EE202C

Networked Embedded Systems Design

Smart Drone

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Week5 Engineering Progress Report

Group members: Peidong Chen, Yitian Hu, Yang Yang, Jiayu Guo

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# Progress Report Referencing Design Document

This is the general format for our reports.

For this section please include:

1. Progress statement ***by each* team member with *attributions* to each team member**. Each team member must contribute a paragraph with a detailed description of their specific contributions to the project mission.
2. Describe problems encountered by the group
3. Describe solutions developed by the group
4. Describe proposed changes in plans by the group
5. Describe any changes in schedule by the group and approaches for resolving schedule delays.
6. Changes that result in design modifications (for example a new interface specification) must also be reflected in design document with a revision update

Progress by each team member:

Peidong Chen: Using uvc webcam to send video stream from board to local server and send snapshots from board to our remote server. The video can been seen at http://edison.local:8080/?action=stream. The function to store video stream to remote server will be done soon. Send the iPhone's GPS and gyro's data to server to do smart navigation based on GPS for the lego car, and it can be used for the drone. We will then use a GPS module and gyro module instead of iphone later. Build the server api for controlling the drone.

Yitian Hu: 3D printing for the drone components setup; assembly most of the components onto the drone (Edison board, uno, MPU9250, power distribution board and battery); generate pwm with a good accuracy from Arduino UNO controled by Edison board.

Jiayu Guo: Object detecting by Ultrasonic sensor; test the pwm generation resolution; test the flight situation of the drone under the new pwm generation situation; help assembling the drone.

Yang Yang: Using uvc webcam to send video stream from board to local server and send snapshots from board to our remote server. The video can been seen at http://edison.local:8080/?action=stream. The function to store video stream to remote server will be done soon. Send the iPhone's GPS and gyro's data to server to do smart navigation based on GPS for the lego car, and it can be used for the drone. We will then use a GPS module and gyro module instead of iphone later. Build ios control app for pid modify.

Problems:

1. Our system is very power hungry. We are trying to decrease the power consumption.
2. We are adjusting PID parameters, which might take much time.
3. Our data sometimes would run into segmentation fault, which means we still need to further ensure the robust of our system

# Source Code

This section includes a source code development history. This may be a list and description of modules that have been developed along with a brief description (one sentence).

This may also include source code excerpts or entire programs that have been developed that you feel are important to highlight.

Our source code is on [www.github.com/peidong/drone](http://www.github.com/peidong/drone).

# Platform Development

This section includes a platform development history. This may be a list and description of systems including sensor systems, sensor components, embedded platform components and any other assets that have been developed along with a brief description (one sentence).

This may also include architectural diagrams and images of systems have been developed that you feel are important to highlight.

1. We using ELP 720p Full Hd H.264 USB Camera Module as our webcam module. We use this camera to send video and snapchat to our server.
2. We using Adafruit Ultimate GPS Breakout - 66 channel w/10 Hz updates - Version 3 as our GPS module. This module will provide GPS information.

# Development Progress

This section includes a development history of progress in the area of algorithm development, system implementation, or other areas as applicable. This may be one paragraph to one page in length.

1. We can establish the communication between Edison and cloud server, which can be demonstrated with an IOS app on IPAD
2. In the beginning, we were trying to generate PWM by Edison board. However, we found that the resolution of PWM is very low because the timer on Edison is only 8-bit. And with low resolution PWM, it will be hard to adjust the drone. Later, we found out that the Arduino UNO have a 16-bit TimerOne, then we use the pwm on UNO and use I2C to realize the communication between Edison and UNO.

See youtube address attached here: https://youtu.be/qPJvyO2-eP4

1. We can read the image data from an uvc webcam. And the video can be seen at <http://edison.local:8080/?action=stream> by using mjpg-stream. We have also implemented a C program using websocket to send and store the snapchat to our server. We are now implement the program to add the function, which can store video stream to our server. These camera function can be used in lego car/drone for detecting.
2. We can get the GPS and gyro information from the iphone attached to our lego car and send these to our server. Then we use http get to receive these information to our edison borad. After this, By send a destination GPS information from server, our lego car can drive to the destination automatically. We have also finished the collision avoidance by using ultrasonic sensor. These two function will be combined by next week.
3. We have a new rough idea of our final project. We wish to combine our car and drone together to form a IOT project. This project could make a very strong connection between the drone and our car. First, our car is guided by GPS as well as our drone. Both of these can follow each other. Second, by using the camera on the drone, the drone is able to be widely used to detect the traffic information and take selfie for the car. Third, the power issue of the drone may be alleviated by recharging on the top of a normal car. Thus, based on the idea that our car can be the carrier and the head of the drone, our drone functionality would be greatly extended without the limitation of battery. In return, our drone would be served as a intelligent robot for our car.

# Development Concerns or Limitations Noted

This section includes any discoveries that lead to confusion, recognition of development unknowns or risks, or any other concern. We will address each of these with planning and assistance.

We have the idea of building one drone following the lego car and take streaming videos of it.

# References

This section lists any new references that you have found important or required in this last week.