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Power Saving Mode of BMS in Electrical Vehicle

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ABSTRACT: The electric car's battery serves as its primary energy storage system. In actuality, it controls the popularity of electric vehicles. The development of batteries and electric vehicles, which are essential tools in the fight against climate change and air pollution, have seen significant recent progress. However, there are still obstacles that prevent people from purchasing electric automobiles, such as a lack of adequate infrastructure, a limited number of charging stations, a restricted amount of battery storage, and limited battery storage capacity. In order to overcome these obstacles,. The Raspberry Pi will receive the battery level information provided by the applications and sensors in the car. This Raspberry Pi will operate the many electronic control systems in the vehicle so that all available power is used for driving alone and not for auxiliary features like the DLR light, air conditioning system, automatic windows, music system, etc. By achieving this, we may extend the range of an electric car on a single charge. This circuit will also concentrate on reducing the energy consumption of the battery of an electric vehicle by improving the BMS's energy management strategy. Threshold charge level will be set for battery to save the power i.e., power saving mode, and anytime the battery percentage falls below that set threshold value, a program that is set up on the Raspberry Pi which will take over and turn off the unnecessary equipment.

KEYWORDS: EV-Electric Vehicle, BMS-Battery Management System, SoC-State of Charge, SoH-State of Health, Raspberry Pi, Supercapacitor.

I. INTRODUCTION

The automotive industry has become one of the most important world-wide industries, not only at economic level, but also in terms of research and development. Increasingly, there are more technological elements that are being introduced on the vehicles towards the improvement of both passengers and pedestrians' safety. In addition, there is a greater number of vehicles on the roads, which allows for us to move quickly and comfortably. However, this has led to a dramatic increase in air pollution levels in urban environments (i.e., pollutants, such as PM, nitrogen oxides (NOX), CO, sulphur dioxide (SO2), etc.). In addition, and (CO2) emissions, while the road transport is accountable for over 70% of the transport sector emissions. Therefore, the authorities of most developed countries are encouraging the use of Electric Vehicles (EVs) to avoid the concentration of air pollutants, CO2, as well as other greenhouse gases. More specifically, they promote sustainable and efficient mobility through different initiatives, mainly through tax incentives, purchase aids, or other special measures, such as free public parking or the free use of motorways. The battery management system, BMS (Battery Management System), is an important component of the power battery system of electric vehicles. On the one hand, it detects, collects and preliminarily calculates the real-time battery status parameters, and controls the on and off of the power supply loop based on the comparison between the detected value and the allowable value; on the other hand, it reports the collected key data to the vehicle controller and receives the controller to coordinate with other systems on the vehicle. Battery management system, different battery types, often have different requirements for the management system.

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II. RELETED WORK

Electric Vehicle Attitudes And Purchase Intention: A Flemish Case Study
This paper focuses on the user and his perception about electric vehicle. It also analyzes the customer opinion on driving the electric car in A living lab ,this forms the ideal environment to question test users about their perception after a 10 weeks EV testing trial. From this type of arrangements the respondents had a moderate positive attitude towards electric mobility. They confirm that the low cost per kilometer, environmental friendliness and home charging are important advantages. This also states that consumers with a more positive attitude experience the environmental character as a bigger advantage. The limited electric range still remains the main disadvantage for users, followed by the high purchase price. Consumers with a more positive attitude attached more importance to the higher purchase price. The willingness to purchase an EV is in some way related to someone's attitude: the morepositive, the sooner one is willing to purchase an EV.

Analysis Of Parameters Influencing Electric Vehicle Range In This Paper, Range is considered as a key parameterof electric vehicles. Increasing electric vehicles range is important for acceptance of electro mobility. Battery capacity is the main parameter influencing electric vehicles range. In order to batteries are the most expensive partof electric vehicle is it suitable to focus on others parameters such a weight, aerodynamic drag coefficient or correct size of motor. Range is not influencing only by the designs parameters such as battery capacity but also important isdriver influence. Simulations were created in order to determine how these are influencing those factors range.

1. PROPOSED SOLUTIONIntroduction

The modern electric vehicles has only systems that warns the driver about potential battery drain out condition. The proposed system will override the controls of the other embedded components in the car other than the driving systems enabling a longer distance.

Description
In this project, Consist of four battery packs which having the lithium-ion battery. This battery gives supply to the BMS Unit (Battery Management System) from this BMS the supply is given to the all equipment's of electric vehicle with the help of connected relay. Power supply is fed from battery pack. Power supply is used for providing supply to the raspberry pi. The BMS output is given as input of the raspberry pi. This raspberry pi is connected tothe relays and with the help of relays non-essential equipment is get turn off. the power saving system will automatically turn off all other systems and allow the battery power only for driving .

2. POWER SAVING SYSTEMWorking principle

Electric vehicles have a significantly shorter range compared to the conventional vehicles with the internal combustion engine. Hence, it is important to use the remaining battery power as efficient as possible. Thus, the range must be somehow improved. The proposed power saving system for electric vehicle will help in increasing vehicle range at the time of critical battery power level, The raspberry pi controls the functions of AC (CPU fan), motors, lights (led lights), music systems(buzzer), dashboard (led display), and speed of the motor when the battery power reaches low level. The system can be activated even when there is sufficient amount of charge manually by using a switch if the user is in need of more travelling range with less battery power consumption. This system reduces the speed of the motor to the optimum speed by using the L293 Motor driver. Thus, the speed will be reduced to optimum speed and the lights if on will be switched to low beam or dim light and all the other systems will be completely turned off by the system.

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Block Diagram

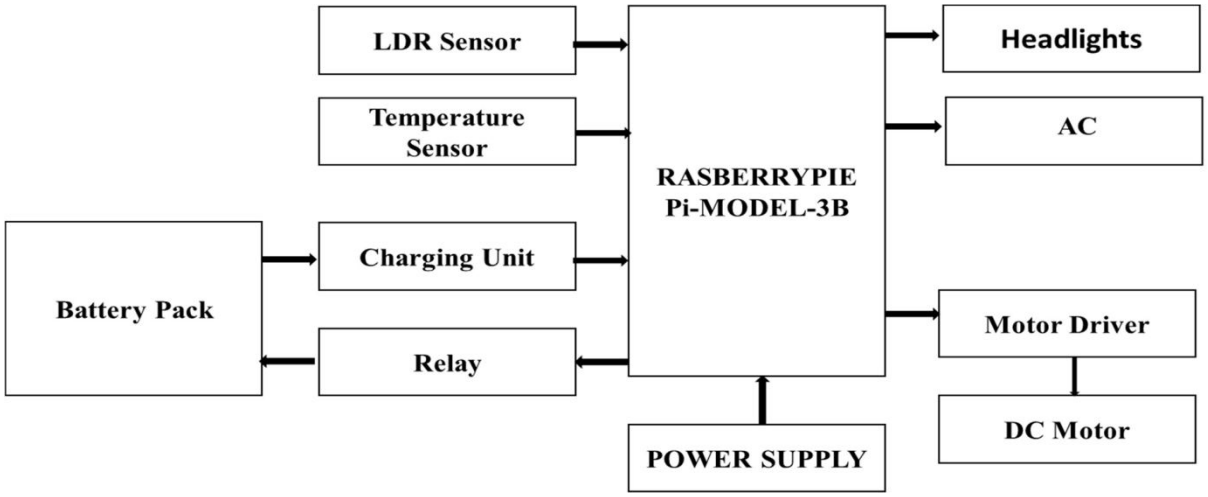

Fig.1. Block Diagram of Proposed System

III. HARDWARE DESCRIPTION SYSTEM

1 Raspberry Pi: The Raspberry Pi 3 Model B is the latest board launched by the Raspberry Pi Foundation in June 2019. This model has the latest high-performance quad-Core 64-bit Broadcom 2711, Cortex A72 processor clocked at 1.5GHz speed. This processor uses 20% less power and offers 90% greater performance than the previous model. Raspberry Pi 4 GPIO Pinout with functions, schematic, and specs are given in detail below. Raspberry Pi 4 model comes in three different variants of 2 GB, 4 GB, and 8 GB **LPDDR4 SDRAM**. The other new features of the board are dual-display support up to 4k resolutions via a pair of micro-HDMI ports, hardware video decodes at up to 4Kp60, dual-channel 2.4/5.0GHz wireless LAN, true Gigabit Ethernet, two USB 3.0 ports, Bluetooth 5.0, and PoE capability (via a separate PoE HAT board)

Fig.2. Raspberry Pi Model

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2. L293D MOTOR DEIVER:

L293d IC is known as a motor driver. It is a low voltage operating device like other ICs. Theother ICs could have the same functions like L293d but they cannot provide the high voltage to the motor. L293d provides the continuous bidirectional Direct Current to the Motor. The Polarity of current can change at any time without affecting the whole IC or any other device in the circuit. L293d has an internal H-bridge installed for two motors

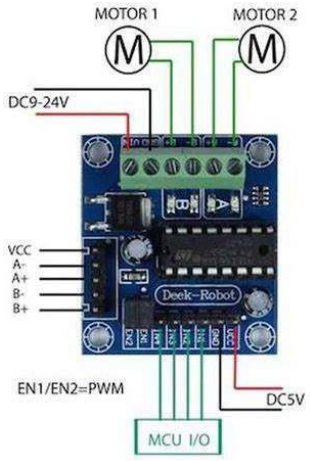

Fig. 3. L293 Motor Driver

IV. SIMULATION DIAGRAM

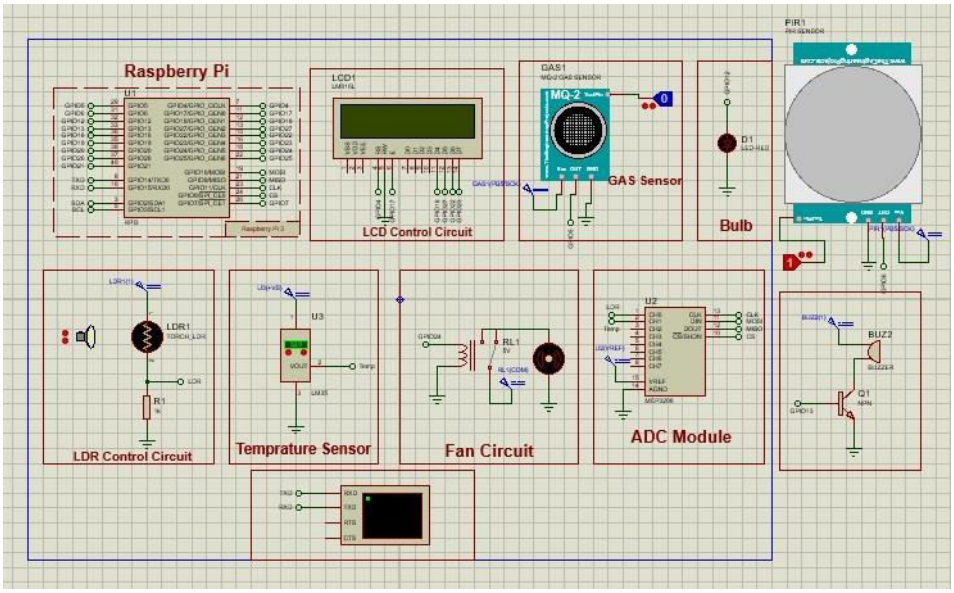

Fig.4 Simulation Diagram Of Proposed System

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V. SIMULATION RESULT

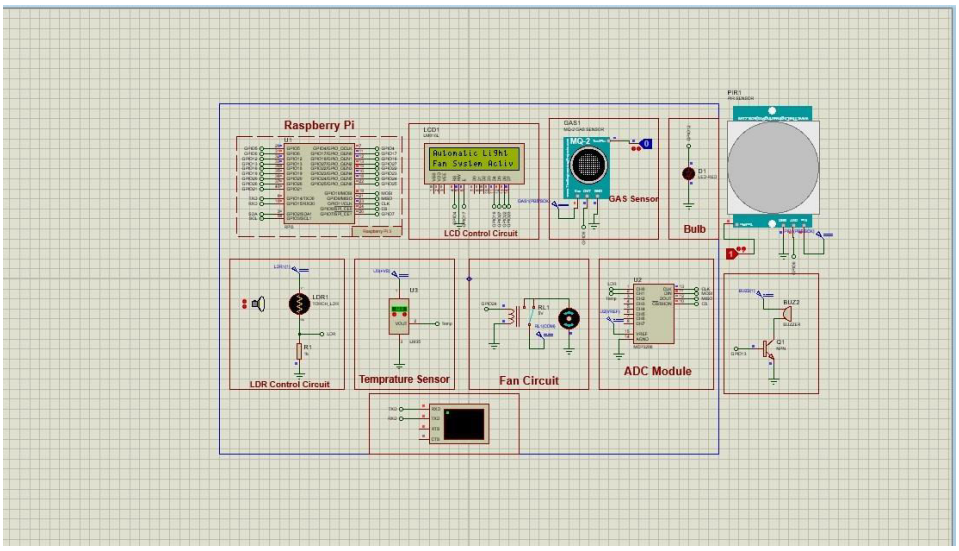

Fig.5 Simulation Result Of Proposed System

VI. EXPERIMENTAL RESULT

The Power Saving System developed has been experimentally proven to work satisfactorily by connecting components such as lights, motors, fans and display with microcontroller. This System successfully controlled the desired components automatically by turning off of non essential systems and by reducing the speed of the motor.

VII. CONCLUSION

Using the power saving system as a base , this system can be implemented in various type of electric vehicles including electric bikes, hybrid vehicles, electric trucks, and even for conventional fuel based vehicles for both decreasing the difficulties faced by the vehicle users when the respective fuel (battery power or fuel) is critically low and increasing the electric vehicle users. These will subsequently help in fighting the pollution and climate change in a faster rate.

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