

EE/CprE/SE 491 WEEKLY REPORT 5 (3/9/2019 – 3/15/2019)

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

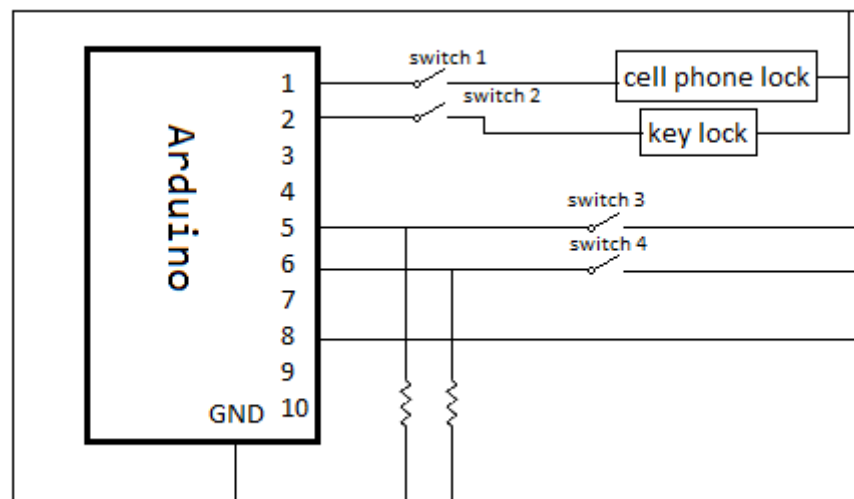
Client: Christine Shea-Hunt

Advisor: Diane Rover

Team Members/Role: (Software) Zixiao Lu, Yifei Wang, (Hardware) Kedan Xin, Yue Chen, Sarah Baratta

Weekly Summary

Our overall objective this week is to design a sensor-activated (represented by switches in the circuit diagram below) locking circuit and combine the circuit with microcontroller to lock and unlock the case for cell phone and key. Below is our simplified circuit diagram.



Switch 1 and 2 represent the lock cover for cell phone case and key case respectively. When the lock is closed, the switches will also be closed. This will be replaced with some sensors.

Several inexpensive sensors have been purchased, and now that it is possible to experiment with them, the team is not yet sure which sensor will be best. Therefore, it was easier to test by using switches. Switch 3 and 4 represent for cell phone and key detection. Again, this will be replaced with some sensor, such as the force sensitive resistor that has been ordered. Actual locks that work at about 2 volts based on datasheet were used to see if the circuit was functionally correct and resistors accompanied by bipolar junction transistors were used to help drive signals high or low.

However, the team ran into problems with our locking conditions based on our code. The timing sequence is wrong, not working as expected because two locks are unable to lock at the same time, forcing one lock open without necessary sensor activation. Another problem is that

the lock is always consuming power and generating heat to lock and unlock. In the future, the team will attempt to only use battery to power the circuit and arduino. Currently, the team has an unsophisticated solution for that, and are starting to look into a motor and a gear to lock or unlock both sides of the case.

Past week accomplishments

For the past week, the most significant accomplishment is that the team has built the prototype circuit for locking the cases. However, the locking sequences consumed a lot of the team's efforts and the issue still remains unsolved. When the key case opens, the cell-phone case immediately opens as well despite trying out several different codes on the Arduino. After inspecting the circuit and the code multiple times, it is clear that the circuit and code design needs to be refined and expanded to include all possible cases.

Also, the team has designed multiple arduino codes to work with different circuit design, but have yet to decide which one to use due to the design flaw in the circuit. Another approach is being explored, such as using a motor, controlled by an H-bridge, that does not need to be energized the whole time while still be able to lock and unlock when buttons/switches are pushed. Members stopped by the ETG to ask for these parts, and were able to receive advice on different types of motors such as the Servo motor that is easily compatible with the Arduino, which is now being considered as another option too.

Described below is what each individual team members worked on:

Zixiao Lu: Write the Arduino codes for testing the physical locks, helped the team build the circuit and then debug the circuit.

Yifei Wang: Write Arduino code for circuit, and helped on circuit design to ground the pin when not in use. Continue researching on GSM module.

Kedan Xin: Meeting with group member to build lock testing circuit and troubleshoot it. Learn how to build 3D model on autodesk fusion 360.

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: Worked with members to attempt to fix the main issues in our circuit, such as the locking sequence and attaching a ground to sensors so that they reach a high and low completely. Went to ETG to discuss motors for project.

Individual Contributions Table:

Name	Individual Contributions	Hours This Week	Hours Cumulative
Zixiao Lu	Write the Arduino codes, helped the team build the circuit, debug the circuit.	7	27
Yifei Wang	Write Arduino code and helped on circuit design. Researching on GSM.	6	28
Kedan Xin	Meeting with group member to build circuit and test it. Learn how to build 3D model on autodesk fusion 360.	6	31
Yue Chen	Tested the circuit functionalities. Redesigned the circuit. Helped to recode the Arduino board. Helped to design the lock linkage. Went to ETG to seek for technical suggestions.	6	32
Sarah Baratta	Helped to write Arduino code and build/debug circuit, visited ETG for parts and advice.	6	29

Plans for the Upcoming Week

The team plans to complete the circuit such that the locking operates as needed, and bring the initial locking circuit prototype to the advisor for furthermore discussion. To do this, the team is considering other types of locks, specifically a gear with a gear rack to function as the lock. A servo motor was acquired from ETG, which the team plans to research if it is a feasible replacement for our current part.

Meanwhile, the team needs to start thinking on implementing the RFID Card component in this project, which includes the RFID Card hardware, the corresponding RFID Card editing application, the RFID Card reader, and the GSM module. The will continue to work together on the motor and circuit design, but will dedicate time to further researching the SMS application and test the module as well. All team members should contribute to the completion of the circuit whether it be assisting with the locking circuit or SMS application. Over the weekend, members will be assigned to work/research on a specific task.

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

Zixiao Lu: Help the team with the circuit build, research on how to communicate between RFID Card reader and user.

Yifei Wang: Write code for motor and research on how to make motor work suitable to our circuit and meet team's expectation. Hopefully, figure it out by next week.

Kedan Xin: Looking for a new locking system. Try to design and build the case on 3D model software.

Yue Chen: Troubleshooting the circuit. Finding a suitable motor for the locking operation.

Sarah Baratta: Develop a code that handles all cases and can operate with the motor. Begin working with the GSM module. Update client on team's accomplishments.