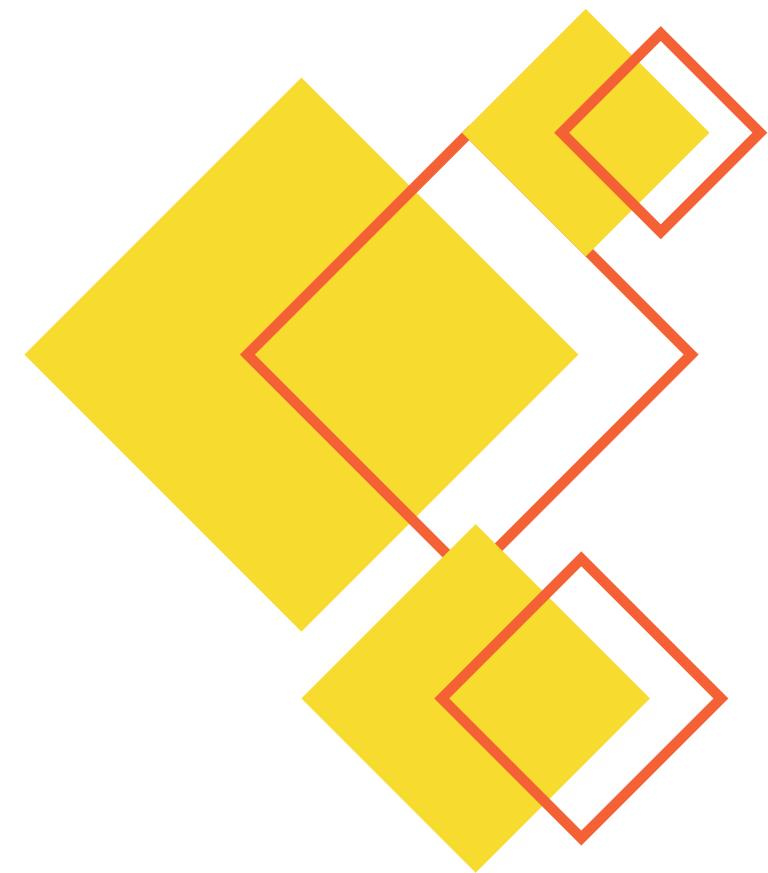
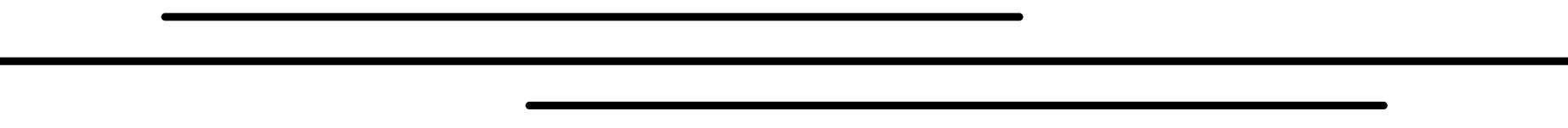


LIFT CONTROL SYSTEM

SECR1013–03 DIGITAL LOGIC
GROUP 4



PREPARED BY



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Terence Lim
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Wong Jing Jie



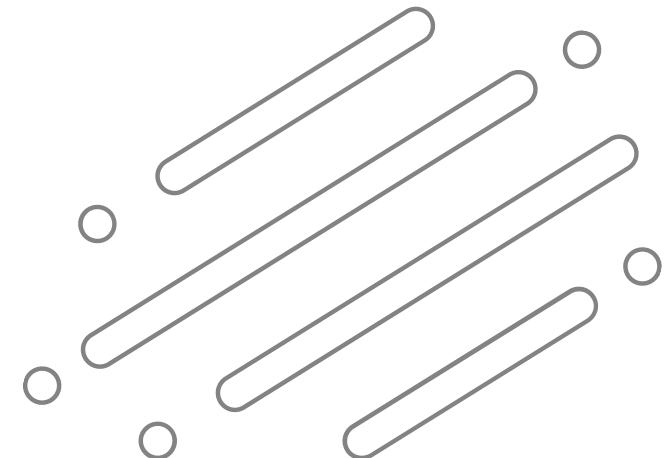
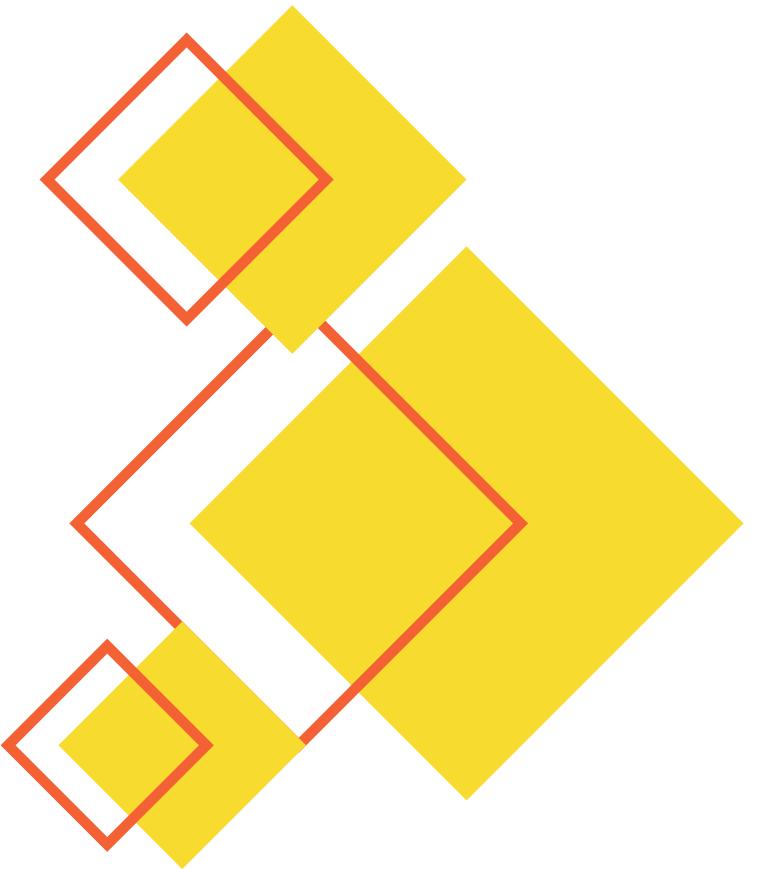
James Sim
Chia Tai

OBJECTIVE

- Design a 3-bit synchronous counter for the lift system controller
- Implement basic principles of combinational and sequential logic
- Test and check the functionality of designed circuit using Deeds
- Utilise the components of combinational and sequential circuits
- Develop problem-solving, logical thinking and teamworking skills
- Demonstrate and explain the operation of the lift system

BACKGROUND

- To implement a 8-level lift system
- Utilise 3-bit synchronous counter
- Added extra authentication features
- Circuits:
 - Combinational circuit
 - Sequential circuit
 - Additional features

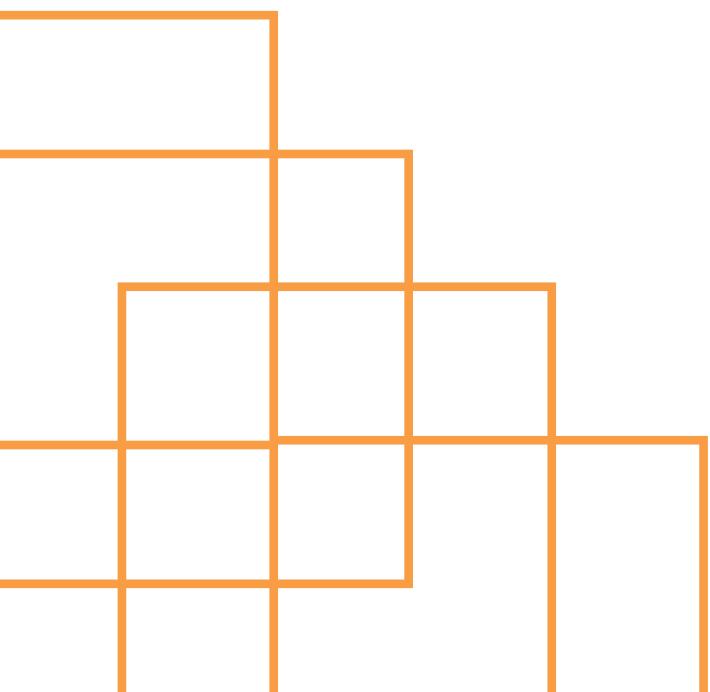


PROBLEM STATEMENT

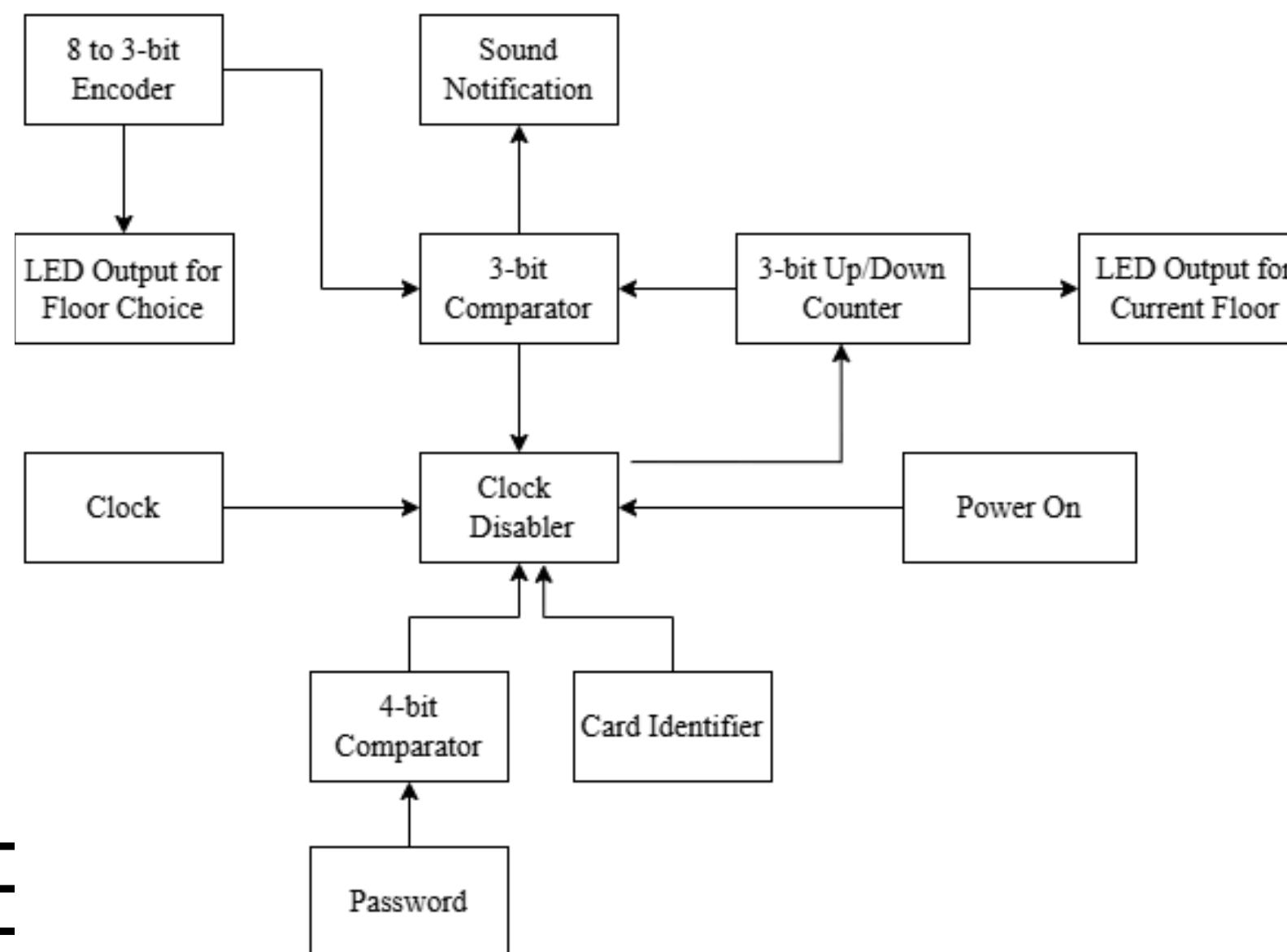
- Lack strong security systems
- Unauthorised lift access
- Need for authentication from authorised personnel

SUGGESTED SOLUTION

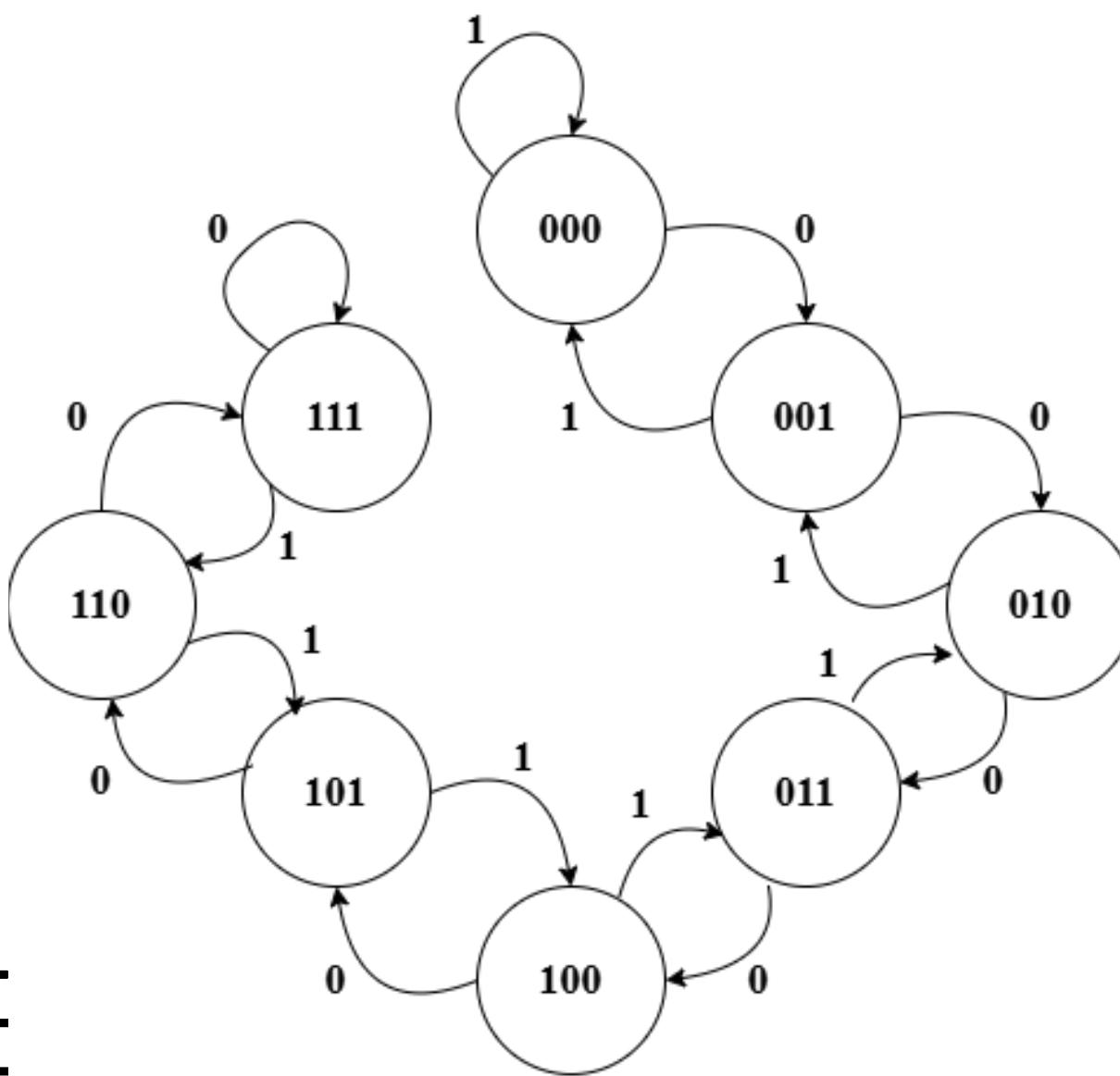
- Card + 4-bit Password Protection
- Integrates advanced electronic components:
 - 3-bit floor comparator
 - 4-bit password comparator
 - JK flip-flops as counters
 - Basic gates to route signals



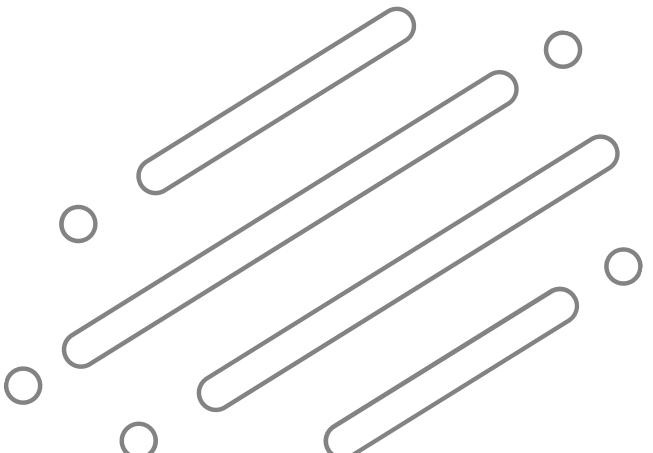
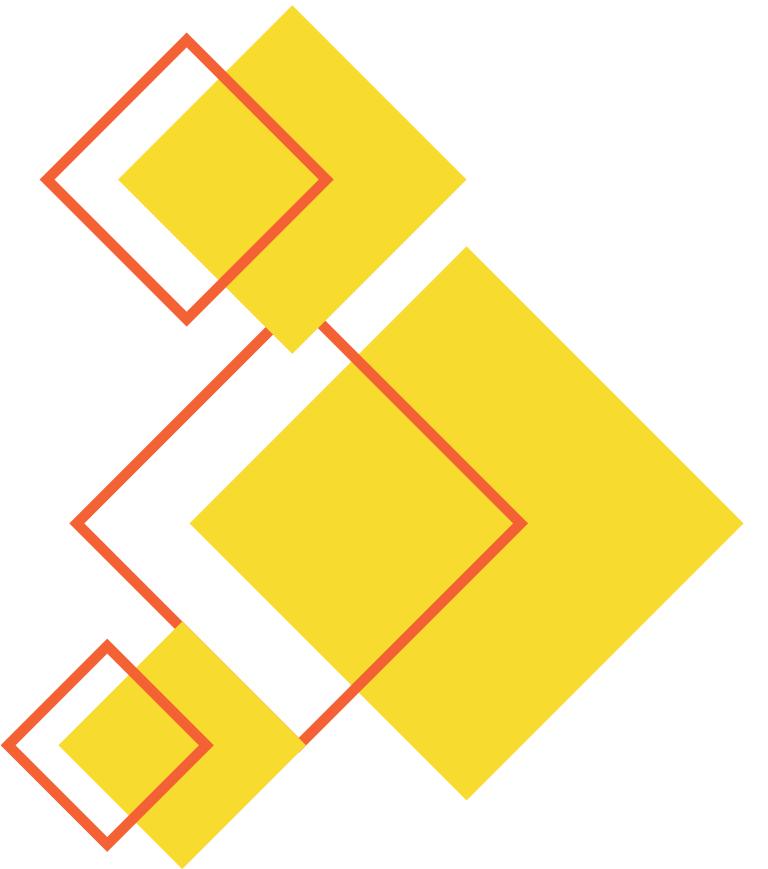
BLOCK DIAGRAM



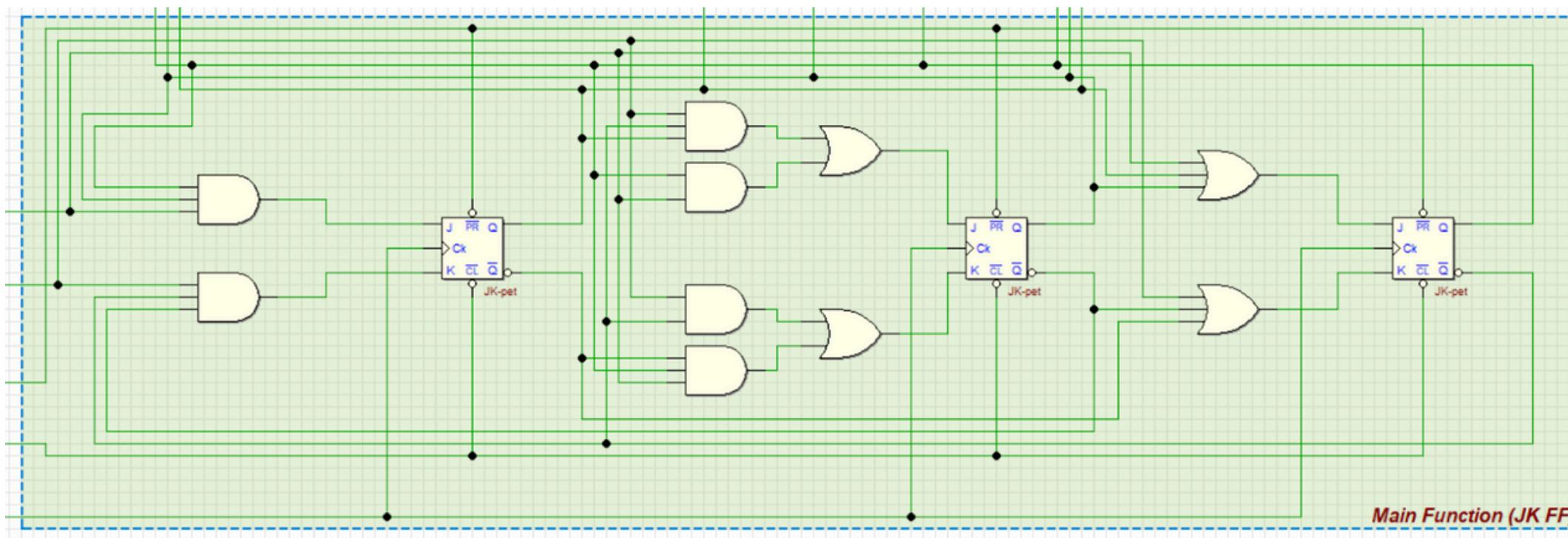
STATE DIAGRAM



IMPLEMENTATION

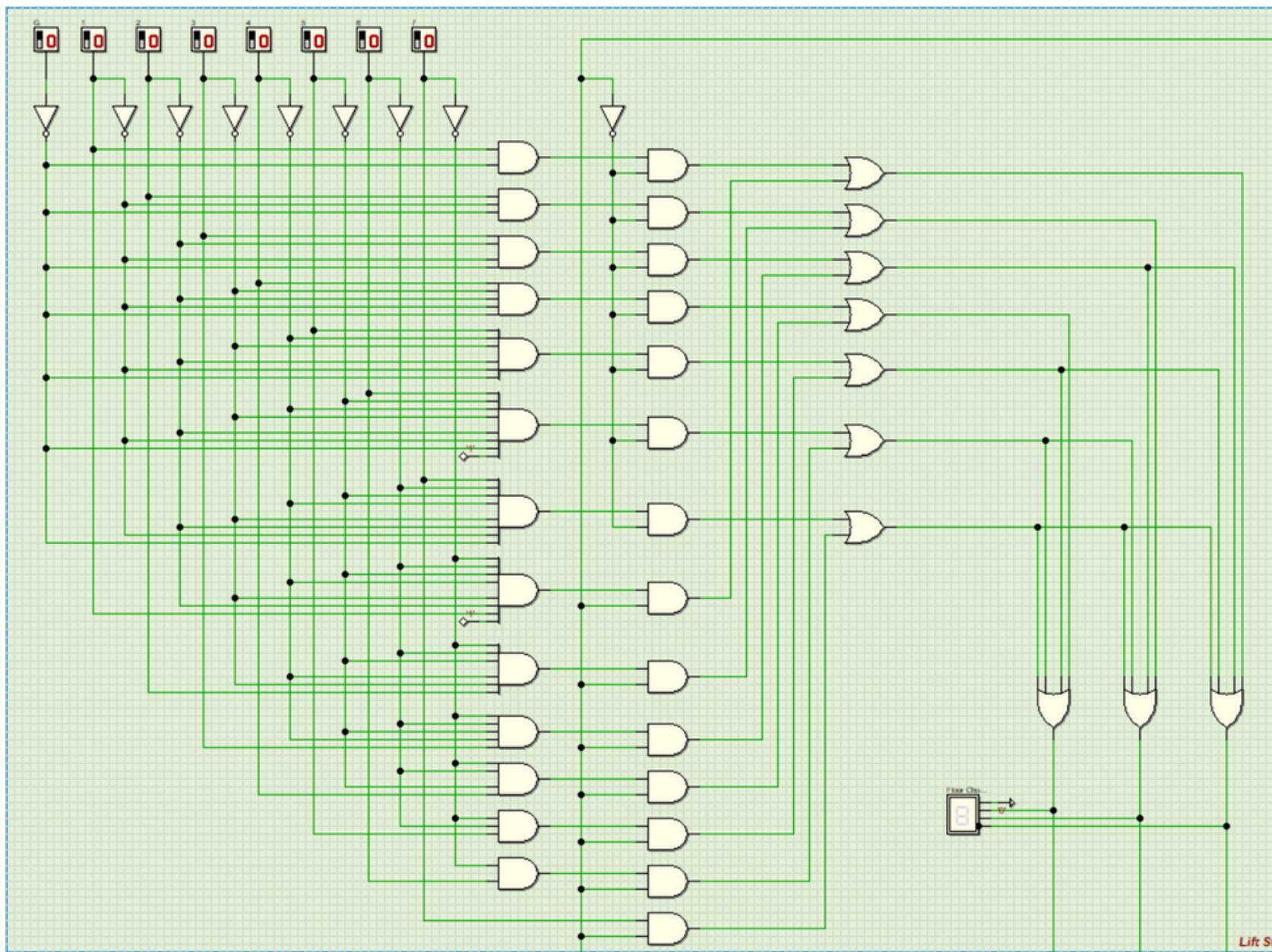


MAIN FUNCTION (JK FLIP-FLOPS)



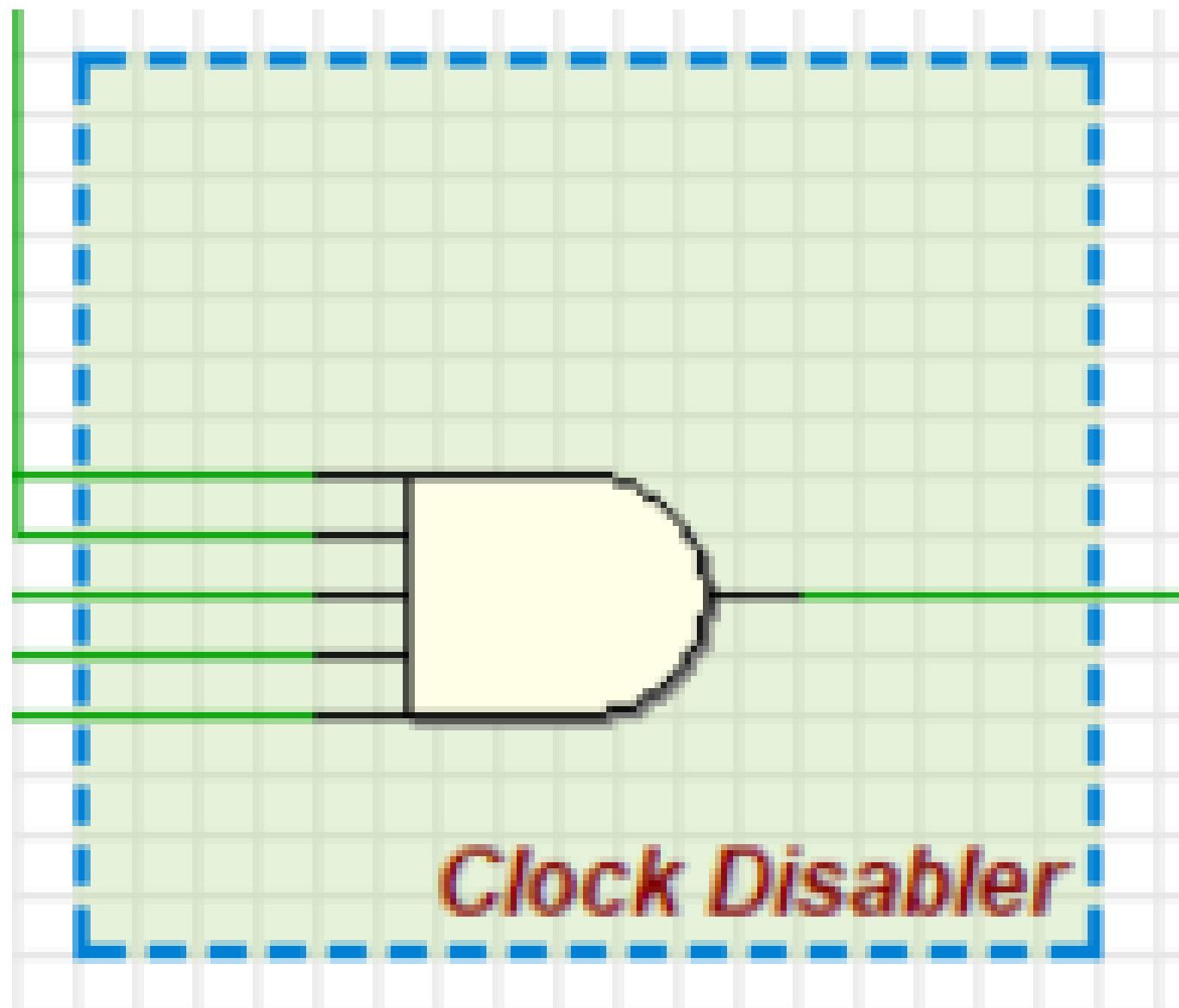
- 3 JK flip-flops
- Synchronous saturated up/down counter
- Common clock
- Stop when clock disabler is LOW

FLOOR SWITCHES



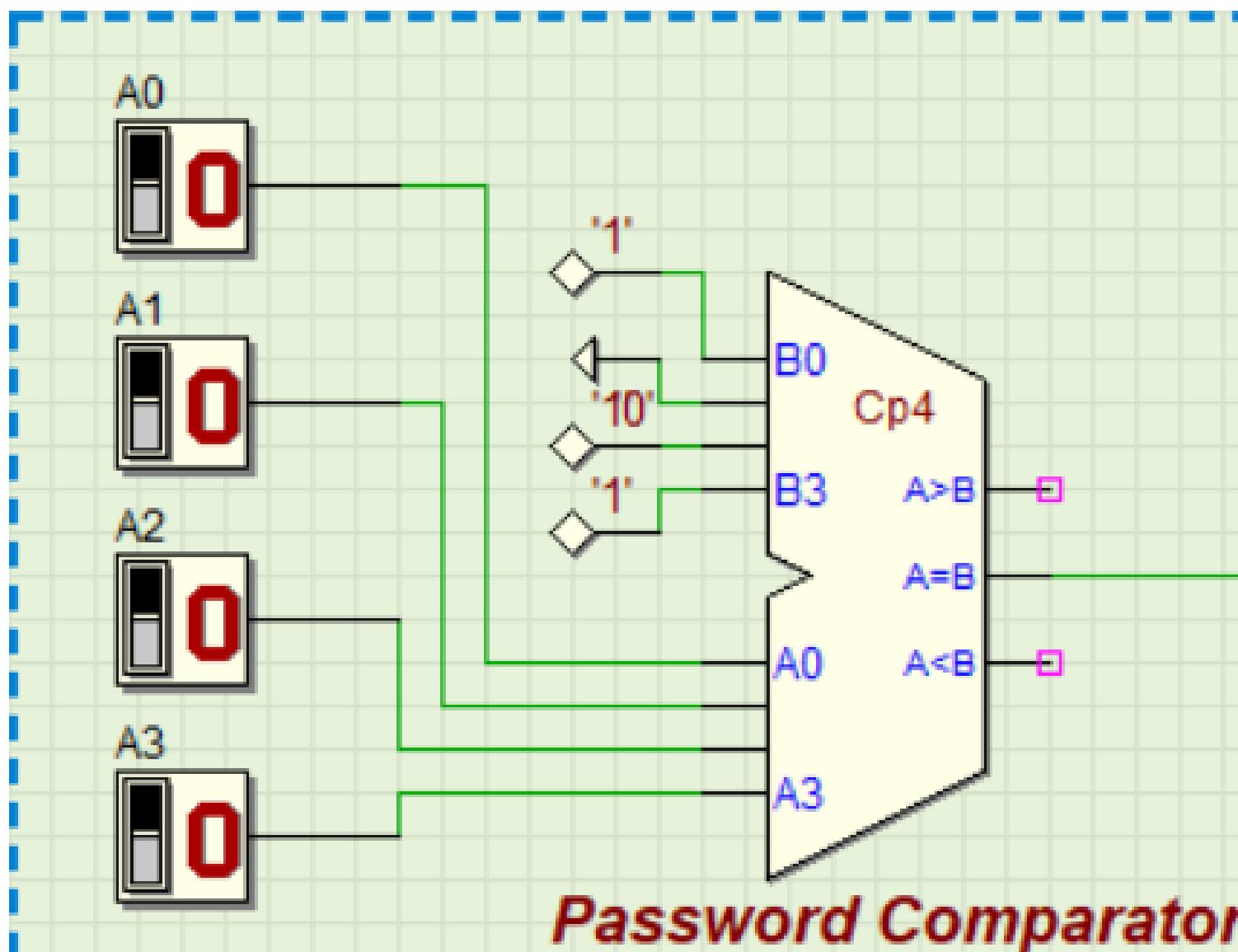
- Uses 8 floor switches
- Encoded into 3-bit destination floor
- Supports multiple selections
- Priority based on the direction of the lift

CLOCK DISABLER



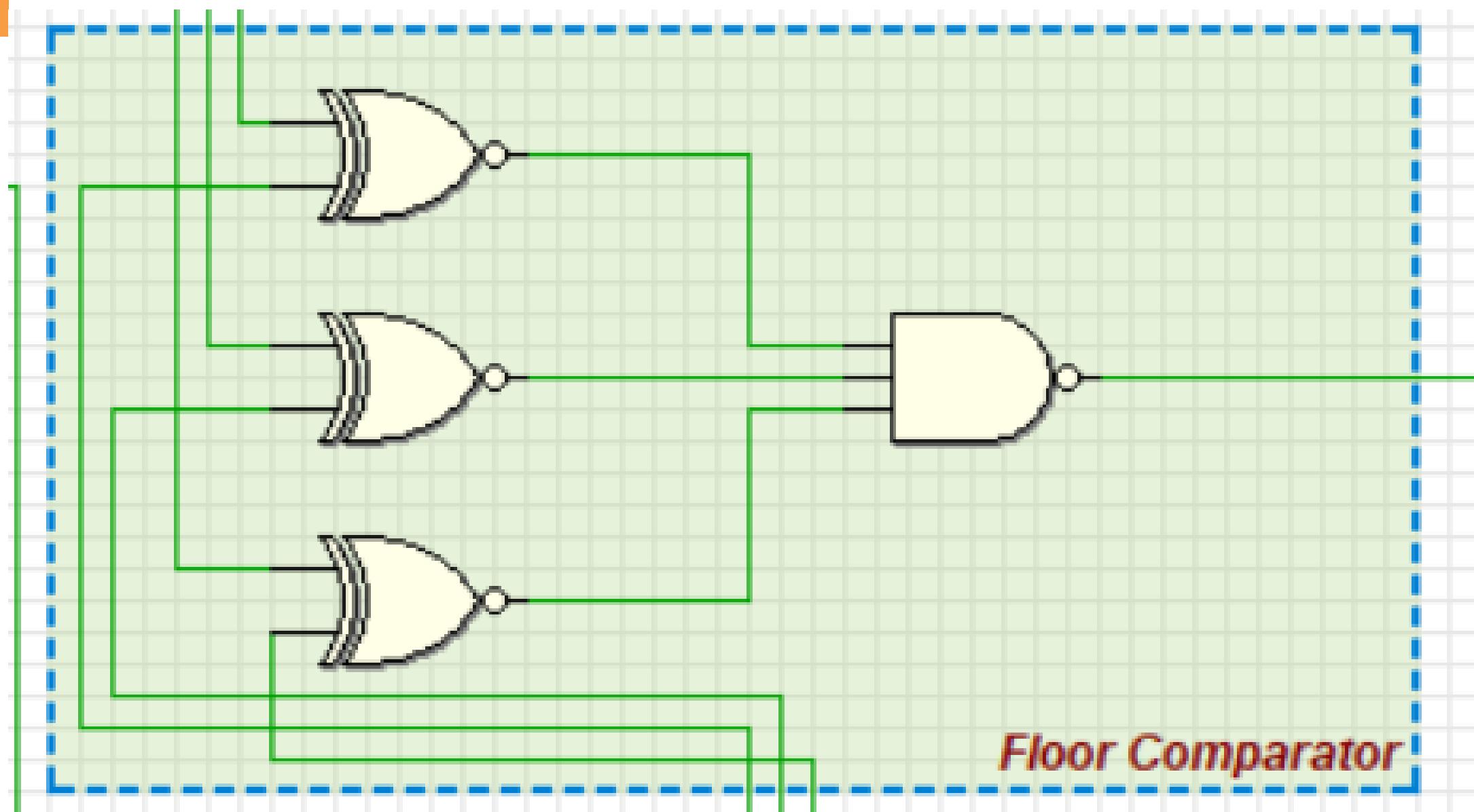
- 5-input AND gate
- HIGH when 5 inputs are HIGH
- Inputs:
 - Clock Generator
 - Password Comparator
 - Floor Comparator
 - Card reader
 - Power switch
- Start and stop the lift operation

PASSWORD COMPARATOR



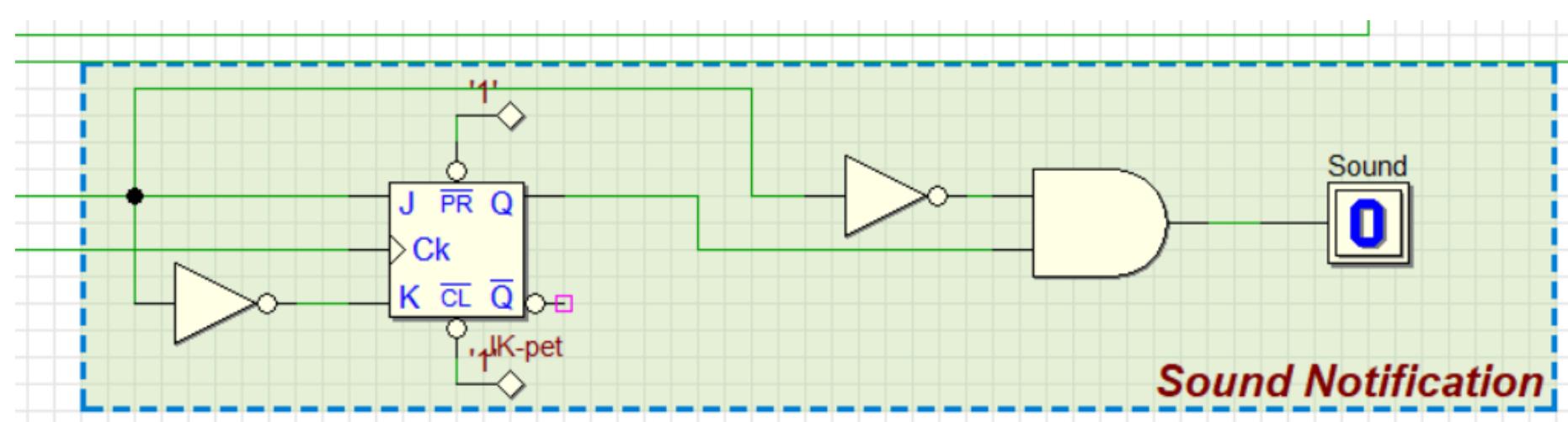
- 4-bit MSI Comparator Chip
- Verifies the password entered
- Only outputs HIGH when the password entered is exactly equals to the preset password: "1101"

FLOOR COMPARATOR



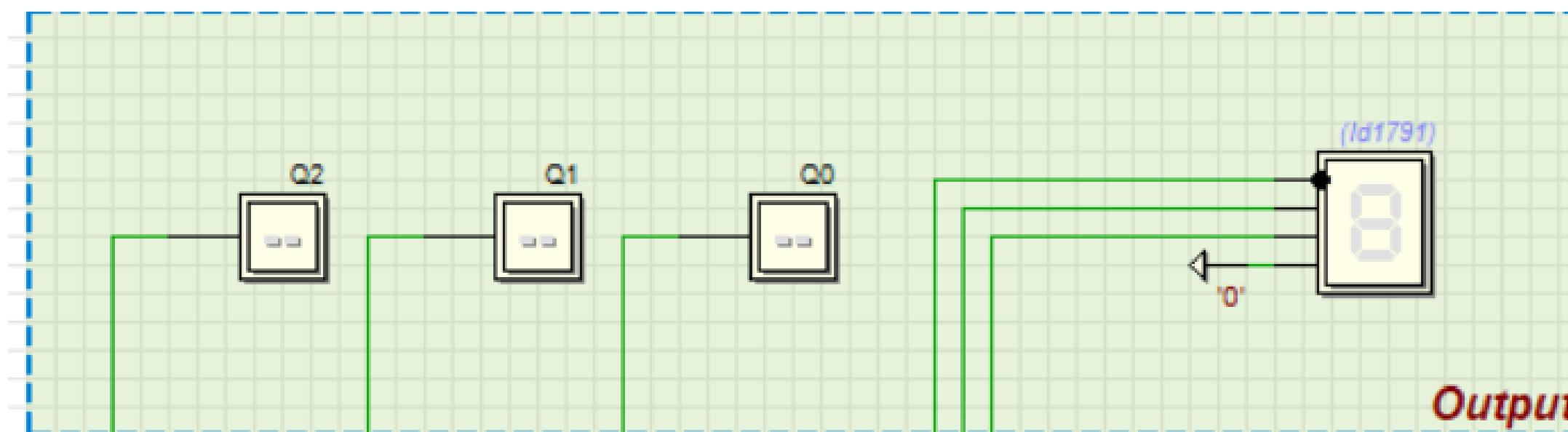
- Uses XNOR + NAND gates
- Compares current floor and desired floor
- Output:
 - HIGH → Floors not equal
 - LOW → Floors are equal

SOUND NOTIFICATION



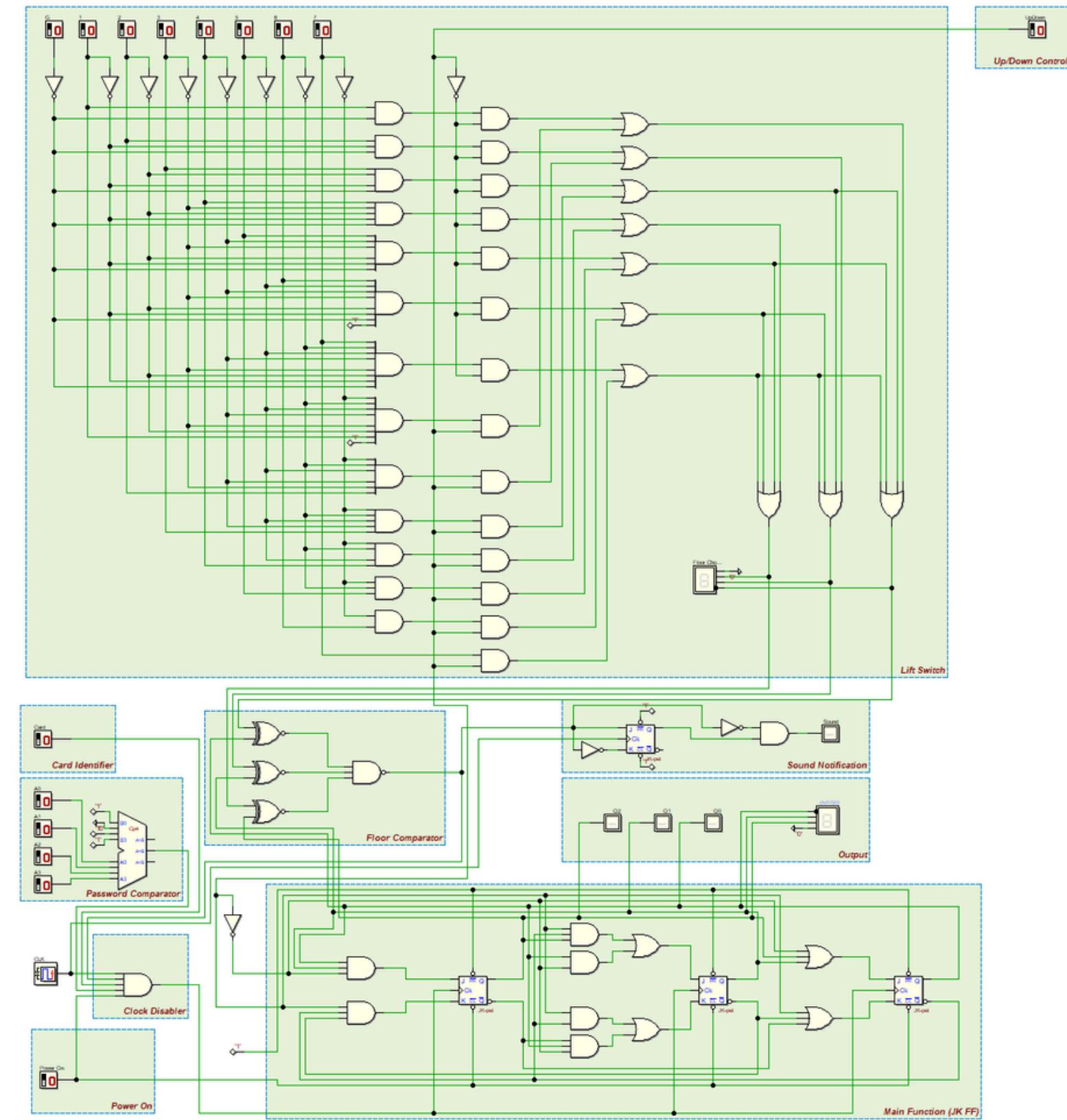
- Configured a JK flip-flop to D flip-flop
- Stores the comparator result one clock cycle earlier
- 2-input AND gate
- Operation:
 - Floor \neq Desired: AND=0 \rightarrow sound OFF
 - Floor = Desired: AND= 1 \rightarrow sound ON
 - Next clock: AND=0 \rightarrow sound OFF

CURRENT FLOOR DISPLAY



- Shows current floor
- Display in both binary and hex form
- Driven by JK flip-flops

FULL DIGITAL ELECTRONIC DEEDS CIRCUIT

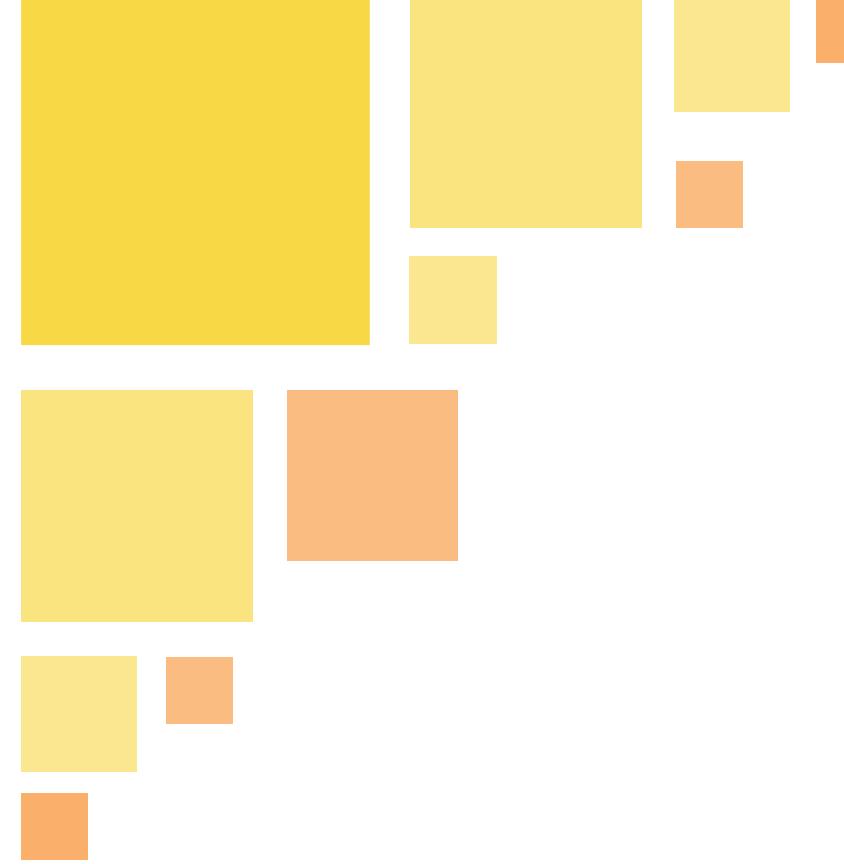


CONCLUSION

- Demonstrated the design and implementation of an elevator.
- Designed by implementing a 3-bit synchronous counter and other components.
- These collaboration of components enable the function of the system.

REFLECTION

- This project enhanced our knowledge in Digital Logic.
- Provided many practical experience in the application of digital electronics concepts.
- We're excited to implement more complex circuit in the future.



THANK YOU

