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ONLINE MONITORING OF OBD PARAMETERS (HARDWARE MODULE)

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ABSTRACT

Our project presents the design and development of On-Board Diagnostic (OBD) device for cars and its working was based on OBD-II standards defined by SAE. Our device shows the real-time status of vehicle's systems and sub-systems including engine speed rpm, coolant temperature, pressure etc, and Diagnostic Trouble Codes (DTCs).The software used in this system has been primitively developed which shows the faults in the system. This device helps the user to understand real-time status of vehicle as well as it makes easier to check the malfunctioning in vehicles systems and subsystems by displaying Diagnostic Trouble Codes DTCs

***Key Words*: automotive, connected cars, parameters, cloud**

1. INTRODUCTION

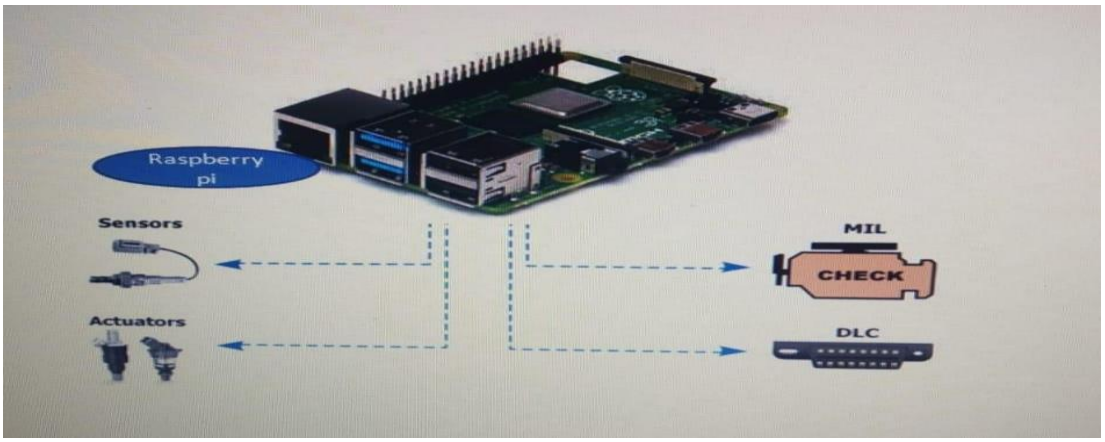
OBD stands for On-Board Diagnostics.OBD is a computer based system designed to reduce emissions by evaluating the performance of major engine components. The system also monitors the performance of the ignition system and transmission operation. It generally functions by placing different kinds of sensors in vital areas of the vehicle. The system reports back to the diagnostic system whether those specific areas are working perfectly .On-Board Diagnostics is a computer system inside the vehicle that tracks and regulates the performance. The computer system collects information from the network of sensors inside the vehicle, which the system can then use to regulate or alert the user about the performance of the vehicle.

2. METHODOLOGIES

RASPBERRY PI

Sometimes you need to access a Raspberry Pi without connecting it to a monitor Perhaps the Pi is embedded in something like a robot, or you may want to view some information from it from elsewhere. Or perhaps you simply don't have a spare monitor! You can connect to your Raspberry Pi from another machine. But in order to do so you'll need to know its IP Address. Any device connected to a Local Area Network is assigned an IP address. In order to connect to

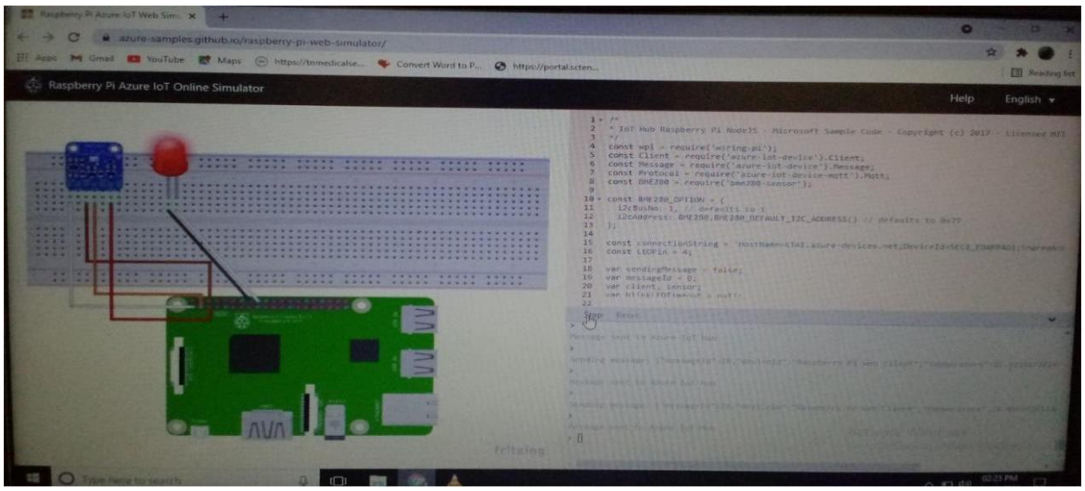
your Raspberry Pi from another machine using SSH or VNC, you need to know the Pi's IP address. This is easy ifyou have a display connected, and there are a number of methods for finding it remotely from another machine on the network.



A system in the engine's on-board computer that monitors the performance of almost every emission-related component for malfunctions. When a malfunction is detected, information about the malfunctioning component is stored. Technicians can download the information with a "scan tool" to help fix vehicle. A basic OBD system consists of a Raspberry Pi, which uses input from various sensors (e.g., oxygen sensors) to control the actuators to get the desired performance. The "Check Engine" light, also known as the MIL (Malfunction Indicator Light), provides an early warning of malfunctions to the vehicle owner. A modern vehicle can support hundreds of parameters, which can be accessed via the DLC (Diagnostic Link Connector) using a device called a scan tool. A mechanic who wanted to access diagnostic information typically had to buy a tool for every different vehicle make. OBD-I scan tools that support multiple protocols are supplied with an array of different adapter cables. It is a computer-based system originally designed to reduce emissions by monitoring the performance of major engine components.

RASPBERRT PI SIMULATOR

Raspberry Pi simulator that allows users to write code to control emulated hardware, and that currently lets users interact with an LED and collect data from a sensor. The simulator shows a graphic of a Pi wired to a combined humidity, temperature, pressure sensor and a red LED via a breadboard, a plug board that allows circuits to be wired together rapidly. Users can type in a side panel to enter Node.js JavaScript code, which can be used to control the LED and collect dummy data from the simulated sensor. That code can be executed using a command line at the base of the panel



PYTHON: Python is a powerful programming language that's easy to use easy to read and write and, with Raspberry Pi, lets you connect your project to the real world. Python syntax is clean, with an emphasis on readability, and uses Standard English keywords.

3. ON-BOARD DIAGNOSTICS

OBD stands for On-Board Diagnostics.OBD is a computer based system designed to reduce emissions by evaluating the performance of major engine components. Implementation began in 1994and Full Implementation achieved in 1996 Over 150 million ,OBD II-equipped vehicles operating in the United States today.Vehicle Applications (< 14,000 pounds) Passenger cars, Light-duty trucks, Medium-duty vehicles and engines. OBD requirements adopted for heavy-duty vehicles in 2005 (HD OBD, > 14,000 pounds) and Full implementation in 2013. On Board Diagnostic is a comprehensive electronic system, which detects exhaust emission related failures in passenger vehicles, light duty trucks and heavy duty vehicles, which run on combustion engines. A system in the engine's on-board computer that monitors the performance of almost every emission-related components for malfunctions Uses information from sensors to judge performance of emission controls o Sensors do not directly measure emissions Mostly software that runs diagnostics in the background.

OBD PARAMETERS (Monitor)

- Battery Level
- Fuel Level
- Tyre pressure
- Coolant temperature
- Oil level
- Engine Speed
- Engine rpm
- Brake system
- Emergency assistance

ALGORITHM / TECHNIQUES / TOOLS USED

On Board Diagnostic using algorithm Tools are used:

- OBD Scanner
- Portable devices
- Remote system
- OBD Module

BLOCK DIAGRAM

BASIC OBD PROCEDURE

- System waits for right monitoring conditions
- Observes Signals Entering the Computer
- Directly from the component/system, or
- Related to performance of component/system
- Verifies Performance /Functionality / Rationality
- Malfunction criteria
- Notifies Driver of Fault
- MIL illumination
- Unique fault code storage
- Freeze frame information

BENEFITS OF OBD

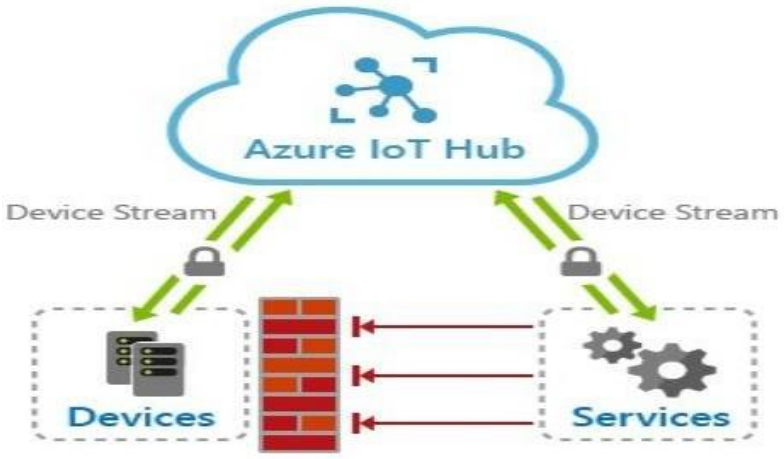
- Encourages design of durable and robust emission control systems
- Helps keep emissions low by identifying emission controls in need of repair
- Provides for effective/inexpensive emission inspections
- Works for life of the vehicle

4. AZUREIOT CLOUD

Azure IoT Hub is Microsoft's Internet of Things connector to the cloud. It's a fully managed cloud service that enables reliable and secure bi-directional communications between millions of IoT devices and a solution back end. ...

Cloud-to-device messages let you send commands and notifications to your connected devices.

Azure IoT Hub provides a cloud-hosted solution back end to connect virtually any device. Extend your solution from the cloud to the edge with per-device authentication, built-in device management and scaled provisioning. In cloud-to-device messages, reliably send commands and notifications to your connected devices and track message delivery with acknowledgment receipts. Automatically resend device messages as needed to accommodate intermittent connectivity. Azure IoT Hub is a Platform-as-a-Services (PaaS) managed service, hosted in the cloud that acts as a central message hub for bi-directional communication between an IoT application and the devices it manages. Azure IoT. Connect devices, analyze data, and automate processes with secure, scalable, and open edge-to-cloud solutions. Help safeguard physical work environments with scalable IoT solutions designed for rapid deployment. IoT security. Strengthen your security posture with end-to-end security for your IoT solutions.



5. RESULT

When a malfunction is detected, information about the malfunctioning component is stored Technicians can download the information with a “scan tool” to help fix vehicle Information also used by Smog Check inspectors Information is communicated in a standardized format so one tool works with all vehicles (SAE and ISO standards)

6. PROPOSED SYSTEM

- Our system previously indicates the failure of the parameter which are monitor by using sensors. hence, wecan avoid the huge failure and accidents of the vehicles.
- This System Proposed Before going to the repair station you can try to know and repair the vehicle in advance in this system using online mode.

7. CONCLUSIONS

This project describes about On-Board Diagnostics and Driver Profiling to the user. The project proposes the use of an Android application to fetch and display the Diagnostics Trouble Codes (DTC) from the car Engine Control Unit (ECU) and thereby facilitates self-car maintenance. The proposed android application processes hexadecimal data of the DTC stored in the car ECU and presents them in a user-readable manner to the user. The proposed android application is also capable of providing a simple, immediate and cost-effective profile of the driver's behavior. This proposed method is by means of tracking GPS co-ordinates of the moving car resulting in a Driver Score. The Driver Score defined as the probability risk of the driving behavior leading to an accident for the observed trip for this approach. This project also proposes an alternate, detailed and novel approach to profile the driver visually and analytically using Machine Learning and Data Analytic techniques. The proposed driving behavior analysis method [3:17 pm, 14/01/2022] : utilizes OBD interface to collect a number of critical driving operation data, i.e., vehicle speed, engine speed (RPM), throttle position, and calculated engine load. The driver behavior is profiled visually using K-means clustering algorithm along with the Elbow method to engine speed and vehicular speed. The visualization assists the user to interpret bad driving behaviors. The driver‘s behavior is profiled analytically by setting thresholds to engine speeds, throttle valve and engine load resulting in a Driver Score. The Driver Score is defined as the percentile of bad driving behaviors over the observed period. The results from all the proposed approaches assist the user.

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