ABSTRACT

The project is about a real time adaptive street lighting scheme, detecting the presence of vehicles and dynamically adjusts the brightness of lights to the optimal level. The main aim of smart street lighting system is reducing the power usage when no vehicle movements are being detected on the road and to turn ON the smart street light only when car approaches. When a vehicle comes, then the next pair of three lights glows while the vehicle keep moving ahead, the coming pair of the lights glows and the pair before, comes back to the initial level after a certain time interval. With this, the energy efficiency is being improved of street lights and its usefulness. The streetlights are assumed to start their operation at sunset and finish at sunrise the next day. We have also proposed a new adaptive smart street lighting algorithm which will illustrate how the system is going to operate according to seasonal changes, and what would be the corresponding operational hours of the smart streetlights to keep them on without causing any delays and problems for the vehicles.

Our proposed model uses Infrared (IR) sensor and LED lights. As LEDs are more efficient and have longer lifespan, lights on the streets of our country are being substituted by LED street lights, which helps to solve the problem of power wastage. The other reason for using LED in our project is that its intensity can be varied as per the time and traffic on road. The successful implementation of a prototype further will be helping in large-scale development of the project. The project presents alternative to a profitable and nature friendly solution to the excessive energy wastage problem with the current street light systems and is one of the effective scheme for electricity saving in smart city project.

Keywords: Arduino Uno, LDR, Sensors .

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Chapter 1

INTRODUCTION

1.1 General Introduction

Automation plays an increasingly very important role in the world economy and in daily life. Automatic systems are being preferred over any kind of manual system. We can also call it an “SMART STREET LIGHT SENSING”. Intelligent light sensing refers to public street lighting that adapts to movement by pedestrians, cyclists and cars. Intelligent street lighting, also referred to as adaptive street lighting, dims when no activity is detected, but brightens when movement is detected. This type of lighting is different from traditional, stationary and illumination, or dimmable street lighting that dims at predetermined times. The research work shows automatic control of streetlights as a result of which power is saved to some extent.

In the scope of industrialization, automation is a step beyond mechanization. Whereas mechanization provided human operators with machinery to assist the users with muscular requirements of work, automation greatly decreases the need for human sensory and mental requirements as well. Basically, street lighting is one of the important parts. Therefore, the street lamps are relatively simple but with the development of urbanization, the number of streets increases rapidly with high traffic density.

There are several factors need to be considered in order to design a good street lighting system such as night-time safety for community members and road users, provide public lighting at cost effective, the reduction of crime and minimizing it is effect on the environment.

1.2 Back Ground

At the beginning, street lamps were controlled by manual control where a control switch is set in each of the street lamps which is called the first generation of the original street light. After that, another method that has been used was optical control method done using high pressure sodium lamp in their system. Nowadays, it is seen that the method is widely used in the country.

- It gives visual grasp of science.
- It builds logical thinking.
- It brings out innovation and creativity.
- It enhances problem solving skills.

1.3 Organization Of Report

The mini project report is organized as follows:

Chapter 1: Highlights the introduction of Smart Street Light using Arduino.

Chapter 2: Deals with history/literature work of the related topic.

Chapter 3: Describes the problem statement and its solution, objectives of this project.

Chapter 4: Deals with the Methodology, hardware and software requirements.

Chapter 5: Describes the designing part and flowchart of the project.

Chapter 6: Describes the applications, advantages and disadvantages.

Chapter 7: Deals with conclusion, future scope and references.

Chapter 2

LITERATURE REVIEW

Author/s	Content	year	Key points
[2] D. K. Srivatsa, B. Preethi, R. Parinitha, G. Sumana and A. Kumar	This paper is based on smart regulator of street lights to heighten the issue of power usage and brilliance of the streets.		
[3] Y. M. Yusoff, R. Rosli, M. U. Karnaluddin and M. Samad	Paper helped us in learning how to program to control the light intensity of the LEDs and about the sensor usage and connection to the board.		
[4] R. Müllner, A. Riener	Learning of the paper involves wide-ranging accessibility to the emerging technology like light emitting diodes and their ecofriendly nature to the environment and long lasting ability motivates the user to believe that power conserving street lighting systems are a reality and can be implemented in the country.		

[5] M. Castro, A. J. Jara and A. F. G. Skarmeta	In this paper authors described the need of smart lighting system. They have described that the sustainable development of cities affects the overall electricity use of lighting and the curiosity in offering greater control of its use. They have proposed the solution for lightning system through Machine to Machine protocols.		

Based on the literature survey which we have carried out, it has been observed that designing of smart street lighting systems is the need of hour which will play a major role in smart city project also. This system will save a lot of electricity wastage compared to the conventional street lights. A large number of street lights can be seen glowing at full intensity on highways, as also observed on airport roads where the street lights were always on during night time with full intensity even if there is no vehicular or pedestrian movement which leads to a burden on power stations supplying electricity. This excessive wastage of electricity can be utilized by some other electrical systems requiring surplus amount of power.

Chapter 3

PROBLEM DEFINITION

3.1 Problem Statement

Statement [1]: Street lights are ON in the presence of sun light.

Statement [2]: Street lights are ON in the absence of any vehicle and pedestrian.

3.2 Problem Solution:

To face the various problem mentioned above in the conventional lighting system we need a lighting system that is well equipped with recent inventions and technology. As it is well known to everyone is that the natural sources to generate power is limited and we are wasting so much of energy meaninglessly.

3.3 Present Work:

On the current street light system, the light dependent resistor can be located on the current street light system, the light dependent resistor can be located on the streetlight. This will help the light to turn on if it receives a low light the streetlight. This will help the light to turn on if it receives a low light intensity based on the current weather and time. Yet, this solution cannot intensity based on the current weather and time. Yet, this solution cannot overcome the ongoing complication as it just an improvement toward the overcome the ongoing complication as it just an improvement toward the contemporary system.

3.4 Limitations of Present Work

The system has restricted to the following limitation.

- Street lights are remain on when there is a visible spectrum of light.
- These street lights need a manual switching operation.
- It also needs man power.
- These street lights are unnecessarily glowing with its full intensity in the absence of any activities in the street.
- High power consumption and waste of energy.
- Less reliable.
- Manual hectic operation due to change in season and climate.

3.5 Objective

The main intention of this project is to design, develop and construct a smart street light prototype which implements new concept so that it could effectively and efficiently. The specific aims are divided as follows:

1. To design and develop the hardware using the Light Dependent Resistor (LDR) and IR Sensor to follow a line based on the ATMEGA 328P microcontroller.

2. To design and develop a control system for smart street light so that it can detect presence of the presence of pedestrian and vehicle come across the road using the C program through the Arduino IDE software for the development of environment.

3. To evaluate the performance of the street light which will be tested on a simulated road by considering the power saving in detecting the presence of the pedestrian and vehicles across the road through two condition, dim and bright of the LED.

Chapter 4

METHODOLOGIES

4.1 Methodology

- **Hardware setup:**
  - **Signal Discovery:** The sensors will be switching on lights when it is required or motion is in range (when vehicle passes by).
  - **Arduino:** The microcontroller is the control unit with the following functions:

    a. Course Statistics: Sensors detect the presence of vehicles.

    b. Handle Output: It handles the potency of the lighting system according to the readings of sensors.

- **Intensity Management:** This function ensures the adjusting of LED lights so that lower lighting levels are used when there is motion according to the clock time.
  - **Algorithm:** Algorithms are used to control the lights smartly to act according to the cars on the road.

- **Strategy and Approach:**

Smart Street Light System is using the IR sensor as the input to receive data.The reason why IR sensor is used in this system is because IR sensor is quite cheaper than using the Ultrasonic sensor. Rather than using the Ultrasonic sensor, IR sensor can detects the motion.

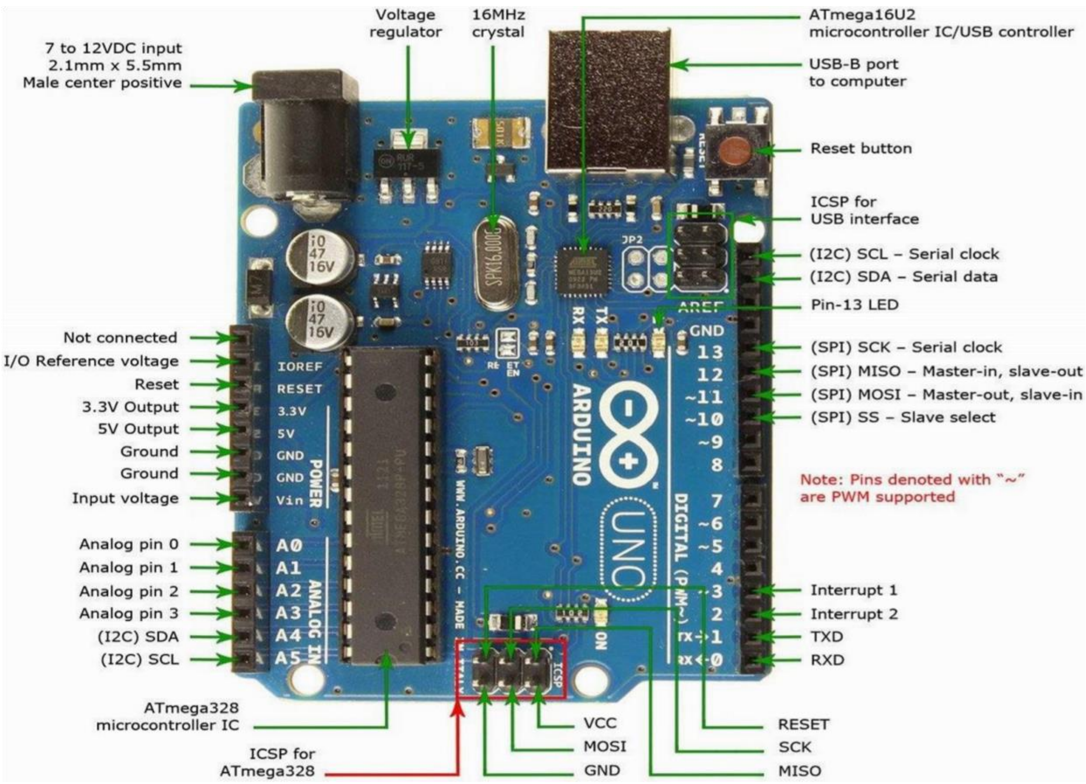
At the same time, this system also is using the LDR. This is because LDR is way cheaper in the market which only cost around RM0.45 each. LDR also is widely being used used as it is readily available besides it is available in the libraries which can come out with solution straight away.

4.2 Block Diagram

4.3 HARDWARE REQUIREMENT

4.3.1 Arduino uno

The Arduino Uno is a popular microcontroller board based on the ATmega328P microcontroller. It is one of the most widely used boards in the Arduino family and is designed for beginners and hobbyists who want to explore and learn about electronics and programming.



The Arduino Uno is a popular microcontroller board that is widely used for prototyping and creating various electronic projects. Here are the specifications of the Arduino Uno:

- Microcontroller: ATmega328P
- Operating Voltage: 5V
- Input Voltage (recommended): 7-12V
- Input Voltage (limits): 6-20V
- Digital I/O Pins: 14 (of which 6 provide PWM output)

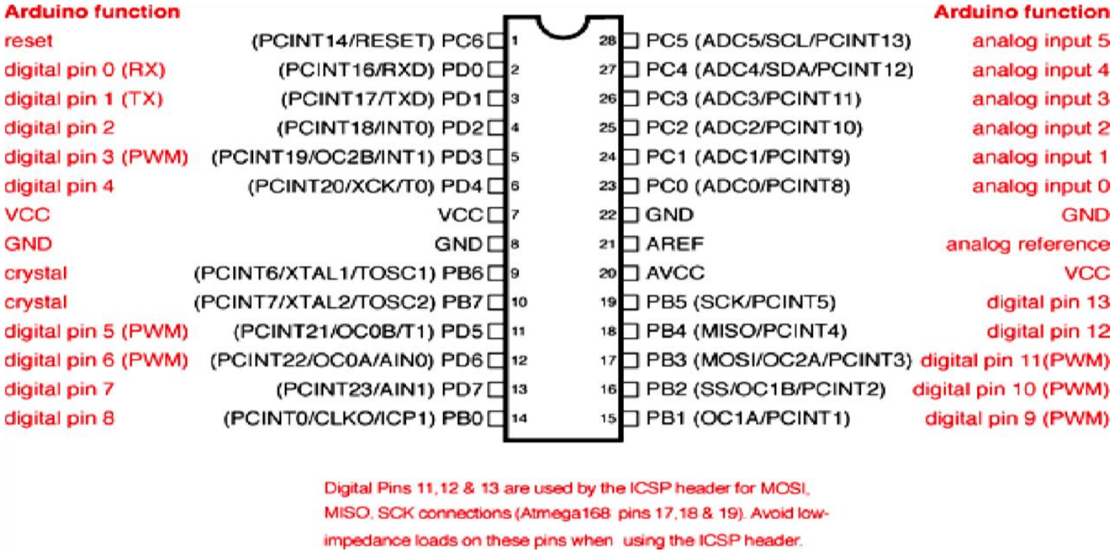
- Analog Input Pins: 6
- DC Current per I/O Pin: 20 mA
- DC Current for 3.3V Pin: 50 mA
- Flash Memory: 32 KB (ATmega328P) - 0.5 KB used by bootloader
- SRAM: 2 KB (ATmega328P)
- EEPROM: 1KB(ATmega328p)
- Clock Speed: 16 MHz
- USB Interface: Type B
- Power Jack
- ICSP Header
- Reset Button

The Arduino Uno board is compatible with a wide range of sensors, actuators, and other electronic components, making it a versatile choice for many projects. It can be programmed using the Arduino programming language, which is based on C/C++.

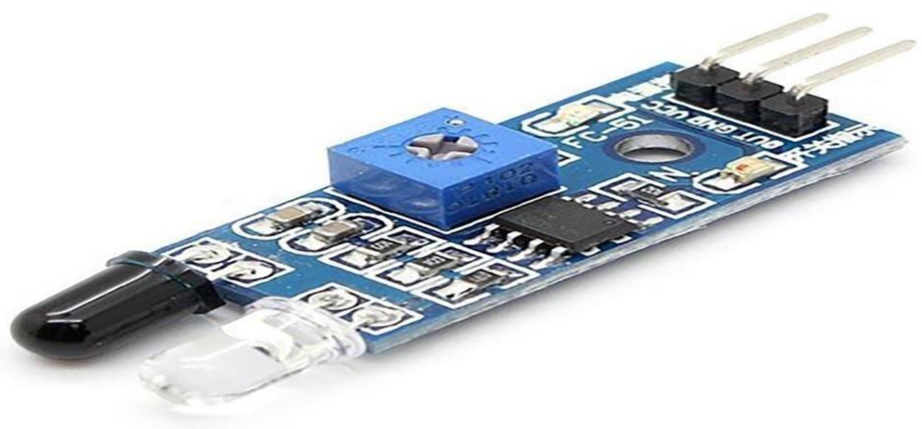
- **Serial Pins 0 (Rx) and 1 (Tx):** Rx and Tx pins are used to receive and transmit TTL serial data. They are connected with the corresponding ATmega328P USB to TTL serial chip.
- **External Interrupt Pins 2 and 3:** These pins can be configured to trigger an interrupt on a low value, a rising or falling edge, or a change in value.
- **PWM Pins 3, 5, 6, 9 and 11:** These pins provide an 8-bit PWM output by using analog Write() function.
- **SPI Pins 10 (SS), 11 (MOSI), 12 (MISO) and 13 (SCK):** These pins are used for SPI communication.
- **In-built LED Pin 13:** This pin is connected with an built-in LED, when pin 13 is HIGH
- -LED is on and when pin 13 is LOW ,its off.

Arduino Uno to ATmega328 Pin Mapping

When ATmega328 chip is used in place of Arduino Uno, or vice versa, the image below shows the pin mapping between the two.



4.3.2 IR Sensor

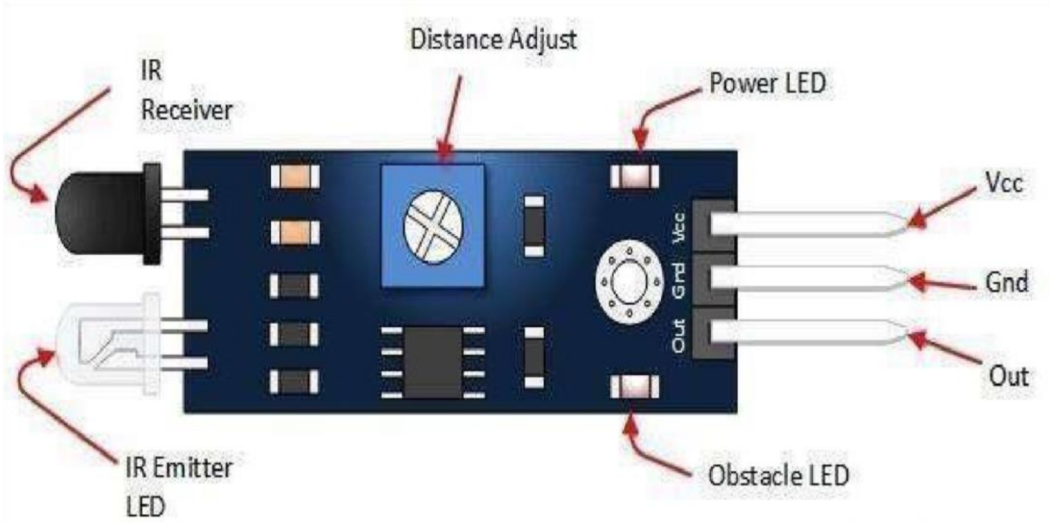


- An infrared (IR) proximity sensor is a device that detects the presence or absence of an object within its detection range using infrared light. It emits infrared radiation and measures the reflection or absence of the reflected light to determine the proximity of an object.

- An infrared (IR) proximity sensor is a device that detects the presence or absence of an object within its sensing range using infrared radiation. While specific specifications may vary depending on the sensor model and manufacturer, here are some common specifications you might find for an IR proximity sensor:

  - Sensing Range: This specification defines the maximum distance at which the sensor can detect an object. It is usually measured in centimeters (cm) or meters (m). For example, a sensor might have a sensing range of 5 cm to 30 cm.
  - Output Type: IR proximity sensors can have different types of output signals. Common types include analog voltage output, digital output (such as a logic high or low signal), or pulse-width modulation (PWM) output.
  - Supply Voltage: This specification indicates the voltage required to power the sensor. It is typically given in volts (V), such as 5V or 12V.
  - Response Time: The response time refers to the time it takes for the sensor to detect an object and provide an output signal. It is usually measured in milliseconds (ms) and can vary depending on the sensor's design.
  - Beam Pattern: The beam pattern describes the shape and width of the detection area. It can be narrow or wide, depending on the application requirements. Some sensors have adjustable beam patterns to cater to different sensing needs.
  - Environmental Considerations: IR proximity sensors may have specifications regarding their operating temperature range, humidity tolerance, and resistance to dust, water, or other environmental factors. These specifications ensure the sensor's reliability and durability in different conditions.
  - Mounting Options: Sensors may come with various mounting options to facilitate installation. Common options include through-hole mounting, surface-mounting, or bracket mounting.
  - Additional Features: Some IR proximity sensors may offer additional features like adjustable sensitivity, filtering options, or digital interfaces (such as I2C or SPI) for easy integration with microcontrollers or other devices.

IR Obstacle Detection Module Pin Outs



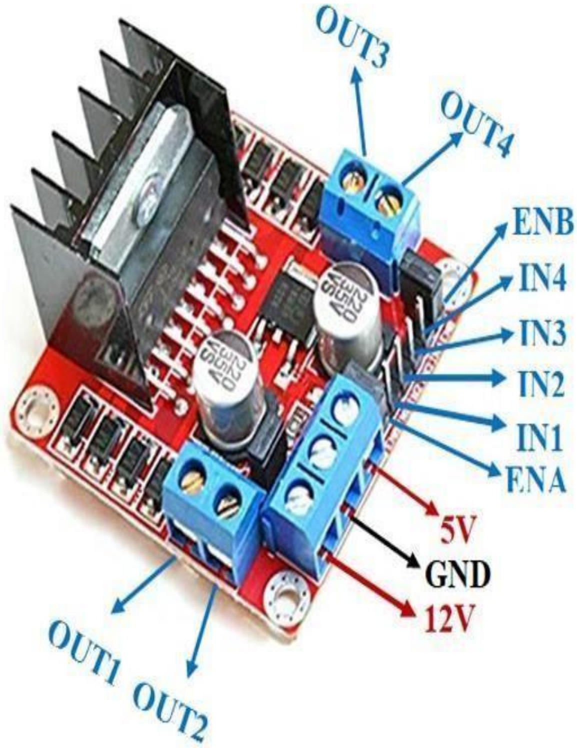
- VCC: 3.3 to 5Vdc Supply input.
- GND: Ground input is in range.
- Out: Output that goes low obstacle is in range.
- Power LED: illuminates when power is applied.
- Obstacle LED: illuminates when obstacle is detected.
- IR emitter: infrared emitter LED.
- IR receiver: it receives signals.

4.3.3 L298N Motor Driver

This dual bidirectional motor driver, is based on the very popular L298 Dual H-Bridge Motor Driver Integrated Circuit. The circuit will allow you to easily and independently control two motors of up to 2A each in both directions. It is ideal for robotic applications and well suited for connection to a microcontroller requiring just a couple of control lines per motor. It can also be interfaced with simple manual switches, TTL logic gates, relays, etc.

Brief Data:

- Input voltage:3.2v~40v
- dc.Driver: L298N Dual H Bridge DC Motor Driver
- Power Supply: DC 5 V - 35 V
- Peak current: 2 Amp Operating current range: 0 ~ 36mA
- Control signal input
- voltage range : Low: -0.3V ≤ Vin ≤ 1.5V. High: 2.3V ≤ Vin ≤ Vss.
- Enable signal input voltage range :
  - o Low: -0.3 ≤ Vin ≤ 1.5V (control signal is invalid).
  - o High: 2.3V ≤ Vin ≤ Vss (control signal active).
- Maximum power consumption: 20W (when the temperature T = 75 ℃).
- Storage temperature : -25 ℃ ~ +130 ℃.
- On-board +5v regulated Output supply (supply to controller board i.e. Arduino).
- Size: 3.4cm x 4.3cm x2.7cm



4.3.4 Light Emitting Diode

A light-emitting diode (LED) is a two-lead semiconductor light source. It is p-n junction diode that emits light when activated. The long terminal is positive and the short terminal is negative. When a suitable current is applied to the leads, electrons are able to recombine with electron holes within the device, releasing energy in the form of photons. This effect is called electroluminescence, and the color of the light (corresponding to the energy of the photon) is determined by the energy band gap of the semiconductor. LEDs are typically small (less than 1 mm2) and integrated optical components may be used to shape the radiation pattern.

LEDs are versatile semiconductor with a number of attributes which make them perfect for most applications. Their features include:

- Long Life: LEDs can last over 100,000 hours (10+ years) if used at rated current.
- No annoying flicker as we experience with fluorescent lamps.
- LEDs are impervious to heat, cold, shock and vibration.
- LEDs do not contain breakable glass.
- Solid-State, high shock and vibration resistant.

• Extremely fast turn on/off times.

• Low power consumption puts less load on the electrical systems increasing battery life.

• Here we have used the most common 5mm white light. White LEDs are perfect for replacing inefficient incandescent bulbs in night lights and path lights.

SPECIFICATION:

• Intensity: 28,500mcd Color Freq: x=31 y=32

• Viewing Angle: 48º Lens: Water Clear

• Voltage: 3.0v-3.3v

• Typical : 3.1v Current : 20mA

CAUTIONS:

LEDs produce a focused light source and extra care should be used for your eyes , though intensity is not very high. While testing the LEDs a resistance must be applied to it. Also, being a semiconductor device, they are sensitive to static charges.

4.3.5 Light Dependent Resistor

LDRs or Light Dependent Resistors are very useful especially in light/dark sensor circuits. Normally the resistance of an LDR is very high, sometimes as high as 1000000 ohms, but when they are illuminated with light resistance drops dramatically. Electronic onto sensors are the devices that alter their electrical characteristics, in the presences of visible or invisible light. The best-known devices of this type are the light dependent resistor (LDR), the photo diode and the phototransistors. Light dependent resistor as the name suggests depends on light for the variation of resistance. LDR are made by depositing a film of cadmium sulphide or cadmium selenide on a substrate of ceramic containing no or very few free electrons when not illuminated.

The longer the strip the more the value of resistance. When light falls on the strip, the resistance decreases. In the absence of light the resistance can be in the order of 10K ohm to 15K ohm and is called the dark resistance. Depending on the exposure of light the resistance can fall down to value of 500 ohms. The power ratings are usually smaller and are in the range 50mw to .5w.

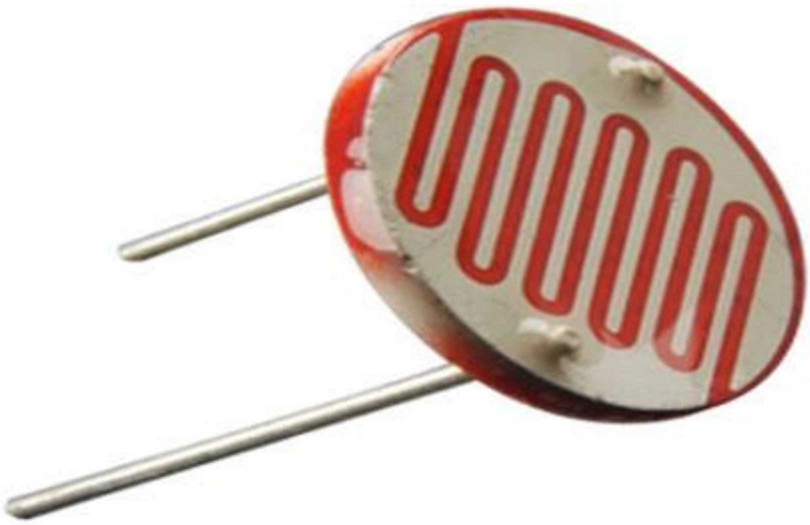
Though very sensitive to light, the switching time is very high and hence cannot be used for high frequency applications. They are used in chopper amplifiers. Light dependent resistors are available as discs 0.5cm to 2.5cm. The resistance rises to several Mega ohms under dark conditions. The device consists of a pair of metal film contacts separated by a snakelike track of cadmium sulphide film, designed to provide the maximum possible contact area with the two metal films. The structure is housed in a clear plastic or resin case, to provide free access to external light. Practical LDRs are available in variety of sizes and packages styles, the most popular size having a face diameter of roughly 10mm. When an LDR is brought from a certain illuminating level into total darkness, the resistance does not increase immediately to the dark value. The recovery rate is specified in k ohm/second and for current LDR types it is more than 200k ohm/second. The recovery rate is much greater in the reverse direction, e.g. going from darkness to illumination level of 300 lux, it takes less than 10ms to reach a resistance which corresponds with a light level of 400 lux. A LDR may be connected either way round and no special precautions are required during the time of soldering.

Darkness: Maximum resistance, about 1Mega ohm.

Very bright light: Minimum resistance, about 100 ohm. The LDR is a variable resistor whose resistance decreases with the increase in light intensity.

Two cadmium photoconductive cells with spectral response are very similar to that of the human eye. The cell resistance falls with increasing light intensity. Some of its features:

1) High reliability. 2) Light weight. 3) Wide spectral response. 4) Wide ambient temperature range.



4.3.6 Jumper Wires

Jumper wires, also known as jumper cables or simply jumpers, are electrical cables with connectors at both ends that are used to create temporary electrical connections between two points on a circuit board or between different components of an electronic device.They are commonly used in electronics prototyping, breadboarding, and troubleshooting.The primary purpose of jumper wires is to establish a temporary electrical connection when the standard circuit traces on a circuit board are not sufficient or when components need to be connected in a specific configuration for testing or experimentation. They allow engineers, hobbyists, and students to quickly and easily connect various electronic components without the need for soldering or permanent modifications.

Jumper wires come in different lengths, colors, and configurations to accommodate various wiring needs. They are typically made of stranded copper wire, which provides flexibility and durability. The ends of the wires are usually terminated with connectors such as pins, sockets, or alligator clips that can be easily inserted into or clipped onto the desired locations.

There are several types of jumper wires available, including male-to-male, female-to-female, and male-to-female wires. Male-to-male jumper wires have connectors (usually pins) on both ends and are commonly used to connect two male headers or pins on a circuit board. Female- to-female jumper wires have connectors (sockets) on both ends and are used to connect two female headers or sockets. Male-to-female jumper wires have a male connector on one end and a female connector on the other, making them versatile for connecting components with different pin configurations.

Jumper wires are widely used in electronics projects for tasks such as connecting sensors, actuators, microcontrollers, displays, and other electronic modules. They provide flexibility in circuit design, allowing for easy modifications and iterations during the development process. Jumper wires are an essential tool for anyone working with electronics, as they enable quick and temporary connections without the need for complex wiring or soldering techniques.

4.4 SOFTWARE REQUIREMENT

4.4.1 Arduino IDE

The Arduino IDE (Integrated Development Environment) is an open-source software application that is used for writing and uploading code to Arduino boards. It provides a user-friendly interface and a set of tools for programming and interacting with Arduino microcontrollers.

Here are some key features of the Arduino IDE:

- Code Editor: The IDE provides a text editor where you can write your Arduino code. It supports syntax highlighting, auto-completion, and indentation, making it easier to write and read code.
- Board Manager: Arduino boards come in different variants and versions, and the IDE allows you to select the specific board you are using. It includes a board manager that allows you to install the necessary board definitions and drivers for different Arduino models.
- Library Manager: The IDE includes a library manager that lets you easily add and manage libraries in your Arduino projects. Libraries are pre-written code that provide additional functionality and make it easier to work with various components and sensors.

- Serial Monitor: Arduino boards usually communicate with a computer through a serial connection. The IDE includes a serial monitor that allows you to send and receive data between your Arduino board and your computer. It is useful for debugging and monitoring the output of your code.
- Upload and Compile: Once you have written your code, you can compile and upload it to the Arduino board directly from the IDE. It handles the compilation process and uploads the compiled code to the board via a USB connection.

4.4.2 Arduino Code

Chapter 5

DESIGN OF PROJECT

5.1 CIRCUIT DIAGRAM

5.2 Working Of The Circuit

5.2.1 Working Principle

It works in accordance with the varying sunlight. Whenever there is sufficient sunlight in surroundings, LDR exhibits high resistance and acts as an insulator. While in darkness this LDR behaves as low resistance path and allows the flows of electricity, this LDR’s operates with the help of IR sensors, these sensors are activated under low illumination conditions and these are controlled by an ATmega328 micro controller, every basic electronic circuit will operate under regulated 5v DC When any object comes in the range of IR sensors, as IR LED emits the radiations and reflected back to IR photodiode by the object. Hence, object is detected. The heart of Arduino circuit is the low power, high performance Arduino micro controller is programmed by embedded assembly programming language for implementing these tasks; this program is stored and operated by means of storage device EPROM. The intensity of LED’s is remained at low initially (when no object is detected, at no natural light condition) by Arduino using Pulse Width Modulation (PWM) technique where analog signal is converted to digital signal, ON-OFF process of LEDs take place so rapidly in such a way, the LEDs seem to glow dimly when seen by naked eye. Hence, intensity of LEDs are controlled by varying duty cycle.

5.2.2 Implementing Light Sensing Algorithm with LDR Sensor and Arduino:

To enhance the functionality of our smart lighting project, we focus on the integration of the LDR sensor Arduino. The LDR sensor, also known as the Light-Dependent Resistor, exhibits a change in resistance based on the amount of incident light. By interfacing the LDR sensor with Arduino, we can implement a sophisticated light sensing algorithm that dynamically adjusts the lighting based on changing environmental conditions.

Using the analogRead() function in Arduino, we continuously monitor the LDR sensor's analog readings, which directly correspond to the light intensity. Analyzing these readings allows us to create a responsive lighting system that adapts to different lighting scenarios. For example, during the transition from day to night, the algorithm can gradually adjust the brightness of the connected LED or light bulb, providing a smooth and natural change in illumination levels.

5.2.3 Integrating Hysteresis for Stability:

Stability and reliability are vital in our smart lighting system, where the LDR sensor Arduino combination plays a key role. We incorporate hysteresis into the light sensing algorithm to prevent rapid and unwanted fluctuations in lighting due to minor variations in ambient light. By defining two threshold values: a higher threshold to turn the light on and a lower threshold to turn it off, we reduce flickering and unnecessary switching, ensuring a seamless lighting experience.

5.2.4 Seamless Remote Control with Bluetooth or Wi-Fi Connectivity:

Adding convenience and remote control capabilities to our smart lighting system is possible through Bluetooth or Wi-Fi connectivity, alongside the LDR sensor Arduino integration. By incorporating a Bluetooth or Wi-Fi module, such as HC-05 or ESP8266, users can easily control the lights remotely from their smartphones or other compatible devices.

A dedicated mobile application allows users to adjust light intensity, turn the lights on/off, or even schedule lighting patterns based on their preferences. This connectivity also opens up possibilities for smart city applications, as data from the LDR sensor and other sensors can be sent to a cloud server for further analysis and monitoring.

5.2.5 Maximizing Energy Efficiency with Motion Sensors and Real-Time Clock:

Energy conservation is a crucial aspect of our smart lighting system, made possible by the LDR sensor Arduino integration. To achieve this, we combine the capabilities of motion sensors (PIR sensors) with the LDR sensor. These motion sensors detect human presence and trigger the lights to turn on when someone enters the area. Conversely, if no motion is detected for a certain period, the system can dim the lights or turn them off, reducing unnecessary energy consumption.

Incorporating a real-time clock (RTC) module allows us to program the Arduino to turn on the lights only during specific time frames, such as dusk to dawn. This feature ensures that the smart lighting system operates precisely when needed, further optimizing energy usage and promoting sustainability.

5.2.6 Exploring Machine Learning and AI for Smart Adaptation:

With the LDR sensor Arduino combination as the foundation, we can explore the integration of machine learning and artificial intelligence (AI) to achieve a highly intelligent and adaptive lighting system. By collecting data from various sensors, including the LDR and motion sensors, and feeding it into machine learning models, we can train the system to predict and adapt to specific lighting requirements based on user behavior and environmental conditions.

Through this advanced approach, our smart lighting system can learn from historical data to anticipate peak activity times and automatically adjust lighting accordingly. This optimized approach not only saves energy but also ensures a comfortable and safe environment for users.

5.3 Flow Chart

Chapter 6

ADVANTAGES AND DISADVANTAGES

Applications:

- Detect the weather conditions
- Dynamically change brightness of bulbs.
- Digitally displays street lights.
- Monitor traffic and count pedestrians.
- Host a public wifi module.
- Conduct surveillance with cameras.
- Integrate an emergency notification system and intercom.

Advantages:

- Energy saving.
- Low cost.
- Automated operation.
- Safety and Security.

Disadvantages:

- The used LED's are low voltage devices.
- Light turn ON when shadow falls on LDR.
- It has a limitation of power.
- The system doesn't have any automatic fault detector.

CONCLUSION

By using Smart Street light, one can save surplus amount of energy which is done by replacing sodium vapor lamps by LED and adding an additional feature for security purposes. It prevents unnecessary wastage of electricity, caused due to manual switching of streetlights when it’s not required. It provides an efficient and smart automatic streetlight control system with the help of IR sensors. It can reduce the energy consumption and maintains the cost. The system is versatile, extendable and totally adjustable to user needs.

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

• Continuous uses of LDR and IR sensors even in day time.

• Not switched on before the sunset.

The Smart light system can be further extended to make the current system in two-way traffic, making the system more flexible in case of rainy days and introduction of ways to control the lights through GSM based service.

FUTURE SCOPE

- In coming future fixing of security cameras will be central feature for the system we proposed. The job of the cameras would be to automatically capture the image of an object in motion across the streetlight and save it in its memory which can be used as a reference in future to ensure the safety at nights. This system can also be customized by upgrading ordinary LED lights to the solar LED lights which are new & renewable energy sources we could serve the same purpose of automatically controlling the street lights much more effectively in both aspects of cost and manpower. The system now is only to be used for one-way traffic on highways. The system has bright feature in twoway traffic environment which enables the system more efficient.

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