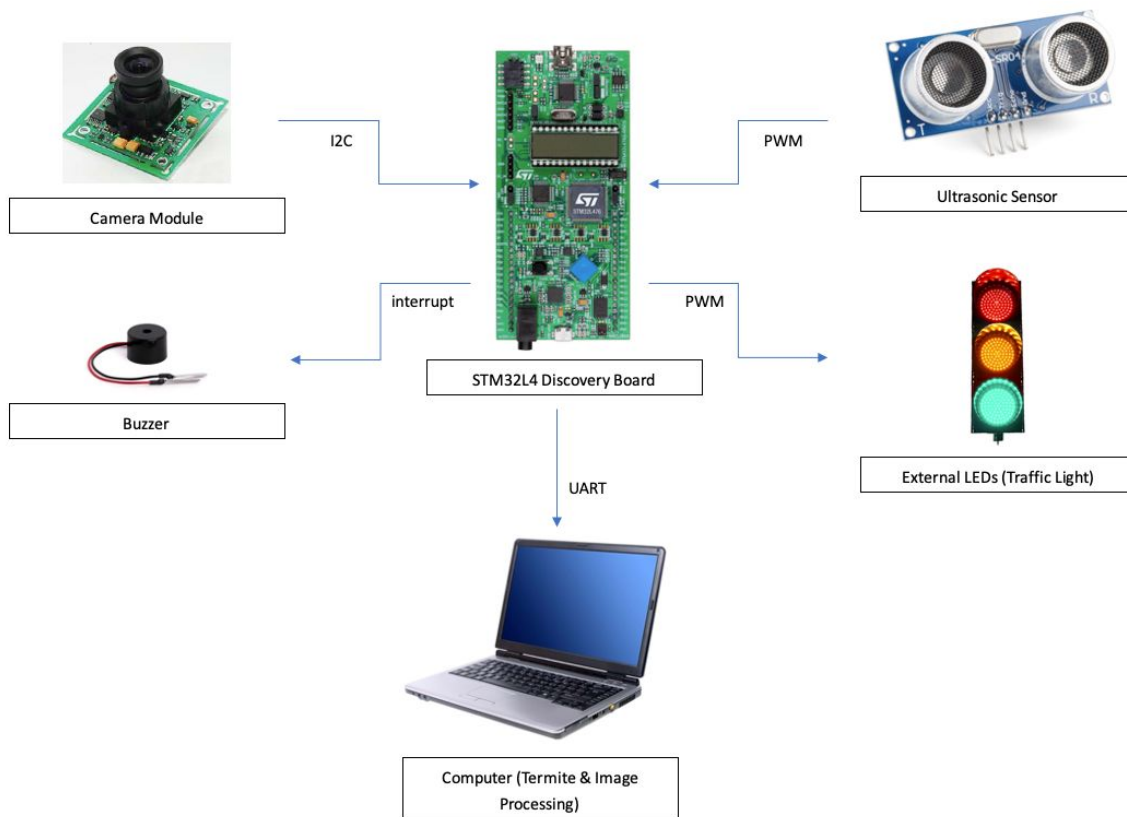
Peripherals

- Camera module (capture license plate)
- Ultrasonic sensor (distance capture)
- Buzzer (ring alarm)
- External LEDs (with red yellow and green light)
- Pressure sensor (optional)

Serial interface protocols

- UART (termite)
- I2C (camera module)
- DCMI (camera module)

Block diagram

Responsibility list for everyone in group

Angela Chen:

Configure the camera system, trigger action of taking a picture, and sending it to computer, optionally do image recognition to extract license plate number.
Write functionality of speeding detection.

Tom Zu:

Configure LED lights, periodic green-yellow-red lighting.
Configure distance sensor, constantly monitor position of incoming vehicles.
Configure buzzer, trigger action to ring alarm.
Develop physical traffic stop light setup.
Write functionality of redlight running detection.

Software structure

Again, this is for a simple one-way, one-lane scenario, the software structure might change if we moved on to a more complex traffic system, but the general idea should be the same.
The LEDs on board should be periodically lit up in the sequence of green-yellow-red, and the distance sensor should monitor the position of incoming vehicles constantly.

Running red light detection:

Let's say that the distance interval of the crossroad is from X1 to X2, when LED is on red, no vehicle should be in that distance interval, meaning that the readings from the distance sensor should not fall in that interval. If it does, then it means that the vehicle is running a red light. The buzzer and camera then should be triggered to ring an alarm and take a photo.

Speeding detection:

The speed is calculated from the distance sensor reading, by the equation distance/time. And if a certain threshold speed limit is exceeded, the buzzer and camera then should be triggered to ring an alarm and take a photo. (depending on the position/angle of the placement of the distance sensor, the distance value might not be the original reading, some experiment trials are required to figure out the exact procedure.)

Website

https://sites.google.com/view/ece-153b-project