Milestone 3

Team Members:
Jacob Diaz (*jdiaz88*), Jamiel Impoy (*jimpoy2*)

Contact:
jdiaz88@uic.edu, jimpoy2@uic.edu

Project Name: Arduino Security System

Abstract:
Our project consists of creating a RFID locking system. This lock will be able to attach to a door and allow a user to lock and unlock the door using a RFID card. Users will be able to see a success or failure message on the locks lcd screen. A valid RFID card will trigger a mechanism to move the locking bolt.

Project Details:

- **Overall Description of Project Idea:**

  We will create an RFID Locking system that uses a RFID card for unlocking. A servo motor will be activated when a RFID card is successfully validated. The device will be able to attach to a door or large drawer. Users will be able to see whether or not their RFID card was successful or unsuccessful based on the message displayed on the screen.

- **Initial Project Design:**

  Our project will consist of a RFID sensor, RFID card, LCD screen, bolt lock, active buzzer, motor driver, and a servo motor. Our Arduino will receive input from the RFID reader when a RFID card is used. We will interpret the card and determine if the card is valid for unlocking the lock. We will display to the user, on a lcd screen, if the card has or has not successfully triggered the unlocking mechanism. If the card is valid, the Arduino will output instructions for the unlocking mechanism to occur. The locking mechanism will consist of a servo motor and a wooden bolt. When the lock is in the locked state, the wooden bolt will be extended to prevent the user from opening the door. The bolt will then retract when the device is in the unlocked state. The user then will have 30

seconds before the locking system automatically locks itself once more. We will use either a passive buzzer or a speaker in order to produce a noise or vibration when the device is unlocked successfully.

- **Expected Plan for Communication:**

In general, we will use Discord as the main form of communication. This includes video calls, voice calls, and text conversations. When in the development phase, we will use Git to work on the same code base. Since we live relatively close to one another, we will be able to work together physically, or be able to work together through a video call on Discord.

- **Original Work Being Attempted:**

Though a lock has been invented before, we will be creating a small-scale RFID lock with a mechanism we will be building ourselves. The originality in this project will come from this mechanism as well as the output we will give our user when using the lock. Most locks will not have a LCD screen to display messages, as well as a speaker or buzzer to signify if the user has successfully or unsuccessfully unlocked the device.

Supporting Materials

- **Timeline:**
  - **Week 7 –** Finish Milestone 3
  - **Week 8 –** create a list of parts and start to acquire parts
  - **Week 9 –** get any parts and make final changes to the project idea.
  - **Week 10 –** Create Fritzing Diagrams for hardware
  - **Week 11 –** Create Pseudo Software and set up development environment
  - **Week 12 -** Build Week (*Hardware*)
  - **Week 13 -** Build Week (*Hardware*)
  - **Week 14 -** Build Week (*Software*)
  - **Week 15 -** Prepare for design presentation
  - **Week 16 –** Work on project improvements and final presentation
  - **Week 17 –** Last Minute Adjustments / Final Project Presentations

- **List of Materials Expected to be Needed:**

MFRC522 RFID Module
16 x 2 LCD Display
Passive Buzzer

Jumper Cables
Servo Motor
Wooden Bolt
Arduino Uno
Bread board
Speaker
Maybe a Proximity Sensor
Resistors
5v Battery

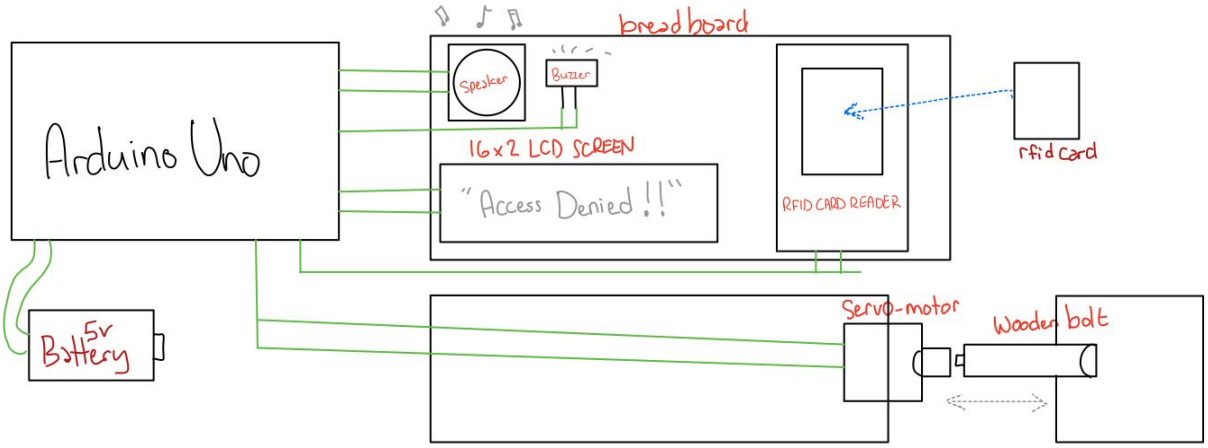
- **List of References**

https://fritzing.org/
https://www.arduino.cc/reference/en/libraries/servo/
https://create.arduino.cc/projecthub/SURYATEJA/use-a-buzzer-module-piezo-speaker-using-arduino-uno-89df45
https://www.instructables.com/How-to-Lock-a-ServoMotorRelay/
https://create.arduino.cc/projecthub/Aritro/security-access-using-rfid-reader-f7c746
https://www.arduino.cc/en/Tutorial/LibraryExamples/HelloWorld
https://www.arduino.cc/en/Reference/ArduinoSound

Github Repository
https://github.com/jacobdiaz/Arduino-Security-System.git

- **Hardware**

Low Fidelity Hardware Design



· **Software**

Below is a pseudocode of the major actions occurring in our locking system.

sketch_oct09a §

```
int attempts; // Keep track of how many times they have attempted

// States
boolean locked ;
boolean unlocked;
boolean unlockedFailed;

// Media
String successSound = "/some-file-path.mp3"
String failureSound = "/some-file-path.mp3"

// LCD
String sitIdleMessage;
String successMessage;
String failureMessage;

// Actions
void printMessage(){
  // Print message based on state.
  }
void unlock(){
    // unlock mechanism - retract servo motor
    // Call 30 second timer
    // lock mechanism
  }
void lock(){
    // extend servo motor
  }
void readCard(){
    // isCardValid()
    // If id card is true... unlock(), printmessage() , playMedia (success.mp3)
    // if not... printMessage() failure and playMedia(faliure.mp3), buzz()
  }
bool isCardValid(){
    // Determine if card is valid
  }
void playMedia(String path){
    // Switch case
    // based on success or failure determine which sound to play
    // Play the corresponding music
 }
void buzz(){
  // Activate a buzz
  }

void setup() {
  // Setup lcd
  // Setup servo motor
  // Setup RFID Reader
  // Setup Buzzer
  // Setup Speaker
}

void loop() {
  // if there is card input readCard()
```