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Automatic street lighting system using IoT

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ABSTRACT

Automatic Street lighting System is a simple powerful concept, which uses LDR sensor as a switch. By using this system we can eradicate manual work at 100%. It automatically switches the lights ON when the sunlight goes below the visible region of our eyes, yet this is done by a sensor called Light Dependent Resistor (LDR) which senses the light actually like our eyes. It automatically switches OFF lights whenever the sunlight comes visible to the sensor. By using this system energy consumption is also reduced because nowadays the manually operated street lights are not switched off even after the sunlight comes visible and also switching ON earlier before sunset. In this project no need of manual operation like ON time and OFF time setting. This project clearly demonstrates the working of the transistor in the saturation region and cut-off region. The working of the relay is also known. Implementation of this project encourages digital work. Light-dependent resistor, a photoconductive device has been used as the transducer to convert light energy into electrical energy. The central dogma of the circuit is that the change in voltage drop across the light dependent resistor on illumination or darkness switches the transistor between the cut-off region or saturation region and switches OFF or ON the LED.

Keywords— *IoT , Arduino Uno, LDR module, Relay module*

1. INTRODUCTION

This is the design and implementation of Automatic Street lighting System using Light Detecting Sensor. This system was designed to detect the light automatically and switches on the light. The design makes use of a microcontroller to control the outputs when it receives input from the resistor. This design can be used in different areas like Street lights, Public parks, and lights outside of houses etc.

2. PROPOSED SYSTEM

On automatic street light system, the street light on /off status does not depend upon the vehicle or objects. It depends upon the intensity of light.
Through this process, 15-20% of the city's power can be saved

3. EXISTING SYSTEM

Normal street lighting system uses a manual power street lights will be switched on during the evening after sunset and it will be switched on the next day morning after there is sufficient light on the road. It uses manual power to switch ON &OFF lights.

It consumes more amount of electricity due to the usage of fluorescent lamps. Improper timings of switching light consume more electricity.

4. LITERATURE REVIEW

The recent research work emphasizes the conservation of energy as well as on the reduction of environmental pollution. This paper introduces an intelligent method for optimizing the street-light-intensity so as to reduce the CO_2 emission which, in turn, reduces the pollution of the environment. The working principle is based on the requirement of luminous energy at a particular moment of time. An automatic system is designed using ARDUINO which will switch ON or OFF the street lights at a given time and also depending on the intensity of the ambient light. This system also detects the movement of vehicles and interrupts the system to increase the intensity of light on the road.

The street lighting is one of the largest energy expenses for a city. An intelligent street lighting system can cut municipal street lighting costs as much as 50% - 70%. An intelligent street lighting system is a system that adjusts light output based on usage and occupancy i.e., automating classification of pedestrian versus cyclist, versus automotive. An intelligent street light management proposes the installation of the wireless-based system to remotely track and control the actual energy consumption of the street lights and take appropriate energy consumption reduction measures through power conditioning and control.

In the present day scenario, a significant portion of electricity produced is consumed by street lights. With the increasing demand for nonconventional energy resources, the conservation of energy is an important domain in current research. The various existing street light systems all around the world use old technology, therefore are not optimized, inefficient and hence consume more power. On account of this, we often find street lights switched ON even when there is no vehicular or pedestrian movement on the roads. Due to the advancement in technology, automated systems are being preferred over manual

systems. Considering this, our automated system refers to Smart Street Lighting System that adapts to movement by pedestrians, cyclists and cars. This, in turn, would save a large amount of electricity that could be used for other constructive work.

The existing street lights are consuming a huge amount of power because the whole night they were glowing even in the absence of vehicles or pedestrians. So this became a most inefficient method. Smart Street light is the project which mainly focuses not only on energy saving but also provides convenience. Automatic intelligent illumination control of light during the night (from 11.00 pm to 5.00 am) by detecting the motion of vehicles, and pedestrians. And it can be turned OFF or ON automatically depending on sunlight. The energy saving in street lights can be achieved by adopting an intelligent automation technique called controllers, necessary sensors, transceivers. It is becoming unavoidable nowadays. IOT uses the machine to machine communication which can transform the existing human-human or human-machine forms of communication. By adopting this new technology electrical power wastage can be reduced. And manual operation can also be eliminated. Here Iot gives energy saving solutions. Due to an increase in the demand for consumption needs, it is difficult to manage the costs and it can grow up to 70% by the year 2050. On an average India saves $42 billion every year just by adopting the alternate methods which can reduce the energy waste. In order to unleash the smart city vision, the IOT can become a major building block to design a unified ICT platform for city development.

5. METHODOLOGY

- LDR Sensor
- Arduino UNO
- Microcontroller
- Relay module

5.1 LDR Sensor

An LDR or light dependent resistor is also known as photoresistor, photocell, photoconductor. It is one type of resistor whose resistance varies depending on the amount of light falling on its surface. When the light falls on the resistor, then the resistance changes. These resistors are often used in many circuits where it is required to sense the presence of light. These resistors have a variety of functions and resistance. For instance, when the LDR is in darkness, then it can be used to turn ON a light or to turn OFF a light when it is in the light. A typical light dependent resistor has a resistance in the darkness of 1Mohm and in the brightness a resistance of a couple of Kohm.

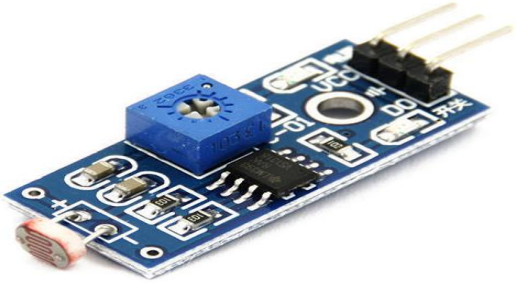

Fig. 1: LDR Sensor chip

5.2 Arduino Uno

The Arduino UNO board is a microcontroller based on the AT mega 328. It has 14 digital input/output pins in which 6 can be used as PWM outputs, a 16 MHz ceramic resonator, an ICSP header, a USB connection, 6 analog inputs, a power jack, and a reset button. This contains all the required support needed for the microcontroller. In order to get started, they are simply connected to a computer with a USB cable or with an AC-to-DC adapter or battery. Arduino UNO Board varies from all other boards and they will not use the FTDI USB-to-serial driver chip in them. It is featured by the ATmega16U2 programmed as a USB-to-serial converter.

Fig. 2: Arduino Uno chip

5.3 Microcontroller

A Microcontroller has all the necessary components which a microprocessor possesses and invariably it poses ROM, RAM, Serial Port, timers, interrupts Input-Output ports, and a clock circuit. The microcontroller always focuses on the chip facility and it is more prominent in the case of serial ports, analog-to-digital converters, timers, counters, read-only memory, parallel input, interrupt control, random access memory, and output ports. The concept of the 8051 microcontroller arises from here and here we will discuss in depth about the various aspects, uses, programming and other features of the 8051 microcontrollers.

Fig. 3: Microcontroller chip

5.4 Relay Module

The relay module is an electrically operated switch that allows you to turn on or off a circuit using voltage and/or current much higher than a microcontroller could handle. The relay protects each circuit from each other. Controlling a relay with the Arduino is as simple as controlling an output such as an LED.

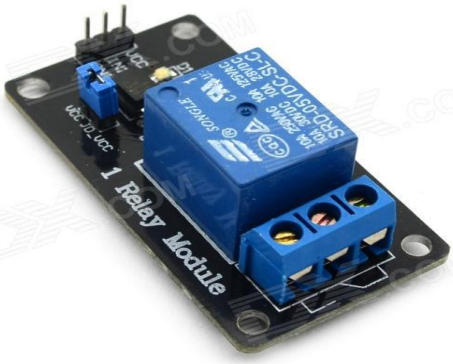

Fig. 4: Relay Module

6. SYSTEM ARCHITECTURE

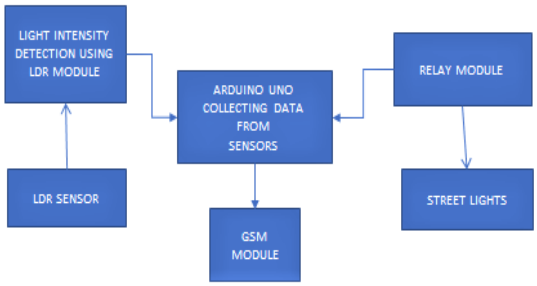

Fig. 5: System architecture

7. CONCLUSION

This is the design and implementation of Automatic Streetlight /Light System. This system was designed to automatically detect Light and switches on the light. The design makes use of a microcontroller to control the outputs when it receives input from the resistor. This design can be used in different areas like Streetlights, Public parks, and lights outside of houses etc.

By using this system energy consumption is also reduced because nowadays the manually operated street lights are not switched off even after the sunlight comes visible and also switching ON earlier before sunset. In this project no need of region and cut-off region. The working manual operation like ON time and OFF time setting. This project clearly demonstrates the working of the transistor in saturation of relay is also known. Implementation of this project encourages digital work.

8. REFERENCES

[1] Energy efficient Smart Street Light, IEEE conference 2017, Ravi Kishore kodali and Subbachary Yerroju, Department of Electronics and Communication Engineering, National Institute of Technology, Warangal.

[2] Brainy Streets, ICISC Conference/ 2018, Dev V.Savla and Heet R.Savla, SBMP Mumbai,India.

[3] The intelligent street lighting system, ISSN Conference/ 2016, Prakash & Prabu, P.G Diploma Student, Dept. of Embedded System and Design, NIELIT, Calicut, Kerala, India.

[4] A smart street light intensity optimizer, IEEE Conference / 2017, Bilam Roy and Jayita Datta, Department of Applied Electronics and Instrumentation Engineering, Guru Nanak Institute of Technology, Kolkata, W.B., India.

