

EE/CprE/SE 491 WEEKLY REPORT 6 (3/25/2019 – 4/5/2019)

Group Number & Project Title: (5) Road Safe Phone Case

Client: Christine Shea-Hunt

Advisor: Diane Rover

Team Members/Role: (Software) Zixiao Lu, Yifei Wang

(Hardware) Kedan Xin, Yue Chen, Sarah Baratta

Weekly Summary

For the past week, the team managed to correct the interlock sequence issue using a servo motor instead of a bolt lock and are now ready to move on to the next operation function, the GSM module which is to program the Arduino to send the text message. However, the module requires a 2G SIM card, which should be in the team's possession by next week.

Also, the team had a weekly status meeting with Dr. Rover for updating the current project's status. The team was advised to search on the market products that can perform the functions that we want to achieve and compare them the current solution the team has to see if there is a better solution that already exists for common subsystems between the two. Additionally, the advisor wants the team to improve the engineering thinking by having the team pause and set aside time to further practice the Engineering Design Workshop methods to expand and explore the possible solutions for the current project, and analyze each subsystem and component for the best/worst cost, ease of use, and functional performance.

Past week accomplishments

For the past week, the most significant accomplishment is that the team has successfully the code to implement the sequential locking systems, which takes in the input from four different sensors and chooses which side to lock or unlock depending on the order that the sensors are activated. The code, shown in Figure 1, was created using a base servo motor code provided in the Arduino library. The circuit, shown in Figure 2, was used with the servo motor and the Arduino along with four push buttons to represent four sensors which will be used in the case, two for the two lids of the case, and two for detecting the two objects (the phone or the key).

Figure 1

```
#include <Servo.h>

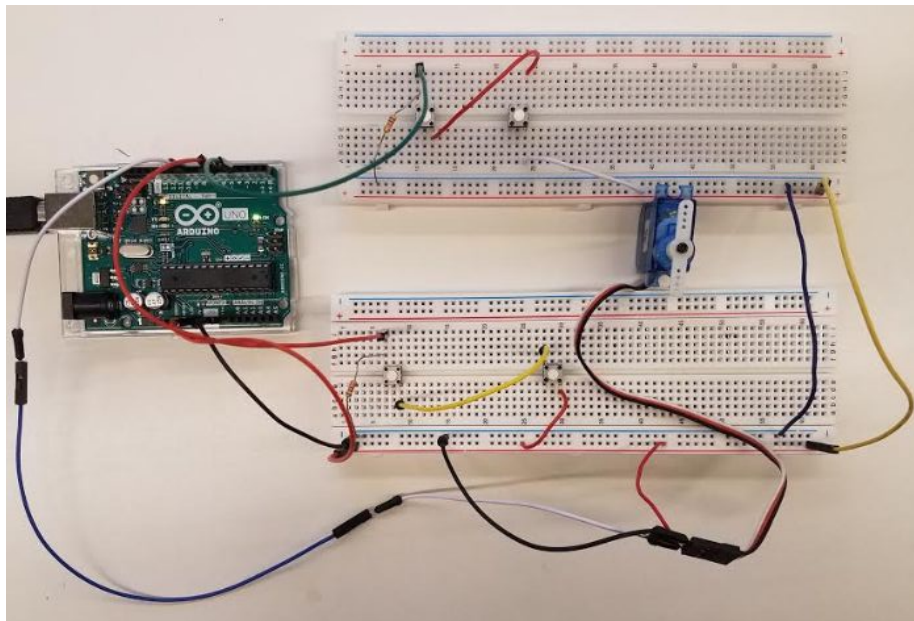
Servo myservo; // create servo object to control a servo

int pos = 0; // variable to store the servo position
int state = 0;

void setup() {
  myservo.attach(9); // attaches the servo on pin 9 to the servo object
  pinMode(6, INPUT);
  pinMode(4, INPUT);
}

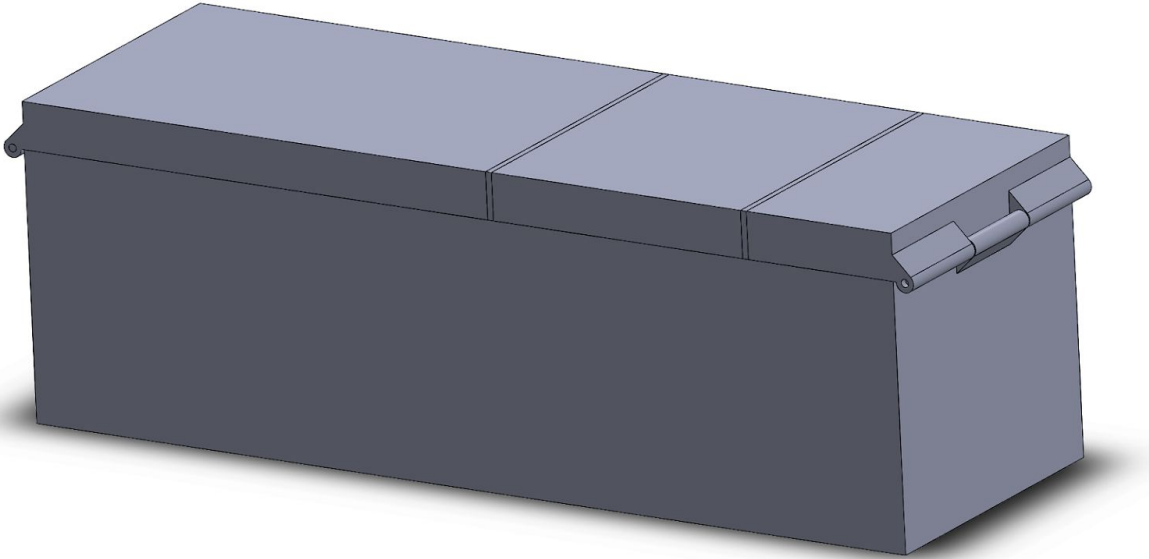
void loop() {
  if (digitalRead(6) == HIGH && digitalRead(4) == HIGH && state == 2) {
    pos = 175;
    myservo.write(pos);
    delay(15);
  } else if (digitalRead(6) == HIGH && digitalRead(4) == HIGH && state == 1) {
    pos = 15;
    myservo.write(pos);
    delay(15);
  } else if (digitalRead(4) == HIGH) {
    state = 1;
    pos = 175;
    myservo.write(pos); // tell servo to go to position in variable 'pos'
    delay(15); // waits 15ms for the servo to reach the position
  } else if (digitalRead(6) == HIGH) {
    state = 2;
    pos = 15;
    myservo.write(pos); // tell servo to go to position in variable 'pos'
    delay(15); // waits 15ms for the servo to reach the position
  }
}
```

Figure 2



The 3D model of the case components were also designed on paper and then transferred to SolidWorks and AutoDesk Fusion, which are programs that have tools to create models that can be 3D printed. The 3D printer located in the basement of Lagomarcino was revisited to see prices and what dimensions the smaller prototype of the case needed to be in order to fit the printer's size requirements. The model, shown in Figure 3, was created using the software, and is the "rough draft" of the case as the team envisions it.

Figure 3



Also, the team met this week to work on the project website. Pictures and biographies were added for each member, along with an additional "About The Project" page. This required playing around with the html code in attempting to figure out how to add another code and modify the rest of the existing codes to create the new page and make it visible when navigating through other pages.

Described below is what each individual team members worked on:

Zixiao Lu: order the RFID component, researched the RFID system and how it should be implemented in our project

Yifei Wang: Researched on different approach to send messages other than GSM and wrote code for Arduino.

Kedan Xin: Tested the circuit. Learn how to use Solidworks and Autodesk fusion 360 and build the 3D model of the case.

Yue Chen: Tested our circuit function. Redesigned the circuit due to the malfunction of the previous design. Helped to recode the Arduino board. Helped to design the mechanical part of the casing.

Sarah Baratta: Tested the locking circuit and determined the correct order for the if-statement that dictates the spinning direction of the motor (the locking mechanism) using states. Talked with the professor about progress and design elements. Updated personal information on the website and added a new page.

Individual Contributions Table:

Name	Individual Contributions	Hours This Week	Hours Cumulative
Zixiao Lu	Order the RFID module and research on RFID Module that how it should be implemented in our project	6	33
Yifei Wang	Met with advisor. Researched on different approach to send messages other than GSM.	6	34
Kedan Xin	Met with professor. Building the 3D model of the case. Finding the price and location of 3D printer on campus.	7	38
Yue Chen	Met with the advisor, assisted in debugging the code, Researched on the locking mechanism design, designed the emergency override circuit.	6	38
Sarah Baratta	Met with advisor, worked with team to correct servo lock and to work on the team website, went to store to try to buy a SIM card	7	36

Plans for the Upcoming Week

Next week, the team will be continuing working on case design and try to finalize a prototype of the phone case and its components using a 3D printer on campus.

The team will also be working on the Global System for Mobile Communications (GSM) module, which was created to describe the protocols for second-generation digital cellular networks used by mobile phones and is now the default global standard for mobile communications. The team will try to assemble GSM on Arduino, writing some code, and enable to use it to send out messages to cell phone. If that is accomplished, the team may also try to figure out how to use a GSM modem to make, receive and reject a voice call.

If the parts arrive by next week, the team may also begin some effort on RFID sensors, radio-frequency identification sensors, which uses electromagnetic fields to automatically identify and track tags attached to the objects.

Described below is what each individual team members plans to work on:

Zixiao Lu: Work with Yifei on GSM and implement the RFID system once it arrives

Yifei Wang: Work on GSM to send messages and assemble GSM module to Arduino circuit.

Kedan Xin: Finish designing the physical case with lids along with the gear and gear rack which will be used for the motor and lock using the 3D model software. Also, print the case and components and test with the motor.

Yue Chen: GSM module for Arduino, adding and testing the emergency override circuit into the locking device, assemble the motor and gear rack into the circuit.

Sarah Baratta: Acquire the SIM card so that it will be possible to start testing the GSM module with the team. Update and discuss with the client on the team's accomplishments and the team's current image for the case.