



# LIFT CONTROL SYSTEM

SECR1013-03 DIGITAL LOGIC  
GROUP 4





# PREPARED BY



Ng Yaw Kuan



Terence Lim  
Jian Yuan



Wong Jing Jie



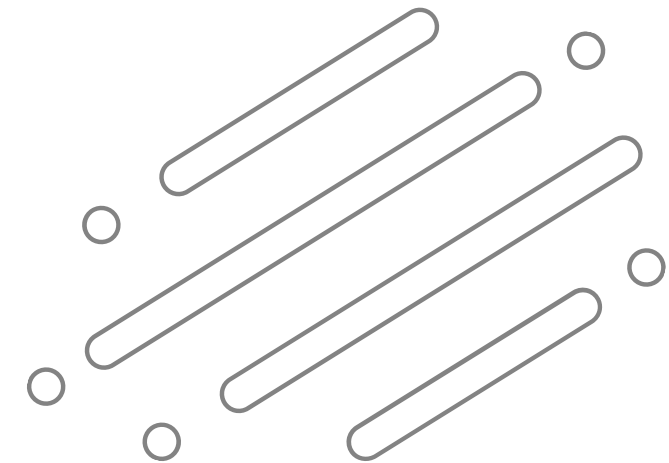
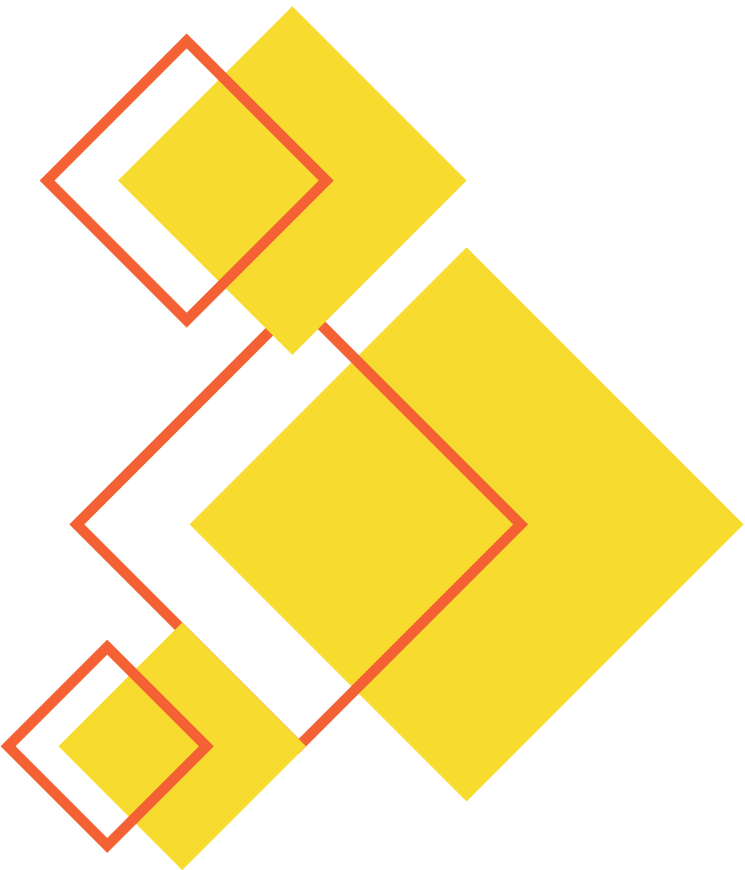
James Sim  
Chia Tai





# OBJECTIVE

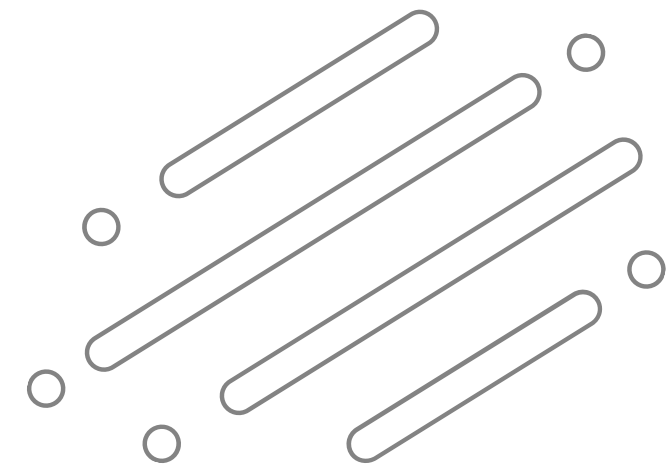
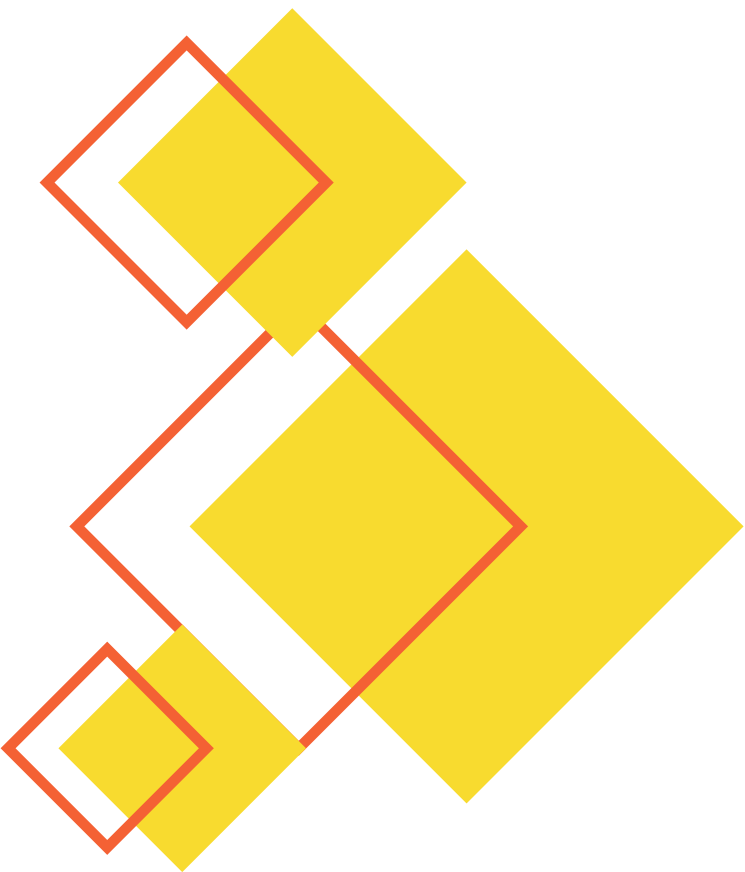
- Design a 3-bit synchronous counter for the lift system controller
- Implement basic principles of combinational and sequential logic
- Test and check the functionality of designed circuit using Deeds
- Utilise the components of combinational and sequential circuits
- Develop problem-solving, logical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





# BACKGROUND

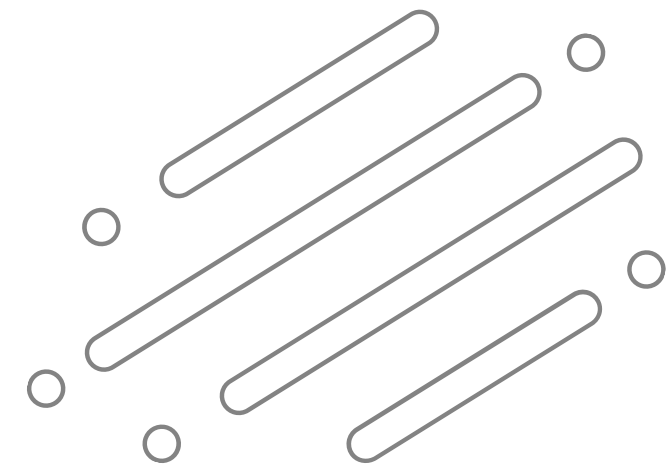
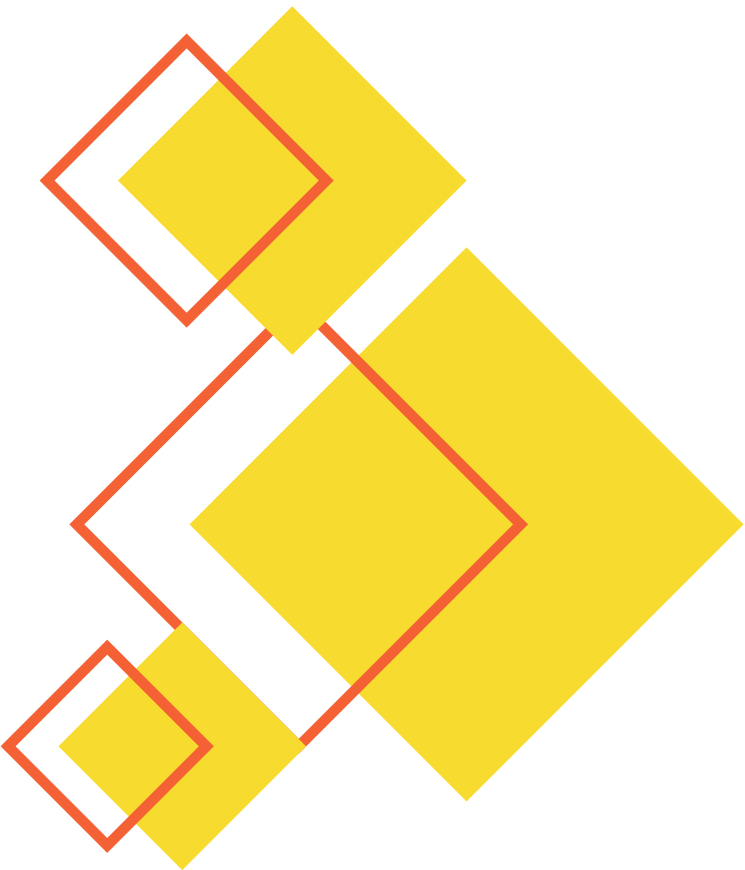
- To implement a 8-level lift system
- Utilise 3-bit synchronous counter
- Added extra authentication features
- Circuits:
  - Combinational circuit
  - Sequential circuit
  - Additional features





# PROBLEM STATEMENT

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

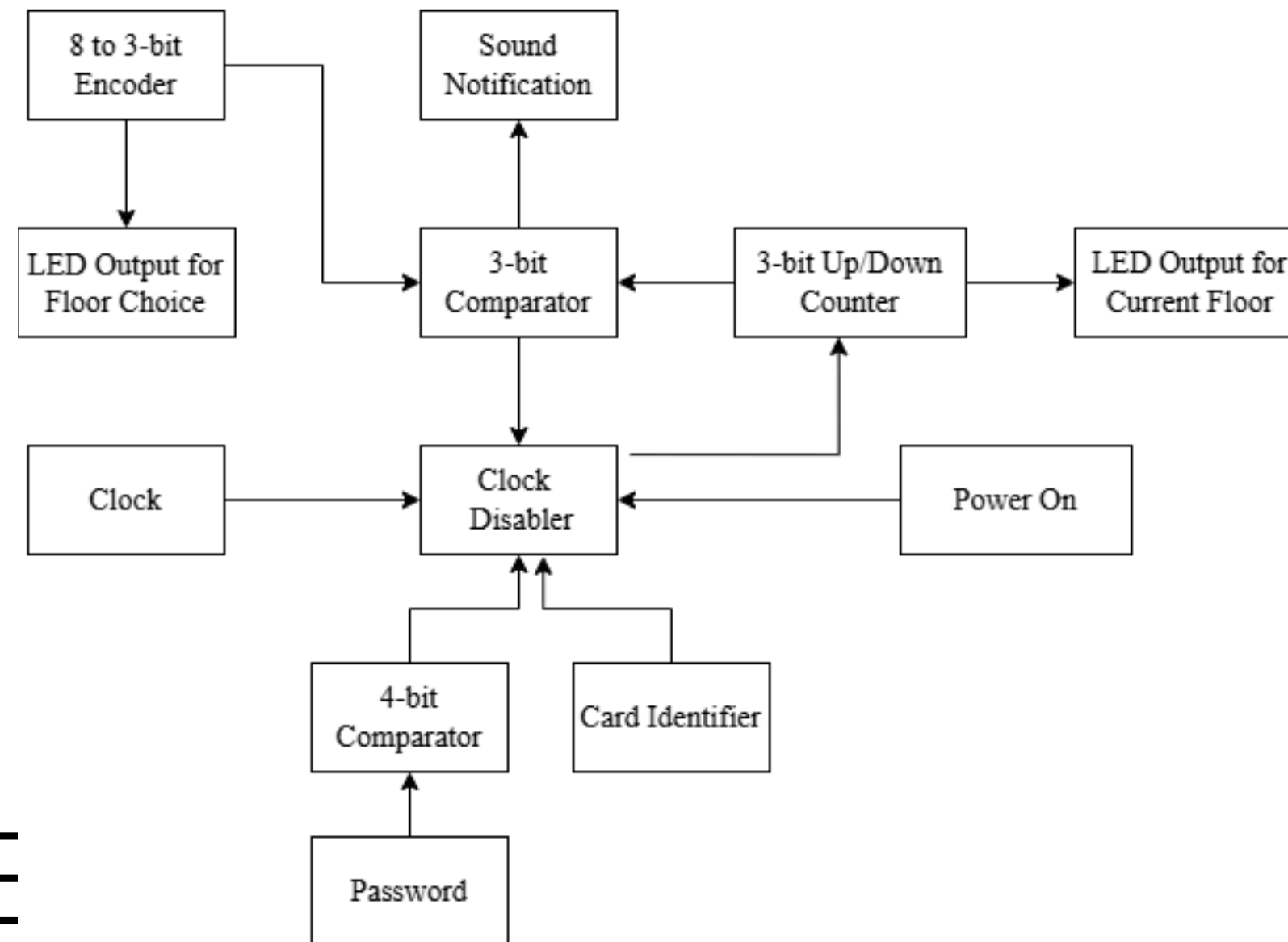


# SUGGESTED SOLUTION

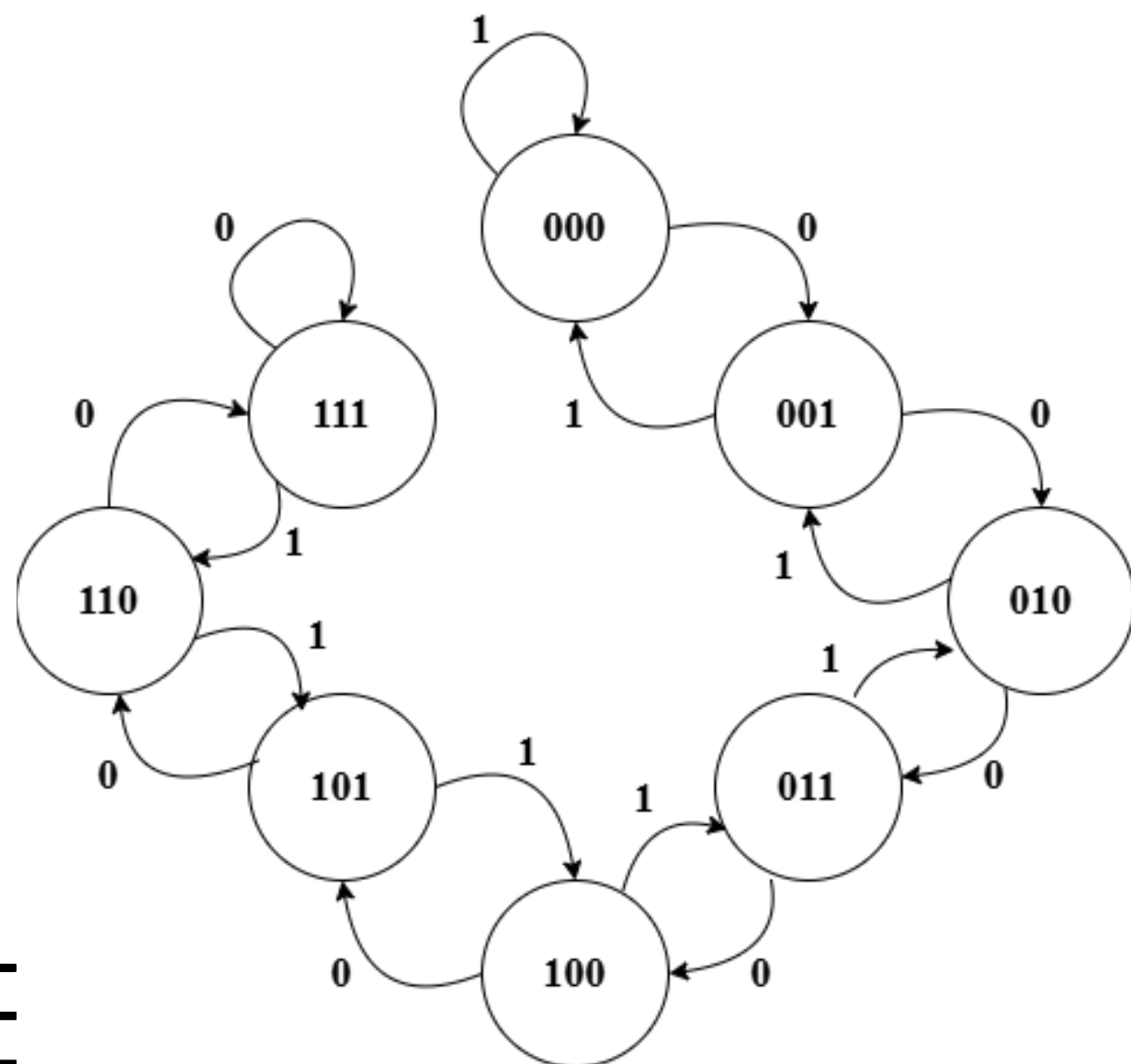
- Card + 4-bit Password Protection
- Integrates advanced electronic components:
  - 3-bit floor comparator
  - 4-bit password comparator
  - JK flip-flops as counters
  - Basic gates to route signals



# BLOCK DIAGRAM



# STATE DIAGRAM

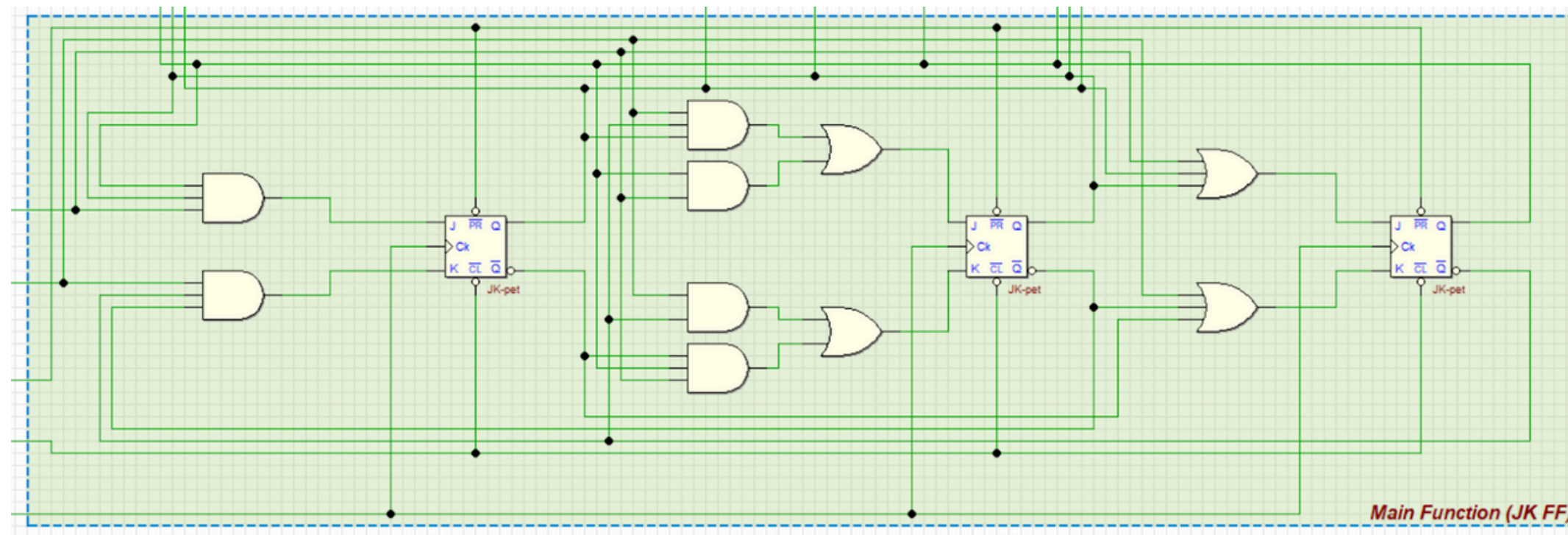




# IMPLEMENTATION

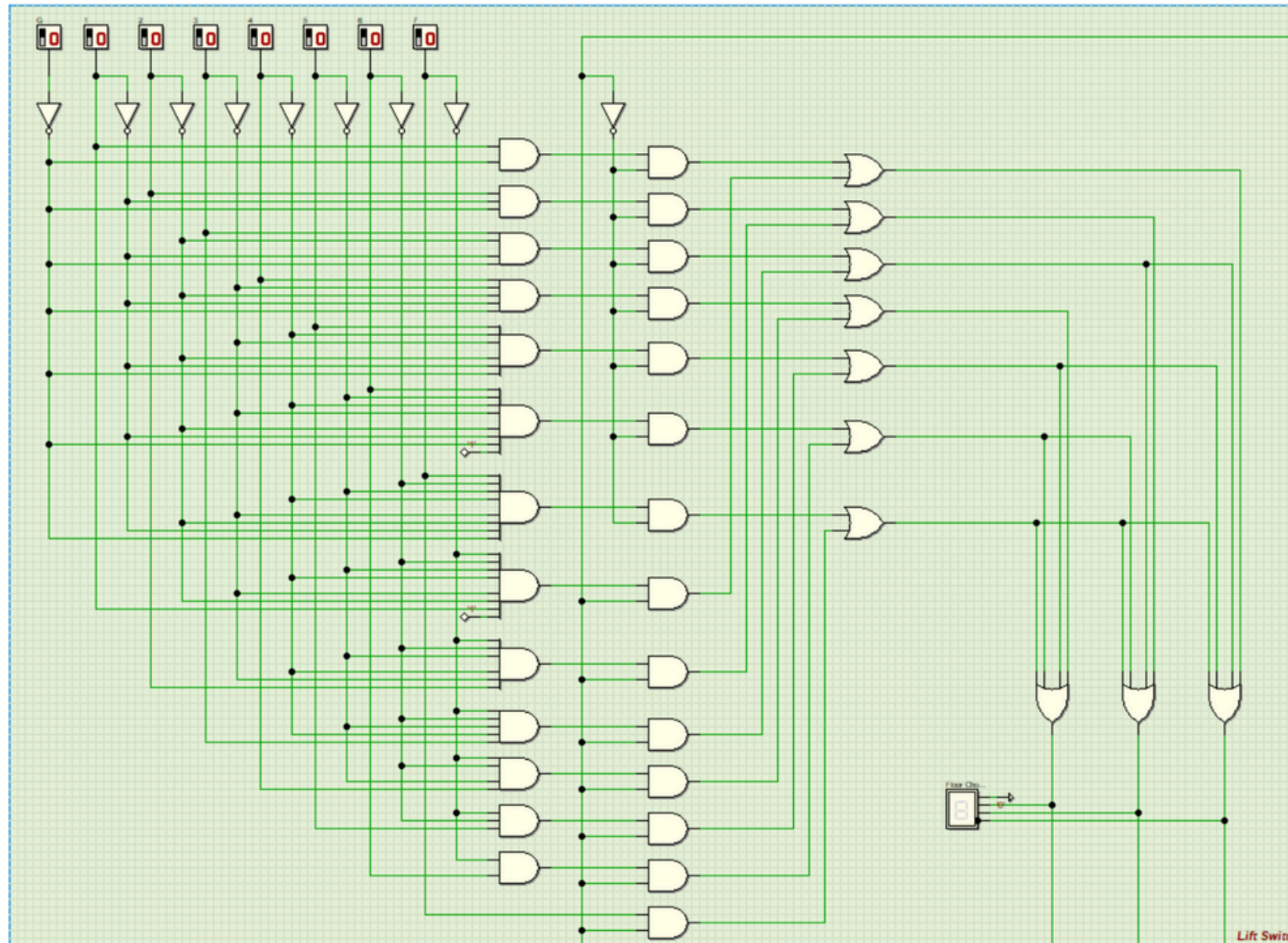


# MAIN FUNCTION (JK FLIP-FLOPS)



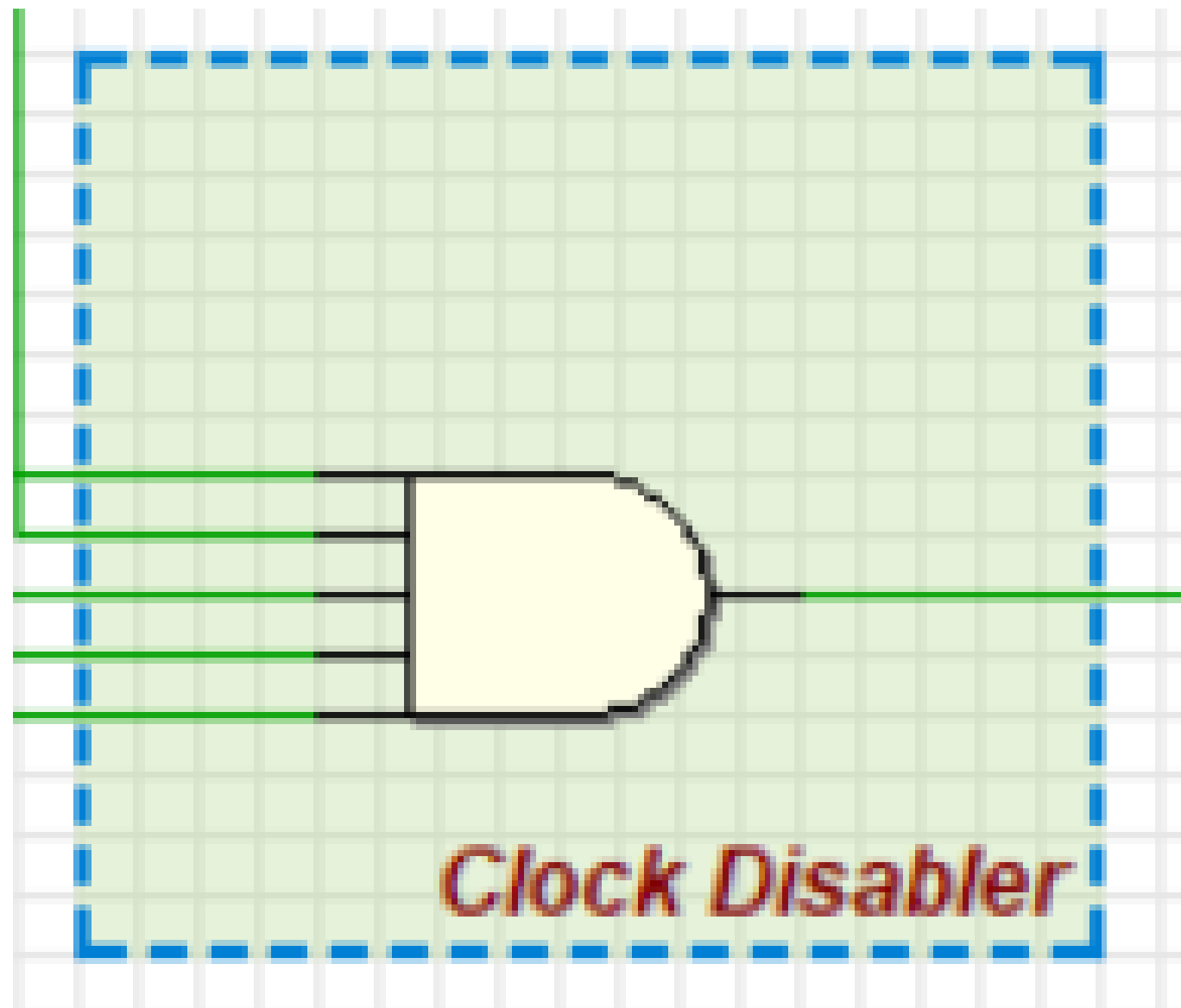
- 3 JK flip-flops
- Synchronous saturated up/down counter
- Common clock
- Stop when clock disabler is LOW

# FLOOR SWITCHES



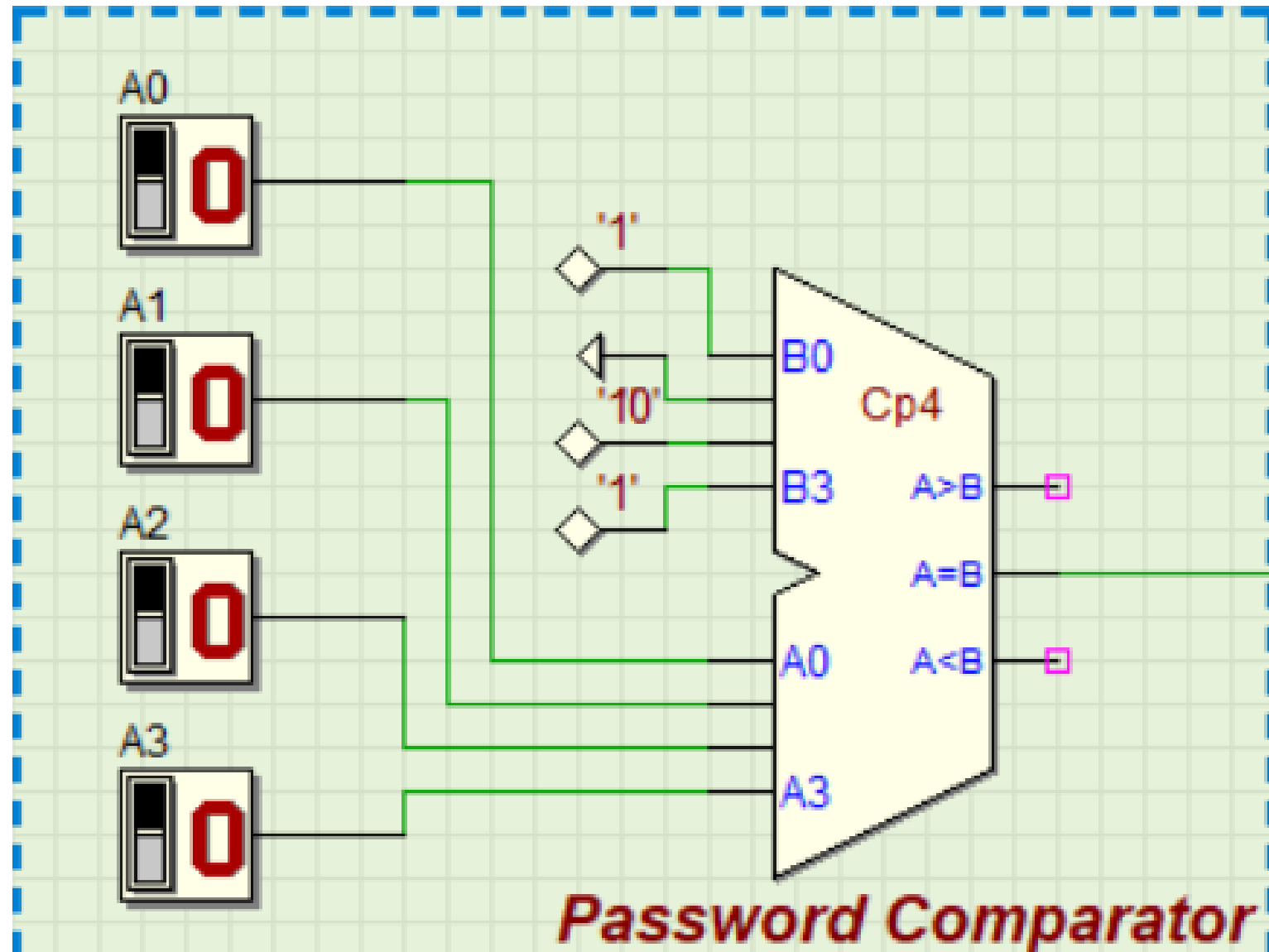
- Uses 8 floor switches
- Encoded into 3-bit destination floor
- Supports multiple selections
- Priority based on the direction of the lift

# CLOCK DISABLER



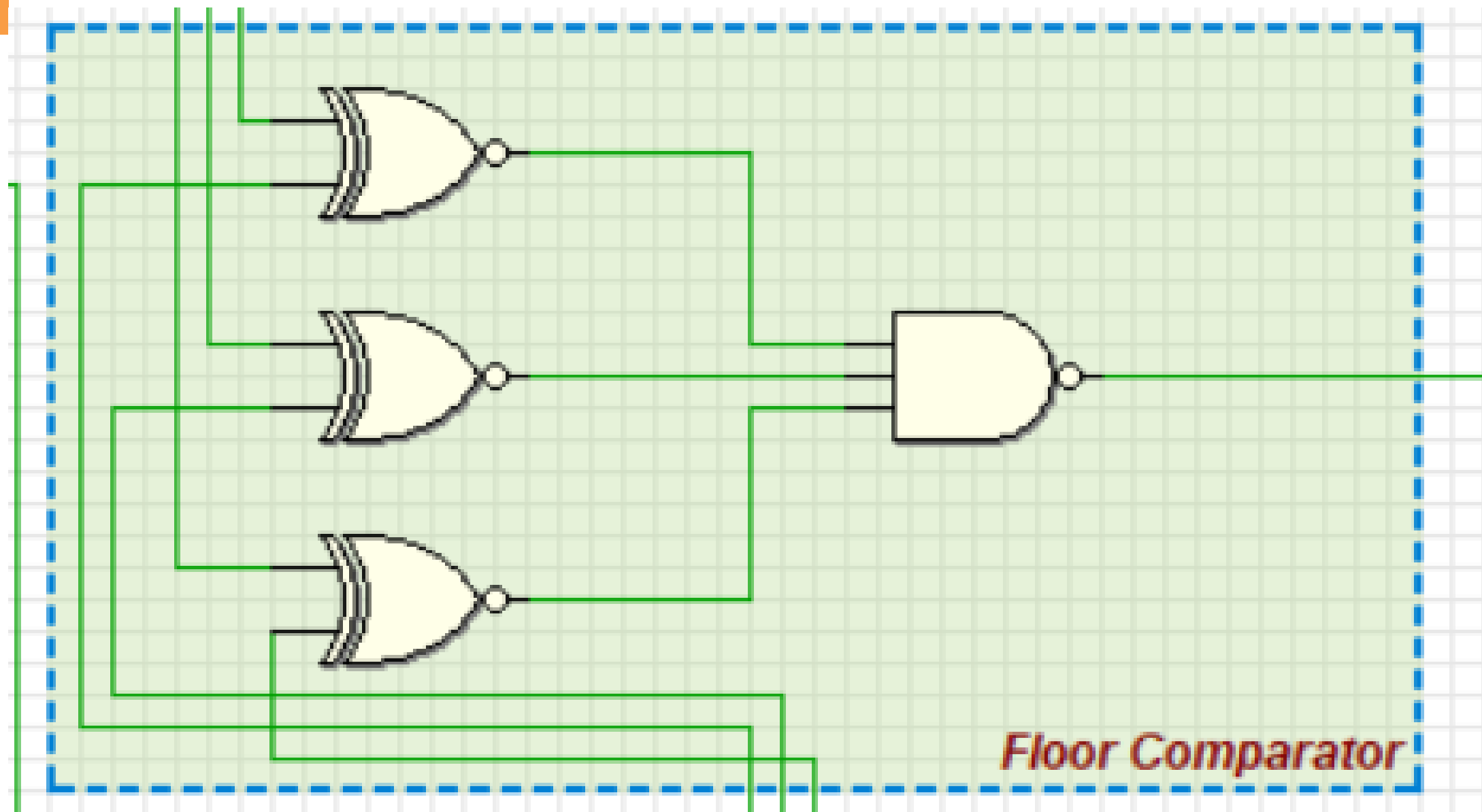
- 5-input AND gate
- HIGH when 5 inputs are HIGH
- Inputs:
  - Clock Generator
  - Password Comparator
  - Floor Comparator
  - Card reader
  - Power switch
- Start and stop the lift operation

# PASSWORD COMPARATOR



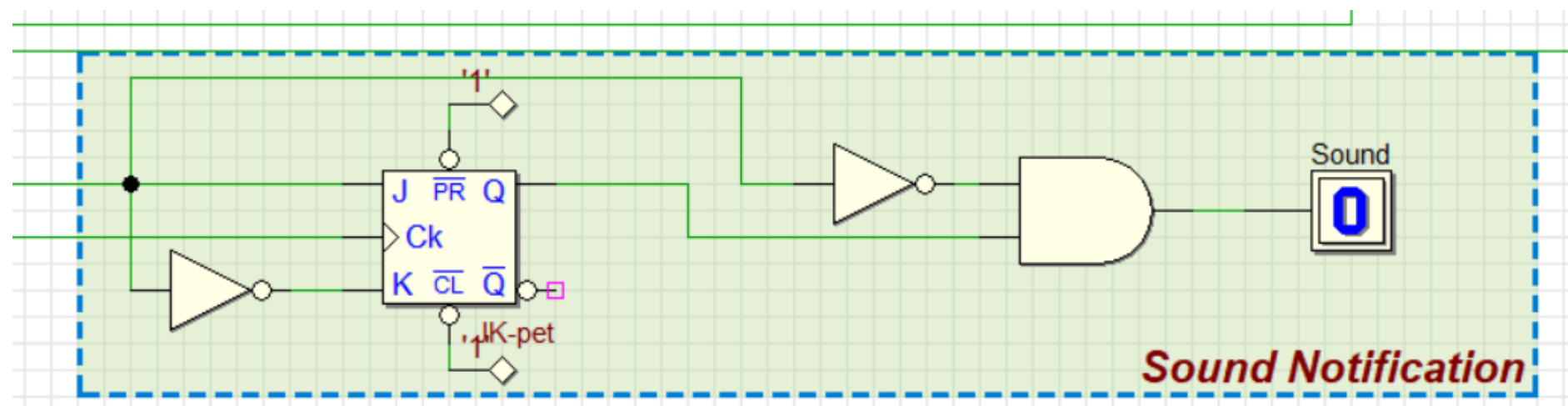
- 4-bit MSI Comparator Chip
- Verifies the password entered
- Only outputs HIGH when the password entered is exactly equals to the preset password: "1101"

# FLOOR COMPARATOR



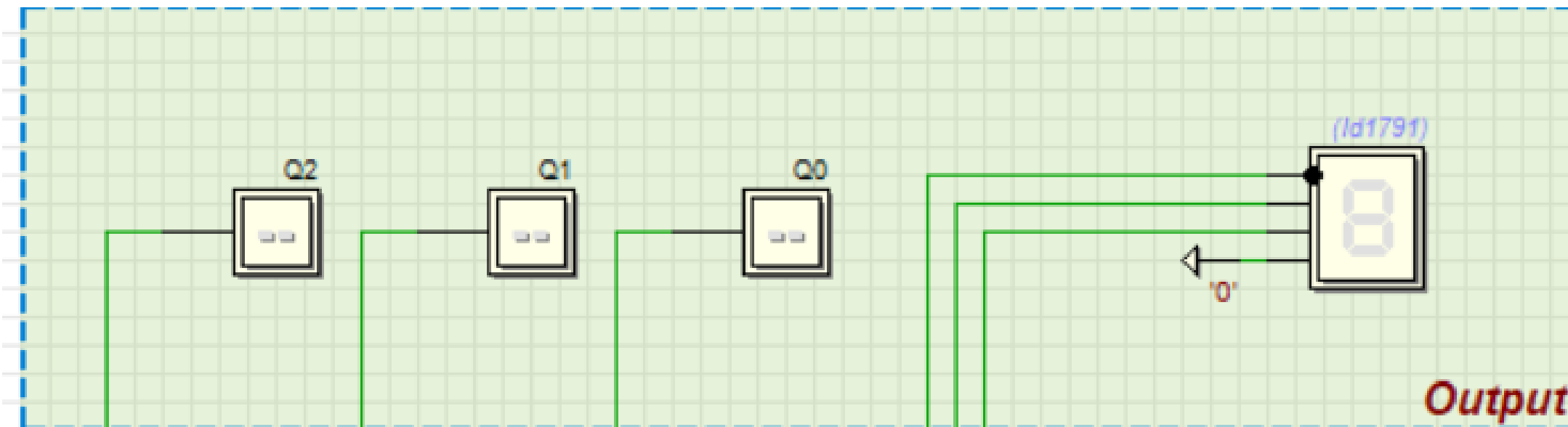
- Uses XNOR + NAND gates
- Compares current floor and desired floor
- Output:
  - HIGH → Floors not equal
  - LOW → Floors are equal

# SOUND NOTIFICATION



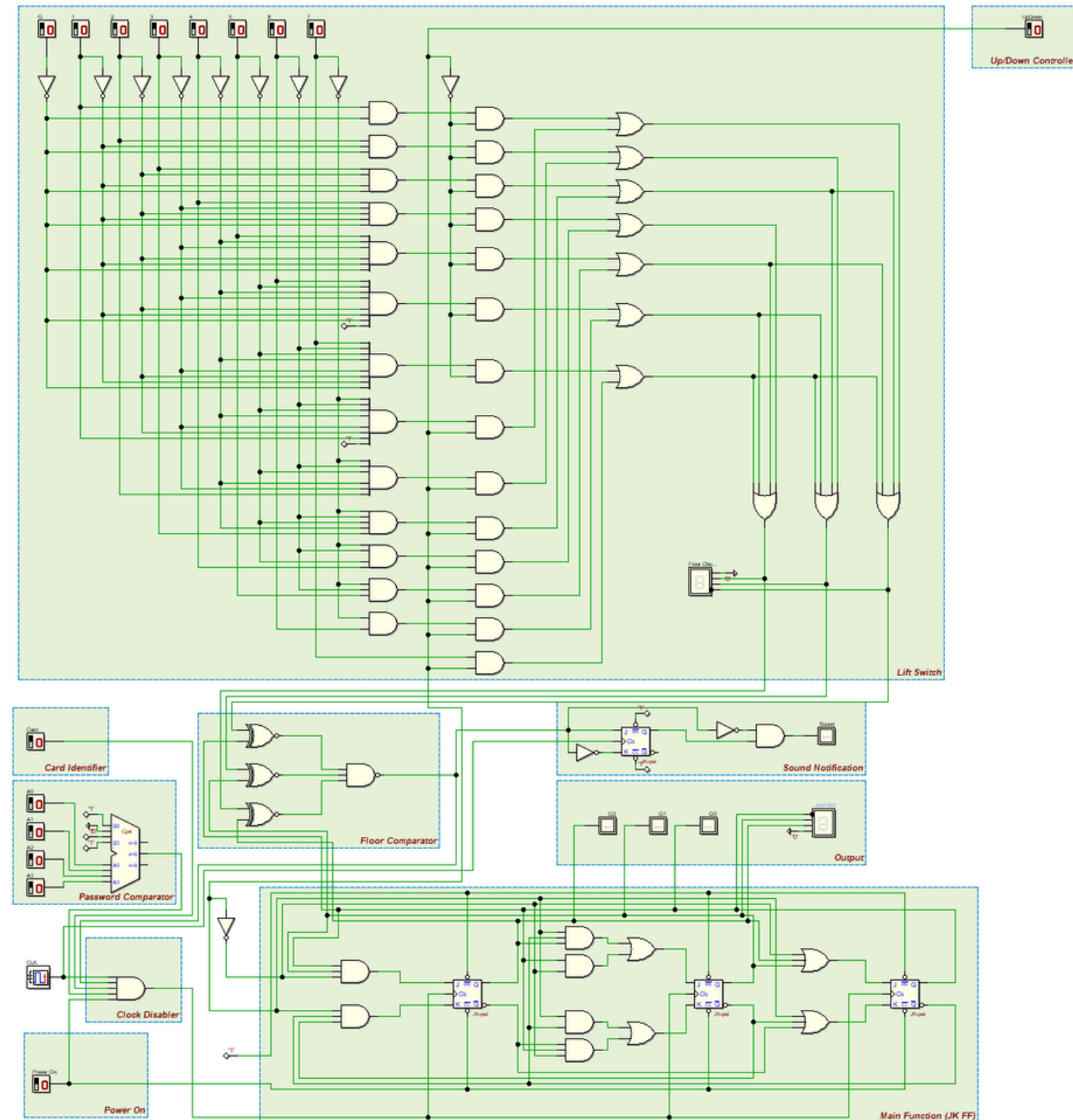
- Configured a JK flip-flop to D flip-flop
- Stores the comparator result one clock cycle earlier
- 2-input AND gate
- Operation:
  - Floor  $\neq$  Desired: AND=0  $\rightarrow$  sound OFF
  - Floor = Desired: AND= 1  $\rightarrow$  sound ON
  - Next clock: AND=0  $\rightarrow$  sound OFF

# CURRENT FLOOR DISPLAY



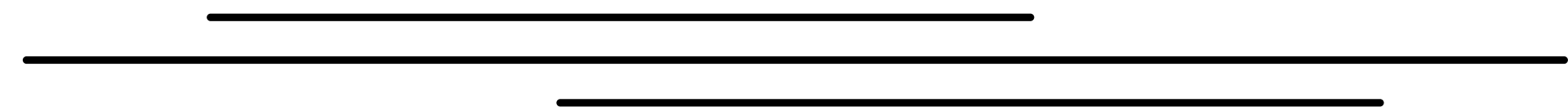

- Shows current floor
- Display in both binary and hex form
- Driven by JK flip-flops

# FULL DIGITAL ELECTRONIC DEEDS CIRCUIT



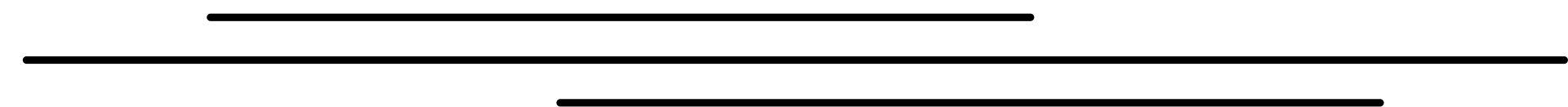



# CONCLUSION

- 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

