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Analyzing the Monitoring and controlling of Electric bike

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Abstract: Electric vehicles (EVs) have been widely regarded as the most promising solutions to replace conventional integrated engine-based vehicles. The control system works by selecting the right energy source to supply voltage to the output load and also this control system can regulate the charging and discharge of the battery automatically based reservation algorithm. The voltage source consists of two energy, from the battery or other external sources. The control application or switch is control system of motor (ON and OFF) condition through a relay when the battery capacity has been widely applied as the power supply for EVs. Hence, for the owner, it is important to know all the information regarding battery operation like percentage charging and also the improper operations like motor control to operate a smooth and efficient operation. In this method, Battery Management System (BMS) will continuously monitor the key operational parameters such as voltage, current, and temperature of the battery and ensures its safe operation. Based on this data, it calculates the State of Charge and informs the owner of the vehicle by using an LCD on the output.

Keywords: Monitoring, Electric Vehicle.

I. INTRODUCTION

The main source of energy storage is the battery, the charger is used to charge the battery by converting electricity from the mains. To drive the motor, the voltage level is DC, and the current is inverted into a decision to switch signal by an electronic power converter. Other electronic components in a car can be powered via a DC-DC converter, which reduces the voltage from the rechargeable battery to lower levels. The battery charger is essential for getting the most out of the lithium-ion battery. Efficiency and reliability, weight and cost, charging time, and power density are all notable characteristics of a charging cable.

The components and switching strategies determine the charger's properties. For a battery, this is a lithium ion battery charger circuit. This circuit is a current- limited lithium ion battery charger based on the well- known variable voltage regulator. The recharging current is determined by the resistor value. The recharging voltage is determined by the resistor. The mains voltage is reduced by the transformer, and rectification is accomplished by bridge filter capacitance is Greater than unity. When the charger is turned off or when mains power is unavailable, the diode prevents

Current from flowing backward from the lithium- ion battery. A critical component of electric and hybrid electric cars is the Battery Management System (BMS).

The BMS's job is to ensure that the battery operates safely and reliably. State monitoring and evaluation, charge regulation, and cell balancing are all functionalities that have been integrated into the Battery system to ensure the battery's stability and security. A battery behaves differently under different environmental and operational situations as an electrochemical product. The inconsistency of a battery's performance makes these functionalities difficult to accomplish. Concerns about contemporary BMSs are addressed in this method. The future problems for BMSs are outlined, as well as prospective answers, by reviewing the newest approaches for battery condition evaluation as well as intended.

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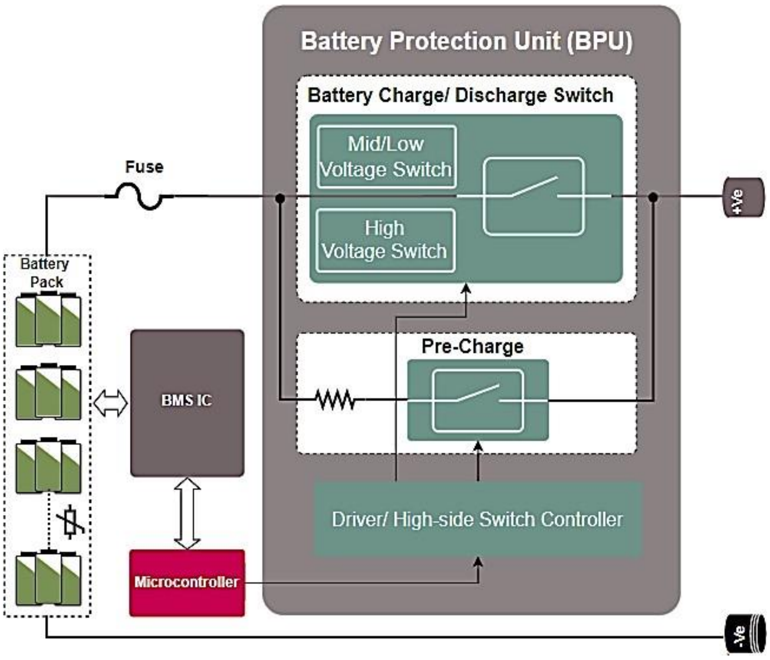

Figure 1 Basic module of Electric Vehicles

Electric bike requirement for systems that govern the DC battery charging process within these vehicles, as well as ensure that a user may obtain diagnostics on this process. Because most electric vehicles use lithium-ion batteries, a mechanism to regulate the charging and discharging process is required. This is required because lithium-ion batteries are delicate, and they can explode if too much power is extracted from them too soon. Short circuiting, denting, overpaying, and overheating can all cause battery damage. Because of "thermal runaway," a phenomenon that causes thermodynamic properties within the battery to rise considerably quicker than they can be dissipated, lithium-ion batteries are more prone to problems.

The battery system is an important consideration, and the objective is growing focus on vehicle range and performance, the Li-ion battery could be a viable option. This method is about the design of a Li-ion battery pack for an experimental electric scooter with excellent performance and autonomy. The chosen battery system is made up of a sufficient number of series-connected cells with a high voltage level. As a result, cell harmonization and monitoring are required. Charge and discharge cycles cause cell unbalancing due to manufacturing asymmetry.

II. LITERATURE SURVEY

A dynamic analysis of a hybrid electric vehicle's behavior is required to accurately assess its performance, as well as its consumption and emission levels. For electric and hybrid electric cars, there are two types of simulation tools: steady state and dynamic tools. Tools that employ steady-state models are best for system-level analysis, whereas tools that use dynamic models can provide information on the behavior of sublevel components [1].

There has been much more concern expressed over the power quality issues caused by electric vehicle chargers on low voltage distribution systems. It is necessary to know the influence of the electric vehicle chargers impact to power grid before electric vehicles operating in scale. In this paper a field measurement is carried out on a low-voltage distribution system with 4 alternating current electric vehicle conductive chargers that are specified by SAE 1772 standard, and a part of operated nonlinear loads. Some measured results of voltage/current trend, harmonics/inter harmonics, flicker, and power quality events are discussed [2].

As transportation trends shift toward electric vehicles, the internal combustion engine may become obsolete at some point shortly owing to fuel depletion. The widespread use of electric vehicles might cause significant changes in society, not just in terms of the technologies used for individual mobility but also in terms of shifting economies away from petroleum and reducing the environmental impact of transportation [4]. The development of electric vehicles and regenerative braking are dependent on energy storage development. Battery’s low lifecycle always be a concern to be overcome which electric vehicle requires a charging and discharging cycle.

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The development of Hybrid Energy Storage Systems (HESS) is increasing [5].

The current progress in EV charging levels, methods, and topologies of charging stations. Contactless charging as a safe and user-friendly approach for charging EVs has been discussed. The influence on the distribution grid in peak hours analyzed. Finally, Hybrid Energy Storage System (HESS) using solar energy is introduced. The EV penetration on the grid either in peak hours or during the night when almost all the EVs have plugged in highlights the role of RES in the charging topologies. Consequently, the impact on the grid will be mitigated the impact on the grid and solution for upgrading the underground. The speed, range, and efficiency of electric vehicles are nearly equal when compared to diesel and petrol engine vehicles.

As the Electric Vehicle (EV) gains traction in the modern automotive market, a focus has been placed on the development of efficient and long-lasting methods to store energy. To exploit the advantages of a Hybrid Energy Storage System (HESS), new management schemes are needed which understand the mechanics of each energy storage device [6].

The battery bank on the PHEV is primarily charged through a grid connection, but like the HEV, can also be recharged using the combustion engine or by way of regenerative braking. Finally, the BEV presents a fully electric drive train running entirely on the battery bank. Without the presence of a combustion engine, there are only two methods to recharge: a grid charging connection or regenerative braking. Connecting different energy storage technologies can be a feasible solution to improve the energy or power density or obtain a faster response. A management scheme for hybrid energy storage systems composed of a super capacitor and lithium ion battery.

Shipboard electric propulsion systems experience large power and torque fluctuations on their drive shaft due to propeller rotational motion and waves. This paper explores new solutions to address these fluctuations by integrating a Hybrid Energy Storage System (HESS) and exploring Energy Management (EM) strategies. The HESS combines battery packs with ultra-capacitor banks. Two strategies for real-time EM of HESS are considered: one splits the power demand such that high- and low-frequency power fluctuations are compensated by ultra-capacitors and batteries, respectively [7].

Nowadays electrical vehicles are in demand and the developments in their field are increasing which is required to improve the performance of the vehicle in terms of single range to cover. An efficient energy storage device is required to improve the performance and efficiency of an EV. The power requirement of EV is dynamic which requires high energy and high power density source. A single source cannot fulfill this requirement. Thus the efficiency of an EV can be improved by hybridization of different energy storage sources [8].

Electric vehicles, as green and non-polluting modes of transportation, have seen a rapid rise in popularity around the world. However, their limited driving range continues to be a major stumbling block to their progress. The energy storage system's exact architecture has changed through time, and electric vehicles can collect kinetic and potential energy during regenerative braking, which is a beneficial approach for increasing vehicle operating range. As a result, designing an effective regenerative braking strategy to improve energy efficiency and boost continued driving mileage is critical [9].

If a lithium-ion battery is overcharged, it may fire due to the fluctuation, ignitability, and entropy changes. This is a critical issue, particularly with electric and hybrid vehicles, because an explosion could result in a deadly accident. Furthermore, due to irreversible chemical processes, over-discharge reduces cell capacity.

As a result, a Subsystem must monitor and control the battery using the safety circuitry included in the battery packs. When problematic conditions are identified, such as overvoltage or overheating.

The Subsystem should alert the user and perform the predefined corrective method. The Subsystem also monitors the system temperature to give a better energy consumption plan and interfaces with different pieces and operators, in addition to these activities. Charges in vehicles and examines its usage in outdoor environments by transmitting data to long detachments. The purpose behind this projected method is to save the life of individuals because there is a possibility that the system will result in a short trial which in turn causes severe damage to human life. Therefore, the main findings of the proposed work are to analyze the maximum limits of charge capacity with limitations in voltage sets [10].

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III. MATERIALS AND METHOD

Electric vehicles are mostly preferred nowadays because it is well efficient and are eco- friendly. But comes with a trade-off of the battery overcharging and deep discharging delay and charging module. The existing method designed Enabled Electric Vehicle's Wireless Battery Management System. Wireless charging based on managing the Battery performance is dependent on certain factors such as temperature, chemical composition, age, and rate of charge or discharge. Also, the user can locate the nearby charging station locations and transaction history can be viewed. Once the user knows about the status of his car battery, he can easily decide whether to proceed with the charging process by permitting him to charge. If any Error will occur, the car place point is not correct, the battery is not supporting the error detection will indicate the LED indicator.

In the electrical vehicle, the power supply circuit is the energy source that might require a specific converter to be integrated into the High Voltage (HV) DC link of the powertrain. For electric sources like SCs (State of art) and batteries in this method system, lithium-ion batteries are used in the proposed method. The mobile application is for the operating the motor ON and OFF condition through relay and controller. The relay was opened and closed via a connected motor based on vehicle or engine on and OFF conditions Initially, the battery is fully charged and kept for discharging, both the times will be recorded and sub- divided into equal parts Charging circuit analyzes the fast charging and discharging capability of (SCs), a fast- dynamic controlled converter is required to avoid incompatible operations.

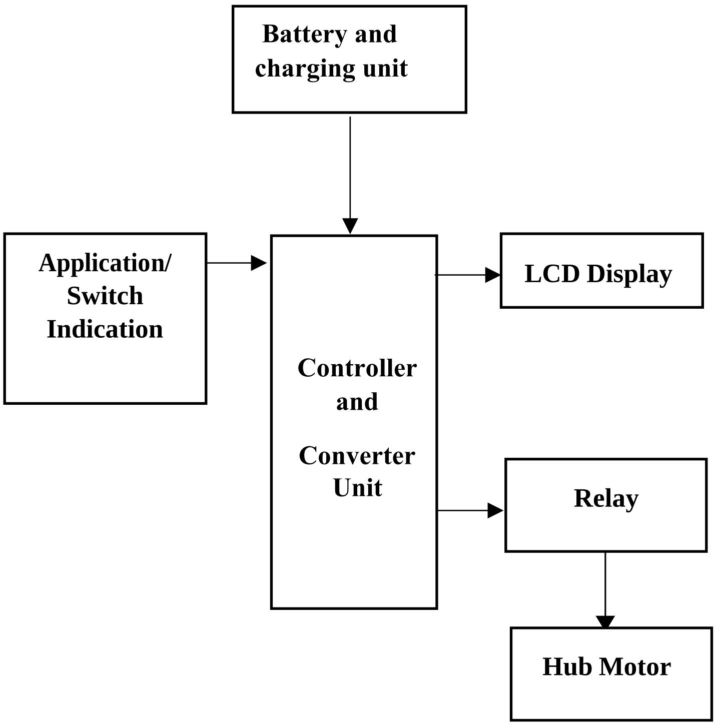

Figure 2 Proposed Block diagram

a. Lithium-Ion Battery

The lithium-ion battery is a self-contained, chemical power pack that can produce a certain amount of power when needed. Unlike normal electric power that begins to control the home by working on tram stops, the battery chemistry. For our convenience and safety, these are usually packed in metal or plastic boxes.

There are two relatively simple fluorescent lamp terminals labeled positive (plus) and negative (negative), which are connected to the outside of the electrode. The difference between batteries and batteries is that the batteries are attached to two or more cells, thus adding to their power.

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Figure 3 Configuration of Electrical Vehicle.

b. Electrochemical Energy Storage

Electrochemical energy storage systems, especially batteries, are essential for various types of Hybrid Electric Vehicles (HEV), plug-in hybrid electric vehicles (PHEV), and all battery-based Electric Vehicles (EVs). Electrochemical storage systems are also referred to as systems that have the capability of transforming the chemical form of energy into an electrical form of energy. Depending on the operating conditions, such transformations can be carried out with reasonable performance.

The normal energy efficiency values lie between 80% and 90% for electrochemical energy storage. Electrochemical batteries are distinguished by slowly converts chemical packaging into electricity, which is usually released in days, weeks, months, or even years. The basic power unit inside the battery is called a cell, and it has three main bits. Between them are two electrodes (electrical terminals) and electrolyte their energy capacity, varying from 30 to 200 Wh / kg compared to other storage systems. In contrast, the energy density from hydrocarbon sources is considerably higher, at an order of 10 kWh / kg. The storage of electrical-chemical energy includes all types of secondary batteries. Through an electrochemical oxidation-reduction reverse reaction, the batteries convert the chemical form of energy that is stored in its active materials into the electrical form of energy. Traditional commercially accessible secondary batteries can be categorized into the following predefined categories as per the used electrochemical system. Traditional batteries (lead-acid, Ni-Cad) with new current batteries and batteries for high temperatures (Na- s, Na metal chloride) and special batteries (Ni-MH, Ly- ion, Li-pol) and flow battery (Ag-Zn, Ni-H2). Charging stations are power by electricity, BEV is considered as zero carbon emission vehicles because they do not produce direct exhaust or emissions comparatively other conventional vehicles. For the electric cars, the energy storage is up to 100 kWh and the electric range is approximately 500 kilometers targets have been explored.

Table 1 Battery characteristics

Battery/Crit eria	**Pb/ ac**	**Ni/ Cd**	**NiH M**	**Li/p**	**Li- ion**	**Na/N iCl2**
Energy [Wh/kg]	35-40	55	70	155	125	80
Power [W/kg]	80	120	200	315	260	145
Energy density [Wh/L]	90	90	90	165	200	130
Life cycles	300	1000	600	+600	+600	600
Charge time [h]	6-8	6-8	6	4-6	4-6	4-6
Driving Range [km]	75	100	150	250	200	200

Vehicles including only battery-based energy storage are called BEV. These types of electric vehicles (EVs) use the battery bank to store the electrical energy that powers the motor. The battery bank is charged by using an external plug that extracts the energyfrom a charging station. Charging stations are power by electricity, BEV is consideredas zero carbon emission vehicles because they do not produce direct exhaust or emissions comparatively other conventional vehicles. For the electric cars, the energy storage is up to 100 kWh and the electric range is approximately 500

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kilometers targets have been explored.

The major requirements of the electric motor drives are high instant power and high power density, high torque at low speeds for starting and climbing, as well as, high speed at low torques for cruising, very wide speed range including constant torque and constant power regions, fast torque response. To satisfy these special requirements the power and torque speed ratings of the motor drive should be determined on the basis of driving cycles and system level simulation. New motor design technologies and control strategies are being pursued to extend the speed range, to optimize the system efficiency and to enlarge the high-efficiency region. Newly developed electronic products have also been adopted to improve the system performance and to reduce the total cost. DC motor drives have been traditionally used for electric vehicle propulsion because of their ability to achieve high torque at low speeds and ease to control

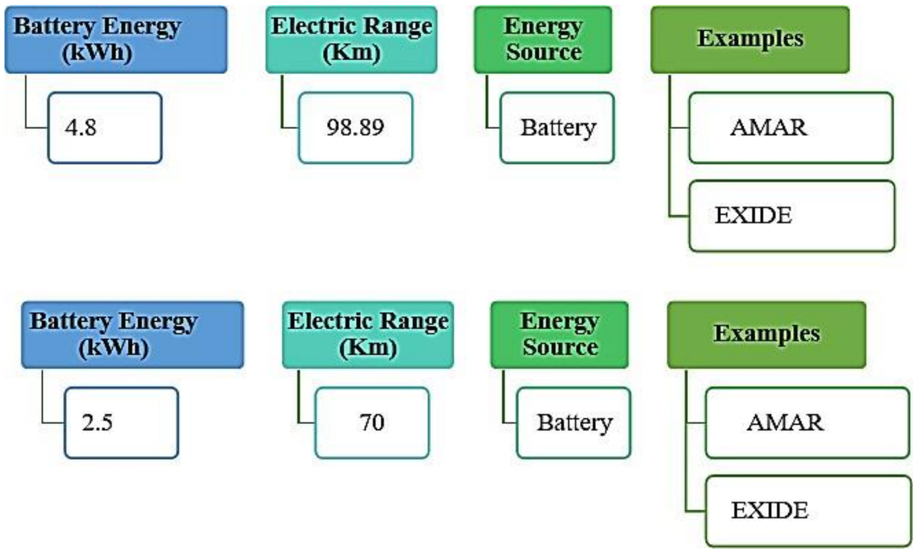

Figure 4 Battery ranges and parameters

c. RELAY

Relays are divided into numerous sorts based on the functionality and application for which they are used. Electromagnetic, solid-state, high-voltage and thermal relays are examples of these classes. As a result, the purpose of this article is to define a few fundamental types of relays that are commonly used in load-control applications. The Solid Static relays use analog electronic devices instead of magnetic coils and mechanical components to create the relay characteristics. the measurement is carried out by static circuits consisting of comparators, level detectors, and filters, while in a conventional electromagnetic relay it is done by comparing operating torque (or force) with restraining torque (or force). The relaying quantity such as voltage/current is rectified and measured. When the quantity under measurement attains a certain well- defined value, the output device is triggered and thereby the circuit breaker trip circuit is energized.

d. MOTOR

The electric vehicle is an integration of vehicle body, electric propulsion, energy storage battery and energy management. It is not only a transportation vehicle, but also a new type of electric equipment. The electric vehicle is a road vehicle based on modern electric propulsion, which consists of an electric motor, power converter and energy source, and it has its own distinct characteristics the configuration of the electric vehicle. The motor drive, comprising the electric motor, power converter and electronic controller, is the core for the electric vehicle propulsion system.

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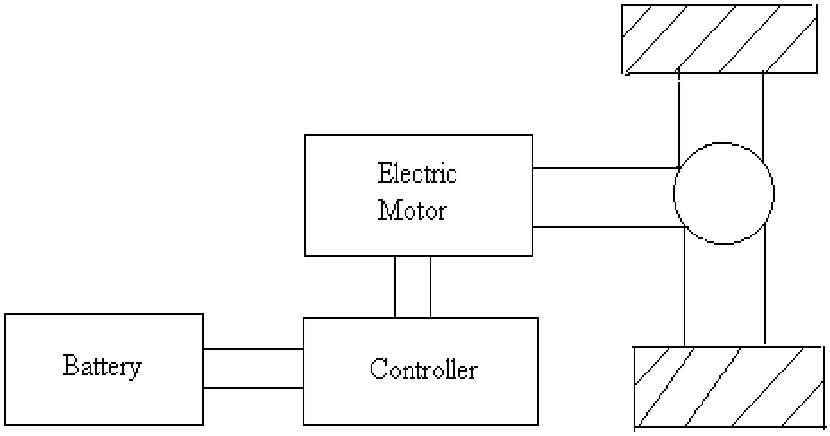

Figure 5 Electric vehicle configuration

The major requirements of the electric motor drives are high instant power and high power density, high torque at low speeds for starting and climbing, as well as, high speed at low torques for cruising, very wide speed range including constant torque and constant power regions, fast torque response. To satisfy these special requirements the power and torque speed ratings of the motor drive should be determined on the basis of driving cycles and system level simulation. New motor design technologies and control strategies are being pursued to extend the speed range, to optimize the system efficiency and to enlarge the high-efficiency region. Newly developed electronic products have also been adopted to improve the system performance and to reduce the total cost. Hub motor drives have been traditionally used for electric vehicle propulsion because of their ability to achieve high torque at low speeds and ease to control.

In this work, the motor is for operating a wheel and input supply to the battery. It can operate at the speed of a robotic wheelchair. When the wheel can go left to right while the motor can control the speed and go in a specific direction. An electric motor is an electrical machine that converts electrical energy into mechanical energy. The reverse of this is the conversion of mechanical energy into electrical energy and is done by an electric generator, which has much in common with a motor. Most electric motors operate through the interaction between an electric motor's magnetic field and winding currents to generate force. In certain applications, such as in regenerative braking with traction motors in the transportation industry, electric motors can also be used in reverse as generators to convert mechanical energy into electric power.

Found in applications as diverse as industrial fans, blowers and pumps, machine tools, household appliances, power tools, and disk drives, electric motors can be powered by direct current (DC) sources, such as from batteries, motor vehicles or rectifiers, or by sources, such as from the power grid, inverters or generators. Small motors may be found in electric watches. General-purpose motors with highly standardized dimensions and characteristics provide convenient mechanical power for industrial use. The largest electric motors are used for ship propulsion, pipeline compression, and pumped-storage applications with ratings reaching 100 megawatts. Electric motors may be classified by electric power source type, internal construction, application, type of motion output, and so on.

IV. CONCLUSION

In electric vehicles, Lithium-Ion batteries are the primary source of electricity in automobiles. The lithium-ion battery used in electric vehicles are inefficient, and they need to be recharged after a few miles. So there you have it: a new battery management system concept. The motor control condition on and OFF system operation as well as an economic output of this comparatively new and acceptable solution for battery problems in electric vehicles.

The mobile application is based on users analyzing the battery in half with this innovative battery management technique. The charging half is for charging, while the discharging half is for discharging. Renewable energy sources are used to charge the vehicle. While one side is charging, the other is simultaneously discharging. The output result is charged section of the battery when the other half is discharged, and the discharged portion is stored in the charging system for (Battery Management System)

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