

IOT BASED SOLAR STREET LIGHTING SYSTEM FOR ENERGY EFFICIENCY

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Abstract: IOT which stands for internet of things is the current trend being adopted in various fields for the best results, it is a platform where various functional elements (or things) inter connected in a network, which communicates with each other for a particular task, here the various things include sensors, development boards, actuators etc.

As it was expressed before, it is found in various urban communities that the road light is one of the gigantic costs in a city. The cost spent is enormous that all the sodium fume lights expend more force. The cost spent on the road light can be utilized for other improvement of the country. As of now a manual framework is utilized where the light will be made to turned ON/OFF i.e the light will be done to turn ON at night and turned OFF in the first part of the day. Thus there is a ton of wastage of vitality between the ON/OFF. This is one of the significant reasons for moving to the programmed framework, since there is less wastage of intensity and subsequently sparing a great deal of financial costs.

1. INTRODUCTION

The venture targets sparing vitality by distinguishing the vehicle development on parkways and turning on the square of streetlight in front of it and at the same time turning off the trailing lights. The undertaking expects sensor to distinguish the vehicle developments and switches on the lights in front of it.as soon as the vehicle pushes forward the trailing lights consequently turns off. This can be utilized to spare a ton of vitality as opposed to utilizing regular framework where the streetlights are remained ON.PWM is utilized for power control through microcontroller.

This proposed framework gives an answer for vitality sparing. This is accomplished by detecting a moving toward vehicle and afterward turns ON a square of streetlights in front of the vehicle. As the vehicle cruises by, the trailing lights switch off consequently. Accordingly, we spare a great deal of vitality. So when there are no vehicles on the interstate, at that point all the lights stay OFF.

Sensors utilized on either roadside detects vehicle development and sends rationale orders to microcontroller to turn ON/OFF the LEDs. In this way along these lines of powerfully changing force ON/OFF aides in sparing a heaps of vitality. The sensors sense the vehicle developments and send it at Arduino Uno family microcontroller that starts orders for turning the lights

ON/OFF.

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Key features

- Automatic switching of street lights
- Maintenance cost reduction
- Reduction in CO2 emission
- Reduction of light pollution
- Wireless communication
- Energy saving
- Reduction of manpower

1.1 MATERIALS

A. ARDUINO UNO BOARD

This kit fetches the information form sensors and converts the analog data to digital; these data get processed using C language and controls actuators connected to board

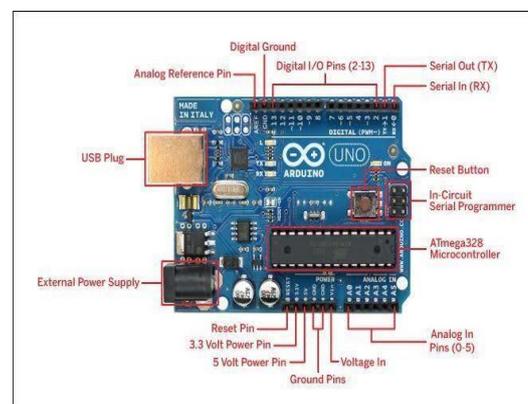


Figure 1: Arduino Uno Board

B. SOLAR PANEL

This unit converts solar energy into electrical energy and supplies energy to light source.



Figure 2: Solar panel

C. ULTRA SONIC SENSOR

Ultra sonic sensor which measures the distance between vehicle and surface such as wall, it given distance in centimetres, Vibration sensors returns value high when they receive external force.

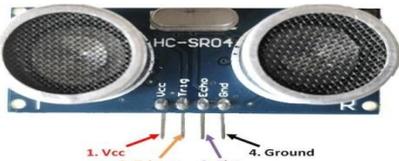


Figure 3 : Ultrasonic Sensor

D. LDR

An LDR is also known as photo resistor, photocell, and photoconductor. it is a one type of resistor whose resistance varies depending on the amount of light falling on its surface. When the light falls on the resistor, then the resistance changes. These resistors are often used in many circuits where it is required to sense the presence of light. For instance, when the LDR is in darkness, then it can be used to turn ON a light.

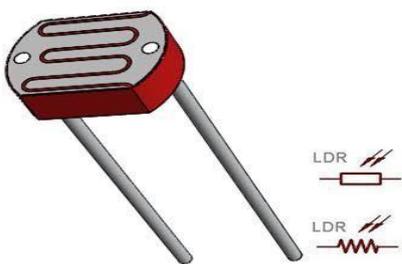


Figure 4: Light dependent resistor

E. BREADBOARD

This device helps to connect various components and form circuit without soldering, it has grid of interconnected sockets with which we can connect various components required for project.



Figure 5: Breadboard and jumper wires

2. METHODOLOGY

These are several methodologies to make this project complete .After doing the literature review, progress and analysis have been done. Research methodology is the system of methods and rules for guiding research. Besides that we have chosen the right methodology to achieve the objectives and the correct flow will make become systematic and easy.

A. Algorithm

1. Solar panel are used for power supply.
2. LDR will detect intensity of the light and send the data to the Arduino Uno board.
3. Ultrasonic sensor detect the presence of vehicle. Whenever vehicle is detected, the lights will glow high brightness else in dim mode. glow high brightness else in dim mode.

B. Block Diagram

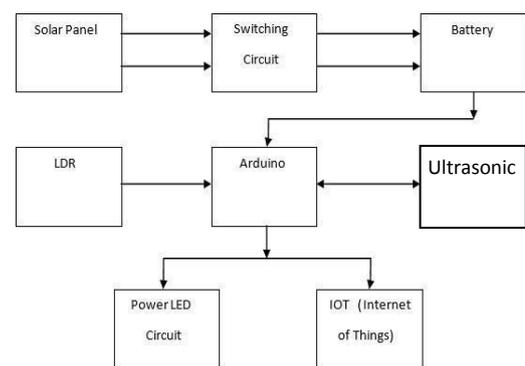


Figure 6: iot based solar street lighting system for energy efficiency

This block diagram shows the working of the project:

- The solar panel is used for converting the sunlight into electrical energy and used to charge the battery using switching circuit which converts the varying voltage into stable voltage.
- And now charged battery is used for power supply to all components.
- Through battery we will provide supply to

Arduino Uno board which controls the functions of LDR and Ultrasonic sensor as per the existence of vehicle.

- Then according to the changes occur in ultrasonic sensor and LDR the Arduino Uno controls the LED bulb.

3. RESULTS AND DISCUSSION

A. Setup at the day time under fully bright

At the day time no LED's are ON and also when the vehicle passes and LDR remains constant value because of environmental brightness

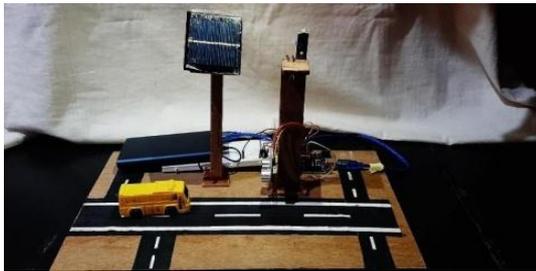


Figure 7: The figure shows the working of LDR during day time.

B. Setup at the evening time under darkness

At the evening time LDR sense the darkness and light gets on with faint and when the ultrasonic sensor senses the vehicle passes through road, the LED bulb gets brighter and when vehicle moves again LED bulb gets faint.

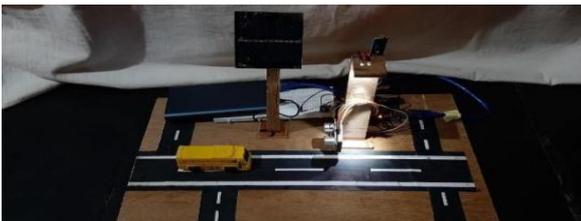


Figure 8: Above figure shows the working of LDR during night vision and street lights will be faint



Figure 9: The working of LDR in night vision to gets lights ON in faint and ultrasonic sensor senses vehicle and brightness the light.

4. RESULT

This proposed framework gives an answer for vitality sparing. This is accomplished by detecting vehicle and afterward turns ON a square of streetlights a leader of

the vehicle. As the vehicle cruises by, the trailing lights switch OFF naturally. Accordingly, we spare a great deal of vitality. There is another method of activity, where as opposed to turning OFF the lights totally they stay ON with 10% of greatest power.

5. CONCLUSION

The proposed system expects to depict a strategy for adjusting road light enlightenment by utilizing sensors at least electrical vitality utilization. At the point when nearness is distinguished, all-encompassing streetlights gleam at their most splendid mode, and LED bulbs will be actualized, as they are superior to ordinary glowing bulbs inside and out. This will lessen heat emanation, power utilization, support and substitution expenses and carbon dioxide discharges. Combined with SSSLs (Solar Smart Street Light System), gigantic vitality investment funds are imagined. Additionally, a show with a continuous proto sort model including expenses and usage method has been created utilizing web of things (IOT) to imagine the constant updates of road handling and telling changes happen. In the proposed system the elements such as LDR, Ultrasonic sensors, Arduino development board, jumper wires, bread board, buzzer, LED's are used, to program the board Arduino IDE is used.

A. FUTURE ENCHANCEMENTS

The project can be improved further by implementing following details

1. Industry standard sensors could be used to get more accurate output.
2. The parameters collected could be analysed using ML algorithms.
3. The data can be get through could about the battery and components.

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