



PRODEX

The logo consists of the word "PRODEX" in a bold, white, sans-serif font. To the left of the "P", there is a stylized graphic element composed of blue and white triangles forming an arrow-like shape pointing towards the text.

boot+

Problem Statement:

“ Solutions to detect air quality inside the cabin and improve it.”



Existing Solution

As of now , no system exists for monitoring air quality in a cabin .

However there do exist systems for monitoring air quality in mines and simple filters in air conditioning system of automobiles to purify mainly dust particles ,odor and VOCs.

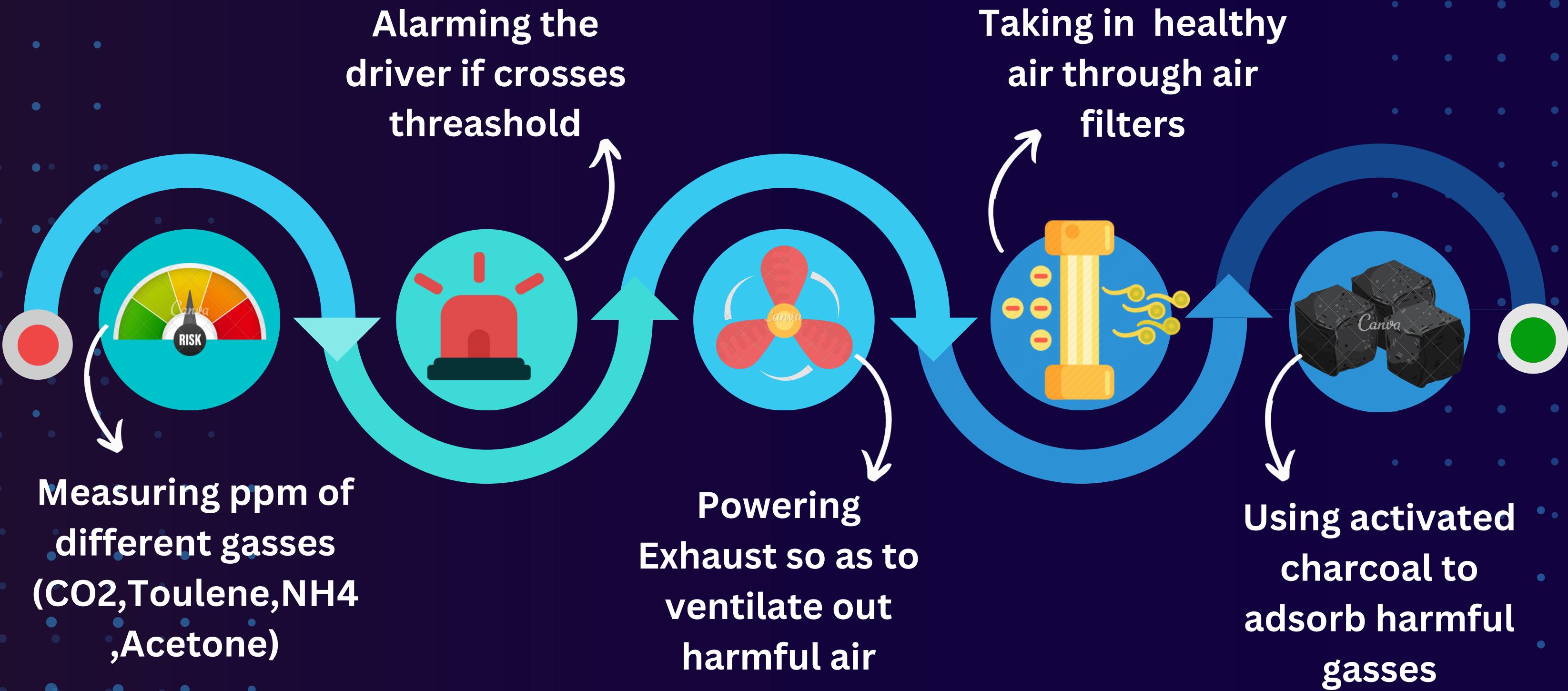


Our Product :

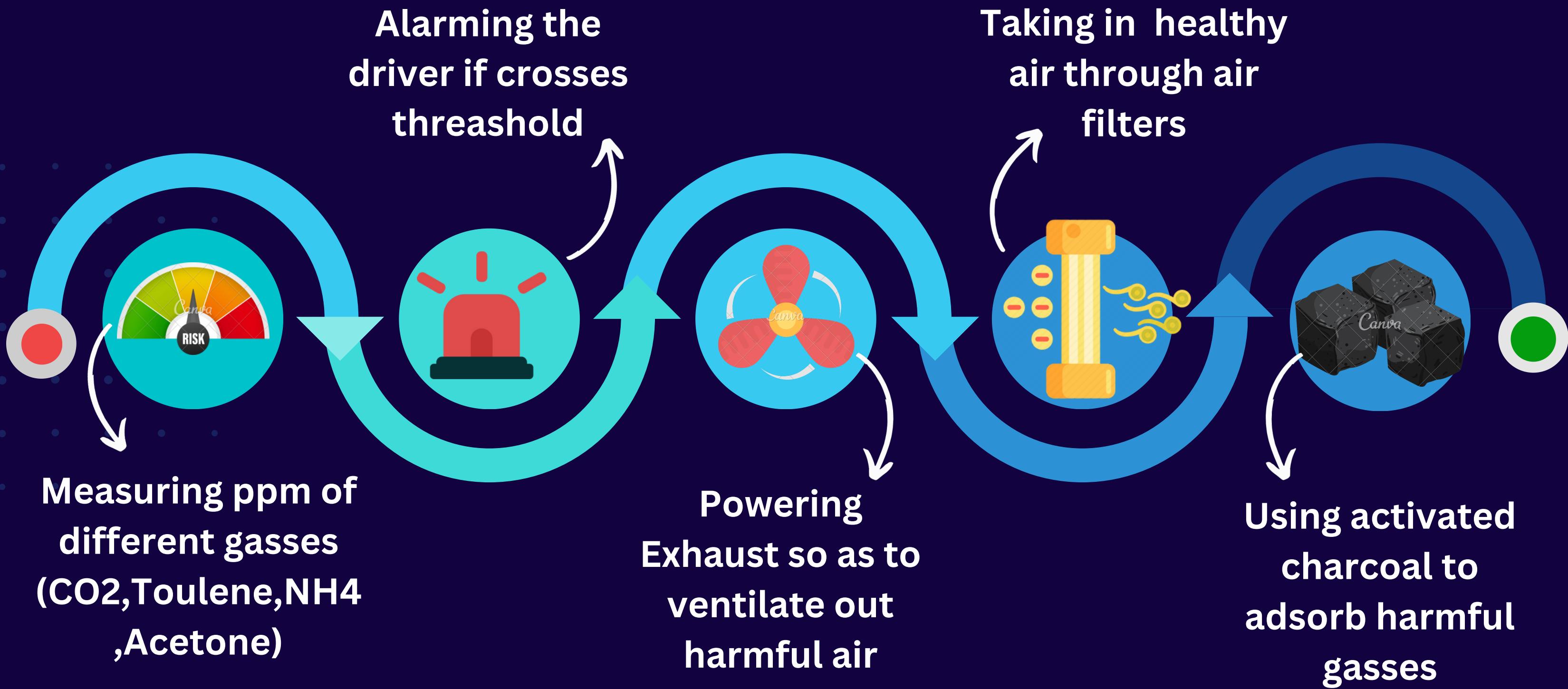
Air Quality Detection
and Purification
System
in Mining Trucks



Our Solution:



Our Solution:



Project Overview

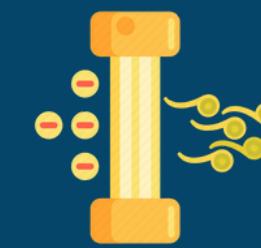
1. Air Quality Detection

The monitoring system checks the quality of air for dangerous gases



2. Purification System

Upon detection our purification system starts working



3. Alarm System

If pollution is beyond treatment Alarm Triggers



3 Alarm System

Alarms that triggers when the air pollution is beyond the capacity of our air purification system



The final layer is a sponge with activated charcoal filter



1 Air Quality Detection



Air quality is measured with gas sensors

automatically activates purifying system when pollutant ppm exceeds a certain level



2 Purification System

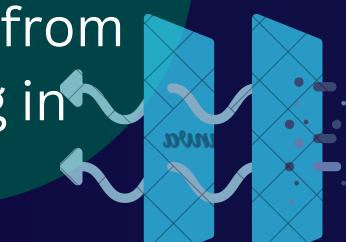
Exhaust fans on roof starts pushing air outside the cabin



high rpm fans creates the pressure gradient

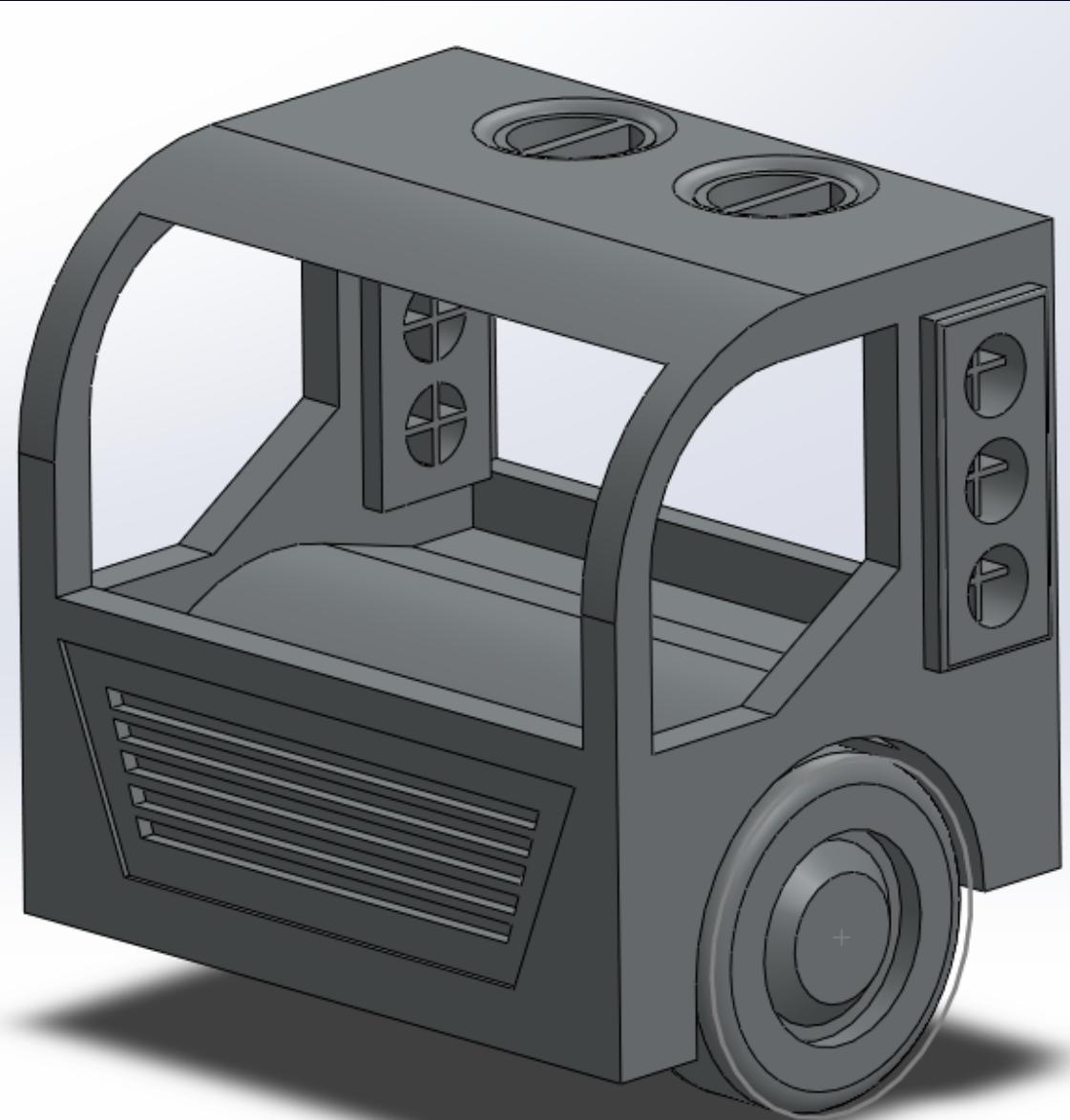


The next layer is a dust filter to remove any particles from coming in

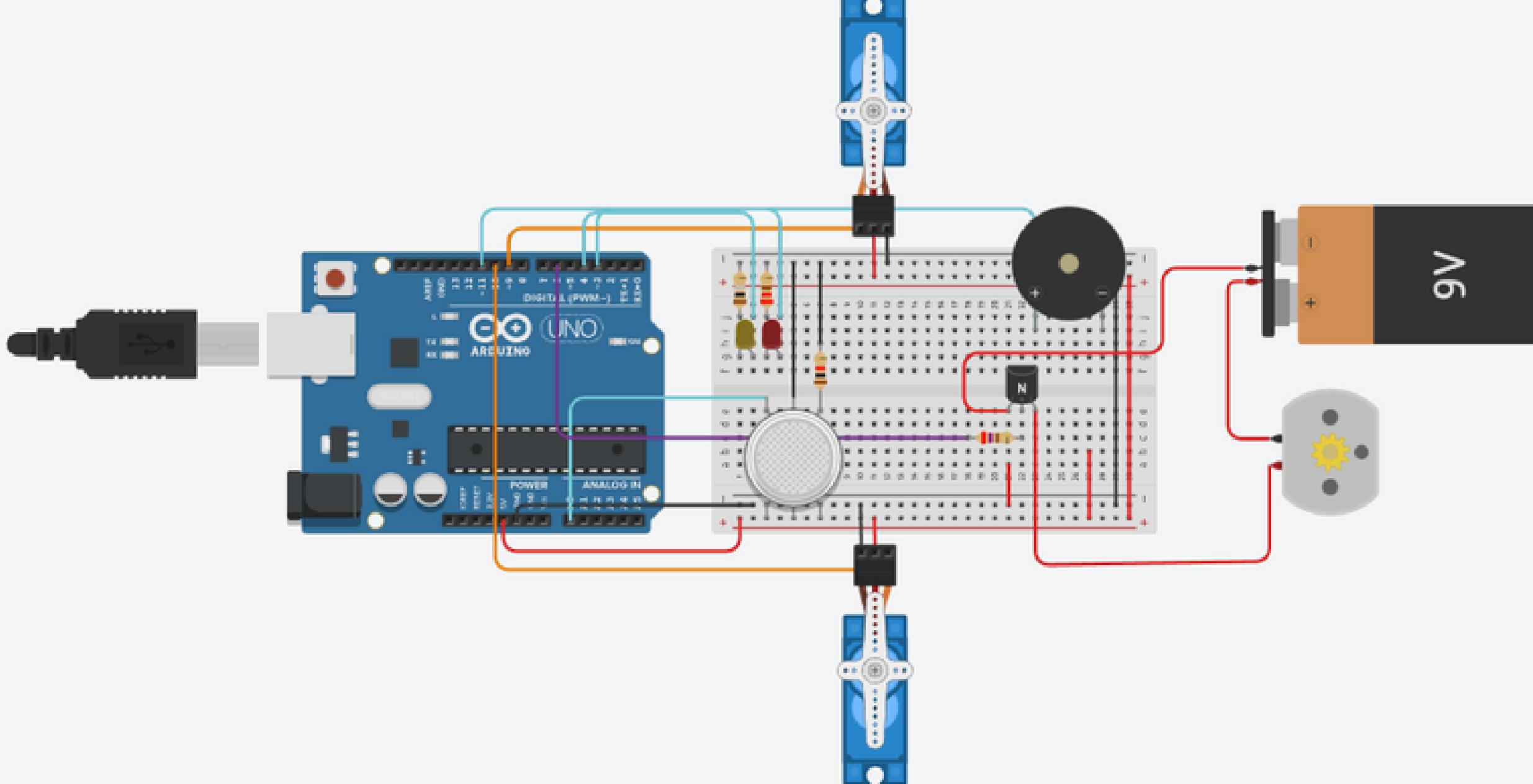


Air is sucked inside from a set of chambers on side wall

CAD Presentation

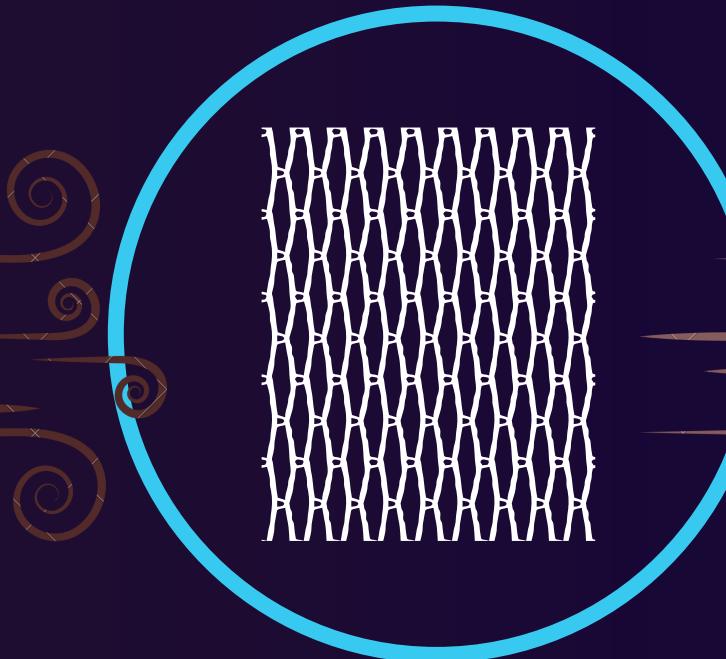


TinkerCAD Simulation



Air Filtration System

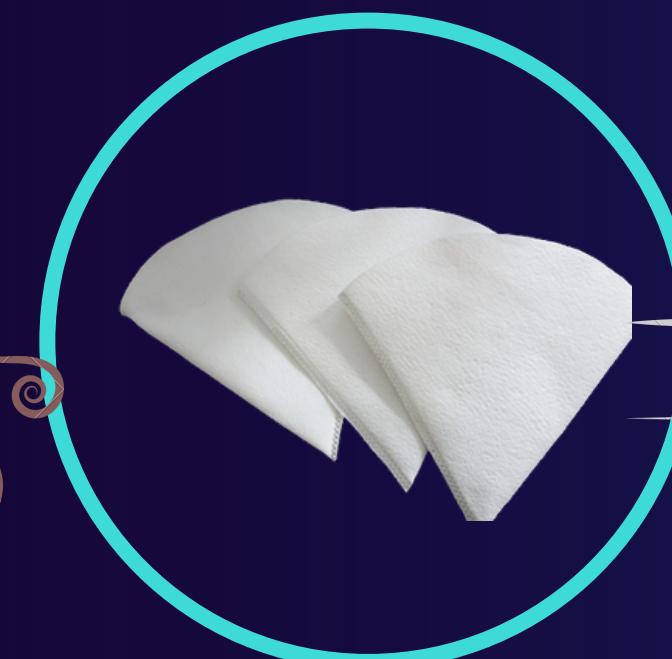
1 MESH



Acts as a water blockage.
and protects the filter cloth
without any
chemical/electronic method

Thus cost efficient and simple
solution

2 POLYPROPYLENE FILTER CLOTH

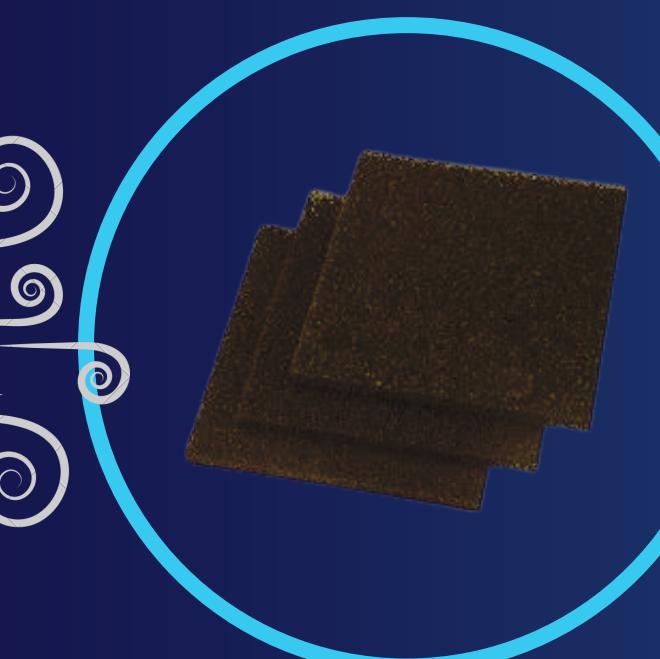


Helps us to get through even
the finer dust particles and
pollutants /harmful gasses in
the air

Easily available , cost efficient

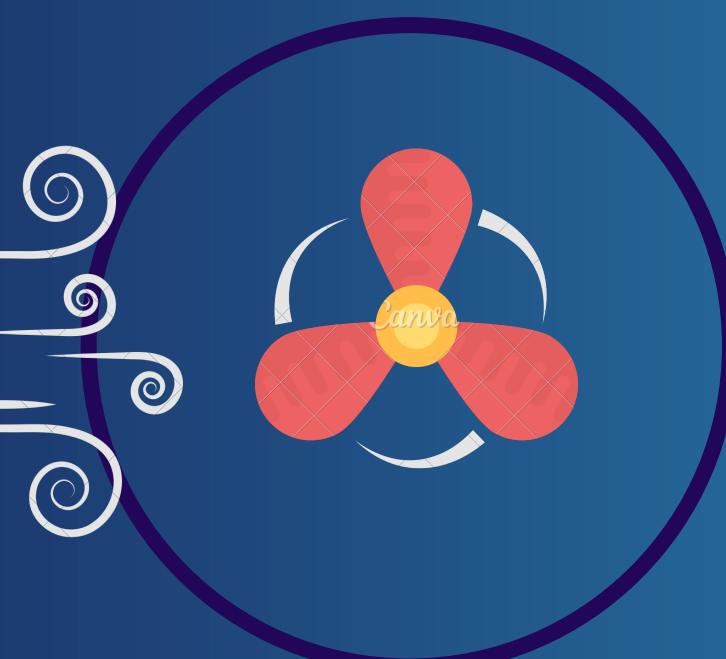
Easy to replace when gets
worn off

3 ACTIVATED CARBON SPONGE



Acts as a major component
of air filter by adsorbing
harmful gasses like CO₂,
SO₂ ,methane and
remaining dust particles

4 FAN



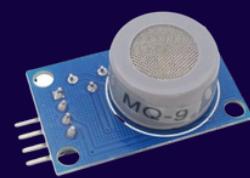
Used for ventilation
Sucks air from outside to
maintain proper air
circulation

Components

Air Quality Detection

Gas sensors

MQ 9



MQ-9 gas sensor has high sensitivity to Carbon Monoxide, Methane and LPG.

MQ135



The MQ-135 Gas sensors are used for measuring NH₃, NO_x, Alcohol, Benzene, Smoke, CO₂.

Air Ventilation

Medium size exhaust fans



We use these exhaust fans to push out contaminated air inside the cabin to outside atmosphere .

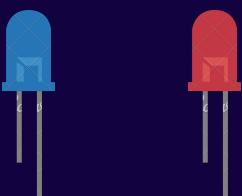
Small Exhaust Fans



We use these exhaust fans to pull in air into the cabin so that the air enters the air filtration section and then pure air goes into the truck cabin.

Alarm System

LEDs



A light-emitting diode (LED) is a semiconductor device that emits light when an electric current flows through it.

Peizo Buzzer



A Buzzer is an audio signaling device which converts signals to audio. It is powered with an DC voltage.

Microcontroller



ARDUINO-UNO

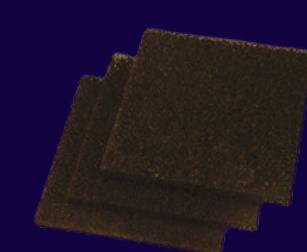
Filtration Column

Polypropelene filter cloth



Polypropylene filter cloth is used in industrial areas in a large scale to purify water and air. It removes the dust particles, pollutants in air and it is best known for its high resistance to corrosion and long life.

Activated carbon sponge



Activated carbon sponges are used to make the air filter. These sponges are used in air purification. Certain gases like CO₂ and methane can be purified by activated carbon.

Circuit and Power

Servo motors



A servo motor is a rotary actuator or linear actuator that allows for precise control of angular or linear position and velocity

Relays



A relay is an electrically operated switch. It consists of a set of input terminals for a single or multiple control signals, and a set of operating contact terminals.

Batteries

external power sources to drive the exhaust fans



Wires & Resistors



Cost Analysis



Components	Price
MQ 9 and MQ 135 Sensors	75 (each)X 2=150
Medium Exhaust Fans	250X 2=500
Small Exhaust Fans	90 X 6=540
ARDUINO UNO	600
Filtration System	Approx 150
LEDs, Servo, Peizo Buzzer and other small circuital items	~500



Total
₹2440



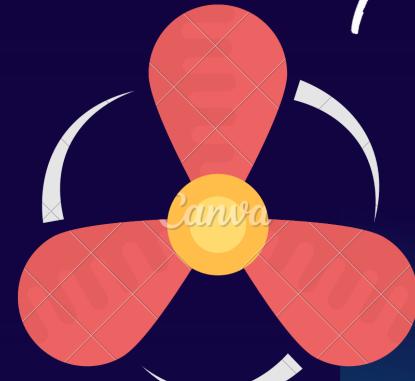
Target Audience:

- Mainly focuses on the truck drivers who are working in most polluted areas like mines and construction places.
- Partnership with truck transportation companies.
- Installing our product in the trucks and then expand to worker cabins in various metal and manufacturing industries.



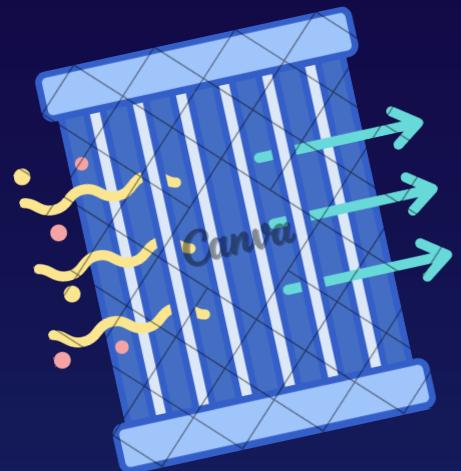
Live Health Monitoring

- Using I2C Oxygen sensor to detect O₂ levels in air.
- Pulse Oximeters, Inductance plethysmography, capnography, piezoelectric, or bioimpedance-based sensors can send data to cloud server via Arduino.
- Any abnormal activity in data can be directed to Hospitals analysed by doctors along with alerting labourers



FUTURE

ADD-ONS

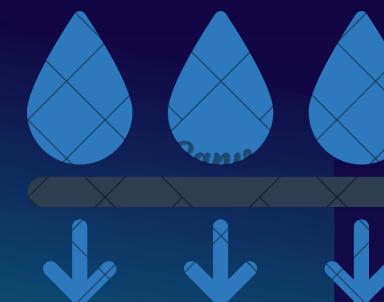


Reagent based Purification

- Anti-reagent based purification which involves reaction with pollutants which makes stable non-toxic compounds
- Works more efficiently than passive filtration techniques.

Moisture Control System

- Measuring moisture to provide better purification
- Increase if less than a threshold level so that it can dissolve SO₂ and other acidic gasses and thus reduce their concentration



Advance Ventilation System

- Proper Airflow is must to prevent saturation of Dangerous gases
- Multi layered air filter in air duct and impeller can be attached at Rooftop
- This will regulate cabin Temperature by removing heated air at top



OUR TEAM

S
A
M
Y
U
K

Subarno Maji
Ambati Jahnavi
Meghandra Fuley
Yash Harale
Unnat Agrawal
Kunal Kathuria



Thank You.