

Batch_13

PROJECT NAME: Touch-Free Switch Control Panel for Elevators

ROLL NUMBERS:

21781A0404 - A. Venkata Siva Prasad

21781A0420 - B.Poorna chandu

21781A0421 - B.Jaswanth

21781A0429 - B.Vinay Kumar

1. Aim of the Project

The aim of this project is to design a touch-free switch control panel for elevators that improves hygiene, reduces wear and tear, and minimizes maintenance issues by offering hands-free operation.

2. Problem Statement and Solution

Problem Statement:

Traditional push-button switches in elevator control panels require physical contact, raising hygiene concerns, especially in high-traffic areas. Frequent use can lead to wear and tear, causing maintenance issues and potential downtime.

Solution:

Develop a touch-free switch control panel using touch-free sensors that can accurately detect user gestures without physical contact. Integrate a suitable controller to manage the sensors and control panel functions. Implement signal processing algorithms to interpret sensor data in real-time and a web interface for remote access.

3. Project Design Specification

3.1 Sensors:

- Type: Infrared or capacitive proximity sensors.
- Function: Detect hand gestures without physical contact.
- Placement: Around the control panel to cover all necessary inputs.

3.2 Controller:

- Type: Microcontroller (e.g., Arduino, STM32).
- Function: Process sensor data and control the elevator functions.

3.3 Signal Processing:

- Requirement: Real-time algorithms to interpret gestures.
- Function: Convert gestures into elevator commands.

3.4 Web Interface:

- Requirement: User-friendly interface.
- Function: Remote access and monitoring from any internet-enabled device.

3.5 Power Supply:

- Requirement: Reliable power source.
- Function: Ensure uninterrupted operation.

4. Project Architecture

4.1 Sensor Module:

- Components: Infrared or capacitive sensors.
- Function: Detect gestures and send signals to the controller.

4.2 Control Module:

- Components: Microcontroller.

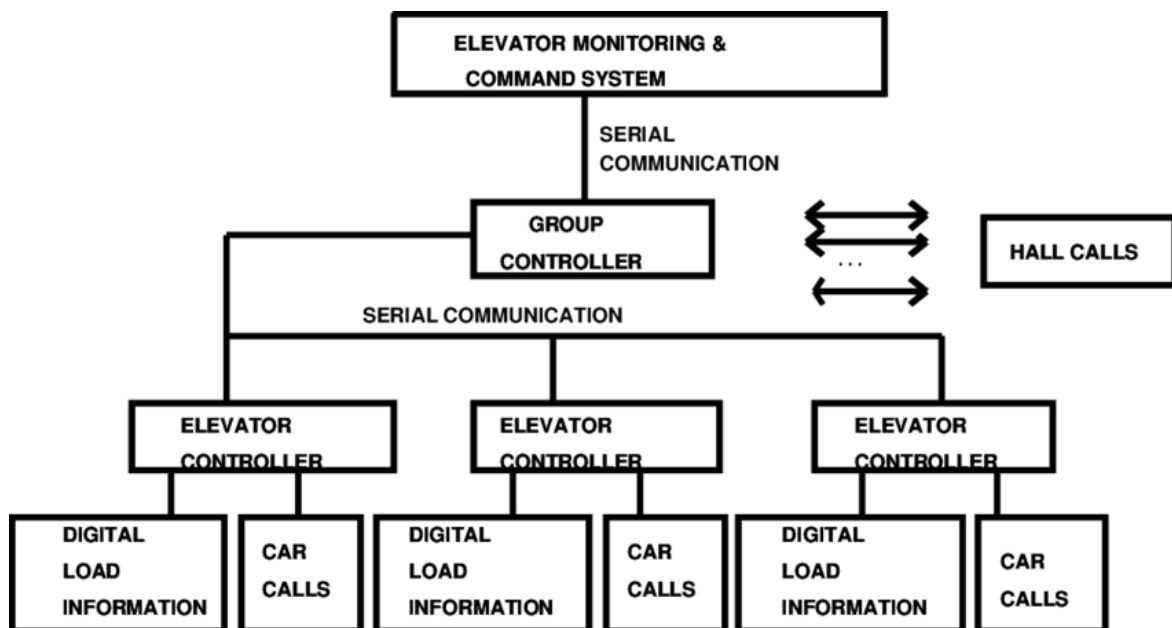
- Function: Process sensor inputs and send commands to the elevator system.

4.3 Signal Processing Module:

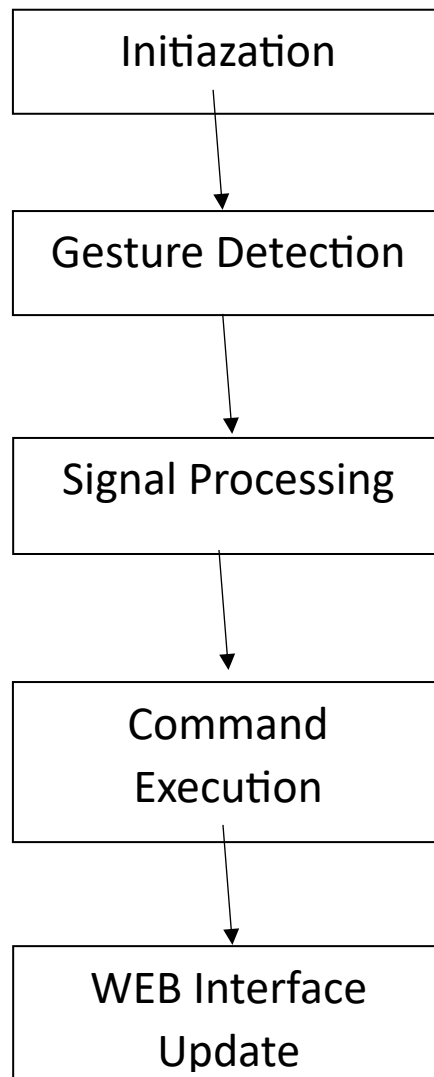
- Components: Embedded software algorithms.
- Function: Interpret gestures and convert them into commands.

4.4 Web Interface Module:

- Components: Web server and interface.
- Function: Provide remote access and status updates.



5. Flow Explanation



5.1 Initialization:

- Power on the system.
- Initialize sensors and microcontroller.

5.2 Gesture Detection:

- Sensors continuously monitor for gestures.
- Sensor data is processed in real-time.

5.3 Signal Processing:

- Algorithms interpret gestures (e.g., swipe up, swipe down).

- Determine the intended command.

5.4 Command Execution:

- Microcontroller sends the command to the elevator control system.

5.5 Web Interface Update:

- Update the web interface with the current status and any user inputs.

5.6 Repeat:

- Continuously monitor for new gestures and update accordingly.

6. Wiring Diagram

6.1 Power Supply:

- Connect power supply to sensors and microcontroller.

6.2 Sensors:

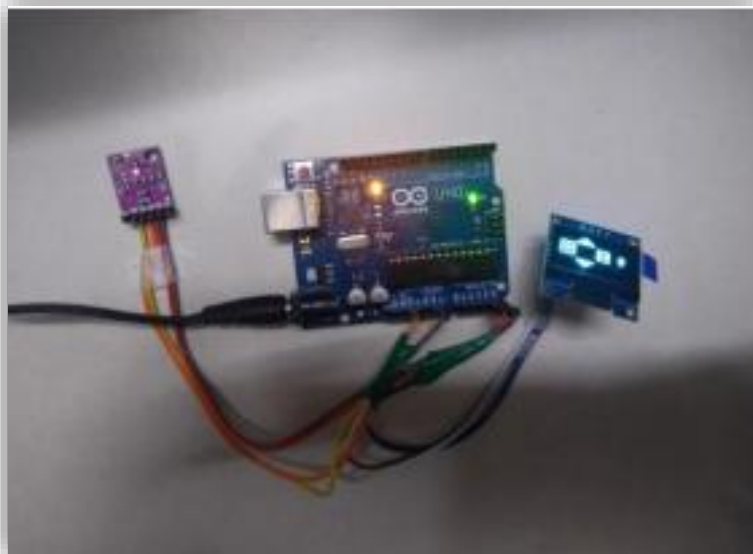
- Connect sensors to microcontroller input pins.

6.3 Microcontroller:

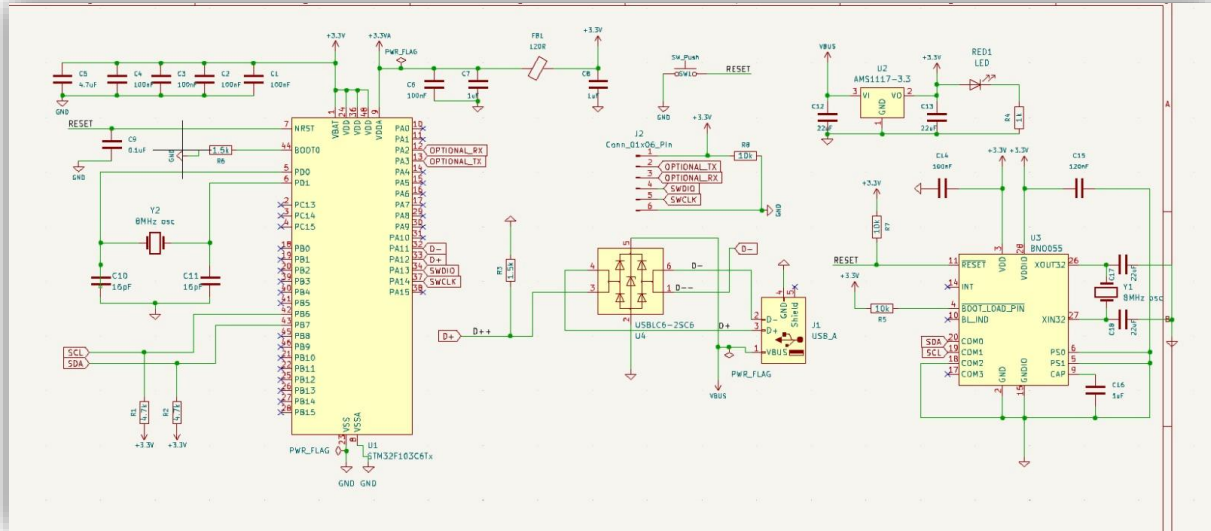
- Connect output pins of the microcontroller to the elevator control system.

6.4 Web Interface:

- Connect microcontroller to a Wi-Fi module or Ethernet for web interface access.



7. KiCad PCB Design



8. Components Working Principles/Functionality

8.1 Infrared/Capacitive Sensors:

- Working Principle: Detect proximity or gestures without physical contact.
- Functionality: Output a signal corresponding to detected gestures.

8.2 Microcontroller:

- Working Principle: Digital processing unit that can execute programmed instructions.
- Functionality: Processes input signals from sensors, runs algorithms to interpret gestures, and sends commands to the elevator control system.

8.3 Wi-Fi Module/Ethernet:

- Working Principle: Enables wireless communication between devices.
- Functionality: Provides connectivity for the web interface.

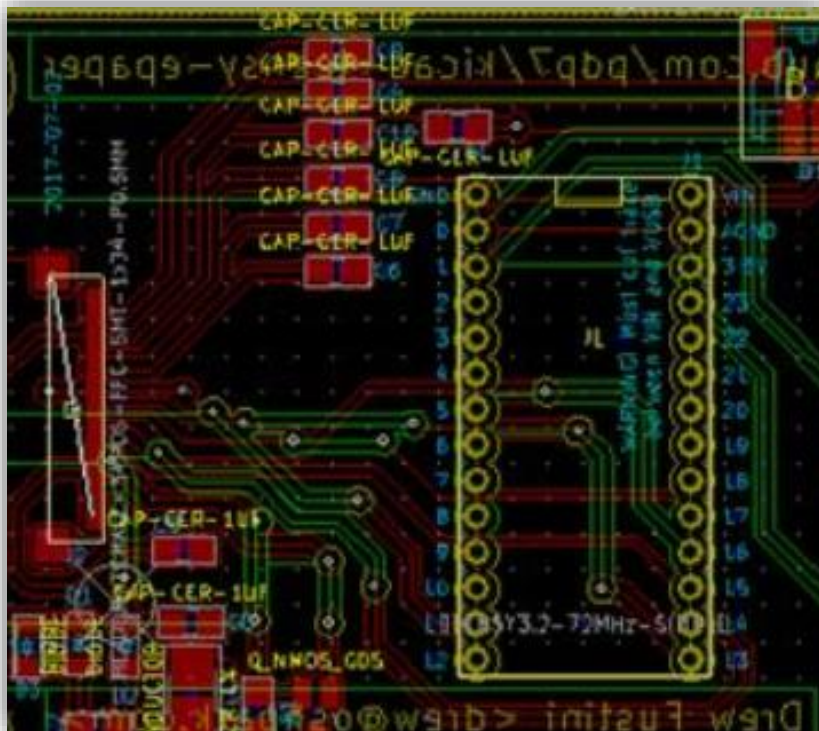
8.4 Power Supply:

- Working Principle: Converts electrical energy to a stable voltage required by electronic components.
- Functionality: Ensures stable power to all components.

9. KiCad Gerber File

9.1 Gerber File Components:

- Copper Layers: Define the electrical connections.
- Solder Mask: Protects the copper from oxidation and prevents solder bridges.
- Silk Screen: Provides component labels and markings.



10. Project Outcome

10.1 Functional Touch-Free Control Panel:

- Improvement: Improved hygiene in high-traffic areas.
- Reduction: Reduced wear and tear and maintenance requirements.

10.2 Web Interface:

- Benefit: User-friendly web interface for remote monitoring and control.
- Accessibility: Accessible from any internet-enabled device.

10.3 Components List:

- Infrared Proximity Sensors: Sharp GP2Y0A21YK
- Microcontroller: Arduino Uno or STM32
- Wi-Fi Module: ESP8266
- Power Supply: 5V DC adapter
- PCB and Connectors

Conclusion

This document outlines a comprehensive plan for designing and implementing a touch-free switch control panel for elevators, addressing hygiene concerns, reducing wear and tear, and minimizing maintenance issues.