

LIGHT AUTOMATION AND FAULT DETECTION

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Abstract

Light automation and fault detection drastically reduce the intervention of humans for physical switching of lights (ON/OFF). This automation system helps us to reduce power and economical wastage. The lighting system can be operated efficiently by using the internet of things (IOT). IOT is the combination of physical components which are cascaded with sensors and software. This makes it possible for the object to gather and exchange information. Arduino is a free and open-source electronics platform with basic hardware and software. In this system mainly two kinds of sensors are used, IR sensor which detects thermal radiation from the surrounding objects, which can be used to identify the presence of different objects. The LDR is a light sensor that detects the brightness of the sun. The Bluetooth module HC-05 is intended for wireless communication. This module can be used as a master or slave configuration. 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.

Keywords- Arduino, GSM module, Bluetooth, Sensors.

Introduction:

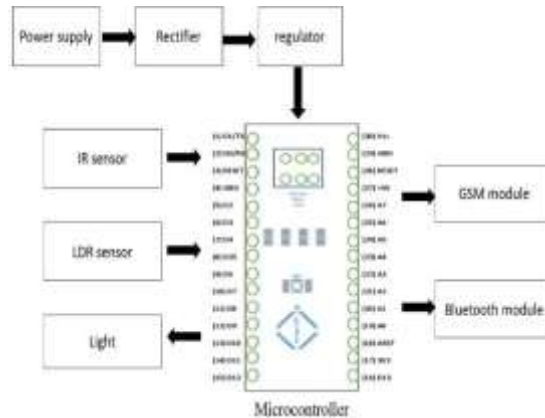
Lights play a significant role in various sectors of its applications, like providing safety for pedestrians during nighttime on roads and various other applications can be done with lighting system. So, automating lighting system play a vital role in the role of maintaining and controlling of lights at large scale. This system helps to fully automate any lighting system available, and this system reduces the intervention of humans for physical switching of lights (ON/OFF).

Switching of lights automatically is possible with the help of LDR and IR sensor. The LDR sensor detects the ambience of the surroundings and IR sensor detects any objects in the surroundings, the commands of the sensors are given to a Arduino which use the signals of both the sensors and gives the switching command to the relays and the relays turn the lights ON/OFF. LED lights are a great alternative for conventional discharge lamps, so there will be less energy consumed. The usage of a smart lighting system that communicates across the power line to give an intelligent technique of conserving energy and monitoring light defects is proposed in this study.

Objectives:

1. Using an LDR sensor, automatically turn on/off bulbs according on the amount of light in the area.
2. When motion is detected by an IR sensor, the light turns on and off automatically.
3. Controlling the lamps remotely by using the Bluetooth (HC-05).
4. Detecting the fault lights and sends message to cell phone by using GSM module.

Block diagram:



The LDR, IR, Bluetooth (HC-05), Arduino, and GSM module are used for the system diagram for light automation and fault detection. The Arduino kit is directly connected to the lights, and it has a power source.

1. To begin, connect the breadboard to the required equipment (LDR, IR, Bluetooth, GSM module, and other resistors).
2. By connecting the breadboard to the Arduino Uno and uploading the source code.
3. Run the source code after compiling it.
4. Pair the system with the “**Arduino Bluetooth**” Android app, which allows you to control the light remotely.

Working:

The working of the light automation and fault detection

1. The Arduino IDE software is installed on the system.
2. Using LDR sensors to turn on and off a light.
3. Automatic ON/OFF when the motion is detected by using IR sensor.
4. By using a Bluetooth application to control the lights.
5. In case of faulty light, an alert message is sent to the user by using GSM module.
6. Putting all the above modules together and calling the whole thing “**LIGHT AUTOMATION AND FAULT DETECTION SYSTEM**”.

HARDWARE PERFORMANCE:

S.No	Input data	Desired output	Actual output	observation
Arduinounit testing	Digital Signal	Control of lights	At regular intervals, the lights being switched ON and OFF.	Hardware accuracy.
LDR unit testing	Ambiance values.	Switching of lights at low light condition.	Switching of lights depends on the surrounding ambience.	Hardware accuracy.
IR unit testing	Motion sensed in the area.	Switching of LED during motion on detection.	When the motion is detected then LED switch ON/OFF.	Hardware accuracy.
Fault detection	Faulty lights	Detection fault	Text message is	Hardware

		and sending text message to the user.	received via GSM module.	accuracy.
Bluetooth module testing	Commands via mobile application.	Controlling lights according to command.	Lights are controlled according to the command.	Hardware accuracy.

Module 1 : The Arduino IDE-Software is installed on the system.

1. Download and install the Arduino IDE-Software.
2. By using USB cable to connect the Arduino-IDE to the PC.
3. Install the Arduino IDE-Software in our system.

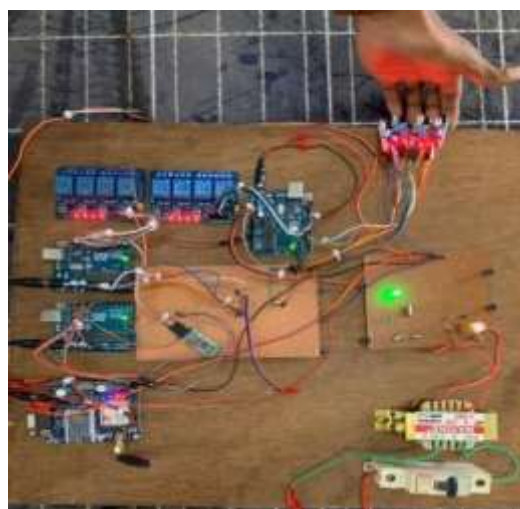


Module 2 : Using LDR sensor to turn ON and OFF a light.

1. Create the circuit by connecting all the components with jumper wires as needed.
2. Upload the software code to the Arduino IDE.
3. Compile and run the Arduino IDE-Software.

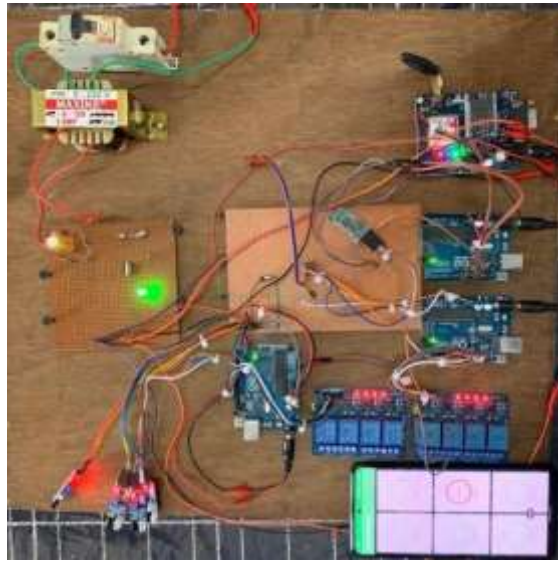
Module 3 : Automatic ON/OFF when the motion is detected by using IR sensor.

1. Create the circuit and place it on the zero board.
2. Upload the software code to the Arduino IDE.
3. Plug the Arduino to the laptop using the USB-Wire.
4. Compile and run the Arduino IDE-Software.



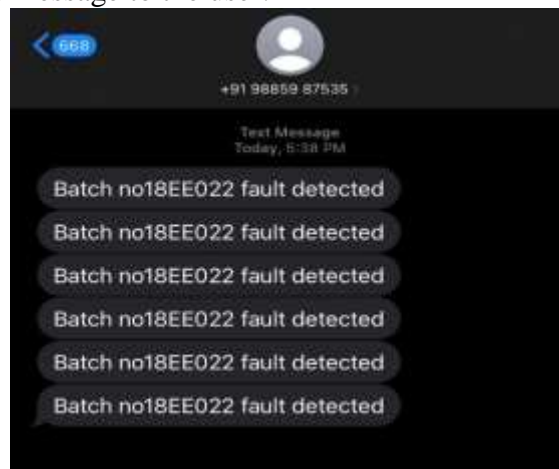
Module 4 : Controlling the lights using Bluetooth Applications.

1. Connect the HC-05 module to the mobile phone through Bluetooth
2. Dump the code in “**Arduino Bluetooth controller**” android application.
3. Controlling of lights can be done by the commands given by the “**Arduino Bluetooth controller**” android application



Module 5 : In the case of faulty light, an alert message is sent to the user by using GSM module.

1. Create the circuit and place it on the zero board.
2. Upload the software code to the Arduino IDE.
3. Plug the Arduino to the laptop using the USB wire.
4. Compile and run the Arduino IDE-Software.
5. And sends the fault detected message to the user.



Module 6 : Putting all the above modules together and calling the whole thing “**LIGHT AUTOMATION AND FAULTDETECTION SYSTEM**”.

OUTPUT: Considering various inputs and instructions from interfaced sensors and Arduino respectively and the lights glow according to the requirement.

Conclusion : By using various inputs and instructions from interfaced sensors and Arduino respectively and the lights glow according to the requirement.

Advantages :

1. This solution automates the control of lighting by saving manual energy.
2. Saving of electrical consumption as the defective lights can be detected.
3. Lights can be control remotely without any physical involvement for switching of lights.
4. By using this system, it is safer while doing work in our home.
5. By using the fault detection technology, the energy consumption of man effect is less.

Applications :

It can use in the hospitals, agricultural field, street light automation, home automation, industrial purposes etc.,

Future scope :

1. It can be developed by using rechargeable battery system. So, it can use when the power is on or off.
2. Home automation is possible with addition of suitable sensors or other equipment.
3. With the addition of an appropriate sensor, pole damage detection is possible.
4. we can develop solar street light system with light automation controller.

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