Gems and Jewels

UCLA ECE M119 Spring 2020

Jackie Lam

Michelle Lam

Erica Xie

Purpose

What

Gems and Jewels is a small secure delivery car that stores compact packages and transports it to the intended recipient.

Why

The project aims to alleviate the overflow of packages being delivered by local postal offices around the world and provide a means of contactless delivery. It can also be used on college campuses to deliver packages from on-campus postal offices and accessed by students with their university IDs.

User Flow

Sender puts package into compartment.

Sender sets a destination and manually controls car towards it.

Receiver is sent an email that the package has arrived (TBI).

Receiver inputs touch sequence and scans UID to get package.

Features

Car Obstacle Detection

As the user tries to control the car's direction, the car will try to avoid obstacles in front of its path with a distance sensor.

Security

Compartment is unlocked if the receiver inputs the correct capacitive touch sequence sent prior to delivery. In addition, UIDs can be used to unlock the package.

Location Server

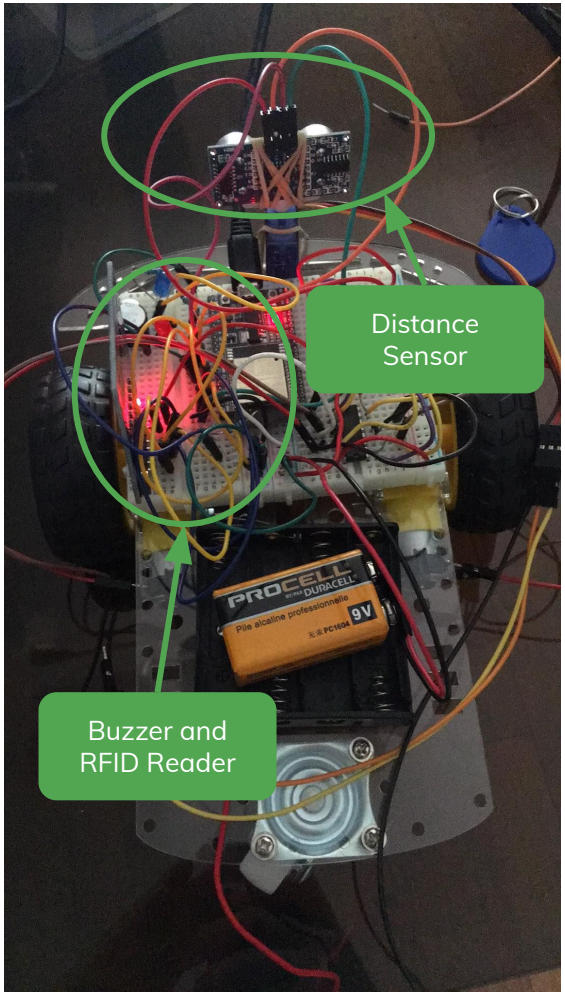
GPS tracking and remote control of vehicle via Wi-Fi is enabled through a local webserver

Car

- Built chassis for car and using an H bridge, could control the direction the car moves in
- Control car via a web server/phone app with ESP32
  - Can move 4 directions and stop
- Avoid obstacles with a distance sensor with a buzzer that sounds when an object is too close
- Integrated with security system

Challenges

- Introducing new parts into the circuit sometimes caused whole-system failure

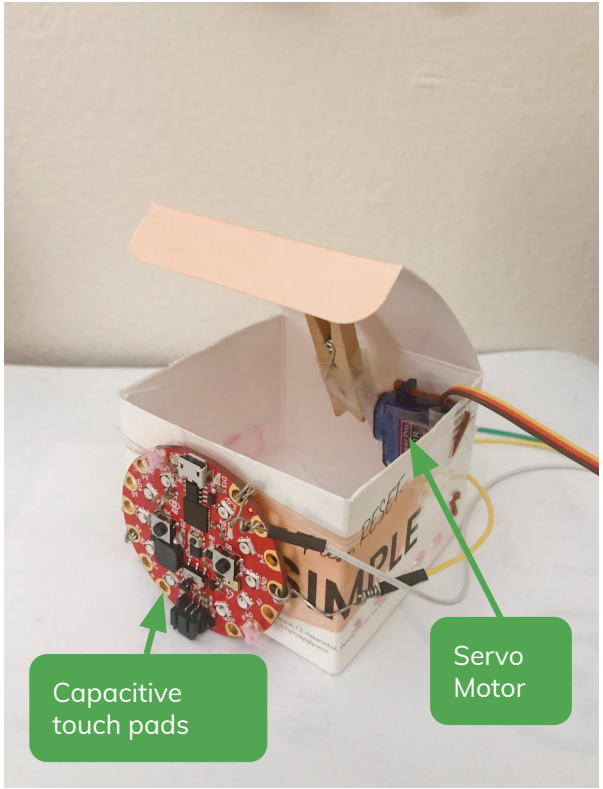


Security

- Password input sequence via capacitive touch pads
- Visual/audio prompts for start of sequence input and correctness of input
- Triggers servo motor (“lock”) to open the lid
- RFID reader mounted onto vehicle
    - Unlock via RFID tag, such as UID

Challenge

- Difficulty in stably mounting servo motor onto security compartment due to its jitter

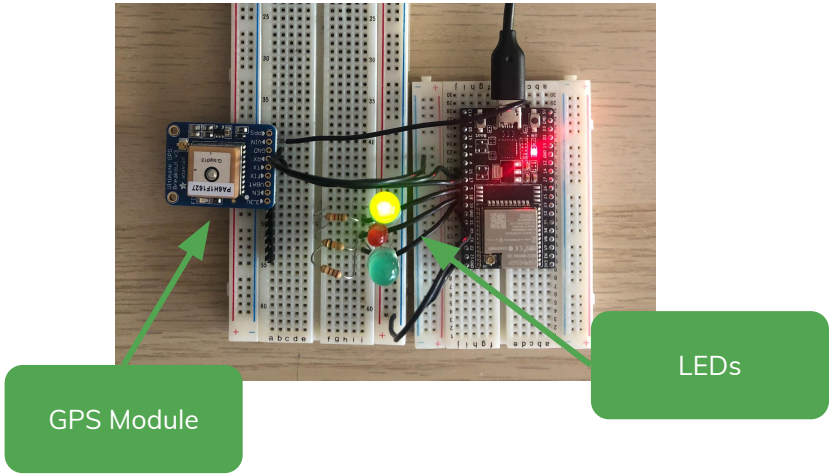


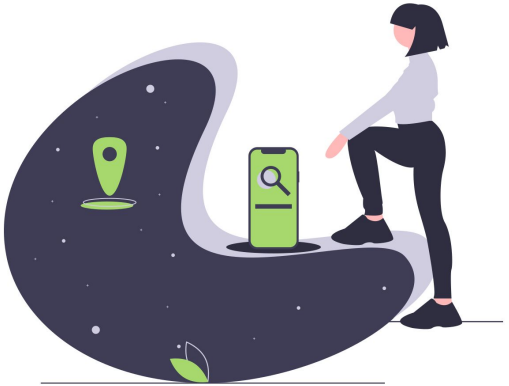
Location Server

- Created a simple local web server with live updates from the GPS module.
  - Login page
  - Can change LEDs that simulate the directions of the motors that will move the car.
- Made the website more user friendly with helpful emojis and formatting.

Challenge

- Difficulty with web server format due to no prior web development experience.





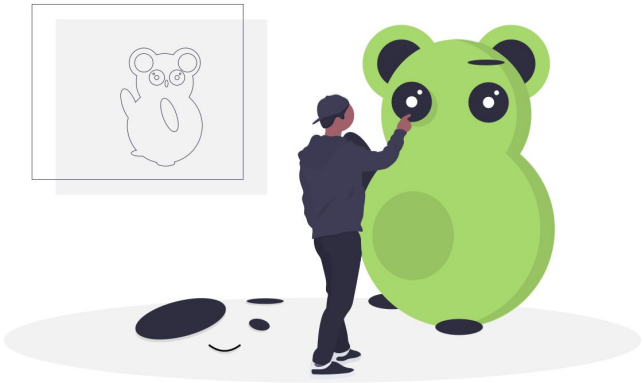
Links

- Car Demo
- Security Demo
- GPS Module + Webserver Demo
- Github Repo

Future Integration

Autobots , roll out!!

- Mount the security system onto vehicle
- Connect the Arduino and ESP32 via Bluetooth to share information about proximity, security, etc.
- Put the GPS module onto the car and track the location through the web server.



Scalability

Users

- Scale to be used across college campuses
- Coordinate with local post offices

Features

- Increase vehicle autonomy
  - Calculate a path using GPS coordinates & distance sensor to avoid obstacles
- Host the local web server on a domain
  - Implement email server to notify receiver of package status
- Adding layers of security to the website including adding a login page and encrypted messaging

Credits

- Presentation template by SlidesCarnival
- Illustrations by Undraw.co

Thanks!

Any questions?