CS437: Internet of Things
Lab2

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Late days used: 0
GitLab Link: https://gitlab.com/cs437-lab2/cs437-lab2
Video Link:
https://drive.google.com/file/d/1S29gAwRg7CftLZmIiNx_hB9jWPFBAHbr/view?usp=sharing

Design Considerations

- Bluetooth / WiFi Connection
    - Connection between the raspberry pi and PC was established without a virtual machine. All necessary packages were installed on the pi and PC (wsl).
    - For WiFi, we modified the provided Python Wifi server script to receive commands from the frontend and send sensor data back.
        - We sent simple messages from the webpage to the Python server running on the Pi (“left”, “right”, etc.)
        - For displaying sensor data on the frontend, we split off a child process from the server to periodically retrieve the data and send it. We then displayed this data in a “gauge cluster” section.
            - For temperature, we used the “sensors” command from the “lm-sensors” package
            - For battery voltage, we used the PiCar’s provided power level check commands.

If you were designing a real, self-driving car platform, with real (big) cars, that would drive all over the United States, which technology would you use?

The general technology in the car would include camera, GPS, radar, lidar, engine monitoring sensors, oxygen sensors… etc. Many sensors are required for the self-driving cars to be able to perceive its surroundings and location in different environment conditions, and provide the “driver” a safe and comfortable experience.

Self-driving cars also need to communicate over the internet. For example, manufacturers need to provide updates over-the-air to fix issues, and service providers need to provide map data for the car's navigation system. To meet these needs, we would use 5G and satellite to provide network connectivity in different environments. The reasoning for the network protocol used would be a combination of reliability, workability around potential interferences, security, data rate, cost and power consumption. Considering bandwidth and range of transmission, 5G offers the high bandwidth required for receiving updates while moving at a high speed. Also, a range of 1 km, that would allow the self-driving car to have enough time to communicate with other vehicles and road infrastructures it will interact with. Satellite is useful for providing a connection in more remote locations, or in areas without 5G infrastructure.

Aside from mapping and navigation, technology is even used for simple things like getting in your car. Drivers expect features like keyless entry and automatic locking. These can be accomplished by incorporating ultra wide band (UWB) technology, giving the car the ability to detect whether the owner is nearby by measuring proximity to the key fob. Additionally, since UWB in phones is becoming more common, manufacturers can allow users to access their car using their mobile devices.

Name	**Contribution**
Nishant Sheikh	HTML/CSS, Python server, report, video
Molly Yang	HTML/CSS, JS for client, report, video