Smart Street Light System using IoT

Bhuvan Chadha
bchadha1@binghamton.edu
Department of Computer Science
Binghamton University

Reha Musale
rmusale1@binghamton.edu
Department of Computer Science
Binghamton University

ABSTRACT

The main objective of this project is to save the unwanted consumption of light. The lights are switched ON only when required. The smart street light system automatically switches the Lamps based on the motion sensed my the PIR sensor. Also, the leds can be controlled from an android application. The intensity of the Leds can also be controlled from the same android application. Earlier system used IR sensor which are not very sensitive to motion. Two different sensors are used in this project. LDR sensor is used to detect the intensity of light and PIR sensor is used to detect presence of any object. Here Led is a prototype for a streetlamp. The light is off during the day even though there is motion detected by the PIR sensor. The lights turn on when the intensity of light is low (night-time) and when there is motion detected by the PIR sensor.

KEYWORDS

IR Sensor, LED, Internet of Things, Arduino Uno, Blynk

1. INTRODUCTION

In a city the expensive energy resource is the lighting system. This project of Smart Street Light can reduce the energy consumption by almost 50%. This system can be installed on light poles, garages, or any other places where energy consumption has to be reduced. It proposes the installation of wireless based system to remotely track and control the original energy consumption of the streetlight and take appropriate energy consumption reduction measures through power conditioning and control.

In this system the street light systems are automatically set ON and OFF according to the natural light intensity. This smart light system automatically detects the movements of the object on the street. In the traditional system IR sensor is used to detect the objects. The intensity of the streetlight can also be controlled through an android application. Also, the lamps can be switched on and off from this application. We are using two different sensors for this process and IR sensor is used. LDR is used to count the intensity of light and IR sensor is used to detect the presence of an object or obstacle.

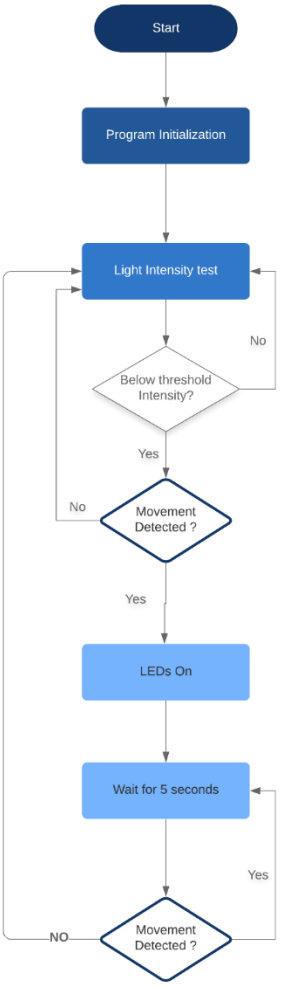
2. DESIGN AND IMPLEMENTATION

In this section, we first describe the overall design of our Smart Street Light Project. Then we describe the tools and the hardware used and we will also give the details of our implementation.

2.1 Control-Flow Diagram

The above diagram shows the overall control of our project. It can be described in below steps:

- Program is initialized or loaded in the Micro controller
- Light intensity is detected by the LDR
- The threshold intensity is 900 or less for day light and >1000 for dark light.
- If The above condition is true i.e. intensity is >1000, it further checks the IR output.
- If motion is detected, then the LEDs are ON.



2.2 Data-Flow Diagram

The data flow diagram is described below-

The LED is connected to digital pin no 6 through a resistor to avoid excess flow of current through the circuit. The LDR is connected to pin no A0 through two pull up resistors. The intensity value varies based on the number of resistors. A 5-volt supply is given to the overall circuit through the Arduino-board.

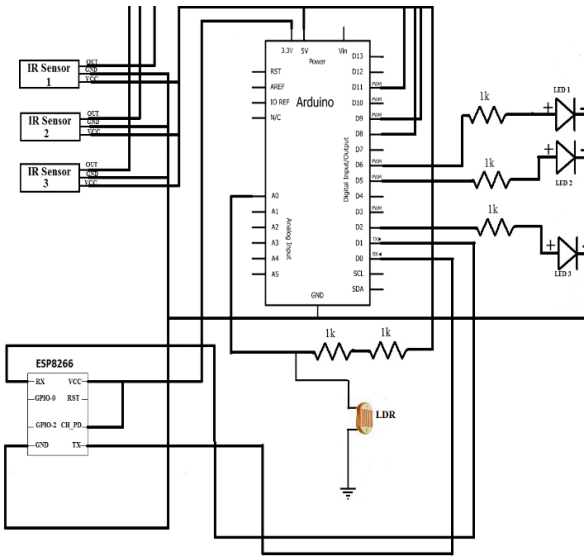


Figure 2: Dataflow diagram

3. HARWDARE COMPONENTS

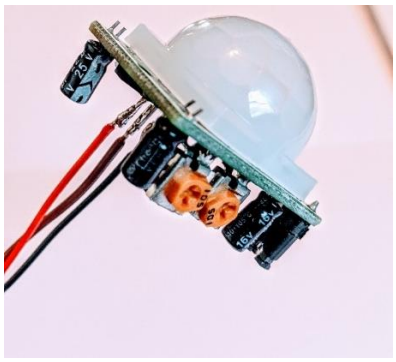


Figure 3.1 PIR Sensor

It is used to detect heat and motion of an object. It works entirely by detection of infrared radiation emitted or reflected by objects. Passive Infrared Sensor (PIR) refers to the fact that they do not radiate energy for detection purposes

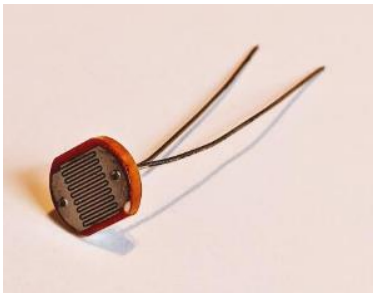


Figure 3.2 LDR sensor

The resistance of LDR changes with the intensity of light, hence it is used in Light sensing devices. It works on the principle that resistance decreases with increase in light intensity.

Arduino Uno board has the following features:

1. It has 6 Analog and 14 Digital input pins
2. It operates on both 5 V and 3.3 V
3. Used ATMEGA 328P microcontroller
4. It is programmable with ARDUINO IDE

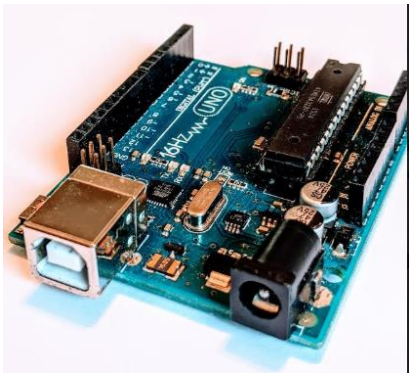


Figure 3.3 Arduino Uno

4. SOFTWARE REQUIREMENTS

We have used following software for our project:

1. Proteus for circuit simulation
2. Arduino IDE for running and debugging code on Arduino IDE
3. Blynk Arduino libraries

5. BLYNK PLATFORM

Blynk is a new platform that allows you to quickly build interfaces for controlling and monitoring your hardware projects from your iOS and Android device. After downloading the Blynk app, you can create a project dashboard and arrange buttons, sliders, graphs, and other widgets onto the screen. Using the widgets, you can turn pins on and off or display data from sensors.

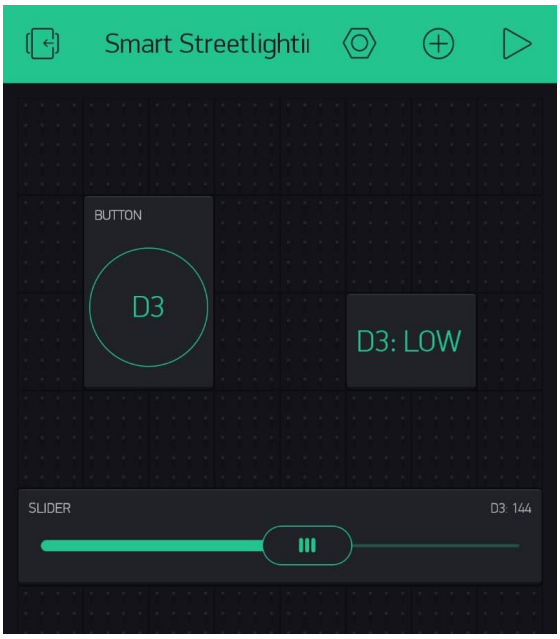
Blynk was designed for the Internet of Things. It can control hardware remotely, it can display sensor data, it can store data, visualize it and do many other cool things.

There are three major components in the platform:

- **Blynk App** - allows to you create amazing interfaces for your projects using various widgets we provide.
- **Blynk Server** - responsible for all the

communications between the smartphone and hardware. You can use our Blynk Cloud or run your private Blynk server locally. It is open source, could easily handle thousands of devices and can even be launched on a Raspberry Pi.

- **Blynk Libraries** - for all the popular hardware platforms - enable communication with the server and process all the incoming and outcoming commands.



CONCLUSION

The important aim of this project is to save the consumption of energy and use it efficiently. This prototype of Smart Street Light System can be used from small streets to highway roads. This system can also be used in public places like hotels, industries, etc. It can reduce the manpower by a large number. Hence it can be used to reduce the energy consumption and cost to a large extent.

REFERENCES

1. International Journal of Advanced Research in Applied Science and Technology ISSN: 2456-1959 Vol.3, No.11, November 2017
2. https://blynk.io/
3. https://ieeexplore.ieee.org/abstract/document/8326023
4. https://www.instructables.com/id/Smart-Street-Light-Using-Ir-Sensor-With-Arduino/
5. https://create.arduino.cc/projecthub/sagnik2017ghosh/iot-based-smart-street-light-system-8e9929
6. http://www.ijircce.com/upload/2017/march/283_SMART.pdf