WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Automatic Street Light Work on Vehicle Movement

Dr. N. Sambasiva Rao[1], Ch. Venkata Mani Durga Praveesh[2], Mrs. S. Ramyaka[3], D. Lakshmana Kumar[4], K. Sudharani[5], T. Lohit Kumar[6], G Vijay Kumar[7]

[1]Professor & Head of Electrical & Electronics Engineering, NRI Institute of Technology Vijayawada, India, (nsraohodeee@gmail.com)
[2](20KN1A0213) Department of Electrical &Electronics Engineering NRI Institute of Technology Vijayawada, India, (praveeshchukka@gmail.com)
[3]Assistant Professor of Electrical &Electronics Engineering NRI Institute of Technology Vijayawada, India, (ramyaka.sammangi@gmail.com)
[4](21KN5A0204), [5](20KN1A0224), [6](20KN1A0249),[7](20KN1A0217), Department of Electrical &Electronics Engineering NRI Institute Of Technology Vijayawada, India, [4](lakshmanakumar991@gmail.com), (kommineni sudharani725@gmail.com)[5], (lohitkumarthotakura@gmail.com)[6], (vijaylumar4102002@gmail.com[7]

ABSTRACT :

An automated system that runs the street is called a smart street light. Reducing power usage when there are no vehicle movements on the road is the primary goal of smart street lights. When there are cars on the road, the smart street light will shine brightly; otherwise, it will stay dull. In today's society, everything is getting easier and simpler for everyone thanks to technological advancements. Automation is the process of producing goods and services with fewer human workers by using information technology and control systems.

Keywords—Arduino Uno R3, LED, light-dependent resistor, IR sensor.

INTRODUCTION

Automation is becoming increasingly significant in the global economy and our daily lives. Automatic systems are favored over all manual systems. We can also call it "SMART STREET LIGHT SENSING". Intelligent light sensing refers to public street lighting that responds to the movement of pedestrians, cyclists, and autos. Intelligent street lighting, also known as adaptive street lighting, dims when no activity is observed and brightens when motion is detected. This lighting differs from typical, stationary, illumination, or dimmable street lighting, which dims at predetermined intervals. The research demonstrates automatic control of streetlights, resulting in some electricity savings. In the context of industrialization, automation is a step beyond mechanization. Whereas mechanization provides Automation significantly reduces human sensory and mental requirements. Street lighting is one of the most crucial aspects.

As a result, street lighting is relatively simple, but as urbanization progresses, the number of streets increases dramatically, as does traffic density. When there are no visible signs, people become more frightened and dependent on others, which limits their freedom and harms their personality. Nowadays, the approach is widely employed across the country. The approach works by establishing an optical control circuit, altering the resistance with a light-sensitive device, and controlling street lamps to turn on automatically after dark and switch off automatically after dawn in the morning. Because of technological development

PROJECT SPECIFICATION

In the proposed system we are implementing the automatic street light intensity control based on solar energy. in this proposed system we are implementing that whenever the light intensity is low light will be on at minimum intensity In addition to these we are also implementing it whenever a vehicle passes the area the sensor automatically detects the object and automatically system will adjusts the light intensity at maximum level, and if there is no object detects light will remain to constant state and also whenever the light intensity is bright then automatically lights will be off. This project explains the circuit that switches the street lights ON when there is vehicle movement and OFF after a fixed time. The hardware section includes the Arduino, LED lights, PIR or ir sensor, and LDR sensor.

PROPOSED METHOD

A dynamic control strategy is given for the smart road control project. As per the proposed arrangement, all the road lights continuously glow for a few moments and switch off. At the point when a vehicle is moving by, a block of road lights switch ON and as the vehicle moves ahead, the following

block of lights turns ON whereas the preceding light turns OFF. The present HID lights are more costly than LEDs. Due to this reason, the high-intensity discharge lights are replaced by light-emitting diodes. Power utilization and cost can be saved in the present field of utilization of electrical gadgets and their advancements. Road lighting systems are becoming complex systems with proper energy conservation techniques due to the fast development of industries and urban areas.

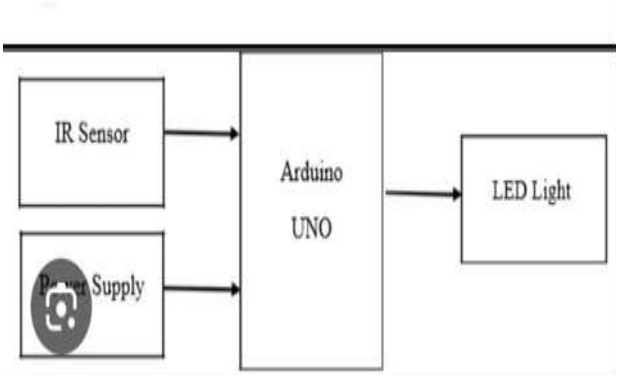

Fig 1 block diagram

The key steps of this implementation are

- Then, Arduino Uno sends a signal to the Bluetooth module which is connected to a mobile(here) with Bluetooth.

A. THEORY

In today's smart cities, streetlights perform more functions than ever before. They use digital networks and embedded sensors to collect and transmit data that allows cities to monitor and respond to any situation, from traffic and air quality to crowds and noise. They can detect traffic congestion and monitor available parking places. These same networks may remotely turn on and off LED lights, flash them, dim them, and do other things, allowing communities to optimize the benefits of low-energy lighting while simultaneously boosting pedestrian and bike safety. With street lights forming a network canopy, data networks may be used by more than just lighting departments, empowering schools and businesses through a lighting infrastructure that illuminates the future of the digital city. all while better-serving citizens and reducing energy use and CO2 emissions.

Fig 2 Design of smart street light

B. WORKING:

The working procedure of the Smart street light using IR sensors Is explained below. The following are the different steps included in building a Smart street light.

1. The output of the LDR pin is connected to the A0 (analog) port of the Arduino Uno board.

2. Connect all output of the IR sensors to port numbers A1, A2, A3, A4 and A5 respectively

(analog) which is the input signal to the Arduino board.

3. Connect the ground of all the IR sensors to the GND port.

4. The output signals from the LED are connected to port numbers 5, 6, 9, 10, and 11 respectively.

5. Again connect all the negative terminals of LED to the GND port.

6. Power is passed to the Arduino(7-12V).

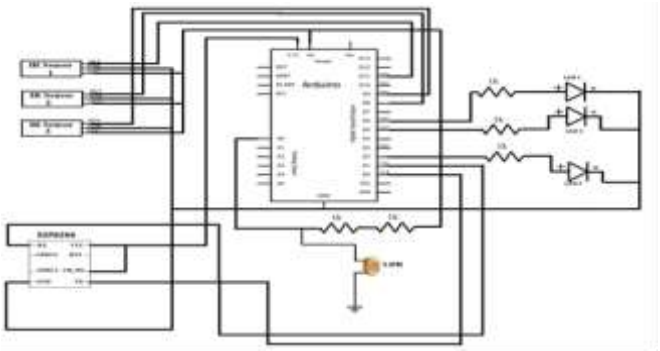

Fig 3 circuit diagram for smart street light using IR sensor

HARDWARE COMPONENTS

A. ARDUINO UNO R3:

It is a microcontroller board based on the ATmega328. Arduino is an open-source, prototyping platform and its simplicity makes it ideal for hobbyists or novices to use as well as professionals. The Arduino Uno has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started. The Arduino Uno R3 uses an ATmega16U2 instead of the 8U2 found on the Uno (or the FTDI found in previous generations). This allows for faster transfer rates and more memory

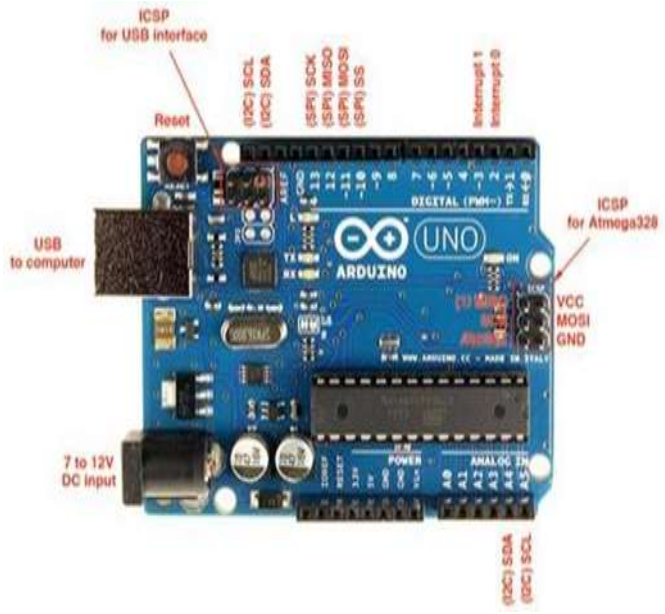

Fig-4 Arduino Uno

The Uno R3 also adds SDA and SCL pins next to the AREF. In addition, there are two new pins placed near the RESET pin. One is the IOREF which allows the shields to adapt to the voltage provided by the board. The other is not connected and is reserved for future purposes.

B. IR sensor

An electrical gadget that emits in order to sense certain features of its environment is called an infrared sensor. An infrared sensor may detect motion, measure an object's temperature, and determine whether an object is present because of an intervention or interruption. These sensors are referred to as passive infrared sensors because they do not emit infrared radiation; instead, they merely measure it. All of the objects typically emit some kind of thermal radiation in the infrared range. These radiations are not visible to the human eye, but an infrared sensor can identify them. An IR LED (Light Emitting Diode) serves as the emitter, and an IR photodiode that is sensitive to IR light with the same wavelength serves as the detector.

Fig 5 IR Sensor

C. Light Dependant Resistor Circuit

Light dependent resistors, or LDRs, are incredibly helpful, particularly in circuits with light and dark sensors. An LED causes an LDR's resistance to decrease significantly when it is lighted. Normally, an LDR's resistance can reach up to 1000000 ohms. Devices that change their electrical properties when exposed to visible or invisible light are known as electronic sensors. The photodiode, phototransistor, and light-dependent resistor (LDR) are the most well-known examples of this kind of device. As the name implies, resistance variation in light-sensitive resistors is depending on light. The process of creating an LDR involves applying a layer of either cadmium selenide or cadmium sulfide to a ceramic substrate that has either extremely few or no free electrons in the absence of light. One kind of diode, or basic semiconductor, is an infrared LED.

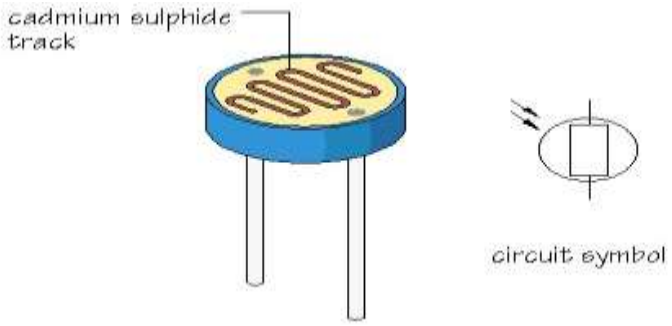

Fig 6 Light Dependant resistor

It is necessary to modulate the emission from the IR diode to use it in the electronic application to prevent spurious triggering. Modulation makes the signal from IR LED stand out above the noise.

D. Light Emitting Diode

A light source made of semiconductors with two leads is called an LED. When turned on, this p-n junction diode generates light. There is a positive long terminal and a negative short terminal. Within the device, electrons can recombine with electron holes when an appropriate current is provided to the leads, releasing energy in the form of photons.

This phenomenon is known as electroluminescence, and the energy band gap of the semiconductor controls the hue of the light, which corresponds to the photon's energy. Since LEDs usually have a tiny size (less than 1 mm2), the radiation pattern can be modified by integrated optical components.

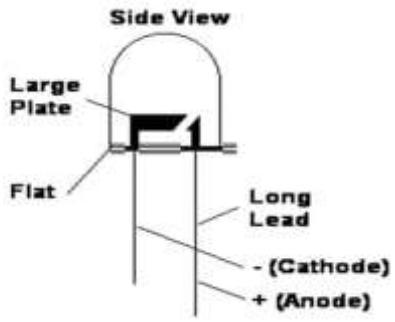

Fig 7 LED Structure

• SOFTWARE COMPONENTS

Arduino IDE

Visit the download page to get the most recent version. The Installer (.exe) and the Zip packages are your options. It is recommended that you choose the first one, which installs the drivers and all other necessary software directly into the Arduino Software (IDE). The drivers must be manually installed when using the Zip bundle. If you would like to build a portable installation, the Zip file is also helpful.

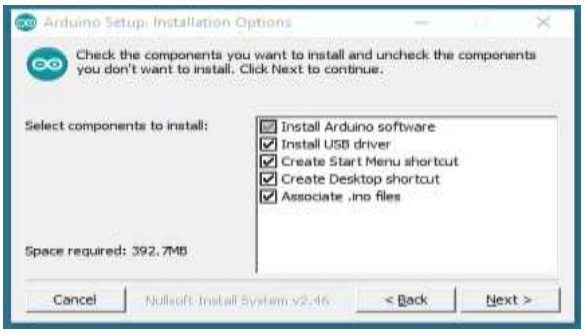

Fig 8 choose the components to install

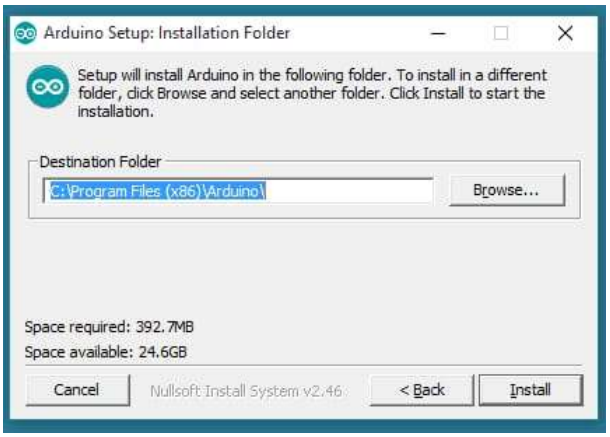

Fig 9 choose the installation directory

Fig 10 installation in progress

RESULT AND DISCUSSION

This section provides a step-by-step illustration of how the entire research project is set up. After the parts are joined and corrected, some screenshots are shown. Since every component is connected and completes the system configuration, it is easier to understand the procedures and do simple tasks. These procedures make things simple, straightforward, and uncomplicated, even for others attempting to apply the same. The screenshots are listed in chronological order below:

Shows the hardware configured in its initial state. Every element is compatible with every other element. Five infrared sensors are positioned adjacent to one another. It's almost time to attach the Arduino board and link it to the external power source so that current may flow. Everybody

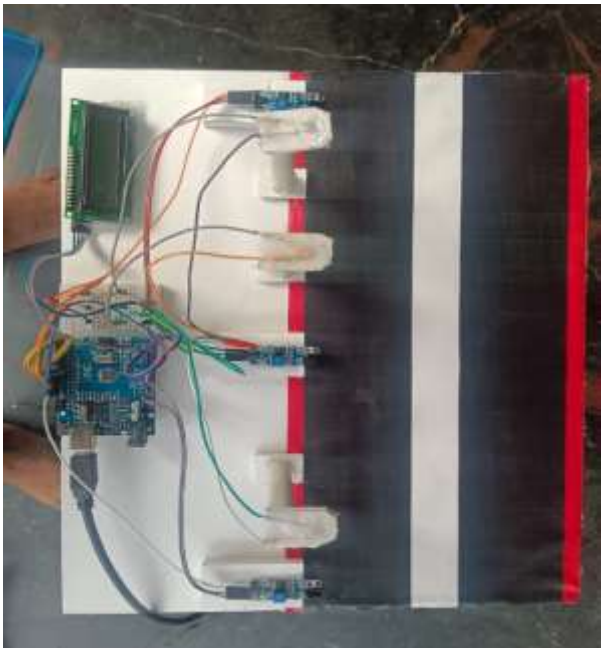

Fig 11. Initial stepup phase

Fig 11 Initial Setup Phase 1

, Fingertip conceals LDR, resulting in a naturally dark environment. When there is no light, the LDR's resistance drops dramatically, allowing current to flow through the circuit. LEDs then have a dull light.

shows how the first two adjacent LEDs light up fully when the first sensor detects an object, while the remaining LEDs remain weakly lighted.

demonstrates how the third infrared sensor recognizes the object and lights the matching LED and the LED that comes after it fully while keeping the other LEDs lighted modestly.

CODING

```
#include <LiquidCrystal_I2C.h>

LiquidCrystal_I2C lcd(0x27, 16, 2);

#define led1 7

#define led2 8

#define led3 9

#define IR1 10

#define IR2 11

#define IR3 12

void setup()

{

 Serial.begin(9600);

 lcd.init();

 lcd.backlight();

 lcd.clear();

 lcd.setCursor(0,0);

 lcd.print("AUTOMATIC");

 lcd.setCursor(0,1);

 lcd.print("STREET LIGHT");
```

```
 delay(6000);
 lcd.clear();
 lcd.setCursor(0,0);
lcd.print("A. STREET LIGHT");
 pinMode(IR1, INPUT);
 pinMode(IR2, INPUT);
 pinMode(IR3, INPUT);
 pinMode(led1, OUTPUT);
 pinMode(led2, OUTPUT);
 pinMode(led3, OUTPUT);
}
void loop()
 int ir1 = digitalRead(IR1);
 int ir2 = digitalRead(IR2);
 int ir3 = digitalRead(IR3);
if(ir1 == 0)
{
 digitalWrite(led1,HIGH);
 digitalWrite(led2,LOW);
 digitalWrite(led3,LOW);
 lcd.setCursor(0,1);
 lcd.print("1st LIGHT ON");

}
if (ir2 == 0)
{
 digitalWrite(led2,HIGH);
 digitalWrite(led1,LOW);
 digitalWrite(led3,LOW);
 lcd.setCursor(0,1);
 lcd.print("2nd LIGHT ON");

}
if (ir3 == 0)
{
 digitalWrite(led3,HIGH);
 digitalWrite(led1,LOW);
 digitalWrite(led2,LOW);
 lcd.setCursor(0,1);
```

```
 lcd.print("3rd LIGHT ON");
}
}
```

APPLICATIONS

• • The project can also be utilized in parking lots of shopping centers, hotels, industrial lights, etc. The street light control circuit can be used on regular roads, highways, expressways, etc.

A. Light switch

The most obvious use for an LDR is to have a light switch on by itself when it reaches a specific light level. A garden light or a street light might serve as an illustration of this.

B. Control of the camera shutter

Camera shutter speed can be adjusted with LDRs. The camera shutter speed would then be adjusted to the proper level based on the light intensity measured by the LDR.

Used in the street light application.

Used in Domestic applications.

ADVANTAGES

Since LEDs have a longer lifespan and are more durable than Neon-based lights, which are typically used as street lights, the cost of maintenance can be lower if the lighting system uses just LED lights.

A significant amount of energy can be saved because the lights are automatically turned on and off.

In comparison to the other system, this one is more affordable, requires less installation and maintenance, and operates more efficiently. One of the main drawbacks of employing a timer circuit or manual operation for switching the street light system is that it is not as versatile in terms of on and off time as it is in terms of energy savings, low cost, safety and security, automated operation, and ease of manufacture on sunny and rainy days.

DISADVANTAGES

1. False activations: Non-vehicle motions, such as those of animals, people, or even blowing debris, may cause the system to activate prematurely. This may irritate locals and waste electricity.

2. Reliability: Because automatic systems rely on technology, it occasionally malfunctions or fails. Lights may not turn on when needed or may turn on continually due to technical issues or sensor problems.

3. Light pollution: If automatic street lights are not calibrated correctly, they may be a contributing factor to light pollution. The nocturnal environment can be negatively impacted by excessive or poorly directed light, which can also upset natural ecosystems and alter the behavior of wildlife. 4. Adaptability: The system might not be easily modified to accommodate shifting environmental factors or traffic patterns. In certain circumstances, this could lead to insufficient coverage or inefficient lighting.

Future work

• The system lacks an automated fault detector. However, it is possible to incorporate pole damage detection by adding a suitable sensor.

CONCLUSION

One can save a significant amount of energy by using Smart Street lights, which replace sodium vapor lamps with LEDs and include security features. It prevents needless electricity waste brought on by manually turning off streetlights when not in use. With the use of infrared sensors, it offers an intelligent and effective automatic streetlight control system. It has the ability to lower energy usage and preserve the cost. The system is versatile, extendable, and totally adjustable to user needs.

• The system is now used only for way traffic on highways.

• Continuous use of LDR and IR sensors even in the daytime.

• It's not switched on before the sunset.

More effective in case of cost, manpower, and security as compared with today\'s running complicated and complex light controlling systems. The Automatic Street Light Controlling System puts up a very user-friendly approach and could increase the power. This is the Street light controller using IDE based Light intensity & traffic density, in today up growing countries will be paper elaborates on the design and construction of automatic street control system circuits. The circuit works properly to turn the street lamp ON/OFF. After designing the circuit that controls the light of the street as illustrated in the previous sections.

LDR sensor and the photoelectric sensors are the two main conditions in working the circuit. If the two conditions have been satisfied the circuit will do the desired work according to a specific program. Each sensor controls the turning ON or OFF of the lighting column. The street lights have been successfully controlled by a microcontroller. With commands from the controller, the lights will be ON in the places of the movement when it\'s dark. Further, the drawback of the street light system using a timer controller has been overcome, where the system depends on a photoelectric sensor.

REFERENCES

1. International Journal of Innovative Research in Computer and Communication Engineering(An ISO 3297: 2007 Certified Organization)

Website: www.ijircce.com Vol. 5, Issue 3, March 2017 Smart Street Light Using Arduino Uno Microcontroller

2. S. Suganya, R. Sinduja, T. Sowmiya& S. Senthilkumar, Street light glow on detecting vehicle movement using sensor

3. K.Santha Sheela,S.Padmadevi, Survey on Street Lighting System Based On Vehicle Movements

4. Srikanth M, Sudhakar K N, ZigBee Based Remote Control Automatic Street Light System

5. M.Abhishek, Syed Ajram Shah, K.Chetan, K, Arun Kumar, Design and implementation of traffic flow based street light control system with effective utilization of solar energy, International journal of Science Engineering and Advance Technology, IJSEAT, Vol 3, Issue

6.Lee, K., Choi, J., Jeong, S., & Kim, J. (2017). Design and Implementation of Automatic Street Light Control System Based on Vehicle Detection Using Raspberry Pi. In 2017 IEEE International Conference on Consumer Electronics (ICCE) (pp. 103-104). IEEE. DOI: 10.1109/ICCE.2017.7889220

.7. Thiyagarajan, P., & Elango, S. (2016). Smart Street Light System with Vehicle Detection and Tracking. In 2016 International Conference on Energy Efficient Technologies for Sustainability (ICEETS) (pp. 415-419). IEEE. DOI: 10.1109/ICEETS.2016.7583069

8. Reddy, K. S., Duggirala, R. B., & Debnath, R. K. (2019). IoT Based Intelligent Street Lighting System with Vehicle Detection and Tracking. In 2019 10th International Conference on Computing, Communication and Networking Technologies (ICCCNT) (pp. 1-5). IEEE. DOI: 10.1109/ICCCNT45670.2019.89438/