Emission purifying unit for automobiles

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Abstract

In this work we have designed and developed a simple, low cost emission purifying unit to remove all the particulate matter (PM) from vehicle emission. The device can block the PM particles using an electric field and an aerosol mixture. The electric field repels the charged PM and the aerosol mixture aggregates PM to form larger and heavier units. The heavy units get deposited on the bottom of the chamber and form a solution of PM and water. The resulting solution is filtered and the water is recycled.

Background

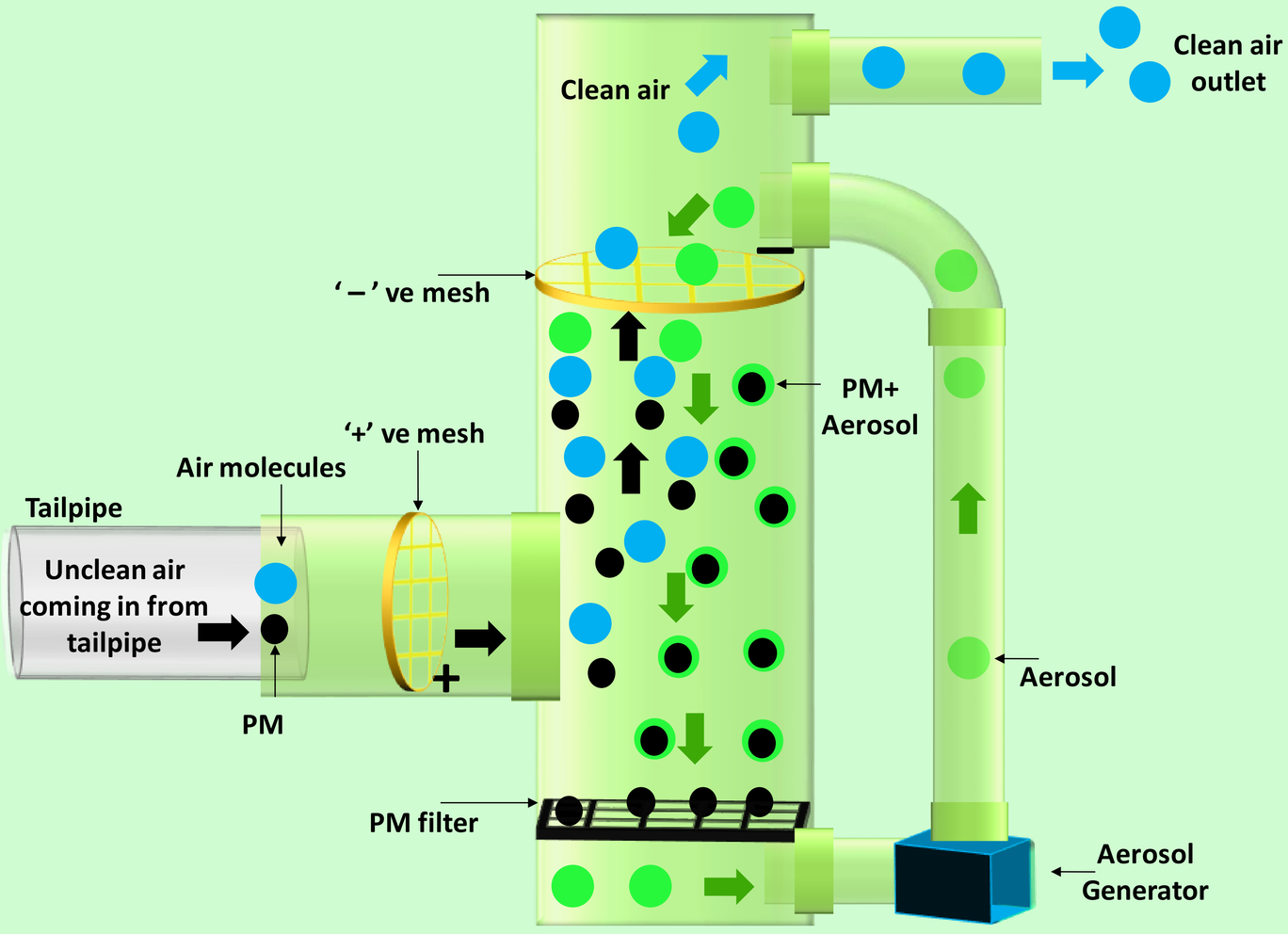
The amount of vehicle pollution emission is increasing drastically with the increasing number of vehicles in the world. Vehicle emission formed due to the consumption of fossil fuel has been identified as a main contributor to air pollution and also a major source of greenhouse gas emission. Vehicle emissions contribute to around 20% of all greenhouse gases emitted in the United States which is the second largest greenhouse gas emitter in the world. According to several reports the transport sector contributes about 35% of CO, 30% of HC and 25% percent of NOx produced into the atmosphere [1-5]. Particulate matter (PM) is another pollutant emit with vehicle emission. It includes all the unburned carbon and other solid particles in emission. These pollutants have adverse effects on the environment and human health.

The emissions from vehicles are generally depends upon the air–fuel ratio. To reduce the harmful content from exhaust gas emissions several techniques have been introduced, engine modification, fuel pretreatment, fuel additives, exhaust gas recirculation (EGR) and catalytic converters [1]. Most of the existing techniques are focused on purifying gases coming from vehicle emission. In this work we are focused on removing PM from vehicle emission.

Materials and methods

The emission purifying unit (EPU) use a combination of an electric field and an aerosol mixture to remove PM from the vehicle emission. The system use one electric field used to charge the uncharged PM and another electric field to repel the charged PM. The aerosol mixture is sprayed over the PM and make heavy droplets of PM+aerosol. These heavy droplets get repelled easily by the electrode and get deposited on the bottom of the chamber. A filter is used to separate the PM and water made with aerosols. The filtered PM can be collected and removed and the filter can be cleaned and replaced. The collected and filtered water is recycled to create aerosol again.

Finally clean air without any PM is released in to the environment.

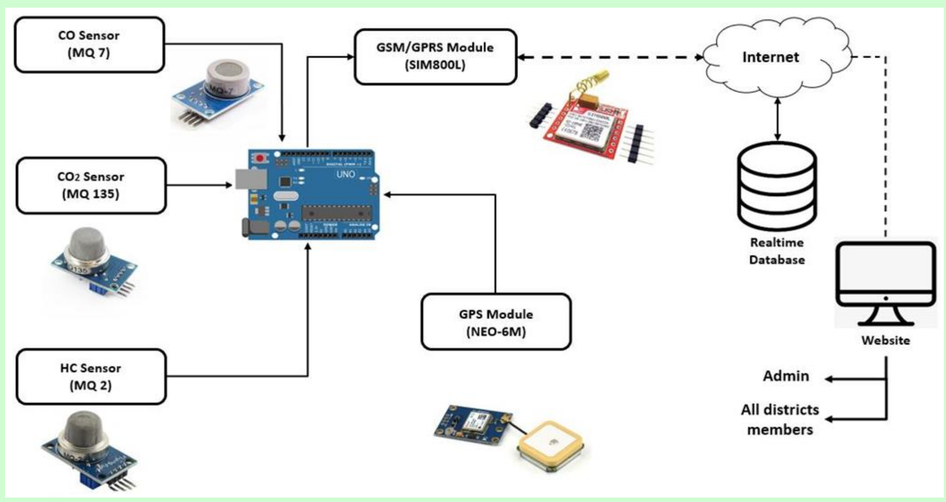


Results

The designed EPU showed promising results when tested with an incoming emission. The device cost is extremely low and easy to design.

Future research

The designed EPU can be further modified with an emission detection system to monitor and alert the emission level of a vehicle in real time.



Conclusions

The designed emission purifying unit is extremely low cost and simple to design. It uses a combination of a high electric field and a aerosol mixture to filter PM from emission. The efficiency of the device is proved to be very high.

References

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