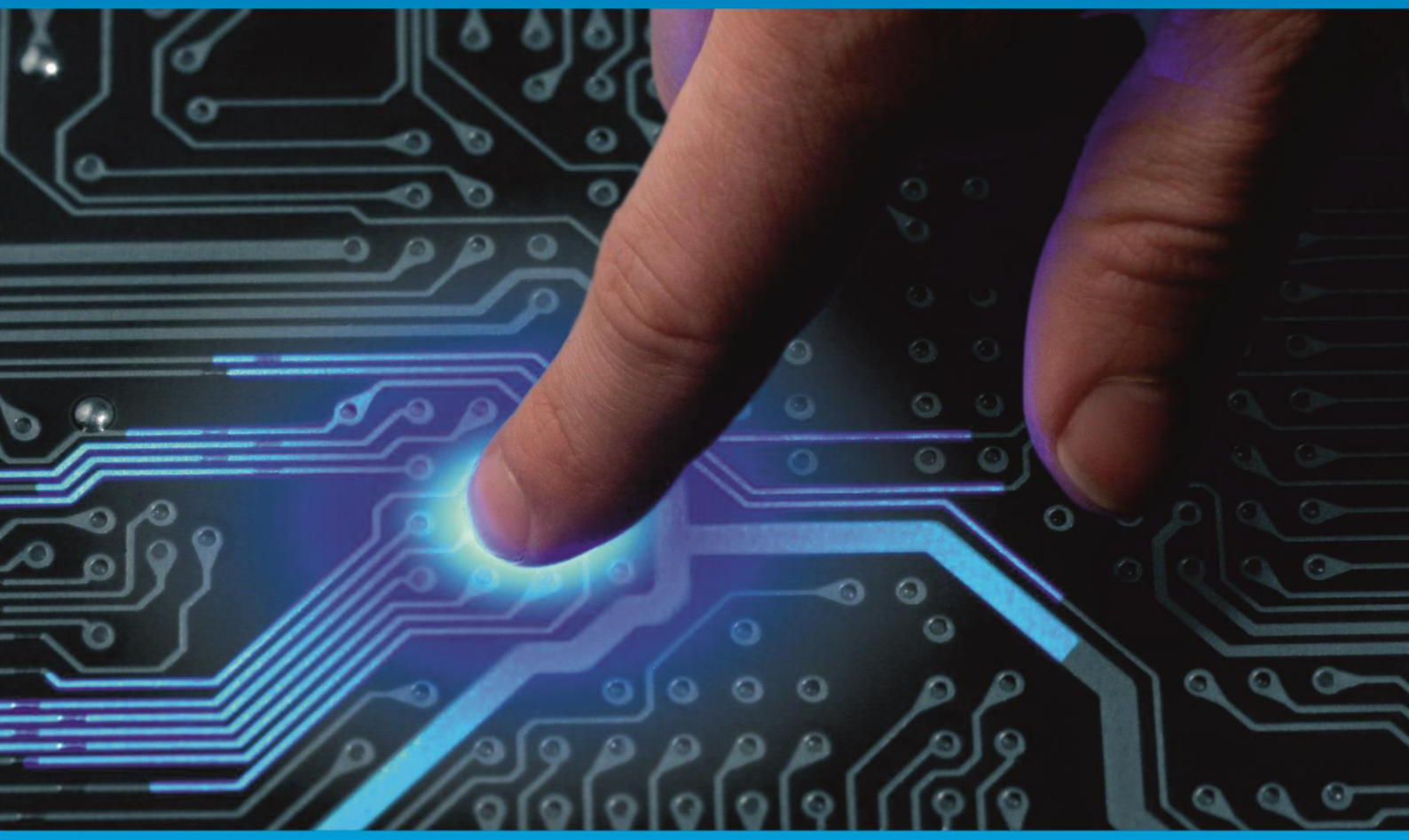
IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 9, Issue 3, March 2021

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 7.488

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.488 |

|| Volume 9, Issue 3, March 2021 ||

| DOI: 10.15680/IJIRCCE.2021. 0903099|

IOT Based Hybrid Energy Smart Street Light Control System

Mr. S.Loganathan., ME[1], Mohindh Kumaran. S[2], Naveen Kumar. S[2], Nazeerbasha. N[2]

Assistant Professor, Department of Electronics and Communication Engineering, Paavai Engineering College, Namakkal, Tamil Nadu, India[1]

Students, Department of Electronics and Communication Engineering, Paavai Engineering College, Namakkal, Tamil Nadu, India[2]

ABSTRACT: IoT based hybrid energy smart street light control system is a concept of saving energy conserved by street lamps. street lights are essential for the safety of drivers and pedestrians. smart street lights are one of the key frameworks of smart cities. Basically, street lights consume high energy and the cost of maintenance is high. This system enables to control, observe the system malfunctioning, and error identification in the hardware through the android application. This smart light system has automatic charging through the hybrid energy called a combination of solar, wind, and RF signals present in the atmosphere is converted into electrical energy.

KEYWORDS: IoT, Wind energy, Solar energy, Street Light and Mobile radiation.

I. INTRODUCTION

This paper reveals the perfect operating system for the public street lights which is more important to avoid accidents by driving and crimes. The energy consumption for street lighting is calculated to be 30% of the total electricity consumption in any country. Street light maintaining systems are mostly manual if any damage to lights it takes some time to repair it. During that time, it leads to some avoidable accidents and crimes. Street lights are maintained every month even though there is a chance of failure of the lamp and it not noticeable to the maintaining team. Lamps are failing due to sudden high-power supply in mains and other defects by the control circuits. Electricity is an important energy source for human life. Electricity is divided into renewable and non-renewable resources. In this project, we proposed hybrid energy called a combination of solar, wind, and RF signal emerged from the mobile. It reduced the cost of electricity and this energy should be stored in rechargeable batteries. With this mobile radiation observing circuit the most of the radiation present in the atmosphere converted into electrical energy. The electrical energy harvested by this circuit can be used for the street light. Due to this hybrid energy, there is no need for external power sources to operate or run the circuit. It allowed controlling, malfunctioning, and problem identification in the hardware system. This comprehensive system consists of a control unit, a managing unit, and a power storage unit. with help of IoT ("INTERNET OF THINGS"), this network becomes more compatibles.

II. LITERATURE SURVEY

Existing systems

[1] Cloud based street lighting system is a system that can control the street lights according to the specific area, can consumes less energy, realize wireless communication, can perform observing and control the street light over the website.

[2] This Paper proposed a street light that will automatically turn on at night but with different light intensity depending on the speed of the vehicles. The Light Dependent Resistor (LDR) will act as sensor that can adjust the light intensity for day and night. If LDR detect less than 80% of sunlight it will turn on the light. There are two Infrared (IR) sensors which is used to detect the speed of moving vehicles or object. When the object across the first Sensor, it will start counting the time taken to reach atSensor 2. The sensor will stop to counting the time taken when the vehicle or object reaches Sensor 2. The gap between two sensorsis six cm in this project.

[3] Nowadays the amount of electrical energy consumed by street lights plays a major energy demand. To overcome this problem, a proper power saving method and lighting control to be executed. This paper work is to have two controls such as one is to automatically switch off lights during no vehicle moments in the roads and automatically on when vehicles in motion and there are two modes to give less intensity light for pedestrian and to switch on high-intensity mode during vehicle motion at sides on the roads and streets. In this project the LED lights are used, the

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.488 |

|| Volume 9, Issue 3, March 2021 ||

| DOI: 10.15680/IJIRCCE.2021. 0903099|

Photodiodes and IR sensors are used to sense vehicle movements. The signals from sensors have been given to the microcontroller. In the microcontroller, the control logic is executed to control street lights based on vehicles and pedestrian moments with the low and high-intensity mode of operation and to switch off street lights when there are no vehicles and pedestrian movement.

[4]This paper proposed a remote street light system with light intensity control based on vehicle motion, changes in weather & climatic conditions like sunny, cloudy weather, the rainy season; this system consists of an LED and wireless sensors network like Zigbee. This system is automatic controlling of street light based upon changes in seasons and climates, which incorporate auto loop system relying on time, while vehicle crossing the road. It will give a great impact on saving electricity.

[5]This paper proposes a smart system to control street lighting and decrease energy consumption. It perceives the vehicle's motion on the road and automatically turns ON street lights ahead of the vehicle. As the vehicle travel by, the system turns OFF the lights. The system will control the intensity of light.

[6]This system proposed the radiated power available in the environment is received through the antenna. Observed RF signals converted into electrical signal the ceramic capacitors. Ceramic capacitors act as a good radio signal receiver. The germanium diodes act as a voltage rectification. The electrical charges are stored in rechargeable batteries.

[7] This work proposed Smart street lighting, a solution that enables control, monitoring, and error detection, converting these systems into self-cognitive and energy-efficient meshes, resulting in huge savings in electricity bills. This project presents an overall analysis of the automatic energy conservative grid solutions for street lighting and techniques to charging through solar energy, wind energy, and utilization of reserved mobile radiation energy. But the radiation observing circuit in this system is not more efficient.

Proposed system

In the proposed system we improved the mobile radiation circuit to more efficient. In addition, here we use the mobile application to control, monitoring and fault detection in the street light. This system enables to control, observe the system malfunctioning, and error identification in the hardware through the android application. This smart light system has automatic charging through the hybrid energy called a combination of solar, wind, and RF signals present in the atmosphere is converted into electrical energy.

The street light system is checking the weather for street lamps' ON/OFF condition. The surrounding or environment is light or dark is sensed through an LDR sensor, If the weather is bright, the system will OFF. If the surrounding or environment is dark, the light system will ON. After the light on the light condition also check through the LDR sensor for light work or not work. If the light is not glowing, the sensor sends the value to the street light system. The street light system will generate a message and send to ward member and ward serviceman mobile through IoT. At the same time, the sensor values are stored in a cloud server. We can access the light system data in the cloud anywhere and anytime.

This system has auto mode and manual mode we can switch the mode using the android application. When it is in auto mode the street light automatically on and off by sensing the luminance of the light intensity and in emergency cases like defects or damage in the LDR sensor we can switch the mode into manual mode and the street light can be on and off by the android application.

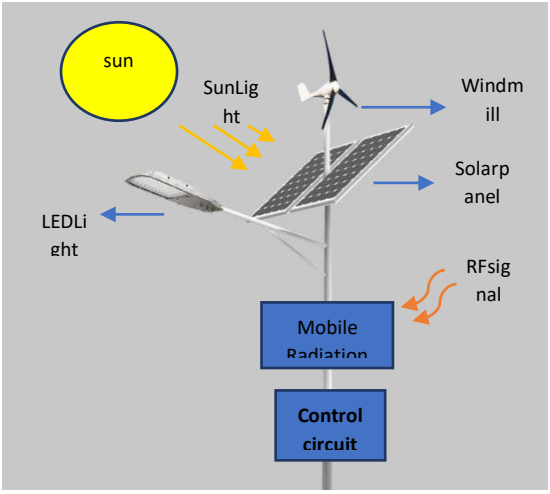


Fig.1 prototype Model

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.488 |

|| Volume 9, Issue 3, March 2021 ||

| DOI: 10.15680/IJIRCCE.2021. 0903099|

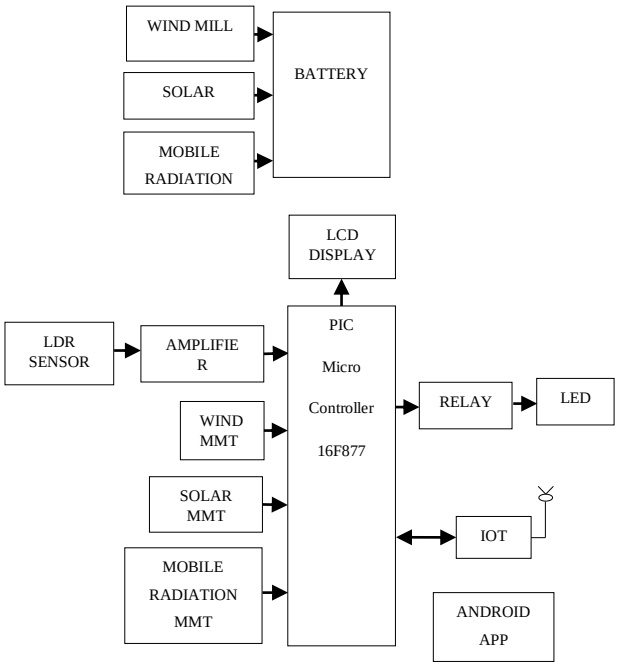


Fig.2 Proposed Block Diagram

Hardware Requirements

This system circuit consists of PIC microcontroller, LCD Display, LDR Sensor, Wind mill, Solar panel, Mobile radiation circuit, IOT, Relay, and Battery.

PIC Microcontroller (16F877)

The PIC16f877A is one of the most used microcontrollers in the industry. This controller is very convenient to use and program. It has a total number of 40 pins and a CMOS FLASH-based 8-bit. The Pin diagram for the (PIC16f877A) is shown in Fig. 3. PIC16f877A Microcontroller finds its applications in a huge number of devices. For example, it is used in remote sensors, home automation, security and safety devices, and in many industrial instruments.

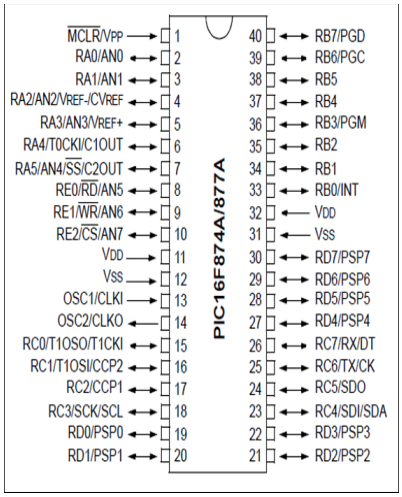


Fig.3 Pin diagram of PIC Microcontroller

IOT

The Internet of things (IoT) defines the network of connecting physical objects “things” which are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices over the Internet. Here, IoT is used to connect the controller of the system to the user interface mobile application. By using the application, we can enable to control and monitoring the system.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.488 |

|| Volume 9, Issue 3, March 2021 ||

| DOI: 10.15680/IJIRCCE.2021. 0903099|

LDR

Light Dependent Resistor (LDR) or Photoresistor are Light are electronic device which are used to detect light intensity &send signal to ON or OFF of the street light dependentupon the intensity level of light.

Fig.4 LDR

Solar panel

A PV cells (photovoltaic cells) are mounted in a framework for installation. Photo-voltaic cells observe sunlight directly and generate direct current electricity. A collection of PV modules is called an Array of a photovoltaic system or solar panel. These arrays of a photovoltaic system supply solar electricity to streetlights. The Street lighting system shall be equipped with the following: 12V-40Wp Solar Module Energy-efficient LED lamps of a minimum of 7.2 Watts with 15 Lux.

Fig.5Solar panel

Wind Mill

With the help of Wind Mills, this smart light also makes use of the energy from nearby passing vehicles. A wind propeller is fixed on the top of the street light post which rotates by the wind and generated electricity is stored in a battery.

Mobile radiation receiving circuit

It is a circuit capturing theRF signals present in the atmosphere is converted into electrical energy. The electrical energy harvested by this circuit can be stored in the rechargeable battery.

III. RESULT

Through using this method, the radiations can be controlled. This will help in constraining the threats of extinction of squirrels, sparrows, and human disorders like cancer. Also, this helps in conserving electricity to some extent. Solar Panels and Wind Energy do not work in a cloudy atmosphere and become faulty during rains but mobile tower radiation energy will remain working even in the worst climatic conditions. So, this would enable people to opt for unused free energy sources to recharge mobile phones and glow LED lights.

IV. CONCLUSION

This system is very much efficient thereby it can very well be embedded into our daily life and this system is enabled with IoT through this we could control and monitor its function with ease and the main thing about the IoT BASED STREET LIGHT it functions autonomously without needing any external means to operate it, even it switches on and off by itself, what makes this system more efficient and exclusive is it uses the unused mobile radiations as its power source, thereby it doesn't require any kind of external power source.

REFERENCES

[1]Mahmut Durgun, Department of Computer Engineering, Karamanoglu Mehmetbey University,Karaman, Turkey. "Cloud-Based Adjustable and Section Led Pattern Controlled Street Light". Levent Gökrem, Department of Mechatronic Engineering, Tokat Gaziosmanpasa University, Tokat, Turkey.

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 7.488 |

|| Volume 9, Issue 3, March 2021 ||

| DOI: 10.15680/IJIRCCE.2021. 0903099|

[2]Aziera Abdullah, Siti Hajar Yusoff, SyasyaAzra Zaini, Nur Shahida Midi, Sarah Yasmin MohamadDepartment of Electrical & Computer Engineering, International Islamic University MalaysiaJalan Gombak, 53100 Kuala Lumpur, Malaysia. "Smart Street Light Using Intensity Controller". 2018 7th International Conference on Computer and Communication Engineering (ICCCE)978-1-5386-6992-1/18/$31.00 ©2018 IEEE.

[3] Yashaswini N, Yashaswini S, Prathib Kumar G, students, and Raghu N, Assistant Professor, Electrical and Electronics Dept.School of Engineering and Technology, Jain University, Bangalore. "Automatic Street Light Control by Detecting Vehicle Movement". 2018 3rd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT-2018), MAY 18th & 19th 2018 978-1-5386-2440 1/18/$31.00 ©2018 IEEE 847.

[4]Prof. Smita A. Bhosale, Tejaswini Ankalkote, Department of Electronics and Telecommunication Engg, Zeal College ofEngineering & Research, Pune, India. "Modern Street Lighting System with Intensity Control based on Vehicle Movements and Atmospheric Conditions using Zigbee". 2018 International Conference on Information, Communication, Engineering and Technology (ICICET) Zeal College of Engineering and Research, Narhe, Pune, India. Aug 29-31, 2018.

[5] Adnan M. Al-Smadi, Salam T. Salah, Areen A. Al-Moomani, Majd S. Al-Bataineh, Department of Electronics Engineering, Hijjawi Faculty for Engineering Technology, Yarmouk University, Irbid, Jordan. 2019 16th International Multi-Conference on Systems, Signals & Devices (SSD'19).

[6] S.N.Deepa,B.Shamili Swarupa Rani"RF Energy Harvesting Using 900MHz of Mobile Signal Frequency to Charging the Mobile Battery," IEEE International Conference on Innovations in Green Energy andHealthcareTechnologies(ICIGEHT'17).

[7] Dr. Anurag Choubey, Dr. Rakesh K Bhujade."IOT Based Smart Street Light System Using Renewable Energy".International journal of scientific & technology research volume 8, issue 12, december 2019 issn 2277-8616.

INNO SPACE

SJIF Scientific Journal Impact Factor

Impact Factor:
7.488

ISSN INTERNATIONAL STANDARD SERIAL NUMBER INDIA

निस्केयर NISCAIR

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

9940 572 462 6381 907 438 ijircce@gmail.com

www.ijircce.com

Scan to save the contact details