Section A-Research paper
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Automatic Battery Charging Using Illumination of Street Light

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Abstract: In this research work, our main objective is to generate the electricity by using the artificial light source like light from the bulbs and florescent lamps. In the world major of electricity is generated by using a coal in the thermal powerplant by burning it. On earth, there is a relatively small amount of coal that may be used. If coal becomes less available, there will be a huge demand for power worldwide. Major of electricity used by human is to light up wherever he is. weather it is day or night. Light is one of the sources we are generating the electricity. This is done only done in daytime and generate electricity using the solar panel or photovoltaic cell. We inspire with this system and use the same concept of generating electricity from the light source Instead of using the natural light source we use the artificial light source to generate the electricity by achieving this concept we can reduce the electricity bill.

Keywords: Light Illumination, Solar panel, Battery Charging System, Battey Charging Street light, solar panel, PIC Microcontroller, Opto Isolator.

1. INTRODUCTION

One of the most plentiful sources of renewable energy is the sun. You have probably seen solar panels attached to streetlights or built into them, powering LED lamps with rechargeable batteries. Due to their affordability and environmental friendliness, solar lamps support green projects. Solar LED Street lights contribute to providing a good living environment while saving money. LED streetlights have already been installed in certain nations with positive results. It has several benefits,

including Solar Street lighting systems are the best option for installations, even in difficult conditions and distant places, because it removes the need for subterranean wiring. It doesn't produce any carbon emissions, costs less over time, and doesn't require any energy. Solar streetlights are appealing for many outdoor lighting applications, including secondary roads, residential streets, driveways, paths, parking lots, and building perimeters, even in metropolitan locations. With the development of technology, modern designs now include wireless technology and sophisticated control theory for battery management

2. RESEARCH METHODOLOGY

Three distinct phases make up the experiment. To ascertain the most significant strategies that have been applied to address the issue statement thus far, research must be conducted. The solution is then put to the test in both software and physical contexts to see if it completely resolves those problems. Several problems with the methods now in use were also recognized, and measures were made to remedy them.

3. LITTERATURE SURVEY

Nidhi Agrawal, Saurabh Patil, Laxmikant Tekam, Shyam Kokate, Pankaj Dhirbassi, Prof. P. R. Dhabi, proposed a “Smart Street Light Using Intensity Controller”, The main aim of this prototype is to design an energy-efficient neon light control system. The prototype is built using an IR sensor, a battery, an LED, and a light-dependent resistor (LDR). The brightness of the bulb may be changed to reduce power consumption. The lights come on before people and vehicles arrive, and when nobody is present, they go out or consume less energy [1]. An "Automated Street Lighting System" was proposed by T. Santhi Sri, Rajesh Varma. In three different lights, Somchai Hiranvarodom compares the photovoltaic road lighting infrastructure. In order to provide the optimum framework for usage in a typical Thai provincial zone, each pole has been outfitted with a low-weight sodium light, a high-weight sodium light, and a fluorescent light [2]. Ms. Swati Rajesh Parekar” An Intelligent System for Monitoring and Controlling of Street Light using GSM Technology” Defect identification and maintenance will be made easier by this technology. By using a system, we can power streetlights using the sun's energy in the most effective way possible. Solar panels are used to collect energy, which is then utilized to charge a battery during the day and power streetlights at night [3]. C.Bhuvaneswari proposed a “Analysis of Solar Energy Based Street Light with Auto Tracking System,” A solar-powered road light with an auto-following framework was offered by Kalaiarasan as a way to boost power delivered from a solar system, which is desirable to upscale the efficiency. One must maintain the boards aligned with the sun to upscale the power generated by the sunlight-based boards. This strategy will allow us to make the most of the sun's beams. Compared to purchasing more solar panels, this setup is far more cost-effective [4]. A "Intelligent Street Lighting System Using GSM" was proposed by K.Y. Rajput. Rajput and Katav presented an intelligent street lighting system to lessen the substantial amounts of electricity lost in street lighting systems. Several number off sensors are used by this system, including CO2 sensors, noise sensors, light intensity sensors, and others. The concentrator and the system communicate with one another using GSM modules to send and receive data [5]. Priyasree suggested a "Automatic Street Light Intensity Control and Road Safety Module Using Embedded System," Priyasree suggested the control system for an LED road lighting system. The proposed control organization makes it possible to disconnect the road lighting system from the mains during periods of high demand, lessening its negative effects on the distributed

power system's natural utilization, lowering the cost of administration, and keeping track of each road lighting unit's status data. A.C[6]. Hengyu Wu, proposed a "Design of multi-functional street light control system based on AT89S52 single-chip microcomputer". A control core architecture for controlling streetlights based on AT89S52 was put out by Tang and Hengyu. This framework integrates several technologies, including an LCD, a electronic clock and metronome, sun allergy, etc. To save power, the lights will switch on when a car passes by and vice versa. This technique allows for significant power savings. In this framework, an auto-alarm function is employed to obtain information on ruined light, including its specifics [7]. X. Shentu, proposed a "A new streetlight monitoring system based on wireless sensor networks," A wireless sensor network framework was developed by Xudan and Siliang for their system to track development. The system is changed based on parallel and meridian data. The system manages the neon light while maintaining automated programming mode by using sunset and dawn processes and information on light intensity. To measure humidity, real-time temperature, and the temperature of neon lights, the system also uses a alcohol thermometer and dampness sensor [8]. "Wireless internet lighting control system," Budike, US patent A lighting control system created by E.S. Lothar consists of elements such as a ballast control module and a data processing module. Several repeaters are attached to the data processing module. A local area network is made up of wireless links that connect data processing modules, ballast modules, repeaters, and computer systems. The advantages of operating and adjusting light intensity, automated operation of streetlights, and scheduling through web browsers are all provided by this technology [9]. J. d. Lee, proposed a "Development of Zigbee-based Street Light Control System," The creation of a Zigbee communication system-based Control System for street lighting was proposed by S.H. Jeong. This solution is offered to lessen the hassles associated with handling lighting systems and the maintenance challenges they provide. This street light monitoring and control system utilizes the automatic light-on/automatic light-off system control command [10]

4. EXISTING METHODOLOGY

In line with the brisk expansion of business and metropolitan regions, the market for road lighting fixture frameworks is expanding significantly. The key considerations in the field of gadgets and electrically-related improvements at the moment are mechanization, energy consumption, and cost-effectiveness. Unique road light management frameworks are developed in order to administer and maintain complicated street lighting infrastructure more affordably. These structures were developed to control and reduce the energy consumption of a town's open lighting fixtures structure by using unique innovations. The high-energy launch light (concealed) is a technique used in contemporary art. Stowed through and used for urban streetlights, depending on the law of petrol release, the power is not regulated by any method of lowering the voltage since the release path is disrupted. An electric arc formed in the middle of tungsten electrodes housed inside a transparent or crystalline fused quartz or interfuse alumina arc tube produces light in hidden lamps, a kind of electrical fuel remittance lamps. The tube is permeated with recycled metal salts and petrol. Fuel is used to perform the arc's basic opening. As soon as the arc is started, it warms and scatters the steel salts, creating plasma. The plasma thus produced significantly increases the awareness of light emitted by the arc and reduces energy usage. The extreme depth exoneration lamp category includes arc lamps. The fundamental drawback of the current system is that it relies on people to manually switch off and on the lighting, necessitating the use of highly skilled people to monitor the process. Additionally, we must frequently check to see if each streetlight is operating properly. If the street lighting isn't working properly, a lot of accidents might also happen. Therefore, daily monitoring of street lighting is also

necessary. We support a modern strategy that decreases cost, human capacity, and power use.

5. PROPOSED METHODOLOGY

With the core approach, the layout of a portable battery charging machine using both synthetic and natural mild resources and using that power to feed the electrical vehicle as well as make the streetlights glow sincerely the use of artificial light is applied. The critical parts required to finish this project at nighttime are a mild source this is primarily available on the earth, an AC to DC converter, a bi-directional AC to DC converter, a 3-segment inverter, a great driving force, a microcontroller, a 3-phase resistive load, and direct AC modern-day.

6. DESIGN LAYOUT

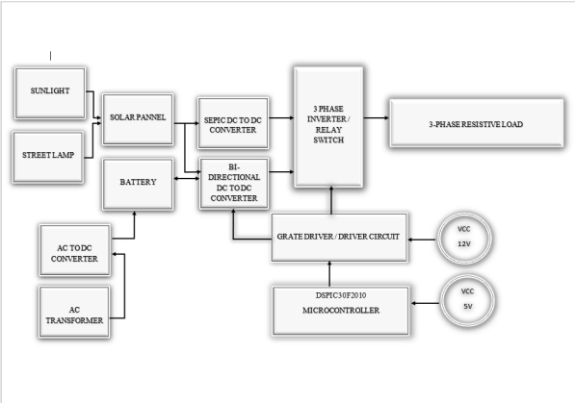

Figure 1. Design Layout

The project's workflow is depicted in the block diagram up top (Figure 1). Our research's main objective is to produce power using both artificial and natural light sources. Wind energy and light energy are the two sources of energy that are constantly present in the planet. The key difference is that we intended to generate electricity using things like tube lights, bulbs, and other artificial light sources. To create power, we decided to use light energy. Both the microcontroller and the grating driver must be connected to a power source for our gadget to work. The grant driver requires 12 volts of power, but the microcontroller just needs 5 volts. The light energy from both solutions is collected by the solar panel. The grate driver runs as necessary and acts as a circuit breaker. The battery is attached to a bifacial Direct current – Direct current converter that is used to both charge and drain the battery. An Alternative current to Direct current converter converts the current generated by the solar panel, which is an alternate current source, into a direct current source. The three-phase inverter is connected to the output of both the Alternative current -Direct current converter and the Direct current -Direct current converter. Low-power applications utilize the battery's power during the day

7. HARDWARE DESCRIPTION

Power Supply Design - The driver circuit requires 12V and 5V. Microcontroller requires a 5V supply, so we first step down the 230V AC supply to 15V using a step-down transformer. Then, using a full bridge rectifier, which is more efficient than any other approach, this 15V AC is linguist to Direct current. With the help of the 7812 and 7805 regulators, this 15V DC is converted into 12V DC and 5V DC, respectively. The capacitor is employed to provide a smooth voltage variation. We used LEDs with 1K resistors to limit current flow to the LEDs for indication purposes.

FIGURE 2. Power Supply

PIC Microcontroller - A PIC microcontroller is a tiny computer housed on a single IC that may be programmed to manage different appliances and carry out different functions. Microchip Technology Inc.'s PIC, or "Programmable Interface Controller," is one of its products. They are widely employed in a variety of embedded systems and renowned for their affordability, adaptability, and programming simplicity. There are numerous PIC microcontroller versions with various memory capacities, processor speeds, and peripheral capabilities. Many different programming languages, including C, BASIC, and assembly, can be used to programmed them.

Figure 3. PIC Microcontroller

SEPIC Converter - Using a Single Ended Primary Inductor Converter, a high voltage DC input can be changed into a lower voltage direct current output. A variant of the Buck-Boost converter that can work in both step-up and step-down modes is the SEPIC converter. The SEPIC converter is especially beneficial in situations where the input voltage can change significantly, such as battery-powered systems or systems that draw their input power from solar panels

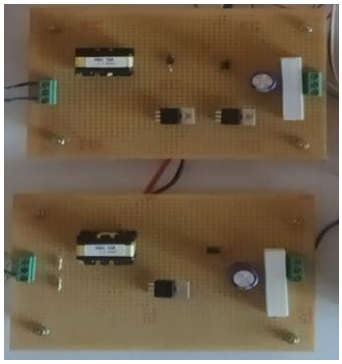

Figure 4. SEPIC Converter

OPTO Isolator - An electronic component known as an opto-isolator employs an optical mechanism to achieve electrical isolation between two circuits. It transmits a signal from an input circuit to an output circuit using an infrared-emitting diode (IRED) or a light-emitting diode (LED), while maintaining electrical isolation between the two circuits. Widespread uses for opto-isolators include shielding delicate equipment from electrical transients and noise, avoiding ground loops, and isolating the input circuit from the output circuit for safety. In addition to being impervious to electromagnetic interference (EMI) and radio frequency interference, they are renowned for having high isolation voltage, quick switching times, and high common mode rejection ratios (CMRR) (RFI).

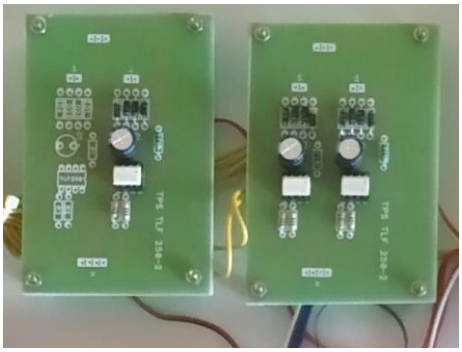

Figure 5. OPTO Isolator

Rechargeable Battery - A battery that can be recharged by running an electrical current through it is called a refillable battery. It also goes by the moniker of a secondary cell. The most common types of rechargeable batteries are lithium-cobalt, nickel-cadmium (NiCd), and nickel-metal hydride (NiMH). Electronic component that employs an optical method to produce electrical isolation between two circuits, these batteries have a higher energy density than primary batteries and can be recharged and used multiple times. It keeps the two circuits electrically segregated from one another by using an LED or an IRED to convey a signal from an input circuit to an output circuit. Widespread uses for opto-isolators include shielding delicate equipment from electrical currents.

Solar Panels - A device that transforms sunlight into energy is a solar panel, sometimes referred to as a photovoltaic (PV) panel. Photovoltaic cells, comprised of semiconductor materials like silicon, are what make up the device. When daylight hits the cells, it excites the silicon chip material's electrons, which then move through an electrical circuit and produce an electrical current

7. RESULT AND DISCUSSION

By producing power from both a natural light source during the day and an artificial light source during the night, the Model of an automated street light illumination-based battery charging system is successfully realized. By applying this idea to daily life Up to 45 percent less energy might be used by us. This concept sparked the massive transformation of the future Automatic battery charging systems using illumination of light refer to systems that use the energy from light sources to charge batteries. The system consists of photovoltaic cells or solar panels that convert light into electrical energy and a charging controller that regulates the charging process to ensure that the battery is not overcharged or damaged. Overall, automatic battery charging systems using illumination of light are a useful solution for areas where there is abundant sunlight and where there is a need for cost-effective, efficient, and environmentally friendly battery charging. In this we successfully achieve the results. In future we planned to add a cloud software that monitors the battery charging and discharging with time and we also planned to add up a

camera facility to generate the bill those who use the electrical vehicle charging and that is to add up in the cloud for maintain the records.

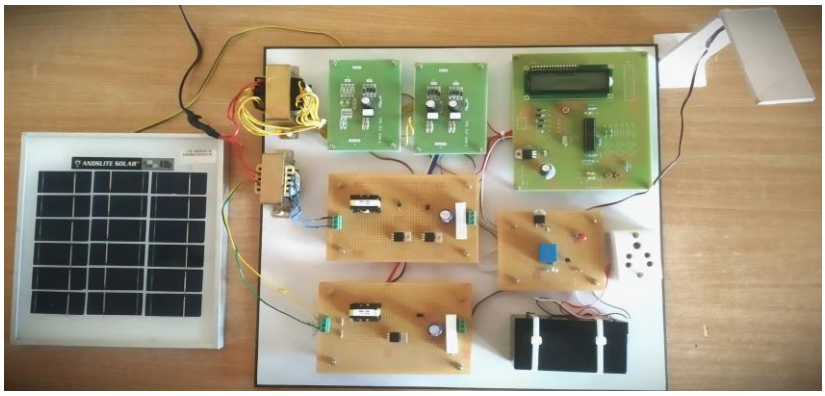

Figure 6. Prototype Model

8. CONCLUSSION

In addition to explaining automated battery charging utilizing both natural and artificial light sources, this document also discusses the operation of nighttime streetlights, the use of other three-phase devices, such as electric car charging stations, and other electrically powered equipment. When the power storage is full or is low on power, we utilize a microprocessor to switch between power storage and direct current. The GRATE driver receives a command from the microcontroller to switch from direct power to power storage when the battery is full. The power switch is activated by the GRATE driver using a Microcontroller after the power storage runs out of juice. In the second phase of the final year project, we shown the prototype of our project.

The design and implementation of an automated streetlight illumination-based battery charging system are analyzed in this work. This system can be utilized in the future as an electric car charging station and is appropriate for the regeneration of power utilizing both artificial and natural light sources. An electrical circuit is broken by the OPTO isolator. Two situations included the MOSFET transistor. It is employed as a bidirectional converter in the first instance and as a solar panel charging booster in the latter. This idea produces the desired outcome. The automatic battery charging system using illumination of light is a cost-effective, efficient, and environmentally friendly solution for battery charging. This system harnesses energy from light sources and converts it into electrical energy to charge batteries, offering several benefits, including increased efficiency, cost savings, environmental friendliness, and convenience. Overall, the use of this technology is a smart alternative to traditional charging methods that use grid-tied electricity.

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