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Design and Implementation of IoT Based Fast Charging and Battery Management System

M. Anandhakumar[1], P. Alwinvinoj[2], T. Dhinesh[3], A. Saranya[4], S. Saravanan[5]

UG Students, Department of Electrical and Electronics Engineering, Muthayammal Engineering College, Tamil Nadu, India[1,2,3],

Associate Professor, Department of Electrical and Electronics Engineering, Muthayammal Engineering College, Tamil Nadu, India[4]

Professor, Department of Electrical and Electronics Engineering, Muthayammal Engineering College, Tamil Nadu, India[5]

ABSTRACT: The Thermal Management System (TMS) of the battery is one of the most significant systems in the building of a wind system, with the goal of improving the battery's performance and life. The benefits and drawbacks of the proposed Battery Thermal Management System (BTMS) solutions are thoroughly examined, as well as the adaptability of these systems. The purpose of this paper is to critically evaluate previous studies and research on the types, designs, and operating principles of BTMSs used in the building of various-shaped lithium-ion batteries, with a focus on cooling methods. Nowadays wind systems have increased over the past decade as consumers demand more eco-friendly solutions to combat climate change. Recently some caught fire due to the failure of the battery Management system. So here the project is to monitor the Battery Temperature & Smoke Detection to Alert the Wind system and its busing cooling system users via Smartphone Notification, Alarm the Buzzer and also to Auto Cut off the Wind system to Avoid Further Damages. The battery monitoring system has two main components: a monitor and an interface. The system is capable of detecting deteriorated battery performance and sending notification messages to the user for further action, based on experimental results.

KEYWORDS: Real-Time Load Monitoring, Remote Control and Optimization, Energy Efficiency and Sustainability.

I.INTRODUCTION

In front of the huge increase demand in energy over the world, and in order to search a substitution kind of energy against the prices rise of the energy fossil fuel resources and then its exhaustion reverse in the long term. The development of this alternative is encouraged because it offers natural, economic, clean and safe resource. Monitoring and diagnosis become essential to reduce maintenance costs and ensure continuity of production, because stopped a wind installation for unexpected failures could lead to expensive repair and to lost production. This operating system stopped becomes critical and causes very significant loses , for this reason there is an increase need to implement a lot efficient maintains, This online surveillance allows an regular early detection mechanical and electrical faults; it must able to prevent major component failures the wind turbine becomes an important topic in scientific research and industries. The main objective of this project is to study the design of a real time monitoring and controlling system for state supervision of wind generator machine. Hence there is an urge to find any alternate resources. Energy can be renewable and nonrenewable. The use of nonrenewable energy resources reached a particular extent. It is better to use any renewable form of energy resources. Among the renewable energy resources wind energy is widely used. It has its own advantages such as availability, non-polluting, no greenhouse gas emission etc. Wind energy can be converted to a useful form of electrical energy using wind turbines. For any process to get the perfect results the process should be controlled and monitored at regular interval of times. The importance of instrumentation system lies here. The various parameters like wind speed, temperature, direction are measured periodically and monitored to check if any deviations occur.

II.EXISTING SYSTEM

Wind generator are taking over combustion engine vehicles. How WPGer, when Wind generator first came out, there was a lot of confusion regarding their systems and maintenance. Today, the current trend in the automotive market shows that these doubts are lessening. Now, the most concerning problem that persists is the thermal management of Wind generator. In conventional vehicles, thermal management is required to cool down the internal combustion

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engine. The thermostat, coolant, and radiator system remove heat from the engine. In Wind generator, thermal management involves the cooling of batteries, power electronic systems, and the motor. Let's take a closer look at why thermal management in Wind generator is so critical. The performance, service life, and cost of the battery packs and Wind generator have a direct dependency. The availability of discharge power for starting and acceleration, charge acceptance during regenerative braking, and the health of the battery are at their best at optimal temperatures. As the temperature increases, the battery life, battery drivability, and fuel economy degrade. Considering the overall thermal effect of the battery on Wind generator, battery thermal management is critical.

II.PROPOSED SYSTEM

In proposed system, solar power is used to charge the battery using Switching Battery, to charge WPG using 100% green energy using "Voltage Shifting Technology"(VST). VST allows the solar panel voltage requirement to be lesser than the load when it is connected to the Switching Battery. This is achi WPGed through a quick shifting with help of voltage regulator, through a new battery connection method when the batteries are almost charged, the Vbat voltage increases from this threshold, the transistor is periodically switched on to reduce the average current to the batteries. When the transistor is conducting, the PV current is derived to the shunt circuit through the transistor. This switching functioning allows finishing progressively the charge. When the Vbat voltage increases up to 28V, the batteries are fully charged. The µC keeps the transistor conducting continuously to stop the current in the batteries. An LCD display shows a few information concerning the functioning: batteries voltage, working state, and so on.

BLOCK DIAGRAM OF PROPOSED SYSTEM

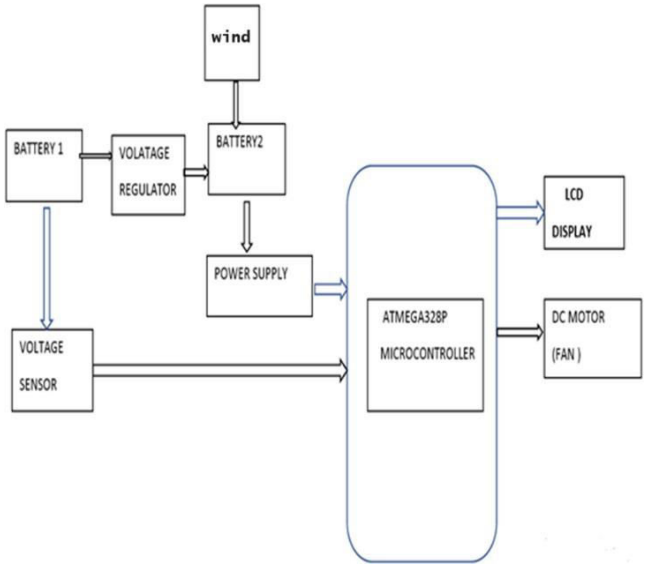

Figure.1. Block Diagram of Proposed System

ARDUINO UNO R3:

The Arduino Uno R3 is a microcontroller board based on the ATmega328. It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains WPGerything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

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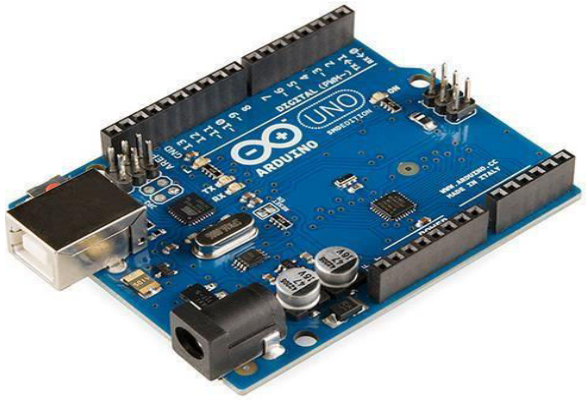

Figure.2. Arduino Uno R3

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2(Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

DC MOTOR

Figure.3. DC Motor

A DC motor is any of a class of rotary electrical motors that converts direct current electrical energy into mechanical energy. The most common types rely on the forces produced by magnetic fields. Nearly all types of DC motors have some internal mechanism, either electromechanical or electronic, to periodically change the direction of current in part of the motor.

LCD

A liquid crystal display (LCD) is a flat panel display, electronic visual display, or video display that uses the light modulating properties of liquid crystals. Liquid crystals do not emit light directly.

Figure.4.LCD

LEAD ACID BATTERY

The lead–acid battery was dWPGeloped in 1859 by French Physicist Gaston planet and is the most established kind of Rechargeable battery. In spite of having a low vitality to weight Proportion and a low-vitality to-volume proportion, its capacity to supply high surge streams implies that the Cells have a moderately extensive energy to-weight Proportion. This element, alongside their minimal effort, makes it appealing for use in engine vehicles to give the High current required via car starter engines.

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Figure.5. Lead Acid Battery

When an SLA battery is being discharged; the lead (Pb) on the negative plate and the lead dioxide (PbO2) on the positive plate are converted to lead sulphate (PbSO4). At the same time the sulphuric acid (H2SO4) is converted to water (H2O).

III.HARDWARE RESULTS

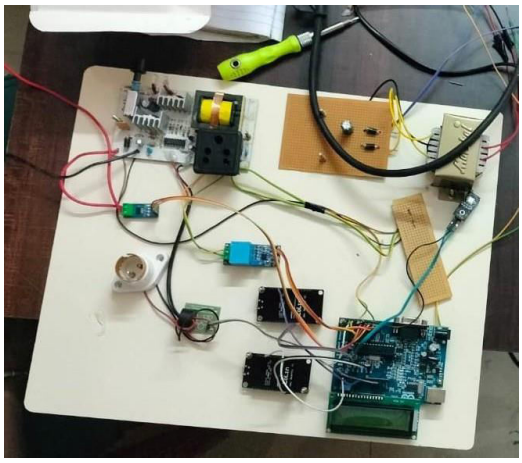

Figure.6. Hardware Results

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD.

IV.CONCLUSION

This paper proposes a solar power assisted battery balancing system for Wind generator based on solar power harvesting and storage. The system is designed to charge the battery module with the lowest SOC/voltage during discharging using the solar energy or energy from a storage cell to avoid the energy loss that happens in conventional active and passive battery balancing schemes. When the vehicle is parked and being charged, the proposed system discharges the battery module with the highest SOC/voltage by transferring energy to the storage cell.

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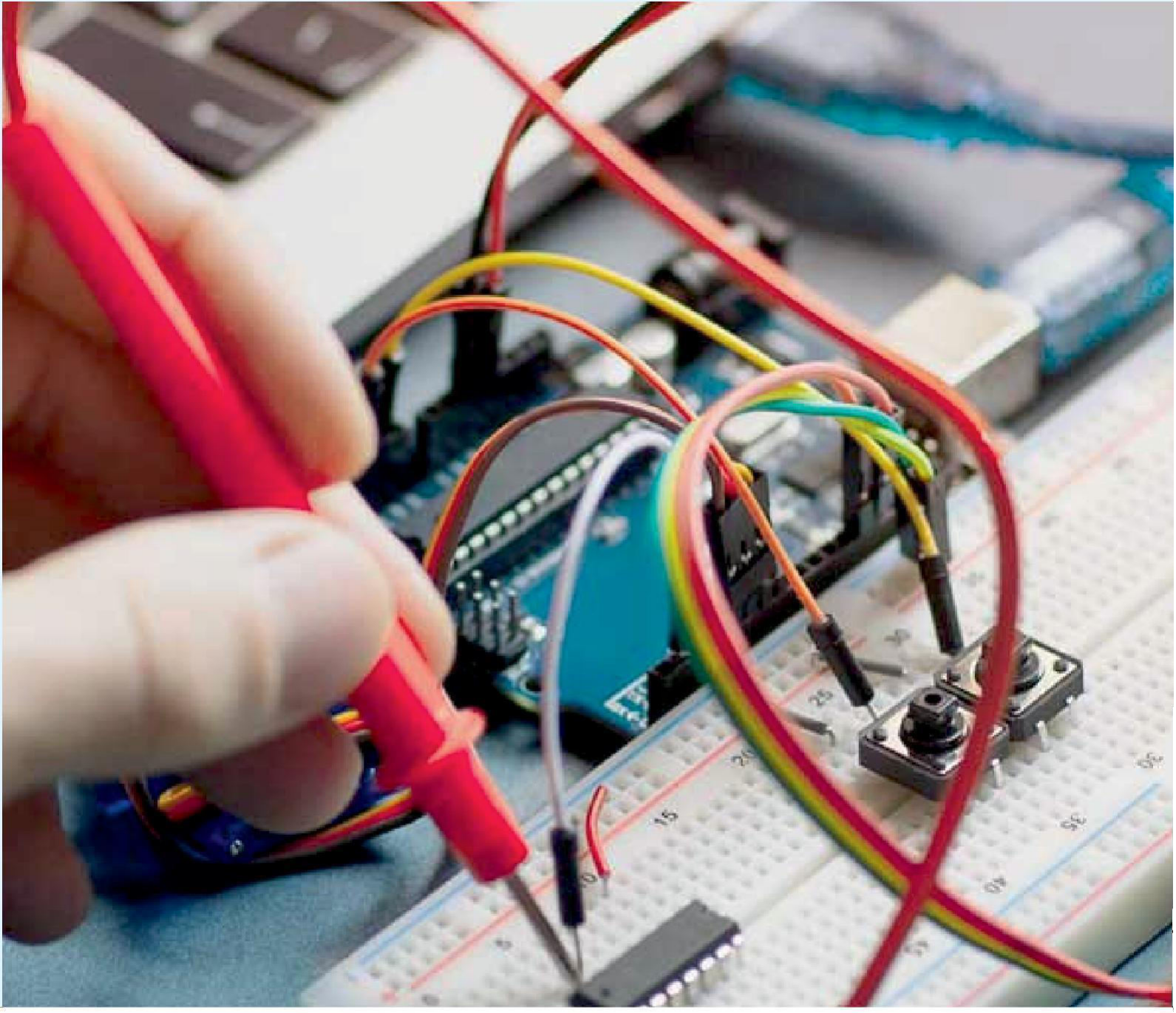

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