TinkerLabs

DESIGN IMPACT MOVEMENT CASE WORKBOOK

A Social Initiative
by Titan Company Ltd.

Team Details

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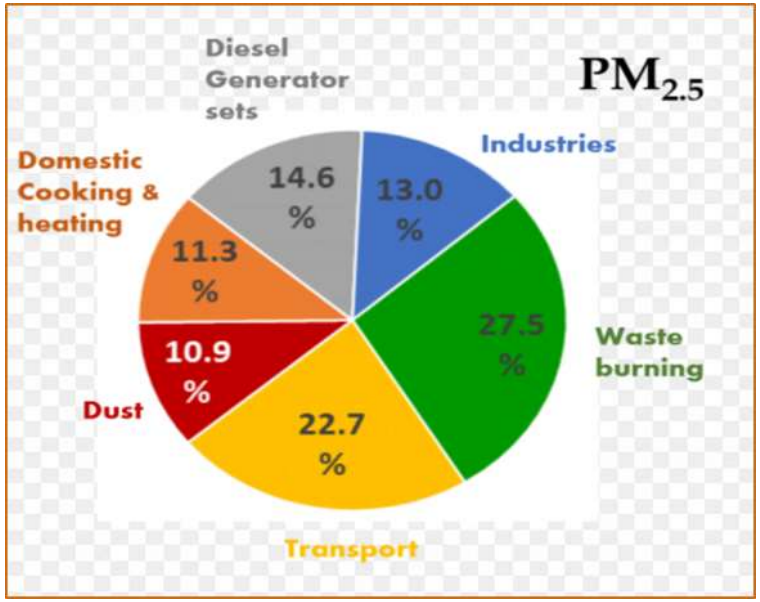
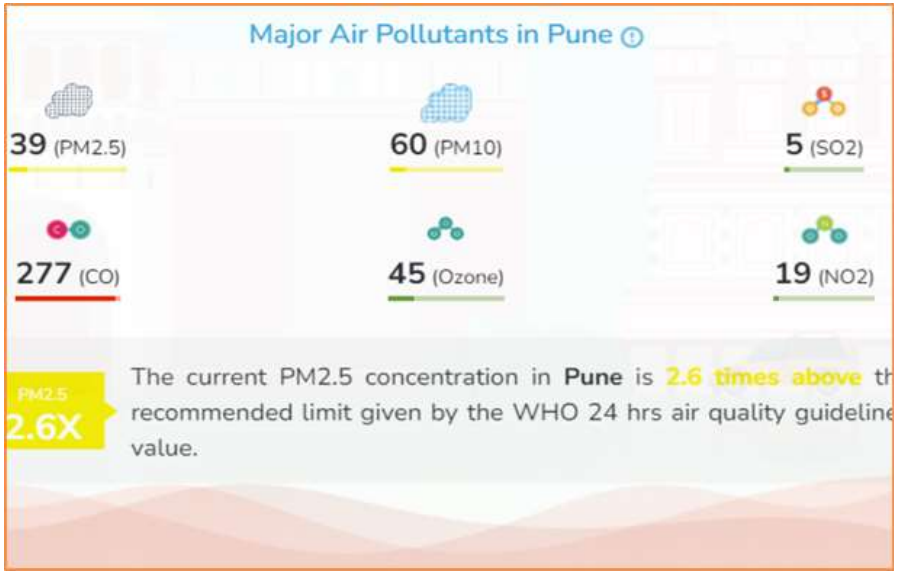
Problem Statement

How might we incentivize vehicle users to choose eco-friendly driving practices to reduce the flue gas emissions?

- According To Economic Times,
  There Are Around 19 lakh vehicles That Do Not Have Valid PUC.
- Rising pollution has been a consent of matter specifically talking about **air pollution due to vehicular emission**.
- Vehicular emission consists of flue gases like CO,CO2,sulphoxides,hydrocarbons,etc. And it contributes **about 20-30% of the particulate matter**(PM) at breathing level of air quality.
- Causing the **premature death of 2 Million Indians every year.**
- Pollution under control (PUC) has a validity of 6-8 months but the vehicular emission takes place daily which leads to **release in hazardous gases on daily basis, increasing air pollution tremendously**.

Problem Statement





Target Audience/ End Users

The users of my product are all the people who use vehicles and own them.

- **Everyone owning & using commercial and non-commercial vehicles running on inflammable fuel (petrol, diesel, CNG, etc.) will use our product.**
- **Also the authority associated with vehicles (RTO) will use this.**

Insights/Need of the Users

The insights about my user are:

Eco-Conscious Commuter

Young professionals living in a city, concerned about the environment & pollution. They use their vehicle for commuting to work.

- Concerned about the environmental impact of their vehicle.
- Interested in alternatives in vehicle which will reduce air pollution which regularly monitors air quality levels of their vehicle.

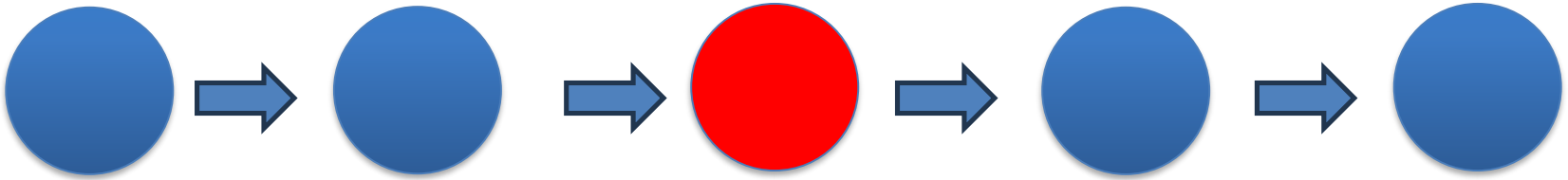
Authority/ organisations

- Many govt. as well as environment conscious bodies (ex: CSIR-NEERI) are looking for a solution that can help monitor real-time air quality in vehicles.
- Govt. bodies are in need of a system which will provide authentic data about the number of vehicles emitting hazardous gases beyond a level.

Tool: https://ai.boardofinnovation.com/personas

As -Is Journey

Uncontrolled System



Decides To Go Out

Uses a Vehicle (Petrol/Diesel)

Emission Of Harmful Gases

Air Pollution Occurs

Reaches the destination

Lack Of General Awareness

Prototype

AutoEmission Eye

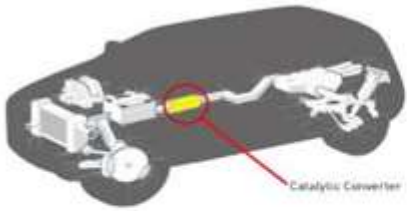
Device Consist Of Customised Sensor,Microcontroller & Wi-Fi Module Is Used.

Key Features:-

1)It Helps To Reduce The Pollution Before Exceeding Extreme Level.
2)Automation System Helps To Control vehicular emission On Daily Basis.
3)Servicing Cost Will be Reduced & Engine Life Will Increase.

Note: You can use DALL.E 2/Midjourney to generate product design or prototype images.

Prototype(Structure)

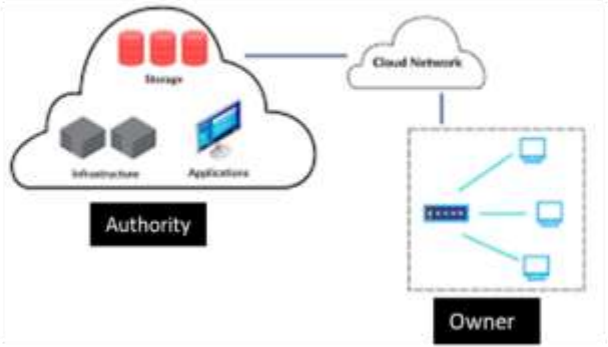


Catalytic Convertor
(Engine)

Silencer(Muffler)

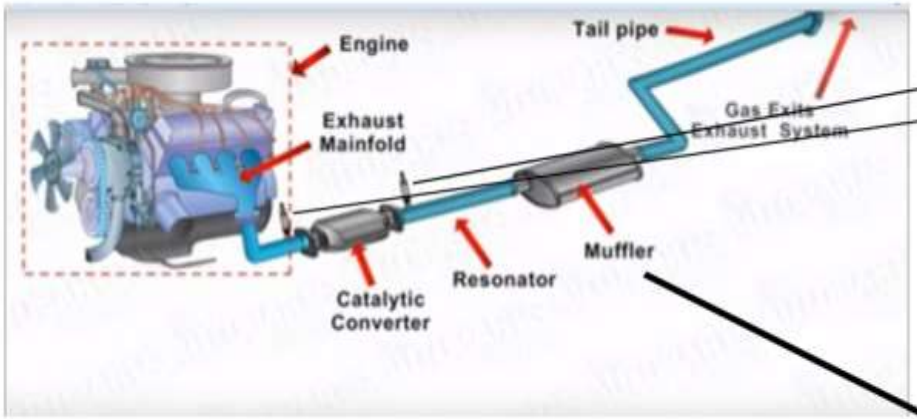
Sensor

Computing & Microcontroller
Device
(Cloud)



Warning

About Project



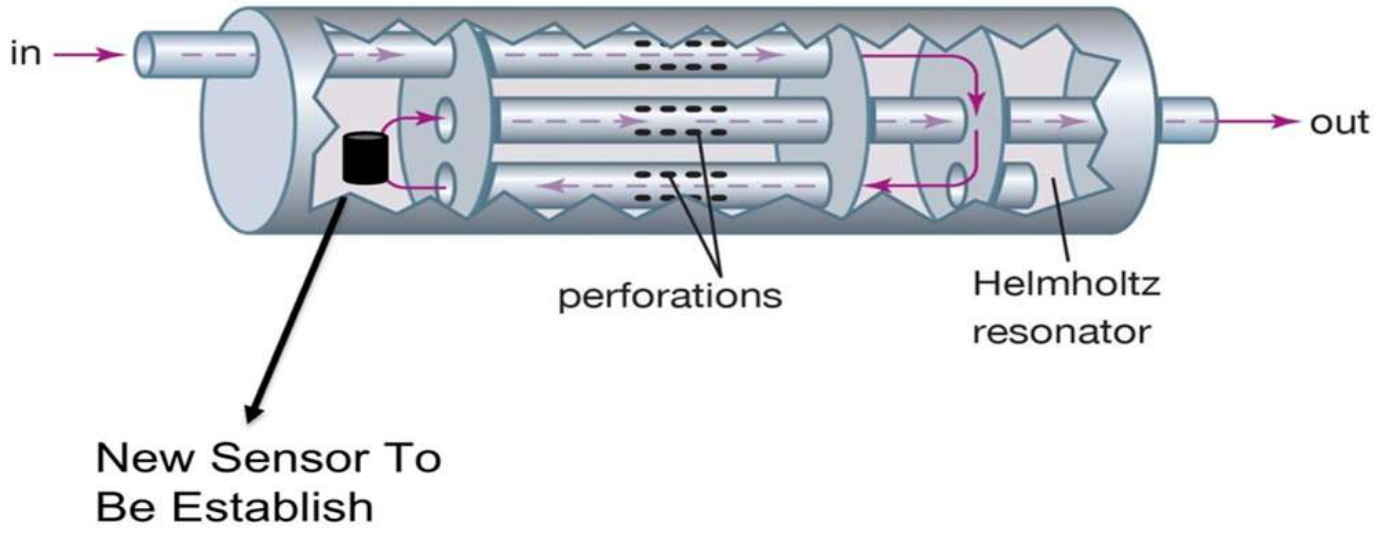
At This Catalytic Converter The Sensors Named ECU(Electronic Control Unit) Are Present.

"Let Us Consider Mahindra Bolero Pickup.
A Pick Up Truck Silencer"

Near This Part The Sensors For Data Collection Must BeApplied.

About Project

DIAGRAM OF SILENCER (MUFFLER)

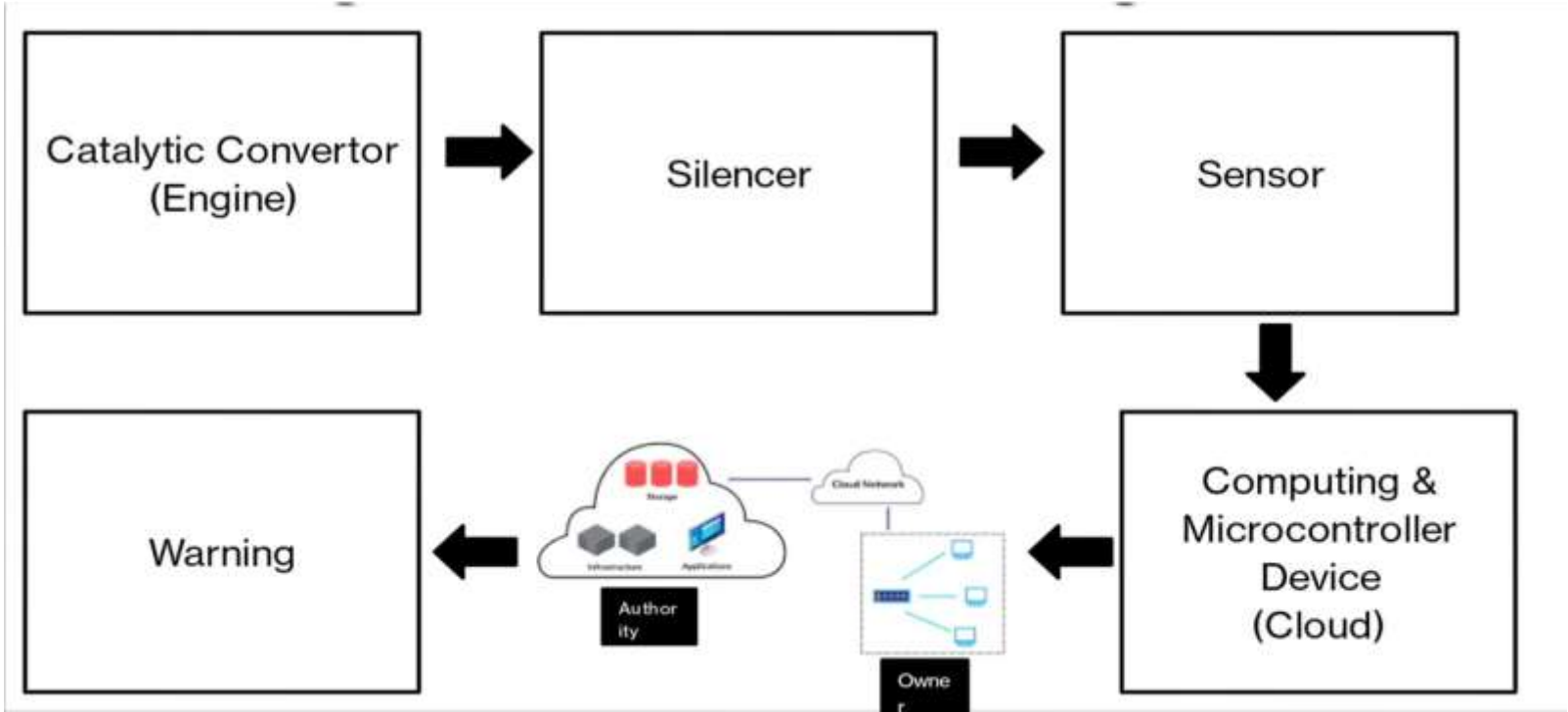


About Project

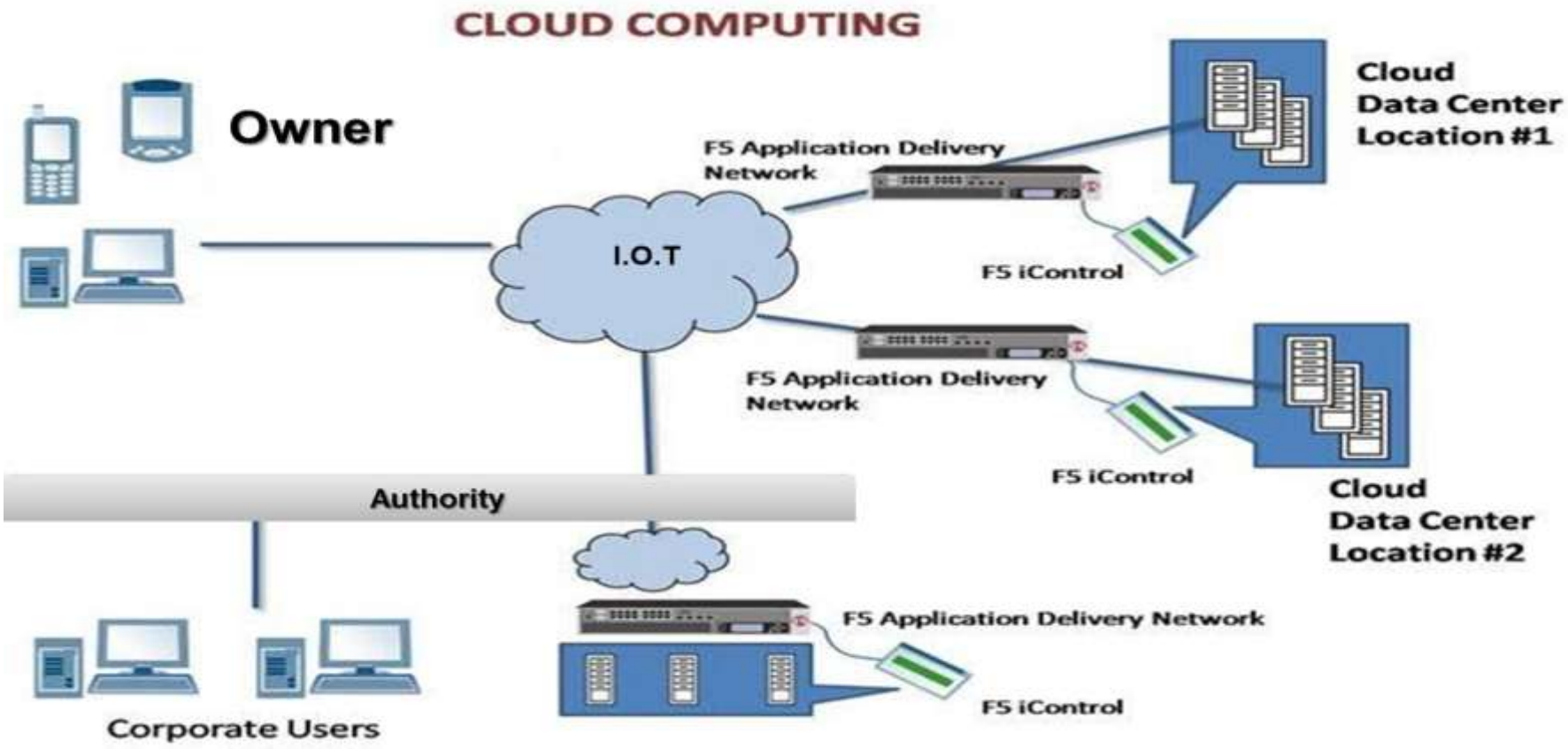
Name of the sensor	detection	Dimension (approx.)	Price	Conc range detection in ppm
MQ-135	ammonia, Sulphur, benzene and CO_2	35mm x 22mm x 23mm	INR 100-150	10-1000ppm
MQ-7	Carbon monoxide (CO)	35mm x 20mm x 11mm	INR 88-120	20 PPM to 2000 PPM
MQ-4	Natural gas and methane	31mm x 19mm x 21mm	INR 90-130	200 to 10000ppm
PM 2.5	Inhalable flue gases having diameter less than 2.5 micrometer	110mm x 84mm x 44mm	INR 6000	0 to 1 ppm
MQ-136	Sulphoxides H_2S	32mm X22mm X27mm	INR 1600	200 ppm

About Project

BLOCK DIAGRAM OF THE DEVICE



About Project



About Project

Working

- Smoke Which Contains Flue Gases Enters The Silencer Through The Engine And Catalytic Convertor After Every Modification With The Help Of The ECU Is Completed.
- In Silencer The Smoke Is Further Passed To The Sensors Which Are Attached At The Last Perforation Of The Silencer.
- Sensor Contains Sensing Element And Tin-Dioxide(SnO_2) As A Semiconductor. When The Heat Is Generated In the Silencer, Sensor Warms up & Gases Present In The Smoke Interact With The Heated Sensing Element ,That Causes Change In The Electrical Resistance.
- The Sensing Element Which Measures The Change In The Resistance Now Converts them into Electrical Signals That Is Processed By Microcontroller.
- Microcontroller Which Will Have Some Threshold Values Now Compare The Provided And Detected Data/values & Stores The Data On The Cloud.
- Further If The Detected Data Exceeds The limits Then It Shares The Information To The Authority And Throws The Warning To The Owner. The Warning Is Given Twice & If The Servicing Is Not Done, The User Is Penalized By The Authority.

Conclusion:-

Realizing The Need Of The Hour,
We As A Team Propose An Idea Of A System That Continously Monitors The Emission Level Of Vehicles By An IoT Based Kit Using Various Gas Sensors, Micro-controller & A W-Fi Module. Any Defect in The Vehicular Emission Generates A Notification To Alert the Authority As Well As The Owner For Further Necessary Actions Towards Reducing Pollution. Through This, We Aspire To Deliver A Massive Social Impact on Our Society.

Thank you