ELECTRIC VEHICLES BATTERY MANAGEMENT SYSTEM WITH CHARGE MONITORING AND FIRE PROTECTION

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ABSTRACT: The most crucial component of any electric vehicle (EV) is its battery storage, which holds the energy required for EV operation. Therefore, an effective battery management system is required to both maximize a battery's operating capacity and guarantee its safe functioning. It keeps an eye on the parameters, calculates the state of charge, and offers the services required to guarantee the battery operates safely. Therefore, BMS is a crucial component of any EV and protects the user and battery by making sure the cell runs within its safe operating ranges.. The proposed system only monitor the battery and charge it safely but also protect it to avoid accidents from occurring. The proposed model has following functions current, voltage measurement, state of charge (SOC) calculation, protection, battery status detection, liquid crystal display (LCD) etc. Electric vehicles (EVs) are automobiles powered by one or more electric motors, which draw energy from rechargeable batteries instead of relying solely on internal combustion engines (ICEs) that consume fossil fuels

Keywords: Electric Vehicles (EVS), Liquid Crystal Display (LCD), State Of Charge (SOC).

I. INTRODUCTION

An electric car Vehicles classified as electric vehicles (EVs) are propelled by one or more electric motors. An EV uses a battery pack to store electrical energy to power an electric motor that propels the wheels rather than an internal combustion engine (ICE) that burns fuel.EVs have several advantages over traditional ICE vehicles, including lower pollutants, quieter operation, and fewer fossil fuel emissions. They also usually have lower operating costs because electric motors are more efficient than internal combustion engines (ICEs) and electricity is often less expensive than gasoline..An EV are popular worldwide because of cleaner and most sustainable future. In many countries the government declares the many subsidies so that Ev gets promoted. Beside with advantages of Ev there are many limitations faced such as internal short circuit causes over temperature. A battery management system (BMS) is an electrical device that controls and keeps track of the operation of rechargeable batteries, such as those found in renewable energy sources and electric cars. During regulating the charging and discharging BMS continuously monitors the SoC and SoH of battery.

Typically, the BMS is made up of several components, including sensors to measure the battery's temperature, voltage, and current, as well as control circuits to regulate how the battery is charged and

discharged under different circumstances. The BMS may also contain software algorithms that predict the battery's remaining capacity and estimate how long it will last.One of the key functions of a BMS is to prevent the battery from being SOC and SOH, which can cause permanent damage to the battery and reduce its lifespan. The BMS accomplishes this by controlling the charging and discharging process and shut down the battery if any abnormal conditions occur.

II. METHODOLOGY

The Arduino microcontroller is a component of this suggested system. A Li-ion battery charging circuit is used to balance charge the Li-ion battery. A DS18b20 temperature sensor attached to an Arduino's analog pin is used to measure the battery's temperature. The LCD shows the results.A 5V relay linked to Arduino Uno is turned off when an over temperature is detected, cut off power to the battery. The Arduino Uno is connecting to a fire sensor, It provides a signal to relay in order to prevent a fire hazard.Motor drivers are used to connect motors to an Arduino. The Arduino UNO pins are connected to the motor driver that we are using. Using charging circuitry, the voltage sensor limits the current flowing to the battery and checks The LCD screen, the battery's voltage and current levels. The technology shuts the power as soon as the battery is fully charged and shows the battery's full charge on the LCD. The current sensor records the amount of current taken from the battery when the system first starts up and shows the parameter on the LCD display. The temperature sensor is used to monitor temperature of battery while charging as well as discharging. If the battery temperature is observed to deviate from standard values, the system automatically cuts off input as well as output supply and displays the temperature as well as a buzzer alert on the LCD display. Thus, the system allows for a smart and efficient battery charging as well as protection system.
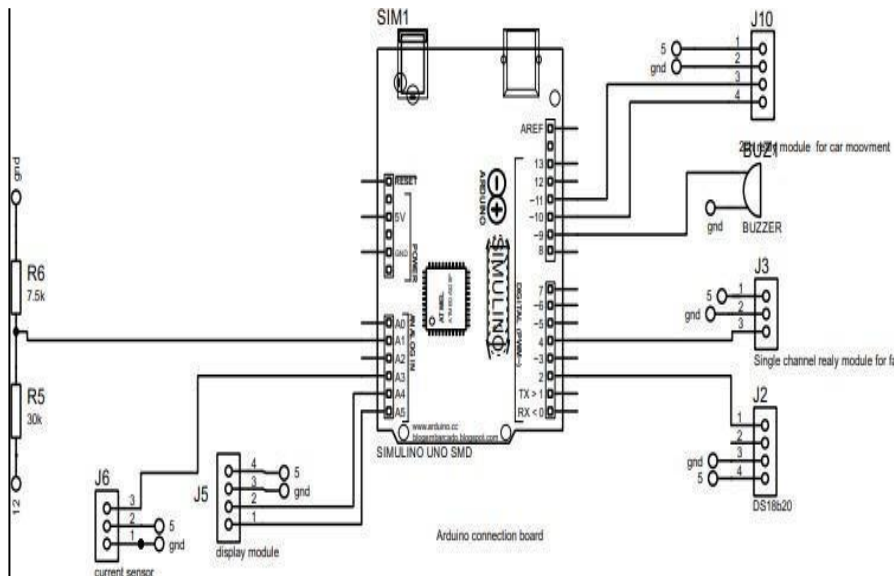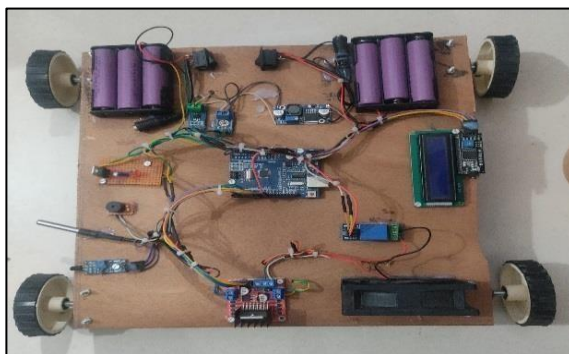
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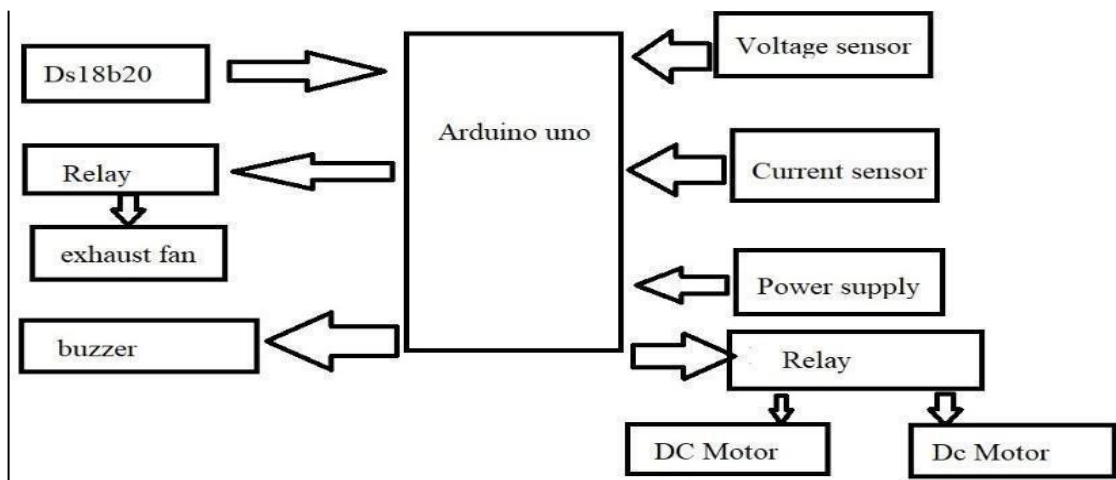
Components

1. Arduino Uno

2. Li-ion Battery

3. DC Motor

4. Bluetooth HC-05

5. DS18b20   temperature sensor

6. LCD Displat

7. Current Sensor

8. Voltage Sensor

9. Relay Module

CONNECTION DIAGRAM

MODEL

IV. RESULTS

We have tracked the battery's voltage, current, and temperature throughout this project. The project's outcome is that the sensor will automatically activate the fan and alarm system and provide you an indicator on the display if the battery's temperature rises for any cause or if the battery is overcharged.. Even if there is a fire due to a short circuit in the EV, the sensor will know

about it immediately so that the safety of the battery and the EV increases.

V. CONCLUSION

The EV BMS with charge monitor and fire prevention is a crucial component of electric vehicles that ensures the safety, dependability, and longevity of the battery pack. The technology increases the overall efficiency of electric vehicles and reduces the risk of battery fires by providing essential safety features like temperature control, fault detection, and fire prevention. In order to improve the features and capabilities of EV BMS with charge monitor and fire protection. A few potential future work areas include enhancing the precision and dependability of battery monitoring systems to deliver more accurate and precise data regarding the charge, health and function of the battery pack.

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