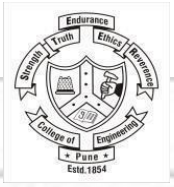
COLLEGE OF ENGINEERING, PUNE



(Electrical Engineering Department)

A Project on

"To monitor the battery condition of the electric vehicle using Internet of Things (IoT)"

For

B. Tech Project

SUBMITTED BY

B.Tech ELECTRICAL

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Problem Identification:

Electric vehicles (EVs) typically use lithium-ion batteries that can be recharged. However, the lifespan of these batteries can be reduced due to factors like overcharging and deep discharges. Overcharging can not only shorten the battery's life but also pose safety risks, such as the possibility of fire incidents. To avoid such problems, it is important to have an EV battery monitoring system in place. This system allows real-time monitoring of the battery's condition and helps develop strategies to extend its lifespan. To address this need, a battery monitoring system for EVs is necessary to notify users about the battery's health and prevent potential issues. Traditional manual monitoring systems only provide real-time data without storing it in a database. Therefore, it is crucial to implement a wireless remote monitoring system that can save battery data and be accessed remotely. We have developed a system that utilizes Internet of Things (IoT) technology, initially implemented on Electric Cycles, with the potential to be expanded to other types of electric vehicles. This system aims to inform both manufacturers and consumers about the battery's condition.

Solution:

This project envisages the study of IoT-based condition monitoring in electric vehicles. A monitoring system composed of a data acquisition system, a communication system, and a platform is built.

Various aspects of the project are:

1. Voltage sensor, current sensor, temperature sensor is used for monitoring purposes. These sensors connected across the battery will continuously sense the parameters.

2. These values are then fed to the Raspberry Pi microcontroller to take the decision. Raspberry Pi 3 (Model A+) is a controller used to monitor the corresponding variables using these sensors, perform certain conversion and send data to the cloud.

3.Coulomb Counting Method is used for SOC Calculation. Through the wireless communication, the battery information such as the recent voltage and current is transmitted to the online monitoring software for real-time display, then it will be stored in the data base for the next step such as the estimating of state of charge.

4. Azure Cloud is used to transfer and store data of E-cycle which makes the system more efficient. IoT HUB helps in establishing connection between Raspberry Pi and Azure, also record telemetry data. This data was further transferred to Power BI dataset using Stream Analytics Job.

5. The Power - BI interface is used to display these variables in pictorial form. Power BI is a visualization tool which allows us to create lucrative dashboards. Authorization and Security is provided by Microsoft along with services.

Our proposed system is hardwired employed on electric cycle and the required results can be seen on the website and app of Power BI. This project provides a better user experience and conscious usage of the vehicle which enables users to take control actions immediately. Condition monitoring and good maintenance can reduce the number of potential faults andensure the safety of vehicles and users. As the number of vehicles is increasing day by day, our electric cycle provides an efficient solution as it excludes the issue related to parking and it is cost efficient. Our cycle provides average 25 kmph

speed thus making it suitable for many day-to-day applications. The proposed system is with internet of things (IoT) technology so the manufacturer and consumers can be informed of the battery's condition. The new age vehicles and cars have on-vehicle display which indicates battery charging and other conditions. Our proposed dashboard on the website and app will serve the purpose of display as in new age vehicles making it perfect for use even in modernworld.

Pictures:

Fig.1 Electric cycle

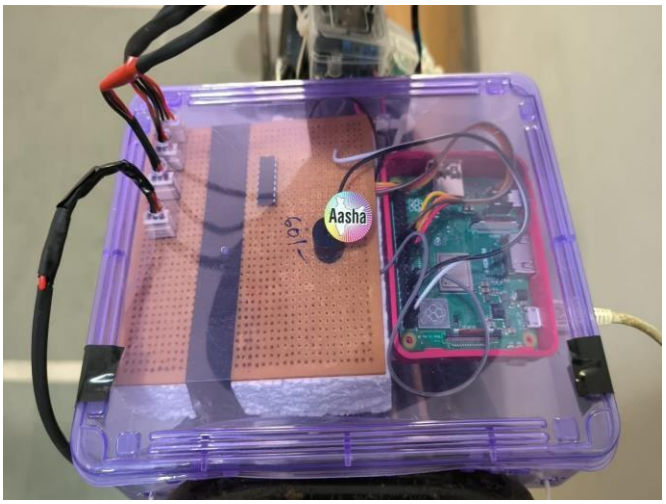

Fig.2 Controller circuit for proposed system

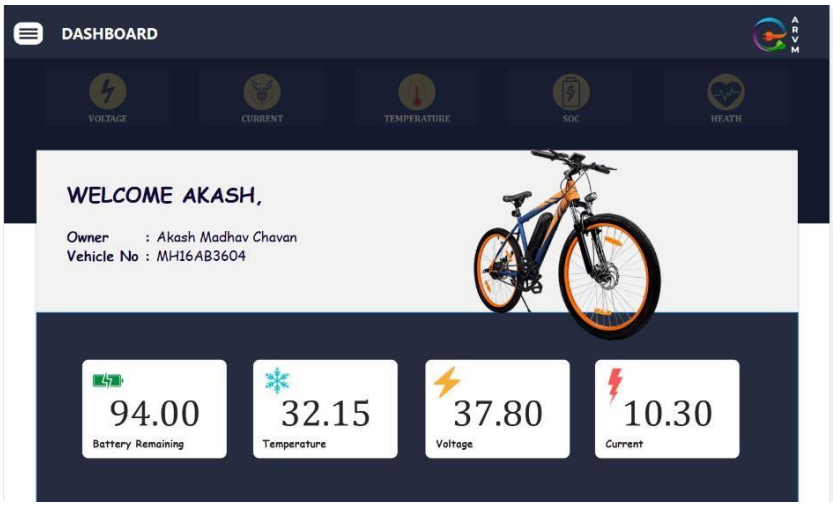

Fig.3 Web based Dashboard

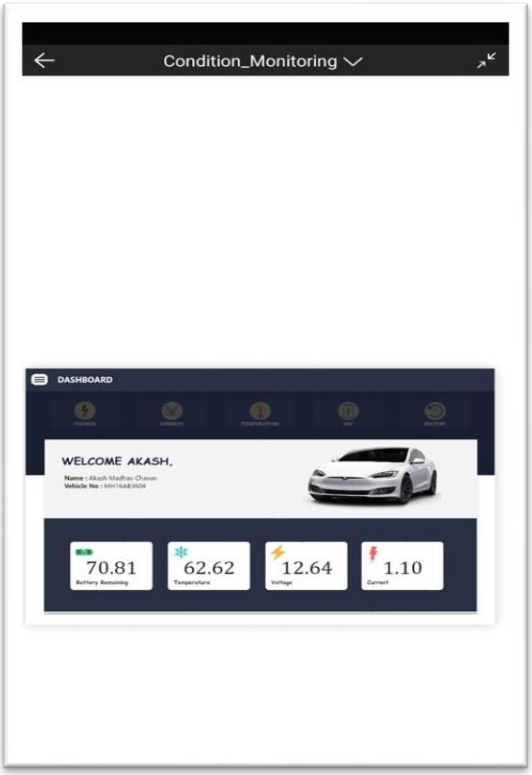

Fig.4 Android based Dashboard

Conclusion:

Through an extensive review of IEEE papers and the EV industry, it has been found that this project introduces a highly beneficial technology that has not been reported before. As the usage and demand for electric vehicles (EVs) continue to rise, ensuring user safety becomes a top priority. Therefore, monitoring factors like temperature and state of charge (SOC) becomes extremely important. The project is ready for implementation as it is already functioning perfectly. It holds great potential for a startup as it is a model that can be readily manufactured using easily available hardware components in the market.

Furthermore, this project serves as a pathway towards condition monitoring for larger vehicles such as cars and buses that travel in rural and remote areas. This breakthrough offers significant value for researchers. Additionally, the technology is user-friendly and can be easily operated by anyone, even those without technical expertise, making it popular among a wide audience.

The idea behind this project is the capacity to expand in various directions, such as applications to different types of vehicles and comprehensive monitoring and alarming systems, particularly for batteries, including individual cell monitoring. Utilizing Internet of Things (IoT) technology for this purpose is considered cutting-edge and an area of active research in the EV industry.

Project Video Link :

https://1drv.ms/v/s!AmeLqiJggWHO0TrAXsq5FGIPRUtO?e=qVcOGL