

# **Electronic Safe System**

ET0104 - Embedded Computer Systems  
Final Report

DCPE/FT/3A/23  
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# 1. Overall System Description

## 1.1. Overall system description

When the user enters the proper four-digit code, the electronic safe, a safe storage device, will unlock. The system is configured to disable access for 10 seconds after three unsuccessful tries in order to prevent unauthorized access. To open and close the door, buttons are employed, and a visual indicator is used to display the door's status, such as whether it is locked or unlocked. It also has the function to change the password. Audible feedback is provided for specific activities like pressing a button or opening or closing a door. To display the appropriate messages, such as requests for the user to input the code or messages describing the system's status, an LCD display is employed. The construction of the electronic safe uses strong materials. In general, the electronic safe provides secure means to keep priceless objects while making sure that only people with the proper authorization may access them.

## 1.2. Goals:

- Provide a secure storage device for priceless objects
- Allow authorized access to the safe through the use of a 4-digit code
- Provide visual and audible feedback for various operations to ensure a user-friendly experience
- Display appropriate messages through an LCD display
- Use strong materials in the construction of the safe to ensure durability and security
- Allow the user to change the password

## 1.3. Constraints:

- The system must be disabled for 10 seconds after three unsuccessful attempts to prevent unauthorized access
- The system must provide feedback to the user through visual and audible means
- The system must display appropriate messages to the user through an LCD display
- The system must use strong materials in its construction to ensure durability and security
- The system must be designed in such a way that it is tamper-proof and resistant to hacking or other unauthorized access.

## 2. User Manual

### 2.1. Getting Started:



Using the Electronic Safe:

1. Enter the 4-digit code using the numeric keypad on the front of the safe. After entering the correct code, press key 1 (1a) to change the password, or press key 0 (1b) to unlock the safe.
2. If you enter an incorrect code three times, the system will be disabled for 10 seconds. Please wait until the system is reactivated before attempting to enter the code again.
3. To close the safe, simply press key 0 (3a) again. The safe will automatically lock. The visual indicator on the front of the safe will display the status of the door, such as whether it is locked or unlocked.

The audible feedback will be provided for various operations, such as when the door is opened or closed.

The LCD display on the front of the safe will display appropriate messages, such as prompts for the user to enter the code or messages indicating the status of the system.

### 2.2. Safety Precautions:

Do not use the safe to store flammable or explosive materials.  
Do not attempt to modify or disassemble the safe.  
Keep safe and out of reach of children.

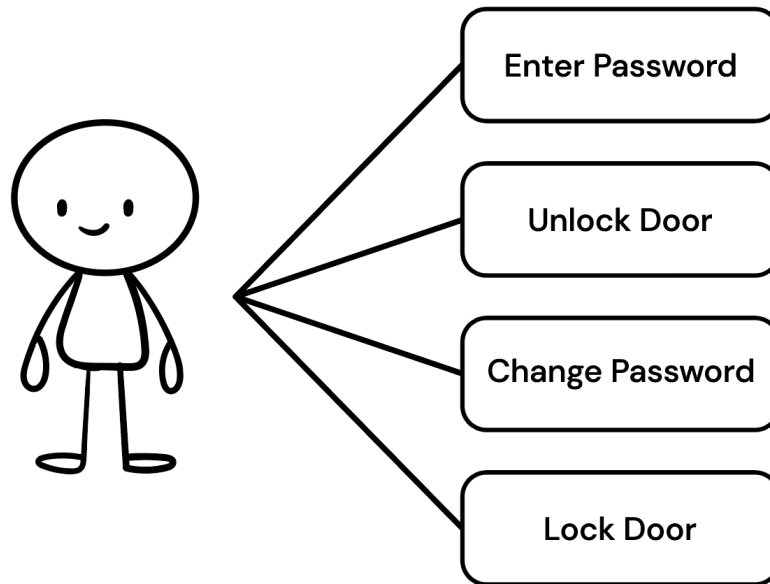
### 2.3. Maintenance:

Keep the safe clean and free from debris.

Test the system periodically to ensure that it is working properly.

Thank you for choosing our electronic safe. If you have any questions or concerns, please contact our customer service department for assistance.

### 3. Use Case Diagram



#### 3.1. Use Cases:

- Enter Code
- Unlock Door
- Change Password
- Lock Door

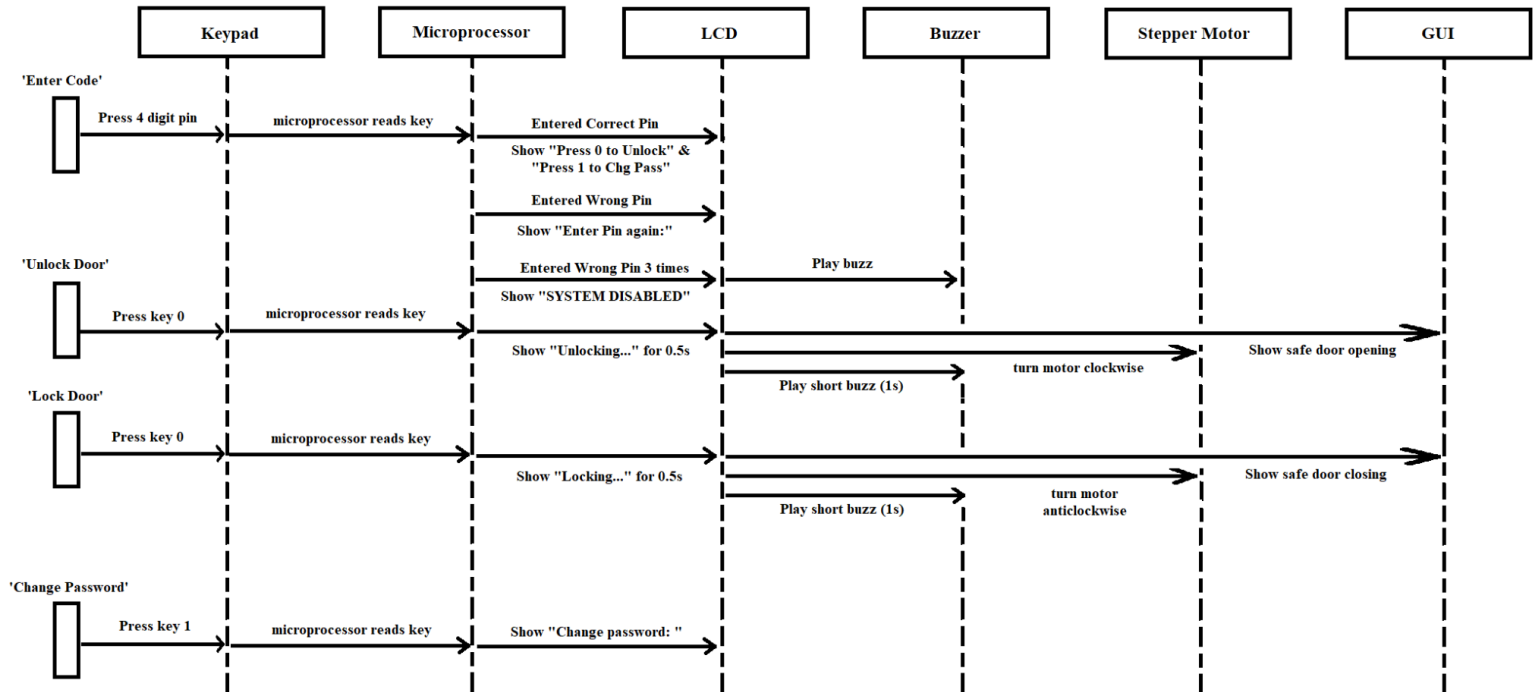
#### 3.2. Actors:

- User

#### 3.3. Subsystem:

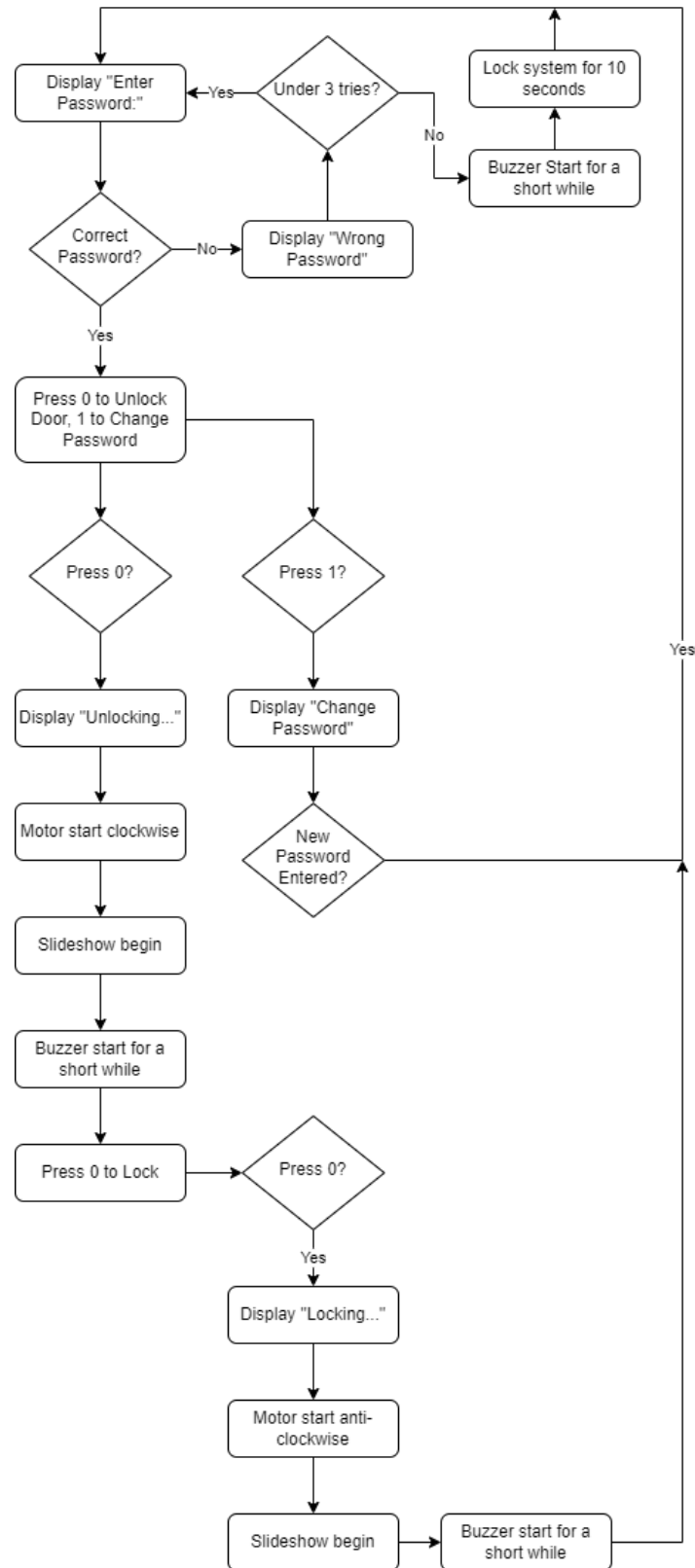
- Buzzer:
  - Sounds for feedback during system operations
- Keypad:
  - Accepts input of 4-digit codes
- Stepper motor:
  - Controls the door's opening and closing movement
- GUI:
  - Displays safe opening and closing
- LCD:
  - Displays appropriate messages to the user during system operations

## 4. Interaction Sequence Diagram



Final Sequential Interaction Diagram for all processes

## Electronic Safe - ECS Mini Project



Flow Chart of the system



## 5. Work Assigned

- Loh Chun Heng: 50%
- Brians Tjipto Meidianto: 50%