Tim Ausec
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ECE 230 Project Proposal

Functional 'Mini' Safe

Introduction

We will be creating a small safe designed to keep users' items secure and protected for whatever reason. The user will operate a keypad, enter their password, and the safe will open. On the front of the safe are LEDs meant to indicate the user of the safe's current 'state'. If the LEDs are green after entering a passcode, you entered the correct passcode and the safe will open, a speaker will also make a sound to indicate the correct code. If a passcode is entered incorrectly, red LEDs will turn on, followed by a terrible buzzer. Moreover, if the system identifies security breach attempts, it will protect the user's items and the red LEDs will turn on as well. Finally, when the safe is opened, a button will be used to close the door to the safe. Overall, the purpose of this project is to demonstrate our knowledge of ECE230 and create a device that most people can admire and appreciate.

Enter Correct Keycode

Enter Incorrect Keycode
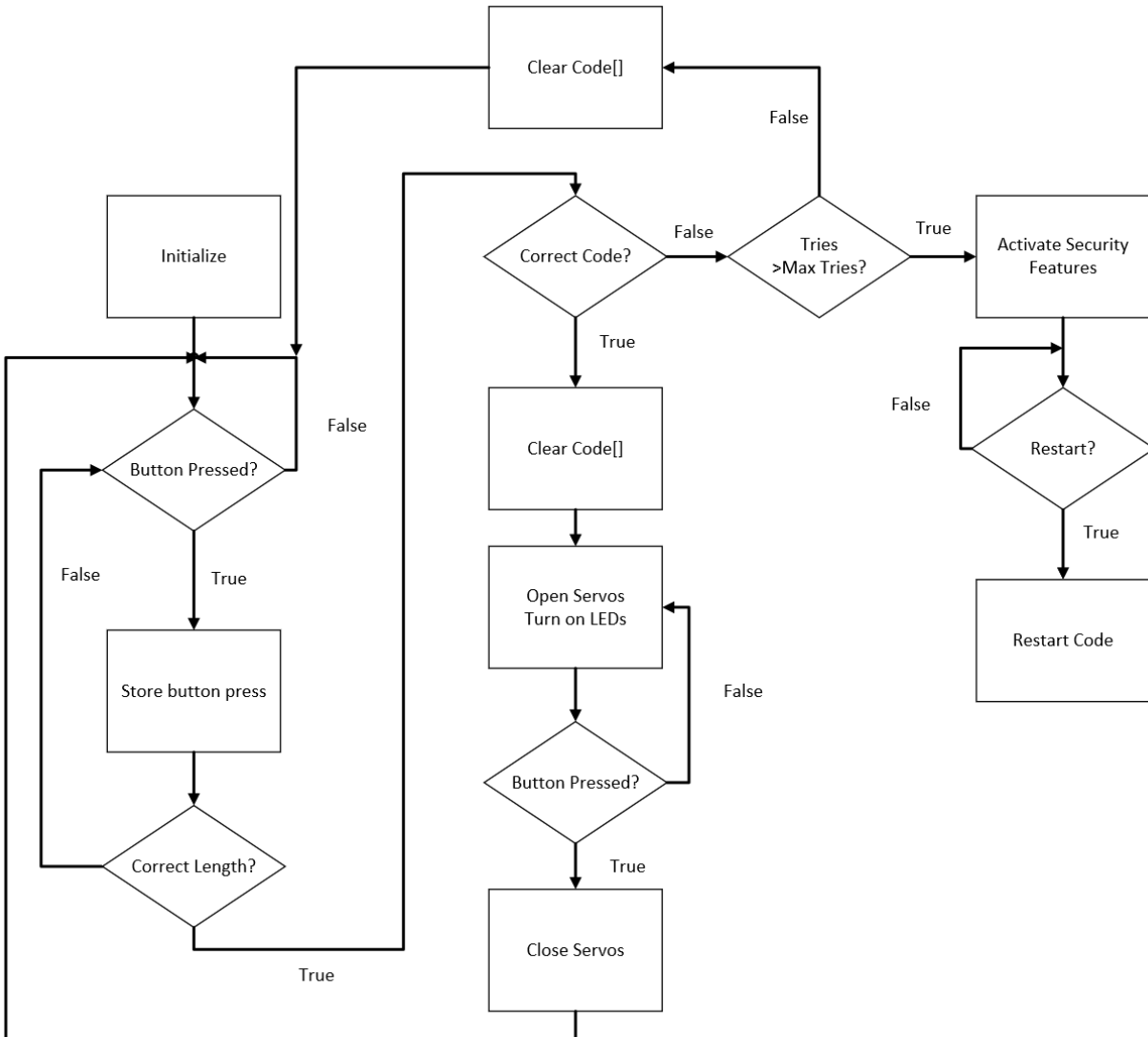
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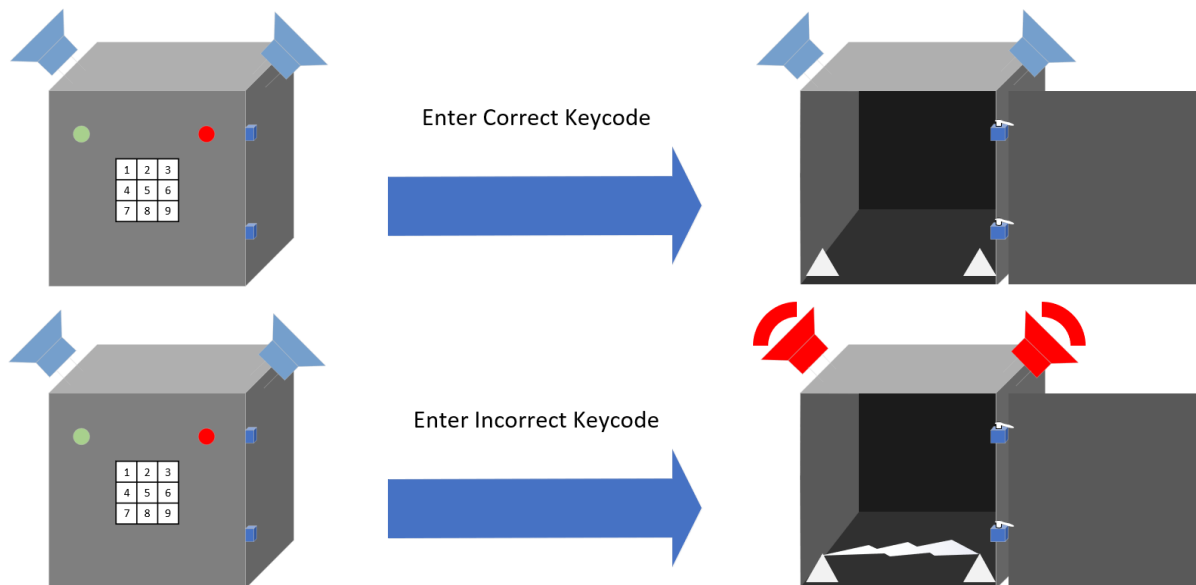
Objectives and Specifications

- Implement minimum safe functionality:
    - Keypad input
    - Open safe
    - Close safe
    - LED indicators
- Implement at least **one** of the following security features:
    - Shake detection and lockdown
    - Burn the evidence
    - Alarm and lights
    - Input cooldown
    - Redundancy (2nd level of verification):
        - RFID tag
        - Secret tap
        - Potentiometer dial
- Safe will be a rectangular prism with lengths of 1 meter
- Use MSP432P4111 microcontroller

Conceptual Design

- User controls
    - Insert password on the keypad to open safe
    - Press a button on keypad to close safe
- Open/close functionality
    - Servos open when the correct keypad sequence is entered
    - Servos close when the close button is entered
- LED display
    - Green LED indicates that the password is correct
    - Red LED indicates that the password is incorrect
- Security feature
    - When the incorrect password is entered more than 3 times, the security feature is activated
- Use MSP432P4111 microcontroller
- Power using a 9V wall-transformer

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System Logic Flowchart

Clear Code[]

Initialize

Correct Code? — False → Tries >Max Tries? — True → Activate Security Features

False (from Tries >Max Tries? back to Clear Code[])

Button Pressed?

False → Correct Code? True → Clear Code[]

Store button press

Correct Length?

False

True

Clear Code[]

Open Servos
Turn on LEDs

False

Button Pressed? — False

True

Close Servos

Restart?

False

True

Restart Code

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Tasks and Priorities

- Determine and acquire needed parts for the project
- Create a schematic
- Create the safe out of our desired material
- Design the system's architecture
  - Assign Timers
  - Assign Port
  - Assign Interrupts
  - Etc.
- Develop Software
  - Develop I/O communication for keypad and servo motors
  - Implement LED indicators for correct/incorrect inputs
  - Integrate components together
- Build the safe and include the MSP432P4111 microcontroller
- Test and Debug the Final Product

Schedule
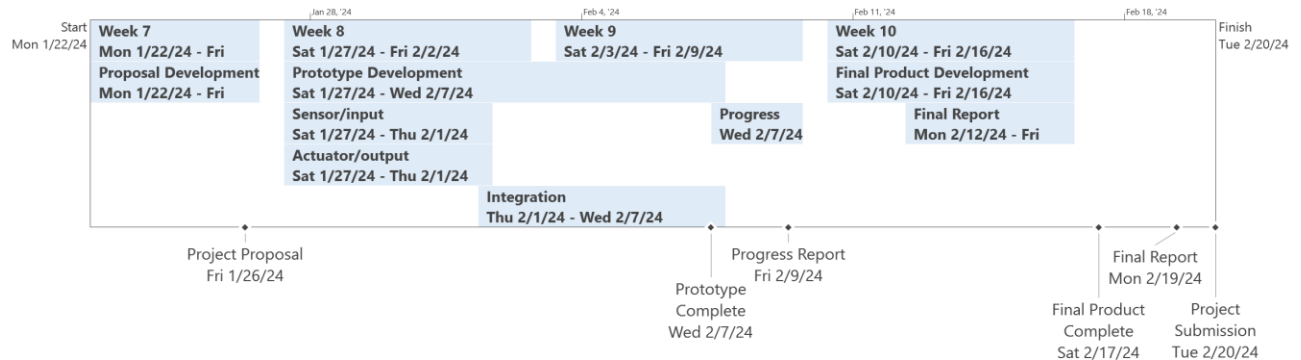
Primary Budget

Quantity	Part	Part Description	Cost
2	Servo Motor	Used to open and close the safe's door	Acquired
1	Keypad	Used for user input (code to the safe)	Acquired
1 or 2	Red LEDs	Used to indicate an incorrect code	Acquired
1 or 2	Green LEDs	Used to indicate a correct code	Acquired
1 or 2	Yellow LEDs	Used to indicate the safe is closed/locked	Acquired
1	3D Printing Filament	Material used to build the safe and its pieces	$0
-	Miscellaneous Items	Wires, resistors, transistors, capacitors, etc.	Acquired
-	Security Feature	Unknown, a lot of potential options	???
		Total:	$0

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Potential Feature Budget

Quantity	Part	Part Description	Cost
1	Gyroscope	Can be used to detect motion on the safe	Acquired
1	High Voltage Converter	Used to create electrical arcs to burn the items inside	$5-$10
1 or 2	Speakers + LED	Used to emit sounds following a code	Acquired
		Total:	$5-$10