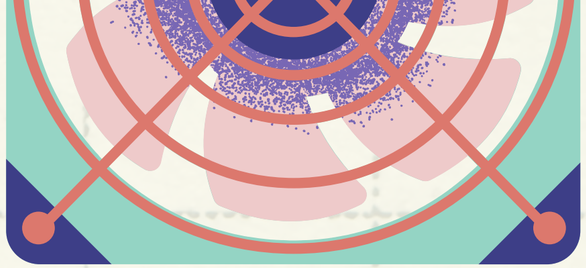
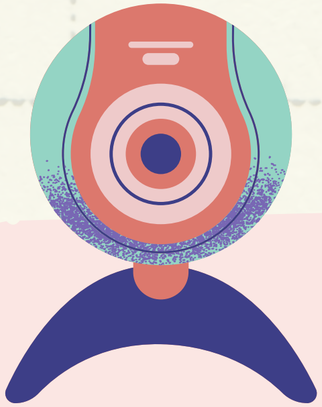
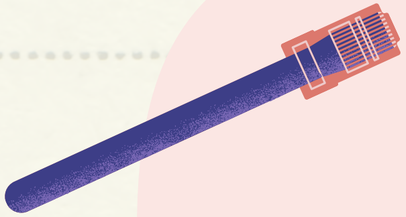
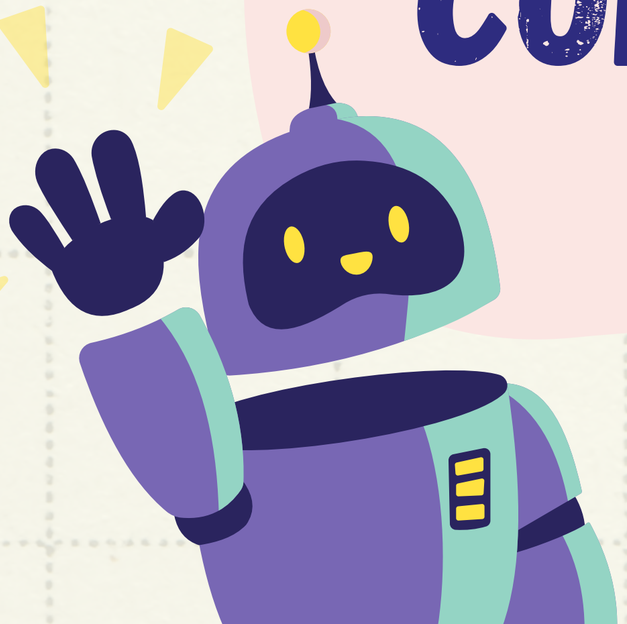
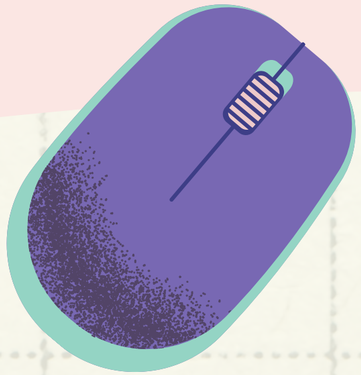
# LIFT ELECTRONIC CONTROLLER SYSTEM

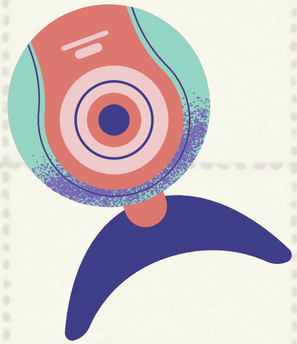






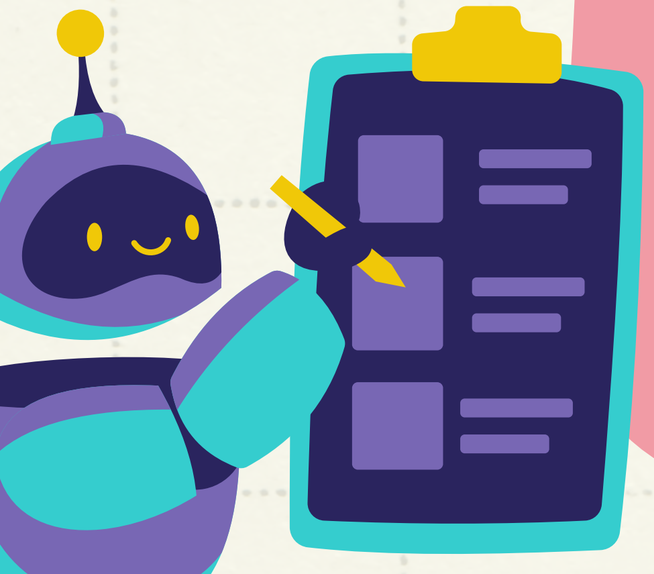


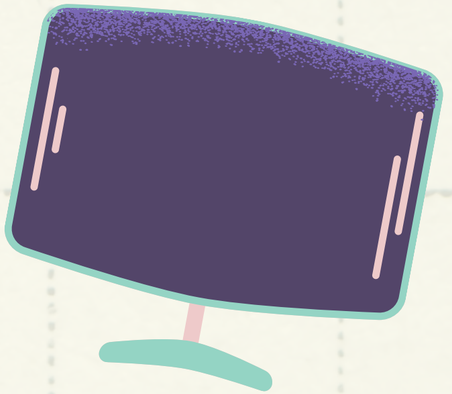


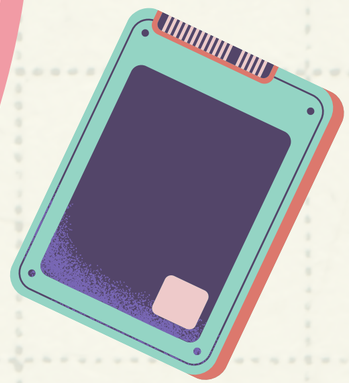


# 1 BACKGROUND

A lecturer wants to use a lift at Block N28a, Faculty of Computing to go up from one level to another. The requirements are put in the desired level to go, tap the lecturer ID Card, close the lift door and push UP button. Then, the lift will goes up by counting up one level to another until its reaches to the desired level. The door will open and at the same time display the 7-segment of level reached. Similarly, the reverse process happen when the lecturer wants to go down. The counting sequence will decrease until it reaches to the desired floor. When there is emergency problem, lecturer can push the emergency button, LED light will turn RED and alarm will ring. Lift will stop functioning and remain at current floor.







# 2 PROBLEMS

## Safety Measures (User Card)

To prevent non-users from using the lift system

## Emergency Alarm System

To comply with safety regulations to ensure the safety of passengers in emergency situations.

## Safety Measures (Passcode)

Can’t use the lift if input invalid password

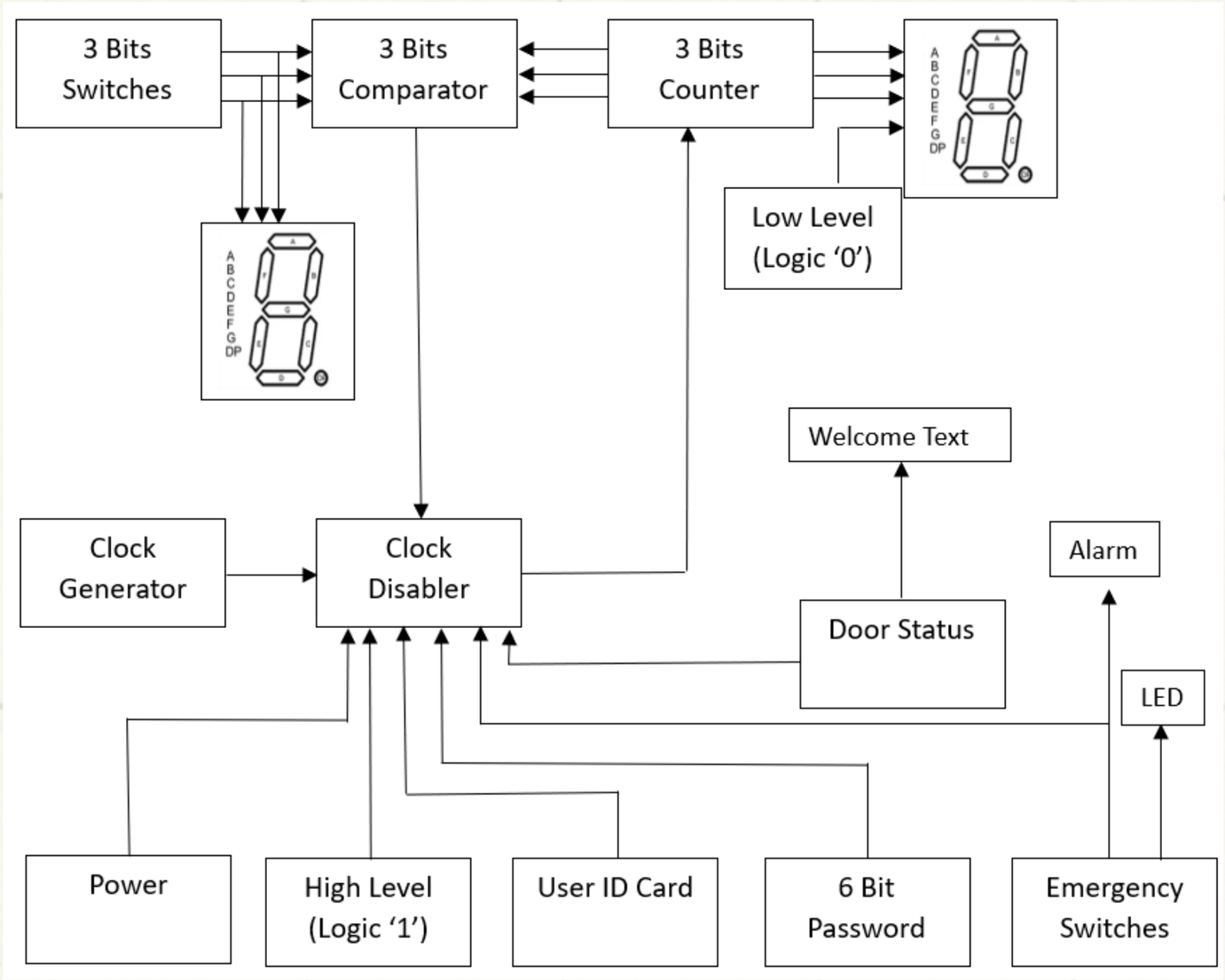
## Floor Leveling

It will show the user his current floor

## User Interface and Accessibility

Show welcome text

# 3 SUGGESTED SOLUTIONS



# EXPLANATION

1.Clock Disabler :

a. Power supply

b. High level (Logic ‘1’)

c. Door status

d. Emergency Switches

e. Users’ Card

f. Clock Generator

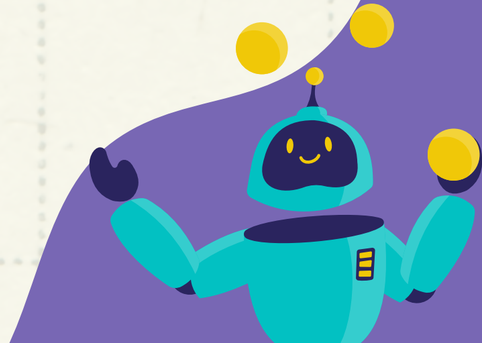
g. Active High Decoder (6-bit password)

h. Comparator

2. 3 Bit Switches

3. 3 Bit Counter

4. 7 Segments Decoder



# 4 REQUIREMENTS

## Lift UP

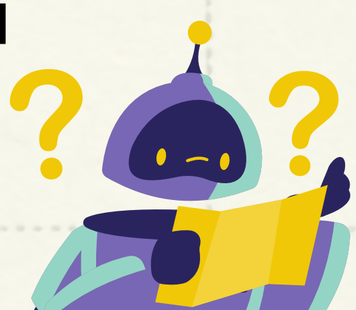
- Key in desired level up
- Tap user card
- Key in passcode
- Door Close
- Lift goes up to destination
- Lift stop at destination
- Display current floor
- Door Open

## Lift DOWN

- Key in desired level down
- Tap user card
- Key in passcode
- Door Close
- Lift goes down to destination
- Lift stop at destination
- Display current floor
- Door Open

## EMERGENCY

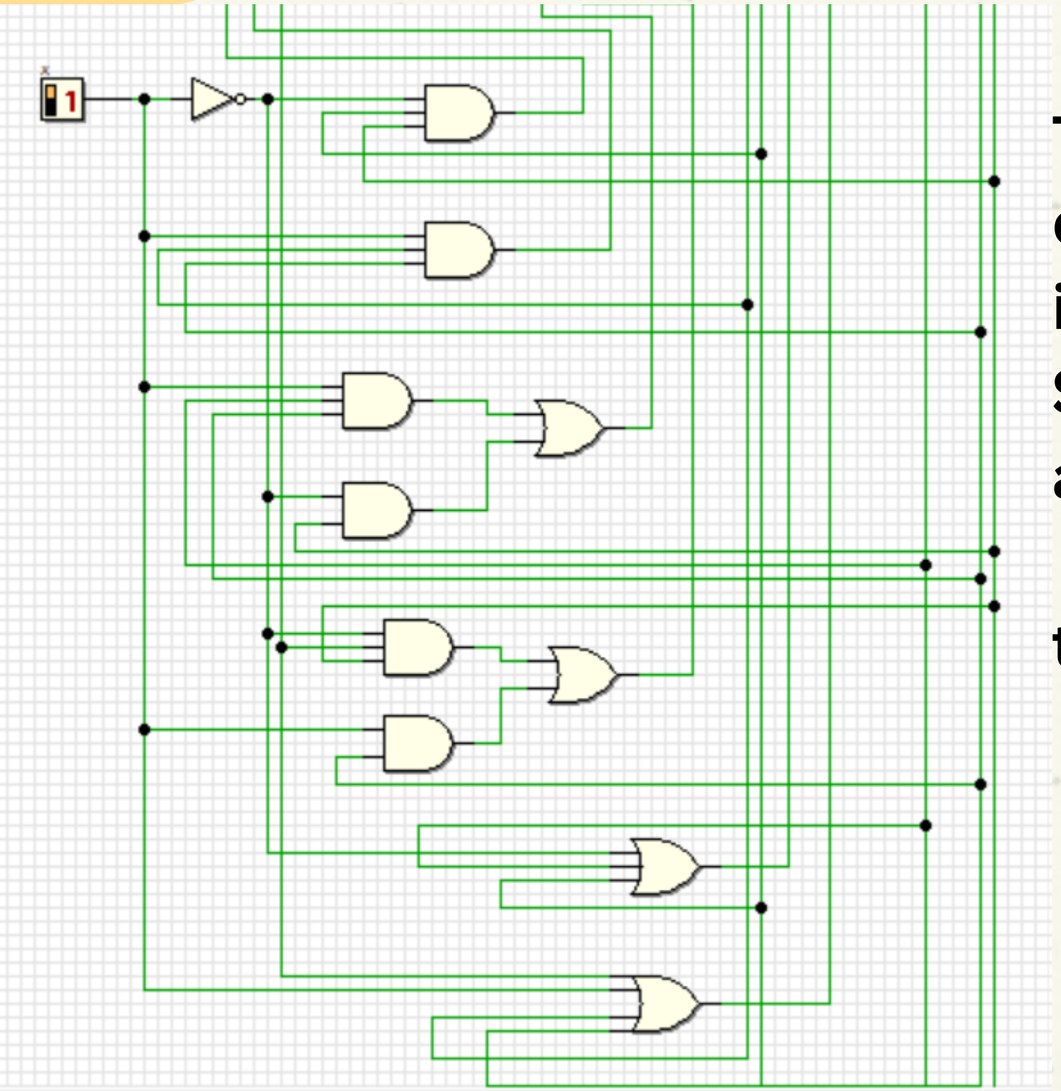
- Press EMERGENCY button
- Lift stop at current floor
- LED light turns red
- Output alarm sound



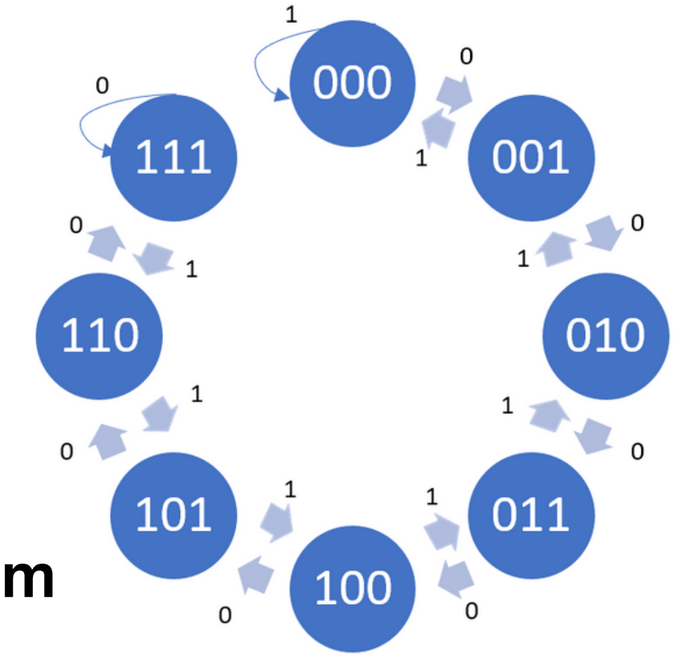
## Lift REMAIN

- Key in desired level
- Tap user card
- Key in passcode
- Door Close
- Current level same as desired level
- Door open

# 5 SYSTEM IMPLEMENTATION



These are the 3-bit up/down synchronous counter circuit using JK flip-flop. When X = 0, it is up counter while X = 1, it is counted down. State diagram, next state table and JK FF transition table is done to implement the circuit.




State Diagram

# Next State Transition Table

| X | Present State | | | Next State | | | JK FF Transition | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Q2 | Q1 | Q0 | Q2+ | Q1+ | Q0+ | J2 | K2 | J1 | K1 | J0 | K0 |
| 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | X | 0 | X | 1 | X |
| 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | X | 1 | X | X | 1 |
| 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | X | X | 0 | 1 | X |
| 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | X | X | 1 | X | 1 |
| 0 | 1 | 0 | 0 | 1 | 0 | 1 | X | 0 | 0 | X | 1 | X |
| 0 | 1 | 0 | 1 | 1 | 1 | 0 | X | 0 | 1 | X | X | 1 |
| 0 | 1 | 1 | 0 | 1 | 1 | 1 | X | 0 | X | 0 | X | 1 |
| 0 | 1 | 1 | 1 | 1 | 1 | 1 | X | 0 | X | 0 | X | 0 |
| 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | X | 0 | X | 0 | X |
| 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | X | 0 | X | X | 1 |
| 1 | 0 | 1 | 0 | 0 | 0 | 1 | 0 | X | X | 1 | 1 | X |
| 1 | 0 | 1 | 1 | 0 | 1 | 0 | 0 | X | X | 0 | X | 1 |
| 1 | 1 | 0 | 0 | 0 | 1 | 1 | X | 1 | 1 | X | 1 | X |
| 1 | 1 | 0 | 1 | 1 | 0 | 0 | X | 0 | 0 | X | X | 1 |
| 1 | 1 | 1 | 0 | 1 | 0 | 1 | X | 0 | X | 1 | 1 | X |
| 1 | 1 | 1 | 1 | 1 | 1 | 0 | X | 0 | X | 0 | X | 1 |

J2 = X'Q1Q0

| X Q2 \ Q1 Q0 | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 00 | 0 | 0 | 1 | 0 |
| 01 | X | X | X | X |
| 11 | X | X | X | X |
| 10 | 0 | 0 | 0 | 0 |

K2 = XQ1'Q0'

| X Q2 \ Q1 Q0 | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 00 | X | X | X | X |
| 01 | 0 | 0 | 0 | 0 |
| 11 | 1 | 0 | 0 | 0 |
| 10 | X | X | X | X |

J0 = X' + Q2 + Q1

| X Q2 \ Q1 Q0 | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 00 | 1 | X | X | 1 |
| 01 | 1 | X | X | X |
| 11 | 1 | X | X | 1 |
| 10 | 0 | X | X | 1 |

K0 = Q1' + Q0' + X + Q2'

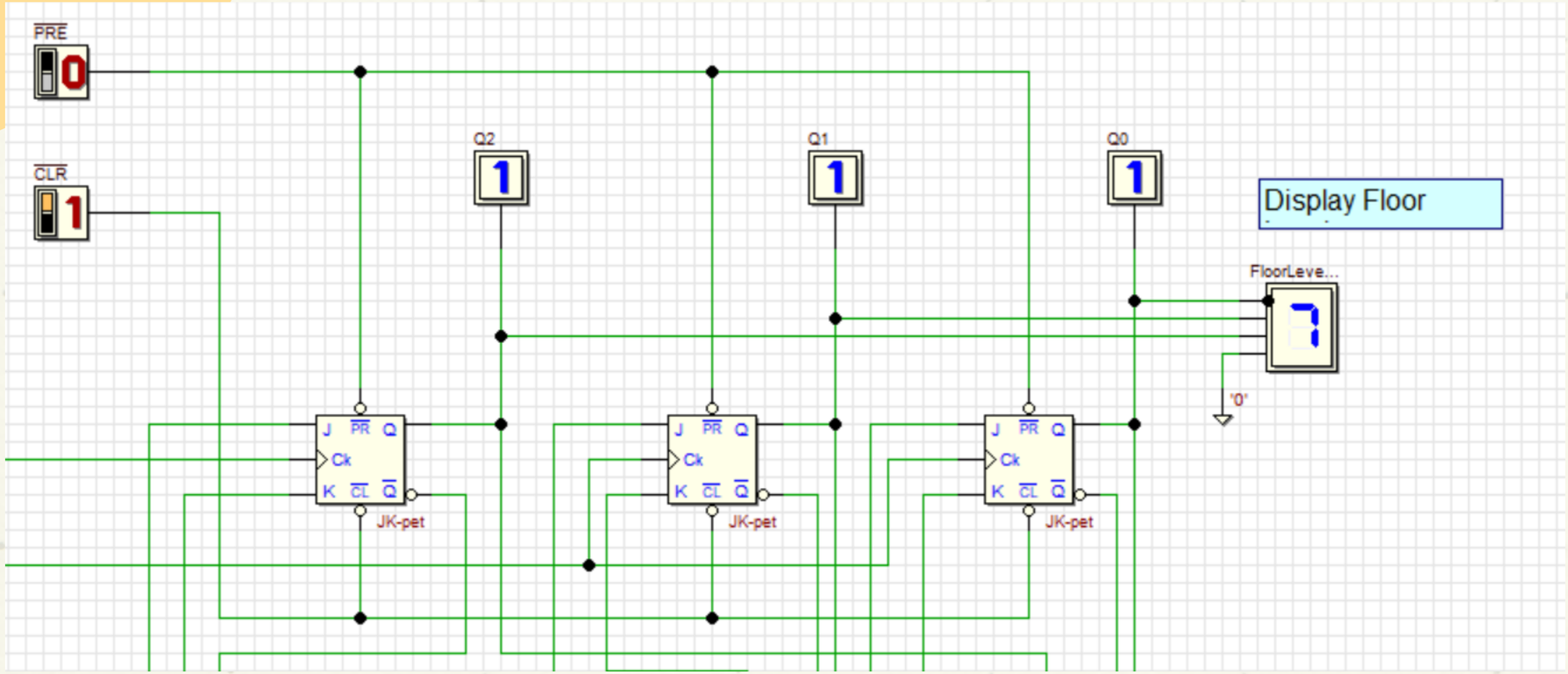
| X Q2 \ Q1 Q0 | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 00 | X | 1 | 1 | X |
| 01 | X | 1 | 0 | 1 |
| 11 | X | 1 | 1 | X |
| 10 | X | 1 | 1 | X |

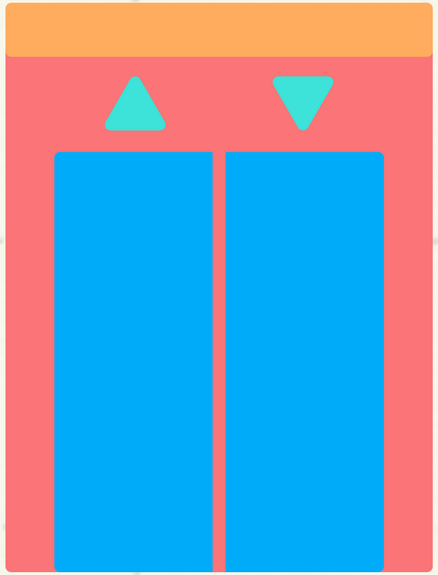
J1 = X'Q0 + XQ2Q0'

| X Q2 \ Q1 Q0 | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 00 | 0 | 1 | X | X |
| 01 | 0 | 1 | X | X |
| 11 | 1 | 0 | X | X |
| 10 | 0 | 0 | X | X |

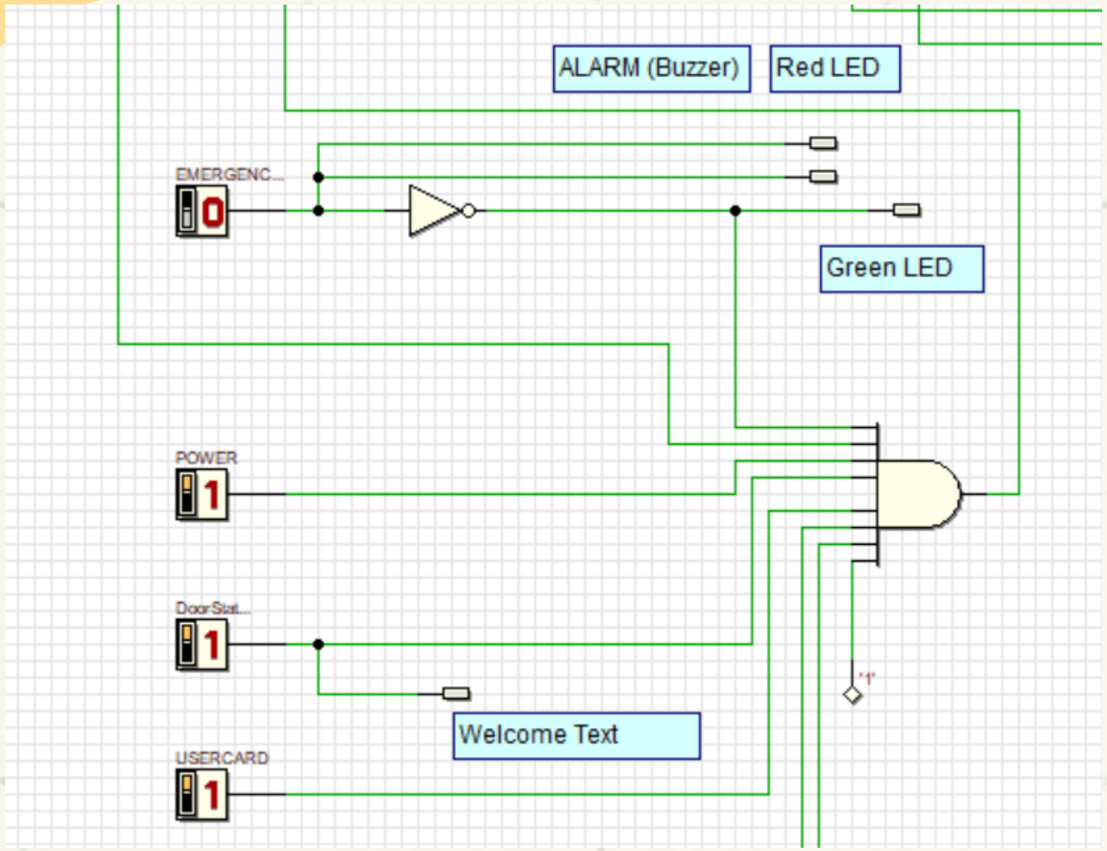
K1 = X'Q2'Q0 + XQ0'

| X Q2 \ Q1 Q0 | 00 | 01 | 11 | 10 |
|---|---|---|---|---|
| 00 | X | X | 1 | 0 |
| 01 | X | X | 0 | 0 |
| 11 | X | X | 0 | 1 |
| 10 | X | X | 0 | 1 |

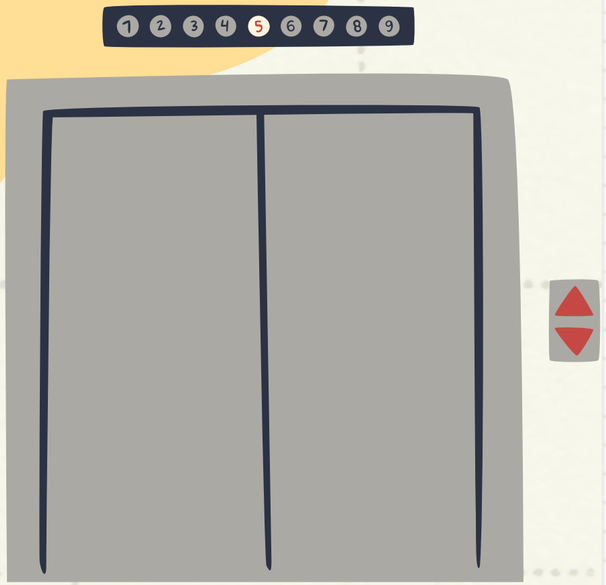


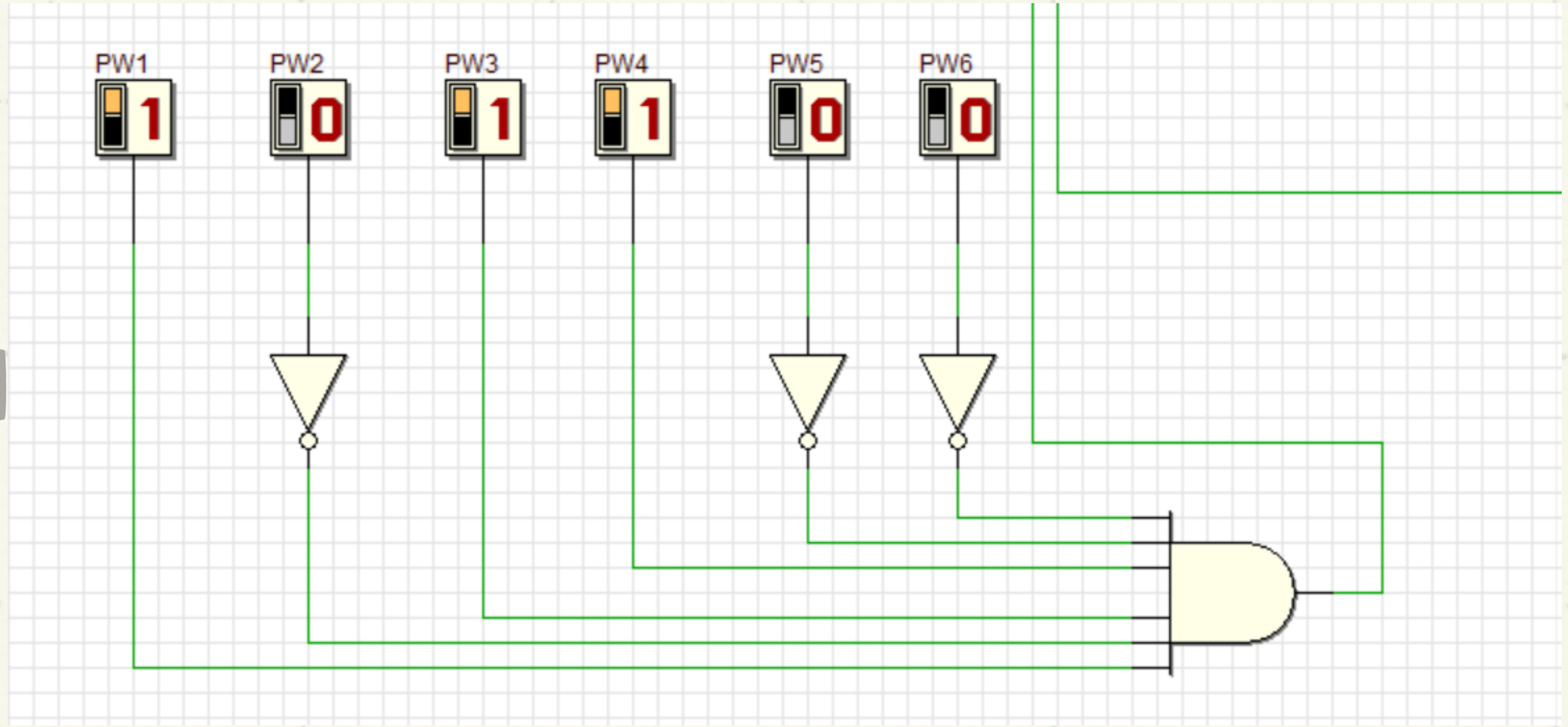



**This shows the current level output using 7-segment display. It will show the level once it is reached.**

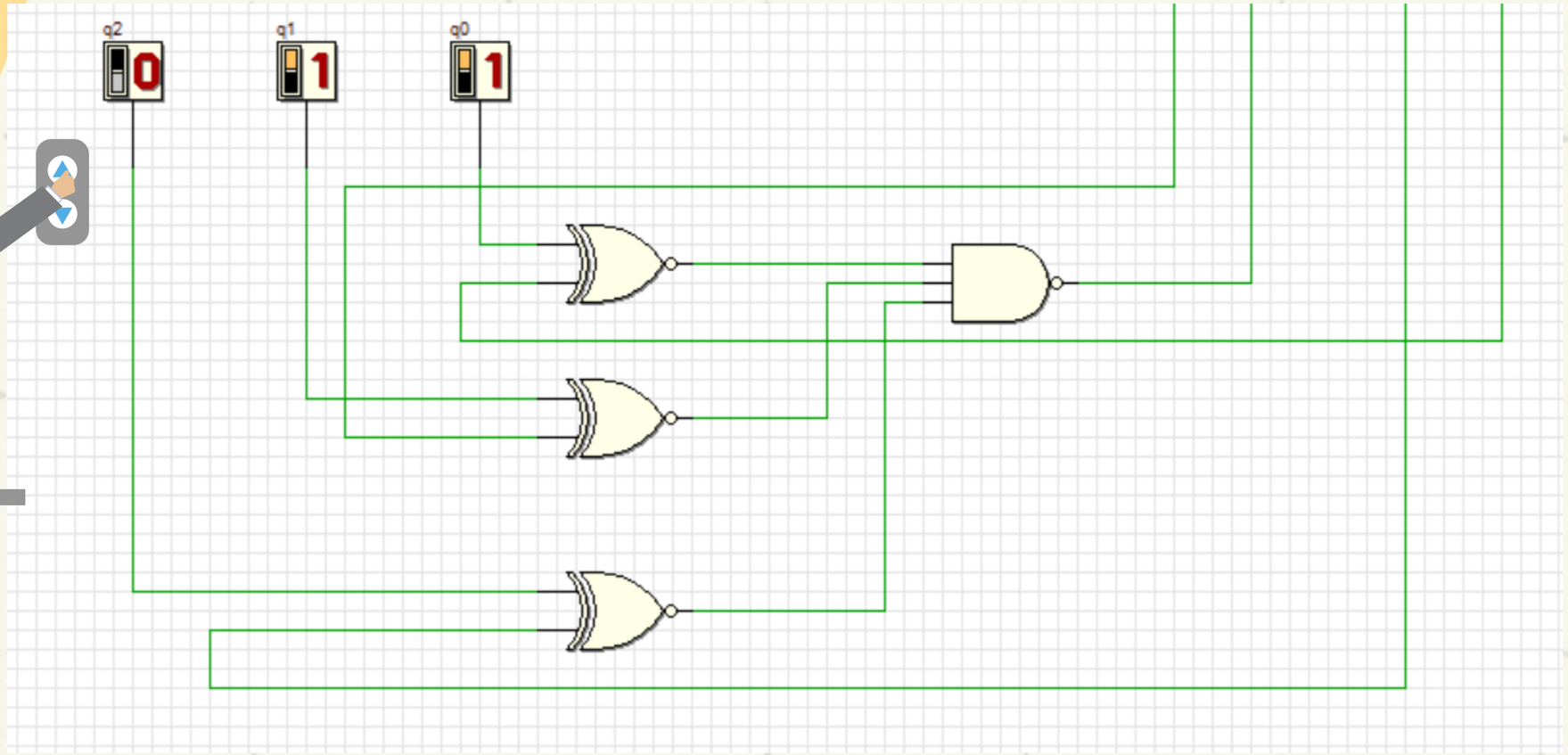



If EMERGENCY is LOW, the lift is work with a GREEN LED light. If EMERGENCY is HIGH, the ALARM( buzzer) will be activated and RED LED light is on.
The power supply must be constantly HIGH, 1.
The Door Status must be closed (1) to start the lift function. When the door is closed, there will be a Welcome Text displayed. (e.g. Welcome to 3rd floor !)
The USER CARD must be tapped (1) to run the lift.



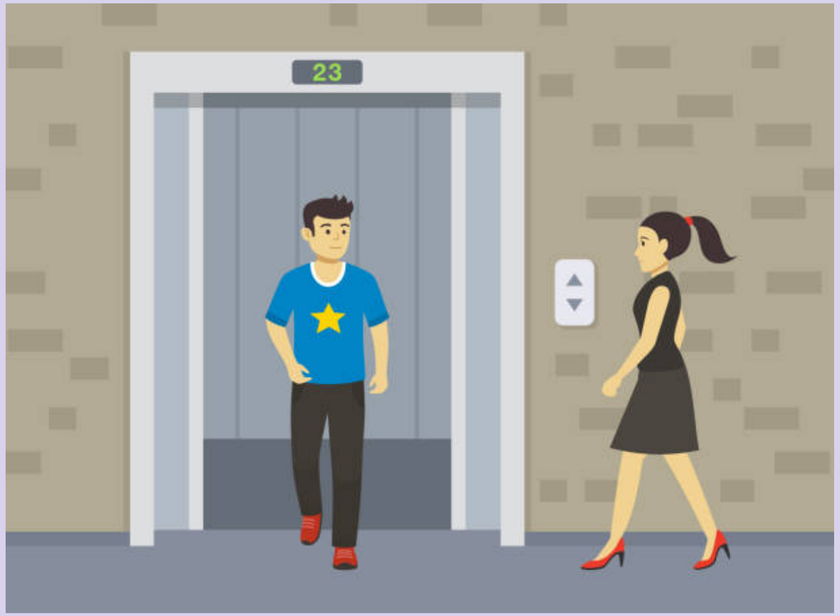




**A 6-bit binary passcode is required to allow users to use the lift. A binary decoder is used, AND gate is implemented to get an active HIGH output. Here we use 101100 as passcode, so the decoder will produce a logic HIGH if 101100 is key in by the user.**




This is user input desired level. To check for 3 bit equality, we use XNOR gate. Then, combine the result by using a NAND gate to get an active LOW output, so that our lift can function. It means that if the current level and the desired level input is not equal, then the lift will move. Otherwise, it will stay at current level.

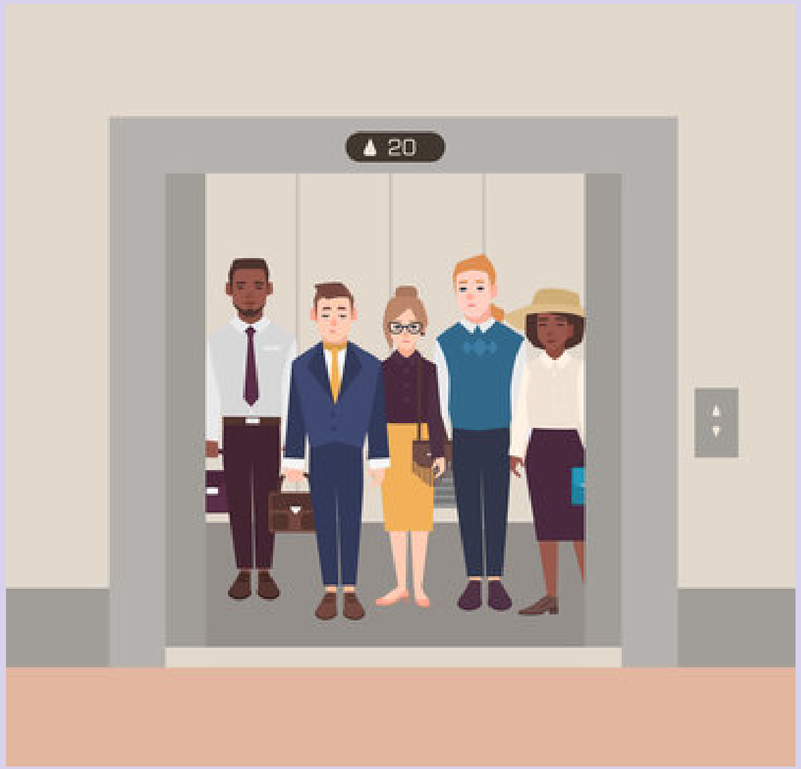
# 6 CONCLUSION & REFLECTION




Throughout the Lift Electronic Controller System project, we have addressed various challenges such as safety issues and interaction between users and system. By considering these aspects, we created a functional lift circuit that prioritizes passenger safety and convenience.

We have included features such as emergency alarm system, floor leveling, welcoming text, passcode verification and users' card verification.

# 6 CONCLUSION & REFLECTION




However, our system also has some weaknesses. For example, if there is no one near the lift, the emergency alarm will not be heard. Besides, our password requirement is less user friendly because it uses binary digits. Thus, in the future, we hope to:

- implement decimal passcode
- integrate a voice intercom system to ensure real-time verbal communication between user and lift assistant
- contact the maintenance team automatically when emergency alarm activated
- show alarm when lift is overweight

# THANK YOU !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