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AUTOMATIC STREET LIGHT

SUBMITTED TO

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ABSTRACT

Automatic Street Light Control System is a straightforward yet influential idea, which utilizes transistor as a switch. By utilizing this framework manual works are 100% expelled. It consequently switches ON lights when the daylight goes underneath senses the light. This is finished by a sensor called Light Dependant Resistor (LDR) which detects the light really like our eyes. It consequently turns OFF lights at whatever point the daylight comes, senses the light. By utilizing this framework vitality utilization is likewise diminished on the grounds that these days the physically worked road lights are not turned off even the daylight comes and furthermore exchanged on before dusk. In this undertaking, no need of manual task like ON schedule and OFF time setting. What's more, furthermore on the off chance that there is deformity in the light sensor, at that point consequently it sends data to the closest light traffic organization and if an individual around evening time endeavour to cross zebra crossing the red light shows up and the driver becomes more acquainted with there is an individual intersection the street that will be useful when the closest mechanized light isn't working.

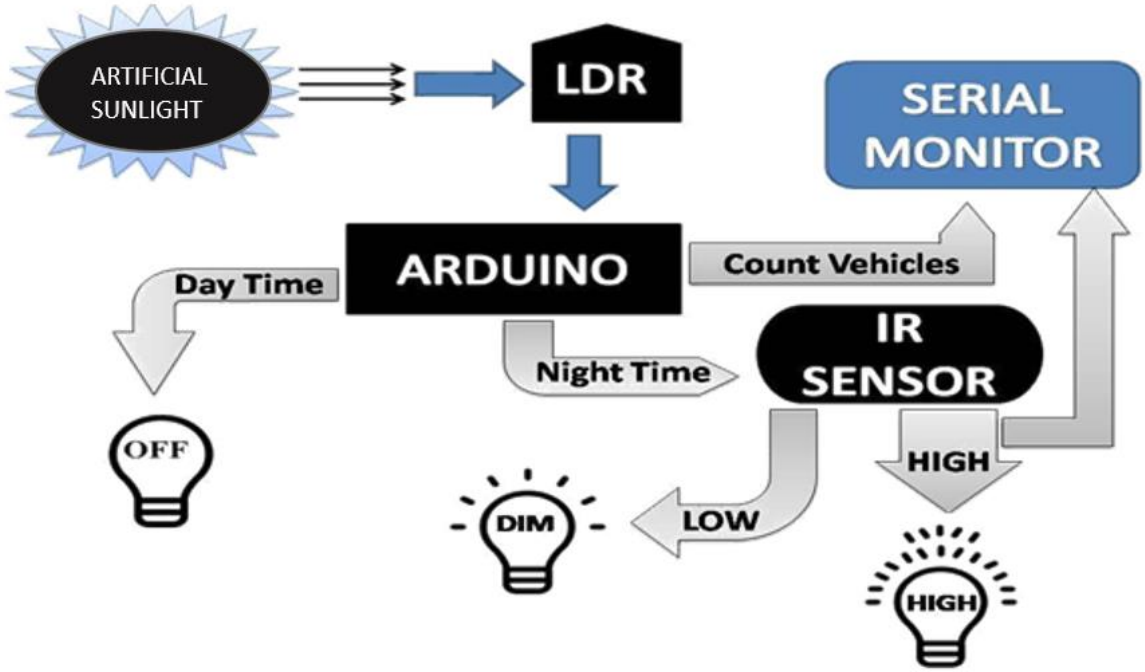
KEYWORDS: Automation, Switching, Energy conservation, Arduino, Sensors.

INTRODUCTION

Automation systems are being preferred over the manual mode because it reduces the use of energy to saves energy, frameworks are being favoured over the manual mode since it diminishes the utilization of vitality to spares vitality. These robotization frameworks assume a basic job in making our everyday life increasingly agreeable and encourage clients from roof fans to clothes washers and in different applications. Among every single energizing application, road lights assume an essential job in our condition and furthermore assumes a basic job in giving light to security amid evening time travel. In this situation, when the road lights are in working usefulness over the entire night that devours a great deal of vitality and decreases the lifetime of the electrical gear, for example, electric knob and so forth. Particularly in urban communities' streetlights, it is a serious power devouring element and furthermore the most noteworthy vitality costs for a city. In such manner, a savvy lighting control framework can diminish road illuminating expenses to 70% and increment the solidness of the hardware.

The traditional lighting system has been limited to two options ON and OFF only, and it is not efficient because this kind of operations meant power loss due to continuing working on maximum voltage. Consequently, wastage of influence from road lights is one of the detectable influence misfortunes, yet with the utilization of mechanization, it prompts numerous new techniques for vitality and cash sparing. In such manner, controlling lighting framework utilizing Light Dependent Resistor (LDR), IR impediment indicator sensor and Arduino together is proposed. It consequently turns OFF lights at whatever point the daylight comes, noticeable to our eyes yet this framework isn't so effective for the vitality utilizations. So as to limit the vitality utilization, we use IR (infrared beam sensor) which shine the light just when it distinguishes the items. Since LDR sensor is utilized just as a switch for IR sensor working. On distinguishing the haziness by the LDR sensor, at exactly that point IR sensor begin working. The most normal arrangement is to control the road lights as indicated by the outside lighting condition. This is the thing that our paper

is going for in keen lighting framework in which the road lights will be killed when there are no articles identifications or day-time, generally the lights will be stayed Dim/ON.
Our proposed design is aimed at efficiently replacing any light systems that are manually controlled, and this is accomplished with the properly arrangements of microcontroller Arduino Uno, IR obstacle avoidance sensor, LDR, and Resistors. In this scenario, when the intensity of sunlight impinges with LDR, street lights can be further controlled as per the desired requirement, automatically. Most importantly, a counter is set to count the number of vehicles/objects passing through the road, which will be displayed on the serial monitor of Arduino UNO. Moreover, the high-intensity discharge street bulbs are replaced with LEDs to further reduce the power consumption. An automatic street light system does not help us in reducing the power consumption only, but also to reduce accidents, criminal activities and maintenance costs.



For the effortlessness of discussion, the general working instrument and the highlights of the proposed lighting idea. Right off the bat, LDR will detect the force estimation of daylight and send it to Arduino. Arduino will pass judgment if they got esteem is over the limit level (which is set autonomously by the client from the discrete value: 0-2023), at that point it will consider it as day-time and LEDs will stay OFF, or if they got an incentive beneath the edge level, Arduino will consider it as an evening. In the evening, if the estimation of IR hindrance finder sensor is LOW and distinguishes no article, at that point DIM LEDs (half of its most extreme voltage) will shine, or in the event that IR obstruction locator esteem is HIGH and identifies any item, at that point HIGH LEDs (brimming with its greatest voltage) will gleam. Arduino will likewise tally the all-out number of vehicles that crossed the road in the evening time with the assistance of IR hindrance recognition sensor and will show it to the sequential screen.

LITERATURE SURVEY

Hengyu Wu, MinliTang, propose about the core technology of the street light control system is an AT89S52 single-chip microcomputer. It integrates a power circuit, a fault detect circuit, a photosensitive detection circuit, an infrared detect circuit, an LCD display circuit, a street light control circuit. GongSiliang describes a remote streetlight monitoring system based on wireless sensor network. The system can be set to run in automatic mode, which control streetlight according to Sunrise and Sunset Algorithm and light intensity. This control can make a reasonable adjustment according to the latitude, longitude and seasonal variation. Gustavo W. Denardin[3]deals about a control network for a LEDstreet lighting system. The use of LEDs is being considered promising solution to modern street lighting systems, dueto their longer lifetime, higher luminous efficiency and higherCRI. Its network layer is implemented using geographic routing strategy, which provides slow overhead and high scalability features. However, due to well-known drawbacks of the existing techniques, a novel routing algorithm is proposed. This system has automatic street light intensity control based on the vehicular movement and switching ON and OFF of street lights depending on the light ambiance. This will help in reducing the power consumption during hours of meager road usage. Somchai Hiranvarodom describes a comparative analysis of photovoltaic (PV) street lighting system in three different lamps. Namely, a low-pressure sodium lamp, a high-pressure sodium lamp and a fluorescent lamp have been used for installation in each mast to determine the suitable system to install in a typical rural area of Thailand. Radhi Priyasree[5] explains a system to reduce the power consumption of street lights by avoiding inefficient lighting which wastes significant financial resources each year. This is done by dimming the lights during less traffic hours. S.H. Jeong describes about the Development of Zigbee based Street Light Control System which control and monitor status of street lights installed alongside load. Lights are switched to ON/OFF by this system's control command. Its local status information is also monitored by control system via communication channel.

HARDWARE REQUIREMENT

COMPONENTS	SPECIFICATIONS	COST(INR)
1.LDR [1]	Voltage: DC 3-5V, 5mm,1.8 gm.	68
2. Arduino Uno [1]	22 pins, operating voltage 6-20V	500
3.LEDs [3]	5 mm, operating voltage 5V	30
4.IR obstacle avoidance sensor [3]	Voltage: DC 3-5V, Range 2-30cm	180
5.Resistors [3]	Resistors [3]	10
6.Breadboard [1]		70
7.jumping wire [15]	Male to female	30

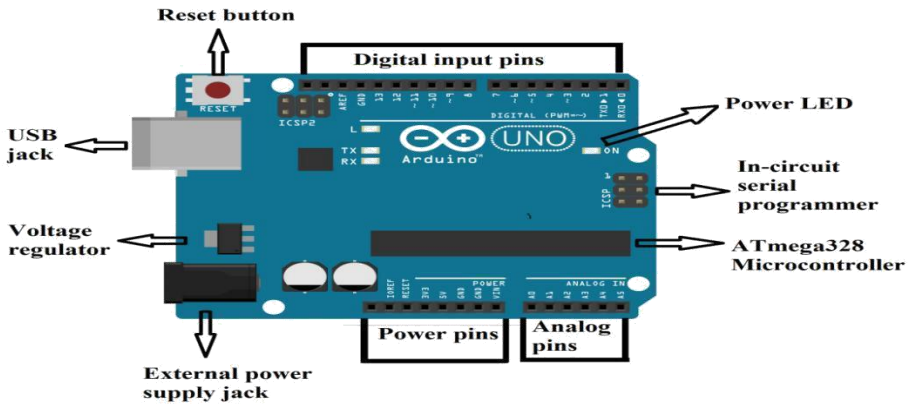
SOFTWARE REQUIREMENT

Arduino idle.

TOOLS USED

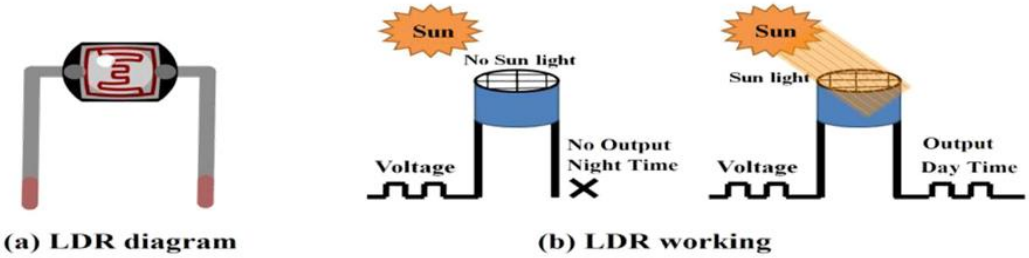
ARDUINO UNO

The Arduino Uno is a microcontroller board which is based on the ATmega328 series controllers and has an IDE (Integrated Development Environment) for writing, compiling and uploading codes to the microcontroller. It has 14 digital input and output pins (of which 6 are PWM) and 6 analogue inputs for communication with the electronic components such as sensors, switches, motors and so on. It also has 16 MHz ceramic resonators, a USB connection jack, an external power supply jack, an ICSP (in-circuit serial programmer) header, and a reset button. Its operating voltage is 5v, input voltage 7 to 12v (limit up to 20v).



LIGHT DEPENDENT RESISTOR (LDR)

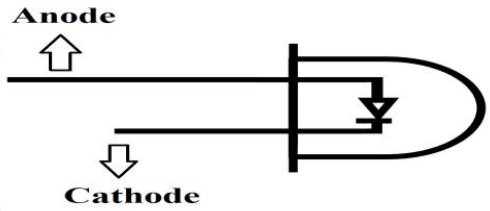
LDR is a Light Dependent Resistor whose opposition is subject to the light impinging on it. The obstruction offered by the sensor diminishes with the expansion in light quality and increments with the abatement in light quality. This gadget is utilized for identification of day-time and evening time since when daylight falls on it, it will consider as day-time, and when there is no daylight falls on it, it will be viewed as a night. These are valuable, particularly in light/dull sensor circuits and help in naturally turning ON/OFF the road lights.



(a) LDR diagram (b) LDR working

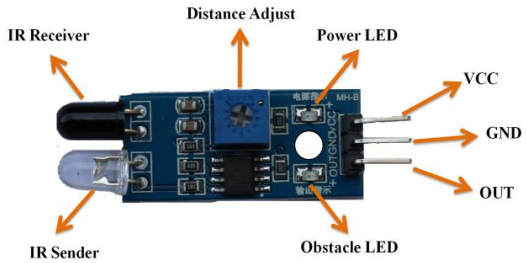
LEDs

A LED (light-emitting diode) is a PN junction diode which is used for emitting visible light when it is activated, as presented in Fig. 4. When the voltage is applied over its elements, electrons regroup with holes within the LED, releasing energy in the form of photons which gives the visible light. LEDs may have the Dim/full capability.

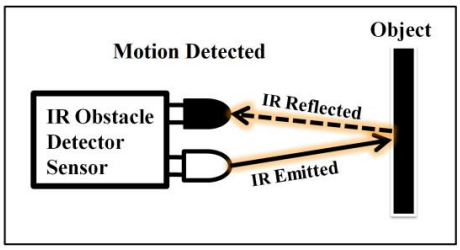


IR OBSTACLE AVOIDANCE SENSOR

An obstacle avoidance sensor consists of an infrared-transmitter, an infrared-receiver and a potentiometer for adjusting the distance. Whenever an object passes in front of a sensor, the emitted rays hit the surface of an object and reflect to the receiver of the sensor so it will consider this as a motion. It is a heat sensitive sensor and used for detection of motion.



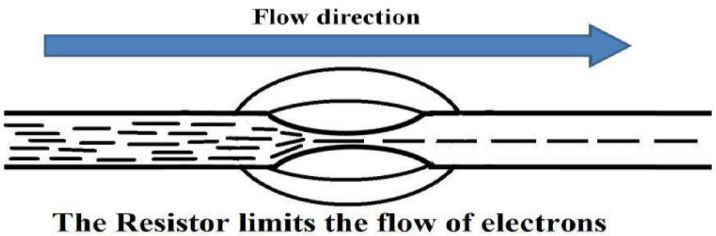
(a) IR board diagram



(b) Working of IR sensor

RESISTORS

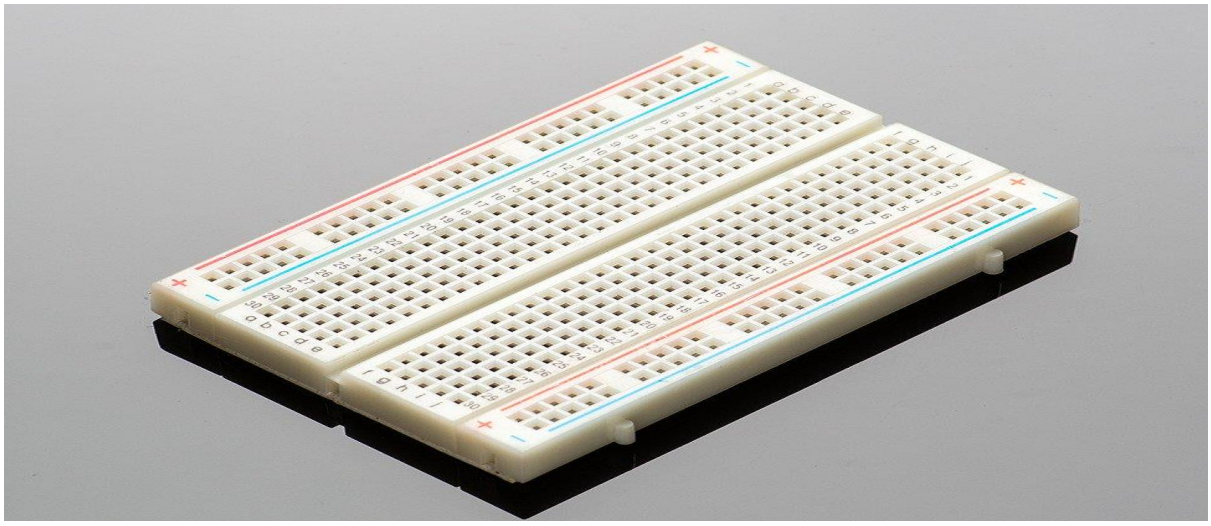
A resistor is a passive electronic component, used with other electronic components such as LEDs and sensors to prevent or limit the flow of electrons through them as illustrated in Fig. 6. It works on the principle of Ohm's law which prevent overflow of voltage.



The Resistor limits the flow of electrons

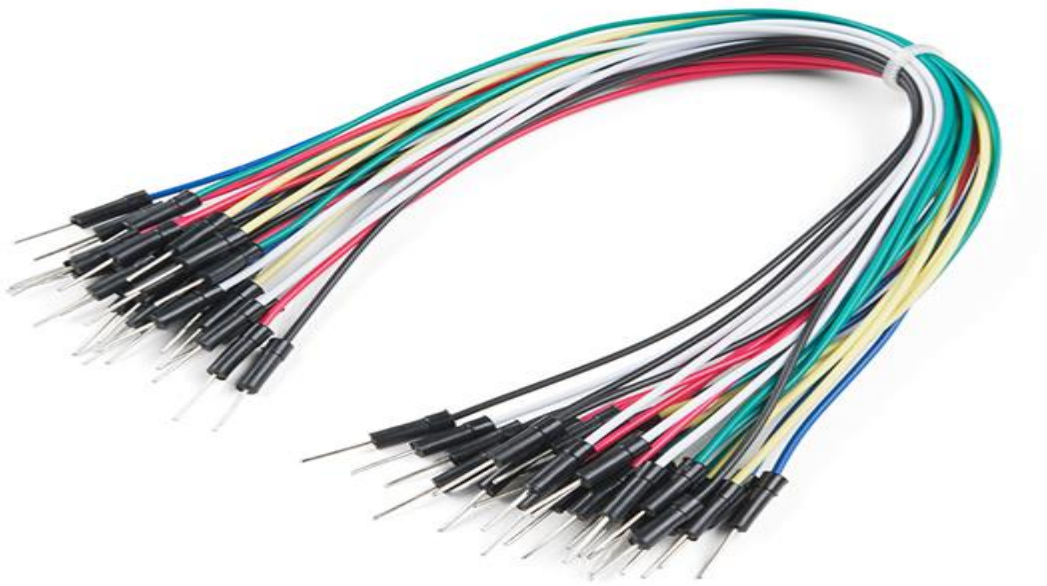
BREADBOARD

A breadboard is a solderless device for temporary prototype with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate



JUMPING WIRES

A jump wire (also known as jumper wire, or jumper) is an electrical wire, or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a breadboard or other prototype or test circuit, internally or with other equipment or components, without soldering



METHODS

Here we conquer the disservices of the current framework utilizing road light mechanization framework dependent on IOT. Computerization of road lights where the road lights are naturally controlled which builds vitality proficiency and cost funds of things. This also distinguishes defective street lights and they can be controlled remotely and TIMER set as well. In customary frameworks there is no alternative of darkening of lights relying on the articles present out and about where as in our venture we have endeavoured to give this framework which will spare vitality just as expense.as expense. The artificial sunlight is created with the help of led. And sensors are used to detect the presence of light which is LDR and for the detection of the object IR sensors are assigned. When there is an object detected by the IR sensor it sends message and led will glow. For this reason, Arduino Uno is utilized which is microcontroller where we transfer code for the specific undertaking. Here the artificial light is given certain time duration for the ON and OFF condition based on RTOS (Real Time Operating System) because we have used two processes i.e. for blink of led which will create artificial Sunlight and another sensor. The intensity of the led can be controlled which leads to the energy conservation.

One leg of LDR sensor is connected to Arduino analog pin number A0 and another leg to VCC pin and same with a resistor to the ground port of Arduino. In addition, the threshold value is adjusted to 10 from the discrete values (0-1023) for understanding whether it is day or night. After that, all the positive terminals of the LEDs are connected with resistors to pin number 3, 5, 7, 8, 9 and 11, depicting the streetlights as the outputs of the Arduino signals. Furthermore, connected the ground of all the LED's to Ground port as per the circuit diagram shown in Fig. The IR obstacle avoidance sensors are connected to the Arduino port from pin number 2, 4 and 10, respectively, which is the input signal to the Arduino board. Similarly, the ground of all the IR obstacle avoidance sensors are connected to GND port and all VCC of IR obstacle avoidance sensors are attached to Arduino 5V pin. Initially, set the IR obstacle avoidance sensors to HIGH at the start if there is no motion. After connecting all these devices to the corresponding pins in Arduino according to Fig., the Arduino Software from the official website "www.arduino.cc" is downloaded and installed. Then Arduino Uno is connected to the computer using the USB cable and installed the driver software on the computer to write, compile and run the software code on Arduino software.

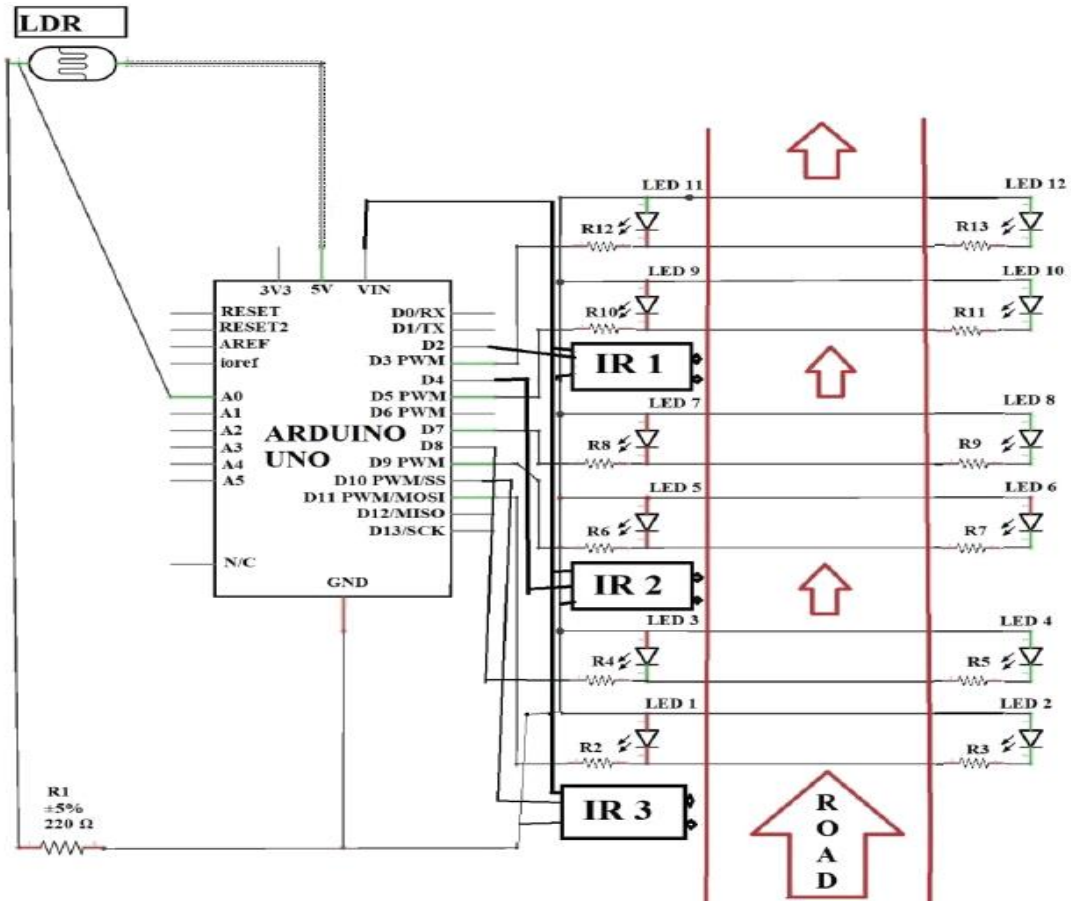
CODE

```
#include &lt;Arduino_FreeRTOS.h&gt;

void TaskBlink( void *pvParameters );
void TaskAnalogRead( void *pvParameters );

void setup() {

Serial.begin(9600);

//Now set up two tasks to run independently.
xTaskCreate(
TaskBlink
, (const portCHAR *)&quot;Blink&quot;
, 128   //stack size
, NULL
, 2  //priority
, NULL );

xTaskCreate(
TaskAnalogRead
, (const portCHAR *) &quot;AnalogRead&quot;
, 128  //this stack size can be checked & adjusted by reading.
, NULL
, 1    //priority
, NULL );
pinMode(2,OUTPUT);
pinMode(5,OUTPUT);
pinMode(6,OUTPUT);
}

void loop()
{

}

void TaskBlink(void *pvParameters) // This is a task.
{
(void) pvParameters;

for (; ;) // A Task shall never return or exit.
{
digitalWrite(2, HIGH);
```

```
vTaskDelay(10000 / portTICK_PERIOD_MS );
digitalWrite(2, LOW); // turn the LED off by making the voltage LOW
vTaskDelay(10000 / portTICK_PERIOD_MS ); // wait for one second
}
}

void TaskAnalogRead(void *pvParameters) // This is a task.
{
(void) pvParameters;

for (; ;)
{
if (digitalRead(11) == HIGH){
analogWrite(5,35);
analogWrite(6,35);
while (digitalRead(9) == LOW)
{
Serial.println(&quot;ir1&quot;);
analogWrite(5,250);
}
while (digitalRead(10) == HIGH)

{
Serial.println(&quot;ir2&quot;);
analogWrite(6,250);

}
}
else {
digitalWrite(5,LOW);
digitalWrite(6,LOW);
}
vTaskDelay(1); //one tick delay in between read for stability.
}
}
```

FUNCTIONALITY OF THE PROJECT

The traditional lighting system has been limited to two options ON and OFF only, and it is not efficient because this kind of operations meant power loss due to continuing working on maximum voltage. Consequently, wastage of influence from road lights is one of the detectable influence misfortunes, yet with the utilization of mechanization, it prompts numerous new techniques for vitality and cash sparing. In such manner, controlling lighting framework utilizing Light Dependent Resistor (LDR), IR impediment indicator sensor and Arduino together is proposed. It consequently turns OFF lights at whatever point the daylight comes, noticeable to our eyes yet this framework isn't so effective for the vitality utilizations. So as to limit the vitality utilization, we use IR (infrared beam sensor) which shine the light just when it distinguishes the items. Since LDR sensor is utilized just as a switch for IR sensor working. On distinguishing the haziness by the LDR sensor, at exactly that point IR sensor begin working. The most normal arrangement is to control the road lights as indicated by the outside lighting condition. This is the thing that our paper is going for in keen lighting framework in which the road lights will be killed when there are no articles identifications or day-time, generally the lights will be stayed Dim/ON.

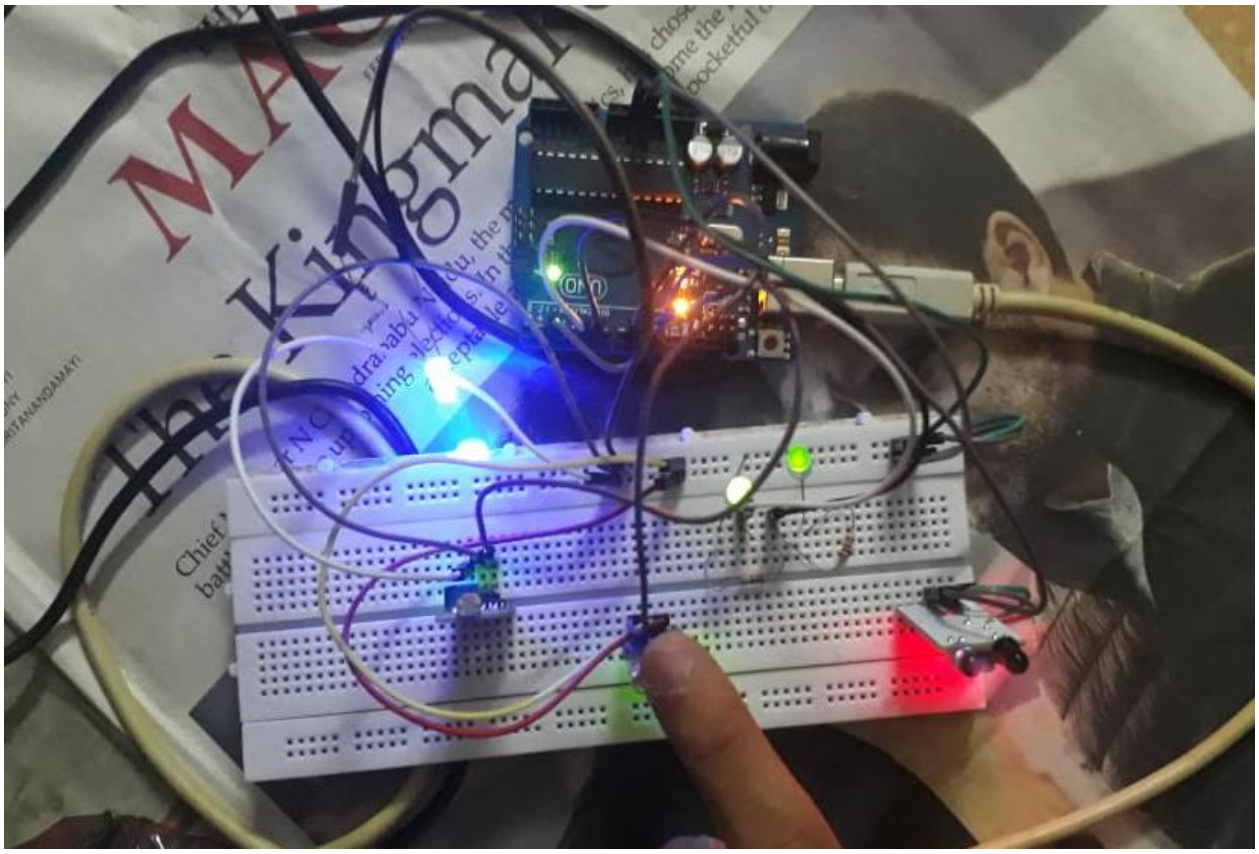


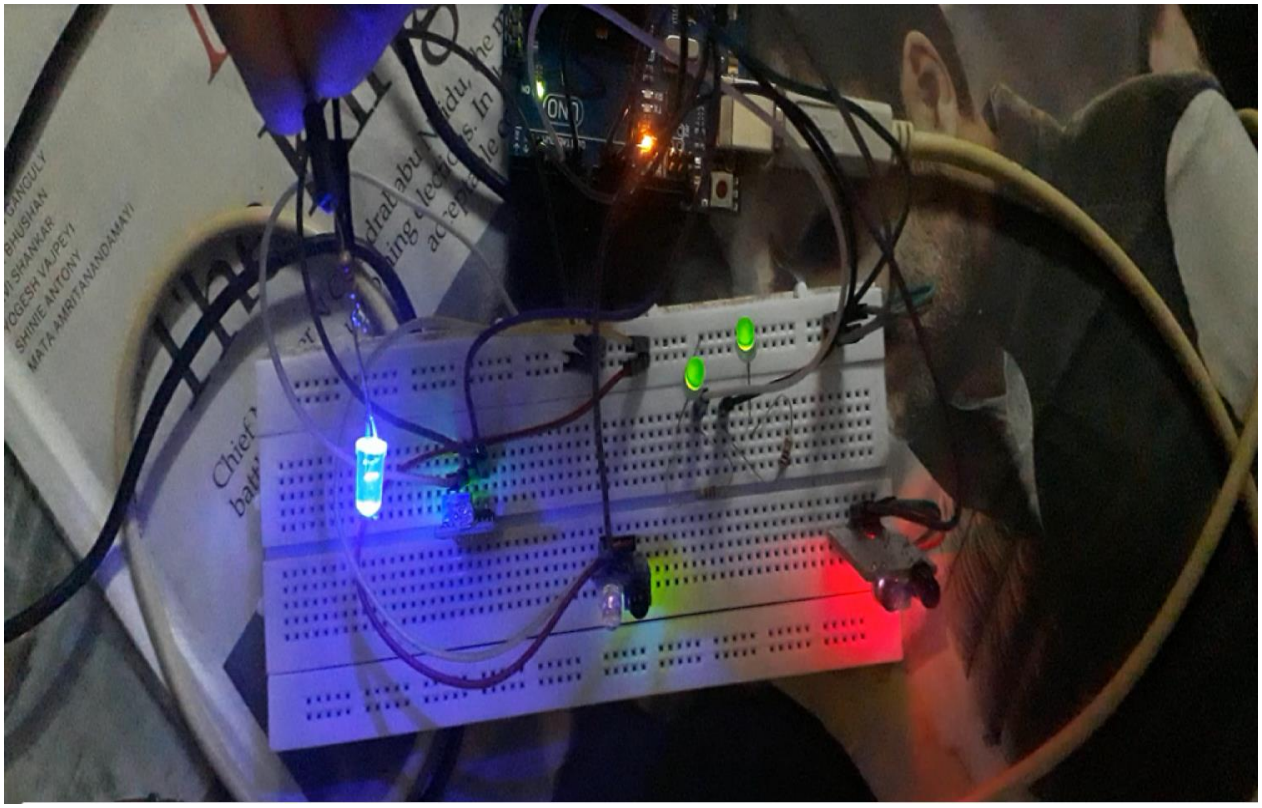
Our proposed design is aimed at efficiently replacing any light systems that are manually controlled, and this is accomplished with the properly arrangements of microcontroller Arduino Uno, IR obstacle avoidance sensor, LDR, and Resistors. In this scenario, when the intensity of sunlight impinges with LDR, street lights can be further controlled as per the desired requirement, automatically. Most importantly, a counter is set to

count the number of vehicles/objects passing through the road, which will be displayed on the serial monitor of Arduino UNO. Moreover, the high-intensity discharge street bulbs are replaced with LEDs to further reduce the power consumption. An automatic street light system does not help us in reducing the power consumption only, but also to reduce accidents, criminal activities and maintenance costs. For the effortlessness of discussion, the general working instrument and the highlights of the proposed lighting idea. Right off the bat, LDR will detect the force estimation of daylight and send it to Arduino. Arduino will pass judgment if they got esteem is over the limit level (which is set autonomously by the client from the discrete value: 0-2023), at that point it will consider it as day-time and LEDs will stay OFF, or if they got an incentive beneath the edge level, Arduino will consider it as an evening. In the evening, if the estimation of IR hindrance finder sensor is LOW and distinguishes no article, at that point DIM LEDs (half of its most extreme voltage) will shine, or in the event that IR obstruction locator esteem is HIGH and identifies any item, at that point HIGH LEDs (brimming with its greatest voltage) will gleam. Arduino will likewise tally the all-out number of vehicles that crossed the road in the evening time with the assistance of IR hindrance recognition sensor and will show it to the sequential screen.

A Real Time Operating System also known as RTOS is an operating system which is intended to fulfils the requirement of real time application. It is able to process data as comes in, typically without buffering delays. RTOS is the combination of calling predefined functions. The key factors in Real Time Operating System are minimum interrupt latency and minimum threads switching latency. The Real Time Operating System is valued more for how quickly and how predictably it responds to complete the tasks in given period of time. RTOS is a working framework particularly intended for constant applications which enables the framework to do various errands in the meantime. In RTOS, the execution of the framework relies upon the yield and on the moment at which the yield is acquired. For a best RTOS the setting exchanging inertness ought to be short. Presently on account of interferes with, the time term between the executing the last guidance of the hinder and executing first guidance of the intrude on handler ought to be insignificant. This is called as intrude on inertness. Additionally, the time term between execution of the last guidance of the interfere with handler and execution of the following assignment ought to likewise be insignificant. This is called intrude on dispatch idleness. Constant is the genuine time amid which a procedure happens and the Operating framework gives an interface among equipment and application programs. Continuous inserted frameworks work in compelled conditions where the principle assets like memory of the framework and preparing power are restricted. It ought to give the administrations inside extraordinary time cut-off points to the clients. For any RTOS there is a due date to do the specific errand or gathering of undertakings. The framework dependably keeps up this due date in light of the fact that missing a due date can prompt exceptional impacts. So, we can say that RTOS is a working framework that is extraordinarily intended to help ongoing applications by giving precise and solid yield inside the timeframe.

OUTPUT





CONCLUSION

The proposed streetlight mechanization framework is a financially savvy and the most secure approach to diminish control utilization. It encourages us to dispose of the present world issues of manual exchanging and above all, essential expense and upkeep can be diminished effectively. The LED consumes less energy with cool-white light emission and has a better life than high energy consuming lamps. Moving to the new and sustainable power sources, this framework can be redesigned by supplanting ordinary LED modules with the sunlight-based LED modules. With these productive reasons, this exhibited work has more points of interest which can conquer the present confinements. Keep in mind that these long-term benefits, the beginning expense could never be an issue on the grounds that the arrival time of speculation is less. This framework can be effectively actualized in road lights, keen urban communities, home mechanization, horticulture field checking, convenient robotized lights, stopping lights of emergency clinics, shopping centres, airplane terminal, colleges and enterprises and so forth.

FUTURE WORK

Automatic Street Light is a lightning technology mainly designed for energy efficiency. In order to energy conservation these light sources are our future. Automatic light dimming is the main aspect of smart lights, in this way the energy is conserved automatically. As we are in the modern world of wireless connectivity, smart lights can operate through our mobile applications. Maintenance technicians will know immediately when a lamp is faulty. Repairs will be much quicker. It automatically changes the colour when it starts to rain. Its durability is so high as long as 15,000hrs i.e. 25 times longer than ordinary bulbs. If we use these smart lights everywhere as possible, we can reduce energy consumption from 18% to 13% by 2021.

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