Project Title: Develop a portable Emission Testing Unit

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Need statement

The increasing air pollution from vehicle emissions poses a threat to the environment and public health. There is a need for a low-cost, embedded system with connectivity features to replace traditional, expensive emission testing methods.

Literature Survey

1. Implementation of portable emissions measurement systems (pems) for the real-driving emissions (rde) regulation in Europe : Portable emission analyzers use advanced sensors and microcontrollers to measure vehicle pollutants like hydrocarbons, CO, and NOx with over 90% accuracy, aiding regulatory compliance and improving air quality.
2. Development of a portable motor vehicle emission test system based on Arduino with android interface : The study uses Arduino AT-Mega 2560 with MQ2 and MQ7 sensors to develop a portable system for real-time vehicle exhaust monitoring, providing cost-effective emission measurements via Android smartphones.

Problem statement

Develop a low cost, portable emission testing unit that accurately measures CO and HC emissions from vehicles overcoming connectivity limitations.

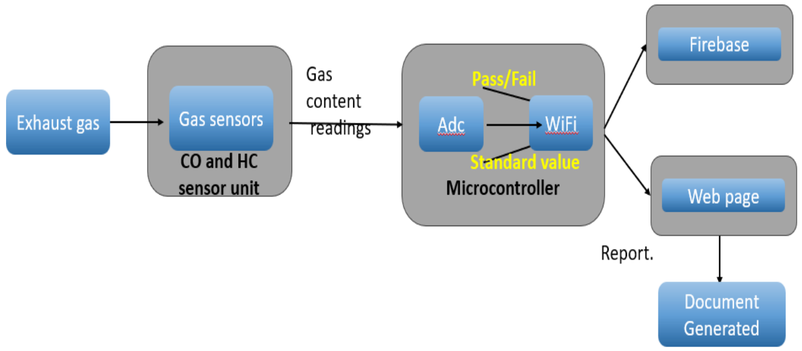
Objective

1. Develop a Portable Emission Testing Unit (ETU) with Advanced Technology and Connectivity Features
2. Enhance infrastructure by providing affordable and accessible emission monitoring tools for effective environmental monitoring and regulatory compliance in the automotive industry.

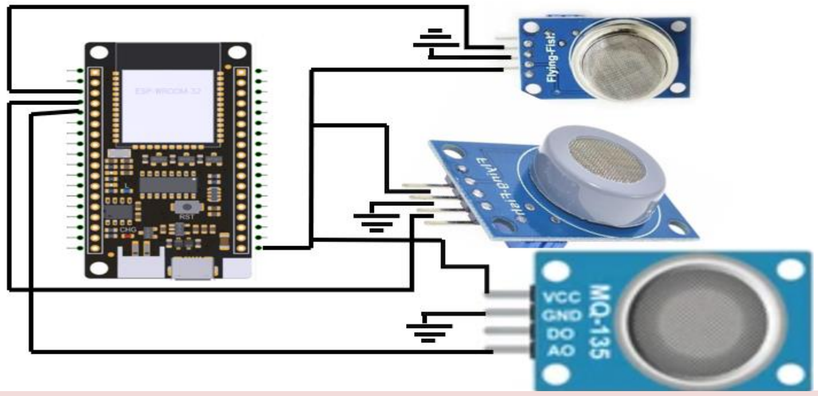
Requirements

1. Arduino IDE.
2. Esp32.
3. MQ-7,MQ-2 and MQ-135

System Block Diagram



System Setup



Challenges and Considerations

Considerations : The exhaust temperature is maximum up to 50°C .
In stage of implementation when we add the wifi, firebase and Bluetooth the memory will not be sufficient. We needed 40% extra memory, by employing optimization technique we drop down that to 19% still it is not deployable. So we eliminated Bluetooth.

SDG Connect

The project can help in addressing SDG-9 Industry, Innovation and Infrastructure.

Results

The newly developed emission testing unit (ETU) has demonstrated significant improvements over existing models in various key aspects. During testing, the following results were observed:

1. Cost Effectiveness
2. Portability
3. Advanced Connectivity

Memory: 1022473 bytes.
Power:
Operating Voltage: 5V
Typical Heater Current:50mA
Power Consumption:
P=5V×(3x50mA+230mA)=1.9W

Conclusion and Future Scope

The project successfully achieved its goal of developing a cost-effective, portable emission testing unit capable of accurately measuring CO and HC emissions from vehicles. The new ETU addresses the primary limitations of existing units by offering improved connectivity features and enhanced user accessibility while maintaining a lower production cost.