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Pocket OBD Datalogger

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Abstract - *The Pocket OBD DataLogger project focuses on creating a compact and cost effective device that can measure critical vehicle parameters, including the State of Charge (SOC), Battery Health, and Vehicle Identification Number (VIN), during the Pre-Delivery Inspection (PDI) phase. This system aims to replace the traditional, expensive Multi-Function Tester (MFT) with a more efficient alternative. By using an Arduino UNO R3 microcontroller with a CANBUS shield, the device retrieves vehicle data within 3 seconds, displaying the information on an LCD and saving it to a Micro SD card for future reference. This project significantly enhances the efficiency of car inspections, automating the process of measuring electrical parameters before vehicle dispatch. With a total cost of approximately INR 10,000, it presents a more affordable solution than conventional MFT devices, while still maintaining accuracy and reliability. The report details the hardware and software components, system design, and testing processes, offering insight into the development and operational advantages of the Pocket OBD Data Logger.*

Keywords *: Pocket OBD Datalogger ,State of Charge (SOC) ,Battery Health ,Pre-Delivery Inspection (PDI) ,CANBUS Shield.*

1.INTRODUCTION *(Size 11 , cambria font)*

The Pocket On-Board Diagnostics (OBD) Datalogger is a small, easy-to-use device designed to help improve the efficiency of car inspections. It addresses a common need in the automotive industry, where checking the health of a vehicle's battery and its State of Charge (SOC) is crucial. This device is especially helpful in the Pre-Delivery Inspection (PDI) process, which is when vehicles are carefully checked before they are handed over to the customer. In many car inspection processes today, a tool called the Multi-Function Tester (MFT) is used to measure the battery's health and SOC. However, the MFT can be bulky, expensive, and time-consuming to use. The Pocket On-Board Diagnostics (OBD)Datalogger offers a solution to these problems by being more affordable and portable, making it easier for technicians to quickly assess the condition of the battery and read the Vehicle Identification Number (VIN). This project focuses on replacing the traditional MFT with this more efficient device, providing a quicker and cheaper way to measure important data about the vehicle's battery and overall health. By using the Pocket OBD Datalogger, car inspections can be done faster and more accurately, which is beneficial for both the technicians and the customer

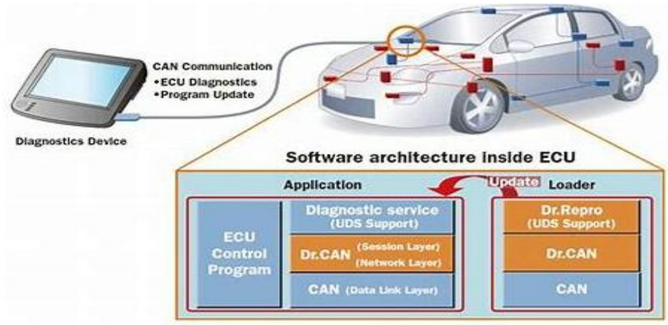

Fig -1: OBD System

1.1 METHODOLOGY

Automatic The Pocket OBD DataLogger project follows a systematic approach to replace traditional Multi Function Testers (MFTs) with a cost-effective, efficient, and compact device for Pre-Delivery Inspection (PDI).
The methodology includes:
1. Problem Identification: The need for an affordable system (~INR 10,000) to measure State of Charge (SOC), Battery Health, and Vehicle Identification Number (VIN) during PDI was identified.
2. Hardware Design: The system uses an Arduino UNO R3 microcontroller integrated with a CANBUS shield for data retrieval from the vehicle's OBD-II system. An LCD displays the retrieved parameters, while a Micro SD card logs them for record-keeping.
3. Software Development: Using the Arduino IDE, custom firmware was developed to retrieve, display, and store SOC, Battery Health, and VIN data. The CANBUS library

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facilitates efficient communication with the vehicle's ECU. 4. Testing and Validation: The device was tested in a simulated OBD-II environment and real-world scenarios. Results were compared with MFT devices to ensure accuracy, reliability, and efficiency.
5. Cost and Performance Analysis: With a total cost of ~INR 10,000, the system demonstrated significant savings while maintaining functionality comparable to expensive MFTs.
6. Deployment: The device automates data retrieval during inspections, reducing manual effort and enhancing efficiency.windows

1.2 FUTURE SCOPES

The data can be sent to cloud using a secure network and can be linked to company MES

2. MODELLING AND ANALYSIS

Analysis

Advantages

- No hard coding- Easy to scale and further develop as platform is ready.
- Easy to operate and light weight – No ergonomics issue – Just need to plug to OBD Port
- Portable – Device is easy to handle.
- No start-up condition – Device is ready to use – No ON/OFF switches etc.
- Not effected by cold temperature - temperature range is wide.
- Scalable - Can be used for other car parameter values.
- Cost Effective

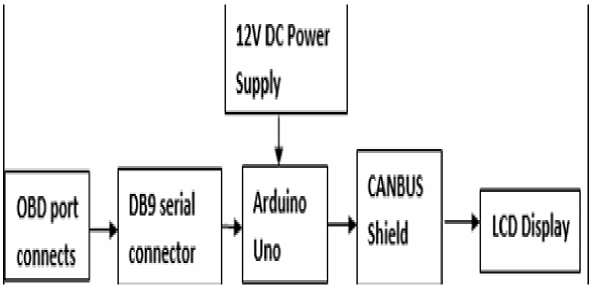

Fig -2: Block Diagram

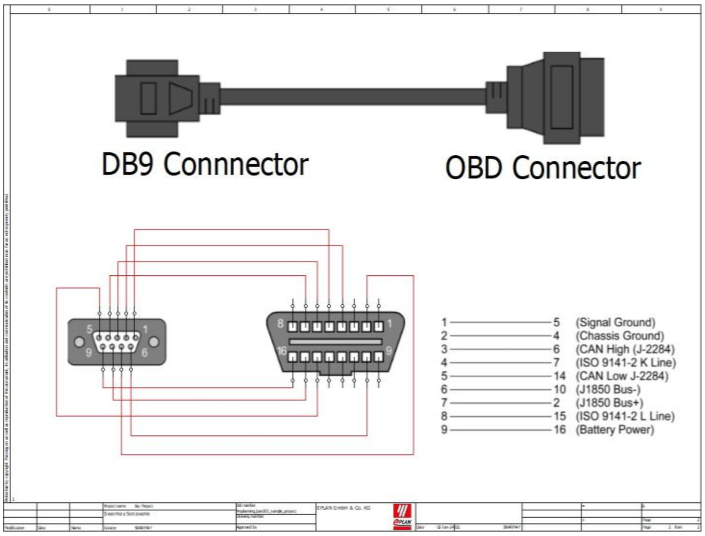

Fig -3:OBD Connector Circuit Diagram

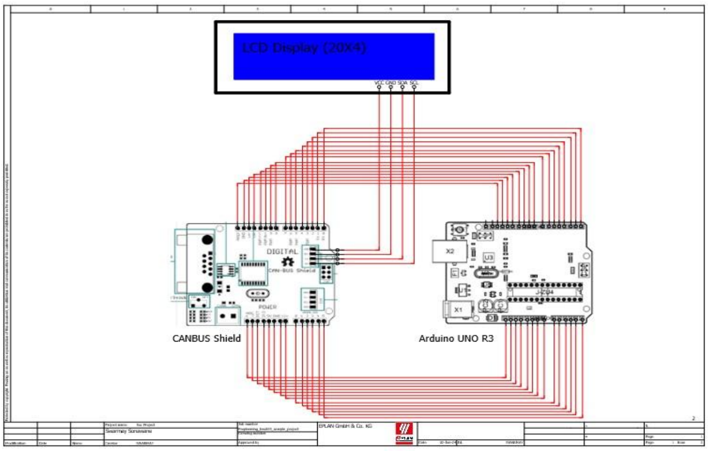

Fig -4: Circuit Diagram

2. RESULT AND DISCUSSION

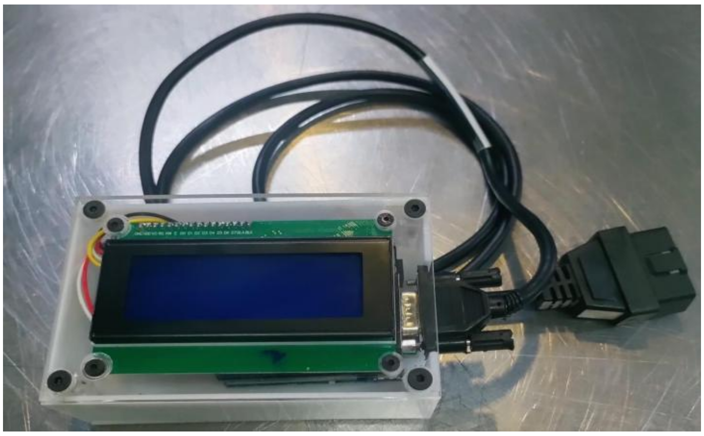

Fig -5: Output1

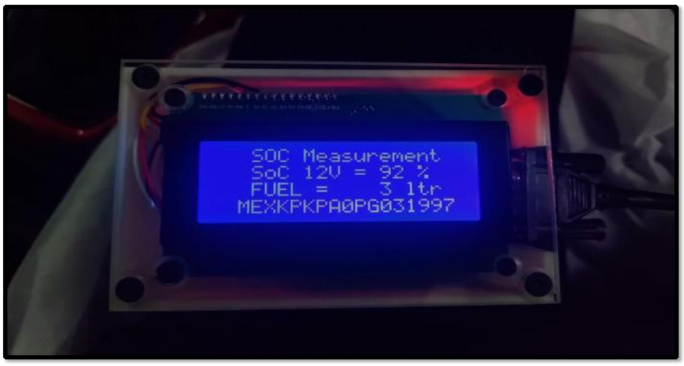

Fig-6 : Output2(Testing)

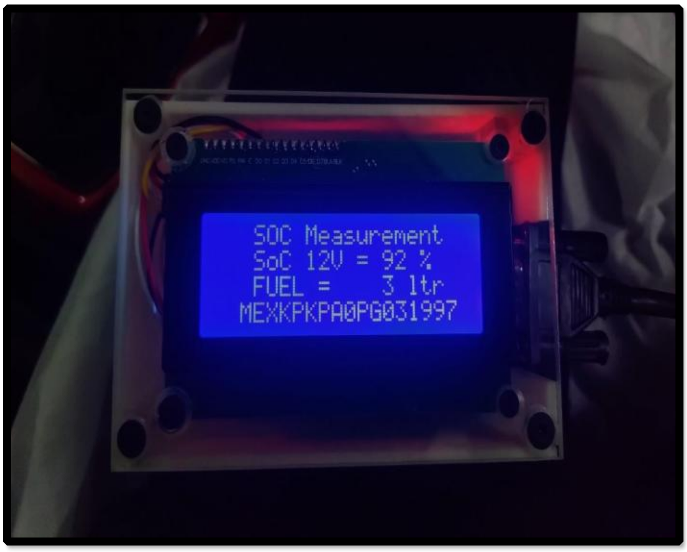

Fig -7: Output 3

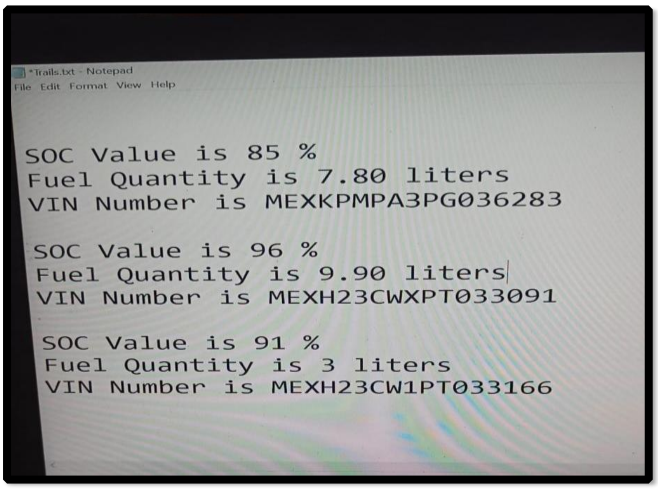

Fig -8: Output 4(RESULT)

3. LITERATURE SURVRY

The OBD Data Logger, as developed by Xueping Sun et al.[4], plays a critical role in collecting and analyzing vehicle network data to assess performance, cost-effectiveness, and diagnose issues. This tool captures both analog and digital signals from sensors and actuators, as well as OBD and ECU message data. By integrating multiple data formats, it enhances vehicle troubleshooting and performance evaluations, making it indispensable for diagnostics and network development. The On-Board Diagnostics (OBD) System has evolved since the 1980s, starting with the use of sensors to enhance fuel efficiency and reduce emissions. The California Air Resources Board (CARB) introduced the first OBD policy in 1988, which led to OBD-I in 1991. However, Raman Kumar[3] highlights the limitations of OBD-I, such as the lack of a standardized Data Link Connector (DLC), which was addressed in OBD-II in 1996. OBD-II brought improved monitoring of engine performance and emissions. In his study, Raman Kumar[3]underscores the importance of the CAN-Bus protocol in the OBD-II framework, facilitating communication between devices like the ELM327 for vehicle diagnostics. Kumar also emphasizes the role of Digital Signal Processors (DSP) in managing onboard sensor networks and processing data for real-time diagnostics, enabling remote monitoring and enhancing vehicle performance analysis. As Xueping Sun et al.[4] discuss, the development of real-time vehicle data acquisition systems has gained prominence with OBD technologies. Their dual-module system, using TJA1050 and MCP2515 circuits, collects extensive data from the Controller Area Network (CAN) bus. One module actively follows the ISO15765-4 automotive protocol, while the other passively records all CAN data, enabling detailed diagnostics and analysis. In the context of electric vehicles (EVs), accurately estimating the State of Charge (SOC) is crucial for optimizing battery management and vehicle efficiency. Sulaiman et al[5]. used data from 70 BMW i3 driving sessions, applying Feed-Forward Neural Networks (FFNN) to improve SOC estimation. Their approach reduced the root mean square error (RMSE) by 2.87% compared to methods like Extreme Learning Machine (ELM), showcasing the potential of deep learning in EV battery management.

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3. CONCLUSIONS

In conclusion, the Pocket ODIS offers an efficient and cost-effective solution for measuring State of Charge (SOC) and battery health at the final checkpoint during vehicle inspections. By incorporating this mechanism, it significantly reduces the likelihood of battery-related field complaints, ensuring better reliability and customer satisfaction. Serving as an alternative to the expensive

ODIS system, which costs approximately 5,000 Euros (₹440,000), the Pocket ODIS provides comparable functionality at a fraction of the cost, making it an invaluable tool for automotive inspections.

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