iJRASET
International Journal For Research in Applied Science and Engineering Technology

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 9 **Issue:** VI **Month of publication:** June 2021

DOI: https://doi.org/10.22214/ijraset.2021.35587

www.ijraset.com

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International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 9 Issue VI Jun 2021- Available at www.ijraset.com

Solar Median Strip

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***Abstract:** This paper describes about using solar energy to create intelligent highways. Smart highway and smart road are terms for a number of different proposals to incorporate technologies into roads for better future. Solar median strip uses solar panels, photovoltaic effect, LEDs and microprocessor chips with circuitry boards. Solar panels are arranged on median strip of the road. Energy from these solar panels is used to operate the street lights, water pump for nearby farms and additional energy can be stored and utilized by nearby communities by using an inverter. Solar median strip will pay for itself through generation of electricity. The implementation of this technology will create the clean energy boom. By this way we can use solar energy efficiently. We can also create smart roads for better future without causing damage to environment by using renewable source.*
***Keywords:** Arduino uno, Solar panel, Motor pump, inverter.*

I. INTRODUCTION

Road and Airfield require electricity for the smooth and safe operation, especially at night. Recent advance in controlling traffic, e.g., intelligent transportation system (ITS) requires more electricity along the roadways. In order to reduce energy demand, transportation engineers looked for various alternatives, which burn less fossil fuel, and emit less carbon dioxide. Most significant approach would be harvesting solar energy from transportation infrastructures. For example, in the State of New Jersey most electrical poles along the highway have been equipped with rigid solar panel. There are only few ways of harvesting solar energy from the roadways and airfield. The approach investigated in the present study was utilizing the current solar cell or photovoltaic technologies. Photovoltaic convert sunlight directly into electricity. Photovoltaic (PV) cells are made of special materials called semiconductors such as silicon. Solar median strip is a concept, in which it uses solar power to produce electricity and helps to build smart highways. A solar median strip is a series of structurally engineered solar panels that are placed on divider in roadways. we have the charge controller circuit, which is used to charge the battery in day time through solar panel and utilize the power at night time. For street lights, photoconductive device LDR is used. whose resistance changes proportional to the extent of illumination and operates LED according to natural light intensity. This system is also enabled with the motor pump automation for the farms using soil moisture sensor. And the excess energy is fed to an inverter circuit for community transmission.

II. LITERATURE SURVEY

During 2015, a particularly bad year for our country the heat waves killed around 2000 Indians and at the month of December Chennai has faced a disastrous flood killing many lives and severe damage to the property. These effects are simply due to nothing but a simple phenomenon called all over the world is nothing but climatic change that leads to rise in temperature on the Earth's surface. The cause for such change in India is due to increased population explosion and continuous carbon emission due to emergency of numerous industries in our country. Suppose we made a section of road out of this material and housed solar cells to collect energy, which could pay for the cost of the panel, thereby creating a road that would pay for itself over time. The ideas and possibilities just continued to roll in and the Smart highways project was born.

III. BLOCK DIAGRAM

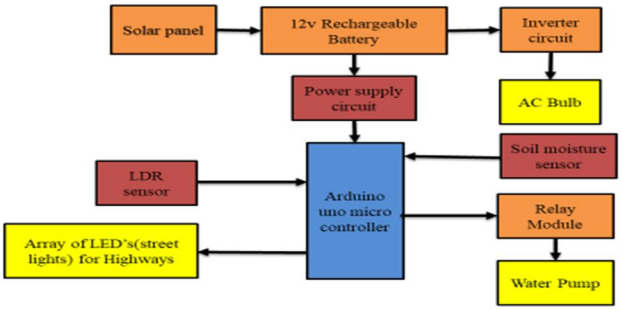

Fig 1: Block Diagram

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IV. HARDWARE REQUIREMENTS

A. Photovoltaic Cell

Photovoltaic (PV) is a method of generating electrical power by converting solar radiation into direct current electricity using semiconductors that exhibit the photovoltaic effect. Photovoltaic power generation employs solar panels composed of a number of solar cells containing a photovoltaic material. Mainstream materials presently used for photovoltaic include mono crystalline silicon, polycrystalline silicon, amorphous silicon, cadmium telluride, and copper indium gallium selenide. Due to the increased demand for renewable energy sources, the manufacturing of solar cells and photovoltaic arrays has advanced considerably in recent years. A photovoltaic system (informally, PV system) is an arrangement of such cells designed to supply usable electric power for a variety of purposes, using the Sun (or, less commonly, other light sources) as the power source.

B. Arduino UNO

Overview The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6analog inputs, a 16MHz ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. 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. Revision 2 of the Uno board has a resistor pulling the 8U2 HWB line to ground, making it easier to connect to DFU mode.

C. Battery

A rechargeable battery, storage battery, or accumulator is a type of electrical battery. It comprises one or more electrochemical cells, and is a type of energy accumulator. It is known as a secondary cell because its electrochemical reactions are electrically reversible. Rechargeable batteries come in many different shapes and sizes, ranging from button cells to megawatt systems connected to stabilize an electrical distribution network. Several different combinations of chemicals are commonly used, including: lead– acid, nickel cadmium (NiCd), nickel metal hydride (NiMH), lithium ion (Li-ion), and Lithium-ion polymer (Li-ion polymer). Rechargeable batteries have lower total cost of use and environmental impact than disposable batteries.

D. Relay

A relay is an electromechanical switch, which perform ON and OFF operations without any human interaction. General representation of double contact relay is shown in fig. Relays are used where it is necessary to control a circuit by a low-power signal (with complete electrical isolation between control and controlled circuits), or where several circuits must be controlled by one signal.

E. Light Dependent Resistor(LDR)

LDR is a special type of resistance whose value depends on the brightness of the light which is falling on it. It has resistance of about 1 mega ohm when in total darkness, but a resistance of only about 5k ohms when brightness illuminated. It responds to a large part of light spectrum. We have made a potential divider circuit with LDR and 100K variable resistance connected in series. We know that voltage is directly proportional to conductance so more voltage we will get from this divider when LDR is getting light and low voltage in darkness.

F. Soil Moisture Sensor

The soil moisture sensor consists of two probes which are used to measure the volumetric content of water. The two probes allow the current to pass through the soil and then it gets the resistance value to measure the moisture value. When there is more water, the soil will conduct more electricity which means that there will be less resistance. Therefore, the moisture level will be higher. Dry soil conducts electricity poorly, so when there will be less water, then the soil will conduct less electricity which means that there will be more resistance. Therefore, the moisture level will be lower. This sensor can be connected in two modes; Analog mode and digital mode. First, we will connect it in Analog mode and then we will use it in Digital mode.

G. Motor Pump

DC Powered Pumps use direct current from motor or solar power to move fluid in a variety of ways. Motorized pumps operate on 6v to 12v of DC power and use hand-operated, electric, pneumatic, or hydraulic motor. DC powered pumps use centrifugal force or positive displacement to move fluids.

V. SOFTWARE REQUIRED

A. Arduino IDE

The Arduino Integrated Development Environment (IDE) is a cross-platform application (for Windows, macOS, Linux) that is written in functions from C and C++. It is used to write and upload programs to Arduino compatible boards, but also, with the help of third-party cores, other vendor development boards.

B. C++ Programing Language

C++ is a powerful general-purpose programming language. It can be used to develop operating systems, browsers, games, and so on. C++ supports different ways of programming like procedural, object-oriented, functional, and so on. This makes C++ powerful as well as flexible.

VI. FLOW CHART

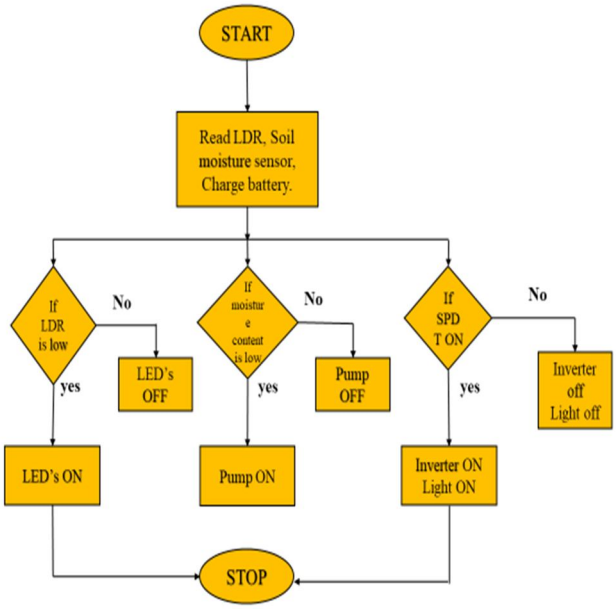

Fig 2: Algorithm

VII. RESULT AND DISCUSSION

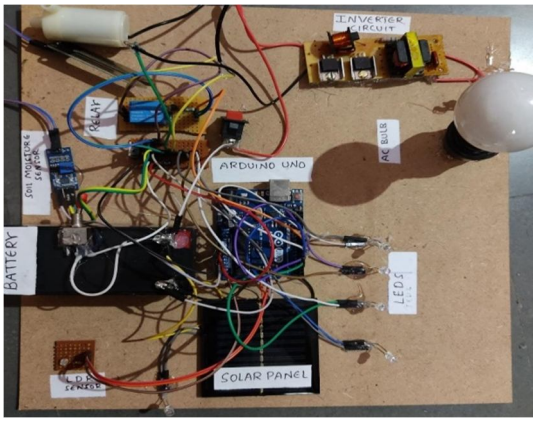

Fig 3: Project kit

VIII. FUTURE SCOPE

In future, when electrical vehicles are into action, we can connect battery stations to charge those vehicles. We can also implement solar panels on footpath or roads with a tough glass surface on it. Led lights for lines and signage.

IX. CONCLUSION

This project titled, 'Solar Median Strip with Multiple Applications' is a cost-effective, practical, eco-friendly and the safest way to save energy. These are a part of intelligent highway infrastructure and can be a decentralized power grid that pays for itself. It clearly tackles the two problems that world is facing today, saving of energy and also disposal of incandescent lamps, very efficiently. According to statistical data we can save more electrical energy.

REFERENCES

[1] Monalisa Hati, "Solar roadways- an effort to make safe and smart highways", International Advanced Research Journal in Science, Engineering and Technology, Vol. 3, Issue 7, July 2016, pp. 50-53
[2] Aaron Seward(2014)" Best of whats new: solar roadways"
[3] Er. Rajeev Ranjan, "Solar Power Roads: Revitalising Solar Highways, Electrical Power and Smart Grids" International Journal of Engineering Research and General Science Volume 3, Issue 1, January-February, 2015, pp. 380-385
[4] http://users.abo.fi/rzevenho/ansys%20fluent%2018%20tutorial%20guide. Pdf
[5] Indian road congress, special publication 20, Rural loads manual, New Delhi 2002

BIOGRAPHIES

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D. Sharanya, Assistant Professor in EEE Department, ACE Engineering College, India, received her B. Tech from Vardaman College of Engineering, M. Tech in Electrical Power Systems from JNTU H in 2015.She has 5years of Teaching Experience. Her areas of interest are power quality management.

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ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
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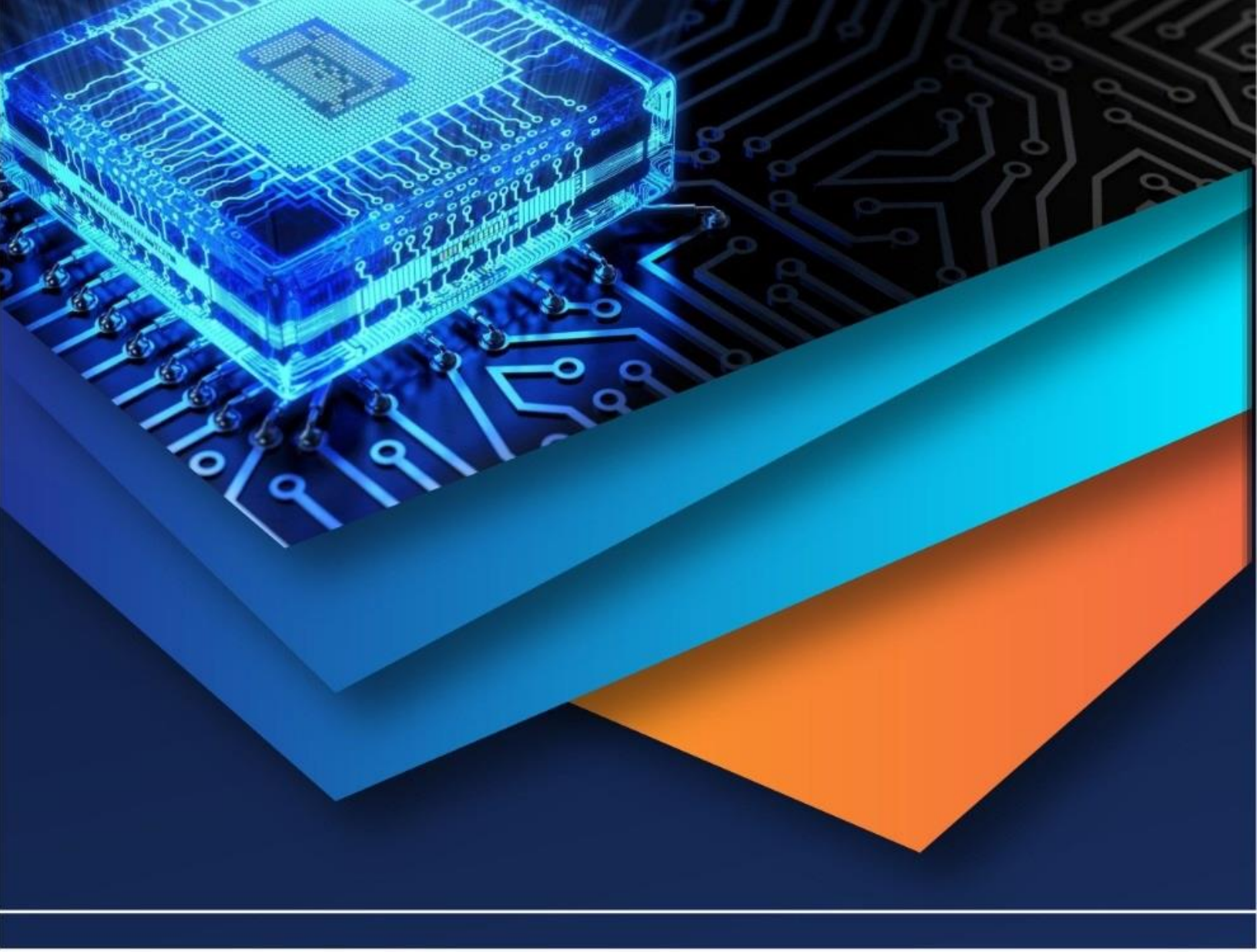

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