

# aeroCure

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## Problem Statement :

We are addressing the problem of air pollution caused by vehicles by continuous monitoring and regulation of emissions thereby helping vehicle owners to adhere to emission standards.

## Proposed Solution :

A vehicle pollution testing device that provides real time analysis of the smoke contents and alerts the user as well as the pollution department when the pollutant level goes beyond the extent.

### -Features :

- Real time monitoring of vehicle emissions.
- Displays different component percentages in emission.
- Alerts the user when smoke contents exceed permissible level.
- Monitoring capability for authorities.
- Unique IDs for each vehicle which makes it free from falsities.
- Non corrosive, heat resistant, and not bulky, hence easy to handle.

## Technologies used :

### -Hardware :

- IoT module
- Arduino Nano
- Sensors - (MQ2 Gas Sensor- Smoke, CH<sub>4</sub> and CO, MQ7 Gas Sensor- CO, MQ135 Gas Sensor- NH<sub>3</sub>, NO<sub>x</sub>, Benzene, CO<sub>2</sub>, etc )
- Hardware material : 17-4 stainless steel (magnetic, temperature resistant, hard, corrosion resistant)

## -Software :

- Flutter - cross-platform mobile application development
- Website - React JS
- Cloud service - IBM Watson for IoT

## -Implementation :

- The device made of magnetic material can be stuck on to the smoke emitters. The gas sensor analys the exhaust and produces the output consisting of composition of different pollutants with their corresponding percentages.
- This data is transferred to our dedicated app in the user's mobile phone using bluetooth and pollutants emitted beyond the safety limit are detected. An alert is given to the user so that the issue could be fixed. If emissions are within safety limits, a green certificate is given.
- The data is also transferred to cloud server via mobile internet so that the RTO could also view and monitor emission details of each vehicle.
- A unique id associated with vehicle number is embedded with data to eliminate possible tampering.

## Relevance and Future Scope :

We know vehicles are a major pollution contributor, producing significant amounts of nitrogen oxides, carbon monoxide, and other pollutants. The health risks of air pollution are extremely serious. Poor air quality increases respiratory diseases and premature deaths.

Vehicle emission standards have helped cut pollution from vehicles by about 90 percent since 1998. Future emissions reductions from such vehicles and other freight sources are essential for meeting air quality standards and protecting the health of people. Aerocure is a solution for all such problems.

This is a futuristic project which can be completely effective when every vehicle owner has access to the internet. It can also be further developed wherein data can be directly sent from vehicle to internet as connected vehicles become common. This can finally eliminate an intermediate application which further makes the process transparent,secure and smooth.

## Challenges faced :

- Size of the device
- Data transfer between the device and server
- User Interface of application
- Making it corruption free
- Ensuring safety and security for user data
- Reusable coding methodology for easy maintenance

## Economic Feasibility

The proposed solution is economically feasible with an estimated cost of Rs.1500 per device.