SMART STREET LIGHT

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Abstract: This paper appeals to an effective way of saving electricity and does not required human labour. The lights are switched ON throughout the night time even when there are no vehicles on the road. This leads to lots of energy consumption. A method is proposed to overcome this issue where the street lights are not switched ON or OFF fully. The street light will glow with minimum intensity when there is no vehicle movement. If there is a vehicle movement, it is sensed and the street light will glow with full intensity automatically. IR sensor senses the vehicle movements. The control signal of sensor has been fed to the Arduino.

Keywords: IR sensors, LDR, Arduino, Vehicle movement.

1.INTRODUCTION

Smart lighting system uses a technology which helps in reducing the power consumption rates. Initially the Light Dependent Resistor (LDR) senses the light, depending on the brightness, the resistance of LDR is varied. When a vehicle is approaching, the lights will glow with maximum intensity and when vehicle moves ahead, the succeeding block of lights glow more intensely while the preceding lights glow with minimum intensity. Light Emitting Diodes are used since they are cheaper than High Intensity Discharge lamps. At night time, when object is detected and the lights are not turned ON automatically, this is recognized as a fault and the message is sent as an alert to the concerned authorities. This operation is done using Internet of Things (IoT) technology. The message is delivered via SMS to the concerned authority.

2.LITERATURE SURVEY

[1]   In this paper, the author came up with the paper based on vehicle movement, street light with automatic light sensing which used IR sensors for vehicle detection. Based on the output of IR sensor, the intensity of light changes.
[2]   In this paper, the author put forward a smart street light system using SMS and Global System for Mobile(GSM) with microcontrollers to meet the requirements.
[3]   In this paper, the author elaborates the design and construction of automatic street control system circuit with LDR sensor and the photoelectric sensors are the two main conditions in this working circuit.
[4]   In this paper the author used microcontroller to control IR sensors, which is used for interruption detection. The Arduino controls the light based on the output of sensors.
[5]   In this paper the author proposed a project which controls the automatic on and off of street lights based on intensity of light but not based on vehicle movement. It uses LDR sensor, relays. It can save up to 15-20% of power consumption and manual work is reduced.

3.COMPONENTS:

1.LDR: A type of resistor whose resistance varies depending on the amount of light falling on its surface. This works on the principle of photo conductivity.

2.IR SENSOR: An infrared sensor emits and detects infrared radiation to sense its surroundings. When an Obstacle is detected it transmits an infrared signal, this IR signal bounces from the surface if an object passes by and the signal is received at the IR receiver.

3.LED: A device that emits light when an electrical current flows through it.LEDs consume less energy and have a long lifespan, they are replacing traditional light bulbs in several places.

4.Arduino UNO: It is ATmega328 datasheet-based microcontroller that has 6 analog inputs, 8 digital outputs and 6 PWM outputs. It comes with a reset button and a 16 MHz ceramic resonator with an USB connection along with a power jack.

5.GSM SIM800A MODEM: It is a GSM/GPRS Modem-RS232. The Regulated Power supply allows to connect wide range unregulated power supply. Using this modem, make audio calls, SMS, Read SMS, through simple AT commands.
6.Software: Arduino IDE is an open-source electronics platform based on easy-to-use hardware and software.

4.PROPOSED WORK

In the proposed system, we are focusing on Designing, Creating, and delivering a smart street lighting system. All the street lights are made to glow with minimum intensity at night time with the help of LDR. The principle of LDR is that it changes its resistance value based on light it senses. With this, the lights are automatically turned ON during night time without manual operation. IR sensors are used which detects the presence and movement of object to detect vehicles by transmitting IR rays. These sensors are made to work only during night time and these sensors starts their work based on LDR detection. All the components are controlled by ARDUINO UNO. Based on the illumination value detected by LDR, the lights are turned ON with minimum intensity level. When sensors detect any movement caused by vehicle or human via ARDUINO. When no objects or pedestrians are detected, the lights automatically switch over to minimum intensity. This reduces power consumption when no vehicle is detected. The GSM used helps in sending messages when a fault is detected in the system to the concerned authority. The current system is an old traditional system which requires human labour to switch the street lights on and off and also consumes a lot of power and money. The proposed system is a smart way of reducing power consumption, detects faults and acts as a security for public.
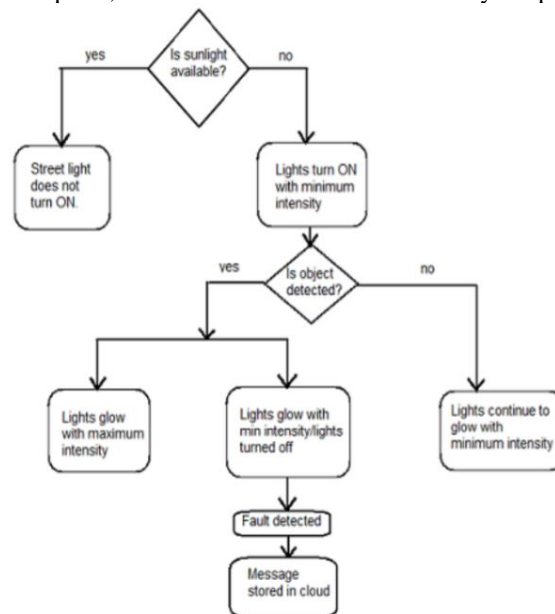
5.FUTURE ENHANCEMENT

Smart street lights can help in monitoring traffic flow, parking, pedestrian crossings, seismic activity, or atmospheric changes. They can be furnished with speakers to alert people to threatening situations and can help police solve crimes by installing cameras. Solar cells in street lighting system can be used which converts the sunlight into DC electricity through solar cells. The generated electricity may be stored in the batteries and used during night hours. With these advancements cities can improve efficiency, increase citizen satisfaction, and decrease costs. Smart street lights opens new revenue opportunities, such as leasing poles for digital signs and other services.

6.CONCLUSION

In today's world, street lighting accounts for nearly 40 percent of many cities' total energy costs, local governments and utility providers are seeking new ways to decrease energy usage and reduce costs. With the use of human labor, the street lights can be switched ON at night and switched OFF during the day. In this process, human energy is wasted and also leads to unnecessary wastage of electricity to the government due to the manual switching of street lights. With improvement in technology, things are getting easier and simpler. Smart street lights can transform the municipalities cities, while delivering enormous savings. Installing LEDs can help in an additional 10 - 20 percent savings by dimming or brightening the lights as required. By using these technologies, there is no need of human labour. These improved technologies can switch ON/OFF the street lights automatically by using IR sensor, LED, LDR and Microcontroller. This method can save surplus amount of money, energy which can be saved and utilized for other useful purposes and does not require human labour. In addition to saving money, cities can improve operational efficiency, functionalities, increase citizen satisfaction and decrease costs.

7.REFERENCES

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