

## Chapter-11

### Implementation of Smart Street Light Automation and Fault Detection

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Automation of lighting systems and fault detection greatly reduce the need for human interaction in the actual ON/OFF switching of lights. With the use of this automation system, we can waste less energy and money. Using the internet of things will allow for efficient operation of the lighting system (IOT). The Internet of Things (IOT) is made up of a cascade of hardware, software, and sensors. The object can gather and communicate information as a result of this.

A fundamental hardware and software platform for electronics, Arduino is free and open-Source. In this system, heat radiation from the surrounding items is detected by an IR sensor, which can be utilized to detect the presence of various things. A light sensor called the LDR measures the sun's brightness. Wireless communication is the purpose of the Bluetooth module HC-05. This

module can be configured as either a master or a slave.

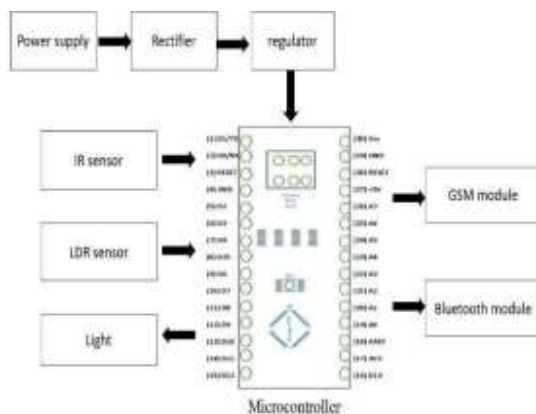


Fig.1: Block Diagram

Using this IOT- based light automation system, the numerous drawbacks of traditional lighting system can be avoided. When compared to a traditional lighting system, automation of lights allows the lights to be regulated automatically, increasing the overall efficiency of the lighting system, and saving money. Whenever there is any fault detected,

the user gets notification through GSM module.

The streetlight's circuit diagram. It operates according to the changing sunshine. The LDR functions with the aid of IR sensors, which are activated under low illumination conditions and every fundamental electronic circuit will operate under regulated 5v DC. When there is enough light present, the LDR displays high resistance and acts as an insulator. When there is no light present, the LDR behaves as a low resistance path and permits the flows of electricity. When an item enters the range of an IR sensor, an IR LED emits radiation that is reflected by the object and passes through an IR photodiode. As a result, an object is found.

When it comes to the functional block, which includes LDR, LEDs, and IR sensors, these parts are more expensive, more compact, less complex, highly dependable, and suitable for low-power applications.

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The system served as the prototype for upcoming advanced intelligent systems that save both human and electrical power. Using the use of Arduino software and coding, the LEDs are switched on and off. The streetlight's circuit diagram. It operates according to the changing sunshine. When there is enough sunlight present, the LDR displays high resistance and functions as an insulator. When there is no light, the LDR behaves as a low resistance channel and permits the flow of electricity.

Each component works with the others in perfect harmony. Four IR sensors and one LDR sensor are positioned close to one another. The external power source will soon be fitted and attached to the Arduino board to allow current to flow. The Arduino board will be attached to each of the four IR and LDR sensors. The PCB board's wiring is fully installed.

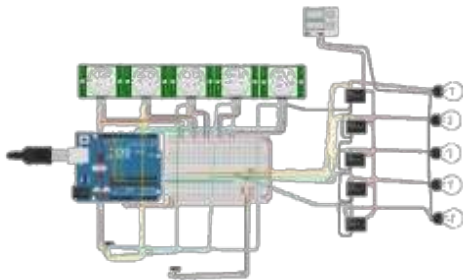


Fig 2: Simulation Circuit

Bluetooth module, the LEDs are control whether the LEDs are ON or OFF. Whether the LEDs are ON or OFF, the problem of LEDs is detected. The GSM module sends a fault message to the registered mobile phone number when a defect is discovered, or when a fault is suspected.



Fig 3: Hardware Setup

The Arduino is placed and all the LEDs are connected to it. The circuit is fully connected, and as soon as a 5V power supply is introduced into the Arduino input, the Bluetooth module will begin to function flawlessly. The depicts the LEDs are controlled by using Bluetooth module is connected to Arduino is mounted. By controlling the LEDs are ON or OFF. Whether the LEDs are ON or OFF, the problem of LEDs is detected. The GSM module sends a fault message to the registered mobile phone number when a defect is discovered, or when a fault is suspected. When an object is identified by the four IR and LDR sensors, the associated LED and subsequent LEDs fully illuminate.

One can conserve energy by employing smart lighting, which replaces sodium vapor lights with LEDs and includes an additional security feature. It stops excessive electricity waste brought on by manually turning off streetlights when it's not essential. With the use of IR sensors, it offers an effective and clever automatic streetlight management system. It can keep costs the same while reducing energy

consumption. The system is flexible, scalable, and completely adaptable to user requirements. In this, we are using 3 streetlights respectively, each pole is placed or inserted by the IR sensor in the opposite direction of the reflector sensor. The working of the reflector sensor in between the UV rays are passed by the vehicle, when the speed obtained by the IR sensor the light automatically it glows when the vehicle is passed away within a sec the light glows and turns off after 10 to 20 seconds of time limit. The IR sensor range is about between 10-15cm and its maximum range is about 20 to 150 cm.