Cabin Air Quality Improver

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- Identification of the Problem and the Title of the project

The project titled "Enhancing Cabin Air Quality: A Comprehensive Approach for Improvement" seeks to tackle the prevalent issue of compromised air quality within cabin environments. Enclosed spaces like aircraft and automobiles often face challenges related to the recirculation of contaminants, limited ventilation, microbial growth, and chemical exposure. These factors can negatively impact the health and comfort of occupants. The project aims to address these concerns by exploring innovative solutions, including advanced filtration technologies, improved ventilation systems, and the use of materials with reduced emissions. By undertaking a comprehensive approach, the project aims to create a healthier and safer cabin environment, prioritizing the well-being of individuals in confined spaces.

Components Used

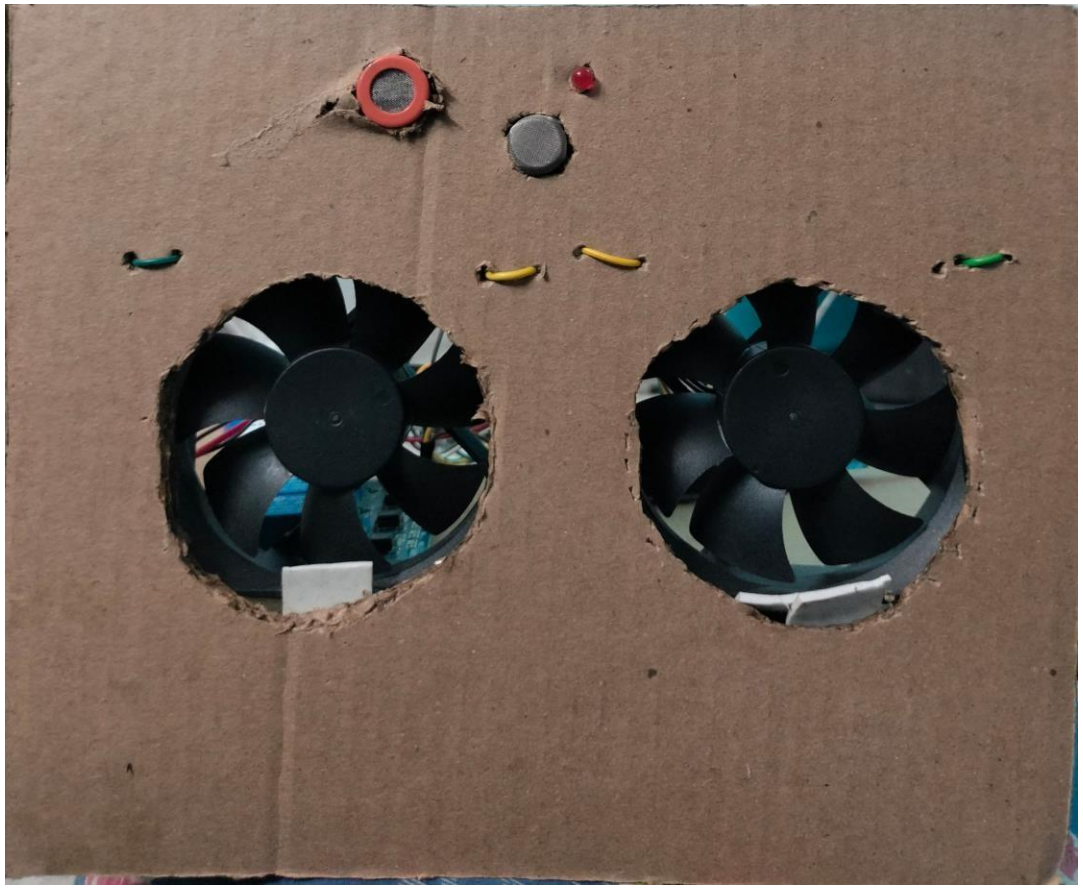
1. Arduino Microcontroller:

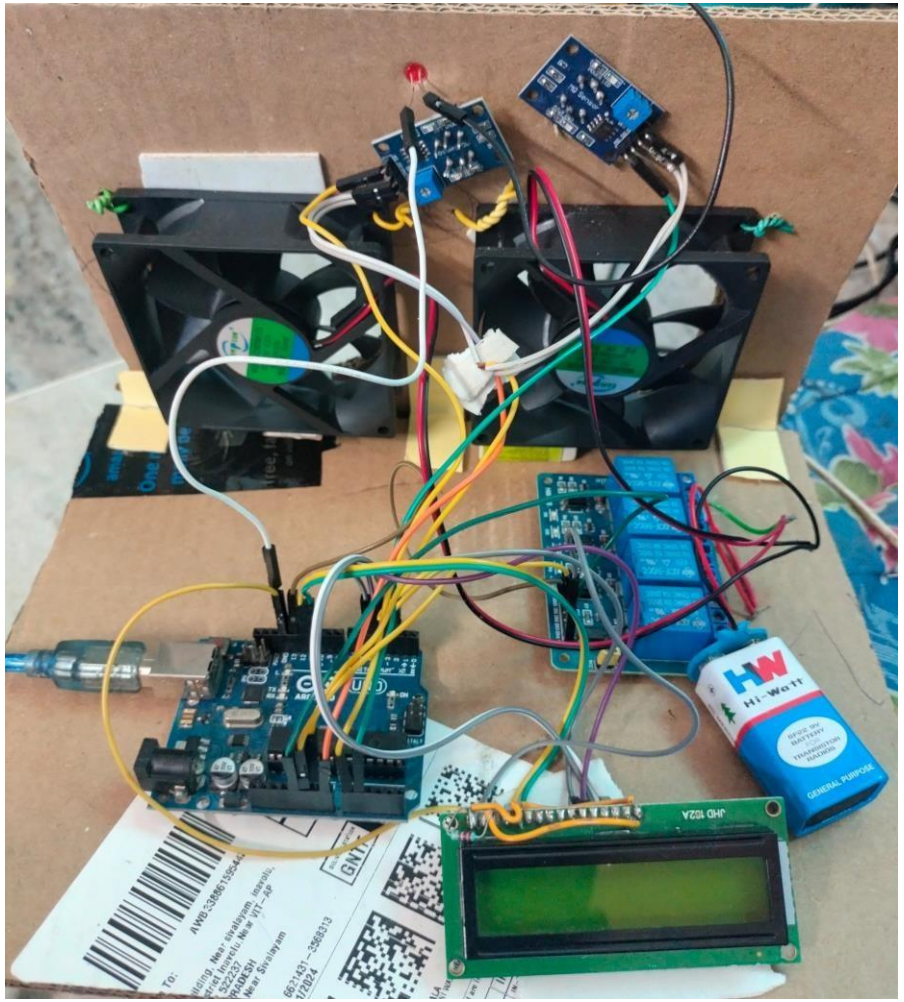
2. Air Quality Sensors: MQ 135 , MQ 3

3. Ventilation Control Mechanism: Suction Fans for adjusting ventilation based on sensor readings.

4. Display Unit: LCD or LED display to provide real-time air quality feedback to occupants

CURRENT PROTOTYPE





WORKING PROCEDURE

Initialization:Upon startup, the system initializes all components including the Arduino board, sensors (MQ-135 and MQ-3), fans, and display.
Sensor Readings: The system continuously reads data from the MQ-135 and MQ-3 gas sensors.MQ-135 sensor detects gases like CO2, ammonia, nitrogen oxides, etc., while MQ-3 detects alcohol vapor.These sensors provide analog readings which are then converted to digital values for processing.
Gas Analysis:The digital sensor readings are analyzed to determine the concentration of different gases in the air.Based on predefined thresholds for each gas, the system decides whether the air quality is acceptable or not.
Fan Control:If the concentration of any harmful gas exceeds the acceptable threshold, the system activates the fans to start circulating the air.The fans are turned on to suck the air out of the cabin and push it through a filtration system.
Filtration:The sucked air passes through filters designed to remove harmful gases and particles.These filters may include activated carbon filters to absorb gases and HEPA filters to trap particulate matter.
Air Quality Monitoring: The system continuously monitors the air quality during the fan operation.Once the concentration of harmful gases drops below the acceptable threshold, the fans are turned off.The system keeps monitoring to ensure the air quality remains within acceptable limits.
Display: The gas concentrations are displayed on the screen in real-time.This display provides feedback to users about the current air quality and which gases are present.Additionally, it might display alerts or warnings when the air quality deteriorates beyond a certain point.

USE CASES :

Smoke Removal: Enhances cabin air quality by filtering smoke particles, particularly beneficial in polluted or congested areas.

Alcohol Odor Neutralization: Efficiently eliminates alcohol odors from the cabin, ideal for ride-sharing, designated drivers, or post-social event situations.

VOC Mitigation: Reduces harmful volatile organic compounds emitted from vehicle materials, safeguarding occupants against health risks.

Bacterial and Viral Filtration: Advanced filtration systems trap and eliminate airborne pathogens, contributing to a safer driving experience, especially during flu season or in densely populated areas.

Carbon Monoxide Detection and Removal: Integration of sensors and filtration systems detects and removes hazardous CO levels, ensuring passenger safety, particularly in older vehicles or congested traffic.

Foul Odor Elimination: Swiftly neutralizes foul odors from various sources, maintaining a pleasant interior ambiance for occupants.