CLOUD OPERATED E-VEHICLE

Shubham A. Joshi[1], Gangadhar B. Dalvi[2], Shubham Honmane[3], Bhausaheb B. Mithe[4]

Prof. S. S. Gadekar[5]

Department of Electronics and Telecommunication Engineering
Shreeyash College of Engineering & Technology,Aurangabad, Maharashtra

---***---

Abstract - This paper addresses two conflicts in the energy management strategy (EMS) for plug-in hybrid electric vehicles (PHEVs). The increasing concerns regarding environmental sustainability and the growing demand for energy-efficient transportation have led to the development and adoption of electric vehicles (EVs). To further enhance the capabilities and efficiency of EVs, cloud computing technologies have been integrated into the design and operation of these vehicles. This abstract provides an overview of the concept and benefits of cloud-operated E-Vehicles. Cloud-operated E-Vehicles leverage cloud computing infrastructure and services to enhance various aspects of electric vehicle functionality. The cloud acts as a central hub for data storage, processing, and communication, enabling real-time monitoring, control, and optimization of the EV's performance. The integration of cloud computing technologies with EVs offers several advantages, including improved energy management, enhanced vehicle-to-grid (V2G) capabilities, and advanced user experiences.

Key Words: Node MCU, Motor and motor driver.

1. INTRODUCTION

Electric vehicles (EVs) have gained significant popularity in recent years as a sustainable and eco-friendly mode of transportation. The advancements in battery technology and the increasing availability of charging infrastructure have contributed to the widespread adoption of EVs. However, to further enhance the capabilities and efficiency of these vehicles, the integration of cloud computing technologies has emerged as a promising approach.

Cloud computing offers a powerful platform for data storage, processing, and communication. By connecting EVs to the cloud, a range of services and benefits can be unlocked. Cloud-operated E-Vehicles leverage this connectivity to enable real-time monitoring, control, and optimization of various aspects of EV performance.

The integration of cloud computing with EVs opens up new possibilities for efficient energy management. By collecting and analyzing data from various sources, such as vehicle sensors, charging stations, and weather forecasts, the cloud can optimize energy consumption and charging patterns. This optimization ensures that the vehicle's range is maximized, and the battery life is preserved, leading to improved overall performance and reduced energy costs.

Cloud connectivity also enables advanced vehicle-to-grid (V2G) capabilities. EVs can communicate with the cloud infrastructure and the power grid, allowing bidirectional energy flow. This means that the EVs can not only consume electricity but also serve as mobile energy storage units. Cloud-operated E-Vehicles can participate in demand response programs, supplying power back to the grid during peak demand periods or absorbing excess energy during off-peak hours. This integration of EVs with the grid enhances grid stability and supports the integration of renewable energy sources.

Moreover, cloud integration enhances user experiences and services. Through the cloud, EVs can access a wide range of applications and services, such as remote vehicle monitoring and control, over-the-air software updates, intelligent navigation systems, and personalized driver assistance features. Cloud-based platforms enable seamless connectivity between EVs, charging infrastructure, and other devices, facilitating enhanced vehicle management, maintenance, and safety.

II. BLOCK DIAGRAM

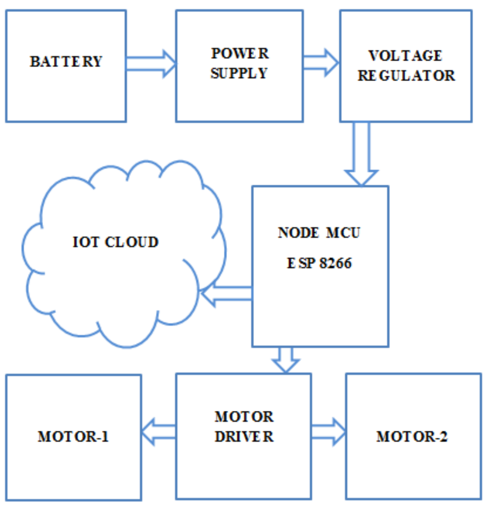

Fig.1: Block Diagram of Cloud Operated E-Vehicle

III. HARDWARE USED

1. NODE MCU

The ESP8266 is a popular and versatile Wi-Fi module widely used in the field of Internet of Things (IoT) and embedded systems. It is a low-cost, low-power, and highly integrated system-on-a-chip (SoC) solution that

International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 07 Issue: 06 | June - 2023 SJIF Rating: 8.176 ISSN: 2582-3930

combines microcontroller unit (MCU) and Wi-Fi connectivity into a single package. The ESP8266 provides a number of General Purpose Input/ Output (GPIO) pins, which can be used to interface with various sensors, actuators, and external devices. These pins can be configured for digital input/output, analog input, or special functionalities such as PWM (Pulse Width Modulation). It typically has more pins available, including GPIO pins (up to 11), VCC, GND, TXD, RXD, and other specialty pins like D0, D1, D2, D3, D4, D5, D6, D7, D8, 3V3, and RST.

Fig.2: ESP8266

2. MOTOR DRIVER

The L293D is a popular motor driver IC commonly used for controlling DC motors. It can control two DC motors independently or a single stepper motor, providing bi-directional control and allowing the motors to be driven with a wide range of voltages and currents. The L293D is designed as a dual H-bridge motor driver, meaning it consists of two separate H-bridge circuits. Each H-bridge can control the direction of rotation and speed of a DC motor independently.

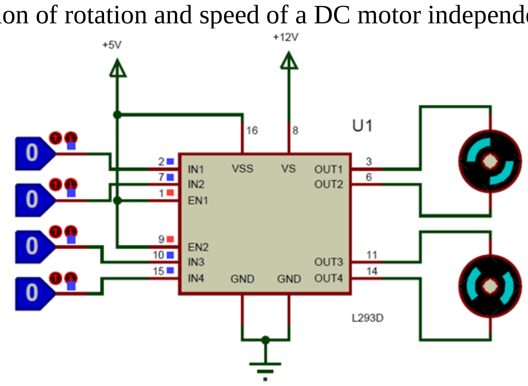

Fig.3: Motor driver

3. DC MOTOR

A DC motor is an electrical machine that converts electrical energy into mechanical energy. In a DC motor, the input electrical energy is the direct current which is transformed into the mechanical rotation.

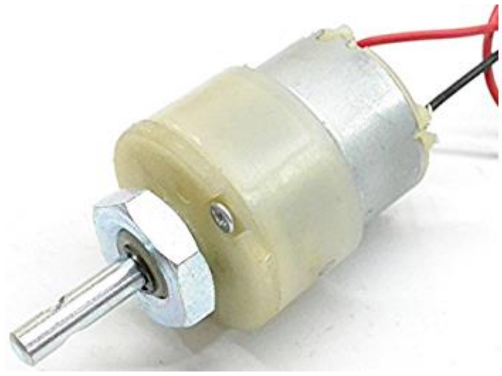

Fig.4: DC Motor

4. BLYNK APP

Blynk is an IoT platform for iOS or Android smartphones that is used to control Arduino, Raspberry Pi and NodeMCU via the Internet. This application is used to create a graphical interface or human machine interface (HMI) by compiling and providing the appropriate address on the available widgets.

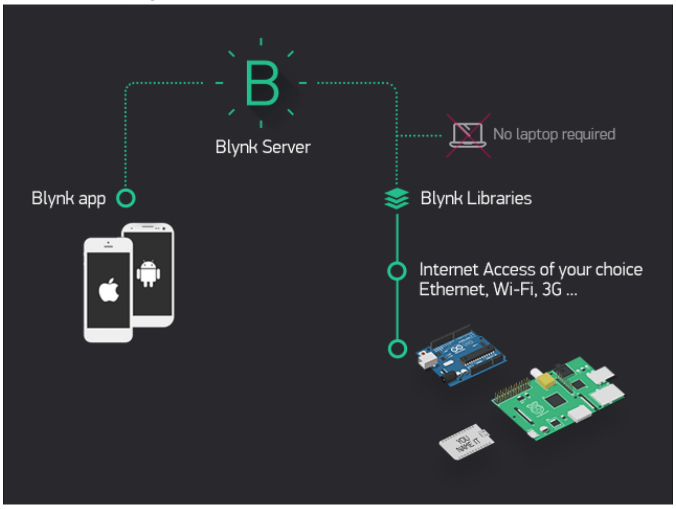

Fig.5: Blynk App

IV. WORKING

A 12v Battery is connected to the bridge rectifier is rectifier the voltage and gives the pulsating dc voltage, then capacitor is connected to the bridge so it give filter output or pure supply. Then voltage regulator we use LM7805 its output gives 5v dc. There are three terminal of LM7805, IN, OUT and GND. Now the voltage regulator output is connected to the controller.

ESP 8266 is connected to the 5v supply. There are 17 GPIO pins in Node mcu. Motor driver receives signals from the microprocessor and eventually, it transmits the converted signal to the motors. It has two voltage pins (VCC1 and VCC2), and one of them is used to turn on the motor driver, and another pin is used to apply the voltage to the motor through this motor IC. This motor IC will continuously toggle the output signal according to the input wave it is receiving from the microprocessor.

Now, in the first condition, when S1 and S4 switches are closed, and S3 and S2 are open, the voltage will pass from the S1 switch to the Motor and then to the S4. Hence we have a complete circuit that will allow current to flow from V to M through S1 and S4. This state will be a short circuit in S1 and S4 switch condition. In this case, the Motor will be in ON, and the direction of the Motor will be in a clockwise rotation.

A device publishes "on" and "off" messages on the motor1 and motor2 topic. You have a device that controls a motor (it can be an ESP32, ESP8266, or any other board or device). The ESP8266 that controls your motor1 and motor2 are subscribed to that same topic. So, when a new message is published on that topic, the ESP8266 receives the "on" or "off" messages and turns the motor forward or back.

V. CONCLUSIONS

In this paper, we have proposed a hierarchical charging model for heterogeneous EVs. To accommodate the diverse service requirements of customers, we considered a two layered cloud computing infrastructure consisting of local and remote clouds. To solve the issues of heavy load demands and uneven charging demands at charging stations, we proposed to combine cloud server planning with capacity planning in charging stations and profit maximization in the model design. Different EV service requirements, end-to-end delays, and different charging levels have been considered and analyzed. Given the QoS metrics, the proposed models guarantee that only a low percentage of customers is not getting served. The obtained results demonstrate the efficiency of our models.

➢ Advantages

- It provides easy analysis of performance parameter of lithium-ion battery of different battery supplier.
- Continuous monitoring of performance parameter of electric vehicle
- Avoid any kind of accidents, hazardous effect due to continue monitoring of EV parameters
- No fuel required so you save money on gas
- Environmental friendly as they do not emit pollutants
- Lower maintenance due to an efficient electric motor
- Better Performance

➢ Future Scope

- To make system more reliable and accessible to owner of Electric Vehicle create a simple database that can be analyzed, and the previous data can be accessed at any time on cloud.
- Create mobile application that displays the analysis of the performance parameter of each cell of EV and also sends notification/alerts for further preventive action.
- Analysis of each EV battery, supplied by battery manufactures to find best battery supplier, amongst all and locate improvement areas for rest of battery suppliers so they can correct their products.

REFERENCES

[1] C. Kong, B. P. Rimal, B. P. Bhattarai, and M. Devetsikiotis, "Cloudbased charging management of electric vehicles in a network of charging stations," in Proc. IEEE Int. Conf. on Commun., 2018, pp. 1–6.

[2] I. S. Bayram and A. Tajer, Plug-in Electric Vehicle Grid Integration. Artech House, Norwood, MA, 2017.International Energy Agency, "Global EV Outlook 2017," https://www.iea.org/publications/freepublications/publication/GlobalEVOutlook2017.pdf, 2017, [Accessed Oct-09-2017].

[3] K. Clement-Nyns, E. Haesen, and J. Driesen, "The impact of charging plug-in hybrid electric vehicles on a residential distribution grid," IEEE Trans. Power Syst., vol. 25, no. 1, pp. 371–380, 2010.

[4] Y. He, B. Venkatesh, and L. Guan, "Optimal scheduling for charging and discharging of electric vehicles," IEEE Trans. Smart Grid, vol. 3, no. 3, pp. 1095–1105, 2012.

[5] H. Hu, Y. Wen, L. Yin, L. Qiu, and D. Niyato, "Coordinating workload scheduling of geo-distributed data centers and electricity generation of smart grid," IEEE Transactions on Services Computing, in print, 2020.

[6] R. Kaewpuang, S. Chaisiri, D. Niyato, B. Lee, and P. Wang, "Cooperative virtual machine management in smart grid environment," IEEE Transactions on Services Computing, vol. 7, no. 4, pp. 545–560, Oct 2014.

[7] W. Wu, W. Wang, X. Fang, L. Junzhou, and A. V. Vasilakos, "Electricity price-aware consolidation algorithms for time-sensitive VM services in cloud systems," IEEE Transactions on Services Computing, in print, 2020.

[8] Hossam A. Gabbar, Ahmed M. Othman "Review of Battery Management System (BMS) Development and Industrial Standards" MDPI Published 11 April 2021

[9] Julio A. Sanguesa 1, Vicente Torres-Sanz "A Review on Electric Vehicles: Technologies and challenges", © 2021 by the authors. Licensee MDPI Published: 15 March 2021