Controlling Street Light through Arduino Uno using Sensors for Power Conservation and Cost Effective

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Abstract - *As the generation is developing and the rate of innovation is increasing rapidly, the requirement of electricity would be numerous. So we must need to concern about, how to conserve the electricity. In this thesis our foremost aim is to conserve the energy and minimize the wastage of unusual electricity because the modern streetlight on the highway remain 'ON' for whole night, where a great quantities of energy is waste, therefore in this thesis work, the IR sensor is implemented in order to switch "ON" when the object moves towards the sensor and switch 'OFF' when the object moves away from the sensor. In this thesis, street moon is suggested to control the electricity. A circuit with Arduino, LDR for detecting of light, IR sensor to sense the objects and LED for the illumination are designed and implemented to conserve the electricity automatically. The main aim of our thesis work is to conserve the energy. So for the conversation energy we have used solar panel. It will conserve the energy and make it in use when required.*

***Key Words*: Arduino UNO, LDR, LED, Infra-red, Resistors, USB, Street light, Solar panel.**

1. INTRODUCTION

In this modern era we all are bounding by lot of electronic products, we cannot imagine a single day without electricity or electronic devices. It is one of the major discover of mankind, more over the light. It was the great achievement for the people survive and hence the discovery of the street light [1].

Street light was discover for the saving life of human being because lot of accident was happening on the highway road in that time there was no headlight on vehicles, as the changing of time the vehicles was also modified with advance technology [2].

In ancient days, when the street light was discover it got advanced as continue by the human on the basis of ON and OFF system. But now as we can see, the street light which work in many process with new electronic devices. As we work on the streetlight with Arduino, LDR (light dependent resistor) sensor and IR (infrared sensor) sensor.

When vehicle or peoples passes from IR sensor then automatically the streetlight turns "ON" by the help of Arduino, which will work as an automatic street light. LDR sensor works as a switch in Arduino when its daytime the LDR will sense and turns OFF the street lights and at the time when sunsets the intensity of light gets low then the street lights will automatically turn ON the IR sensor will works as a detector, when it will detect the nearby object it will send the signal to the Arduino then the Arduino will control turning ON & OFF of the street lights. Propose of LDR and IR sensor is to save the energy and time [3].

At day time energy is consumed by the help of solar panel, which will convert the solar energy into electrical energy. That energy is saved in the form of electricity and gives power to run the street light. So through that power, street light will work only when any objects will pass through the IR sensor at night [4].

2. BLOCK DIAGRAM DESCRIPTION

As shown in Fig.1: In the day time, LDR (light depending resistor) will not work, due to the high intensity of a sun light, a high resistance of LDR is ultimately leads to open circuits and IR will also work but the street light will not turn 'ON'. But at night the intensity will be low the resistance of LDR ultimately leads to close circuit. LDR sensor will send the signal to the Arduino and when the object pass through the IR sensor then it will send the signal to the Arduino. Arduino is the main controller to control all sensors, when sensor will send the value as output to Arduino, it will receive and LED will be 'HIGH', till when the object pass through it and again the LED will be 'LOW' [5].
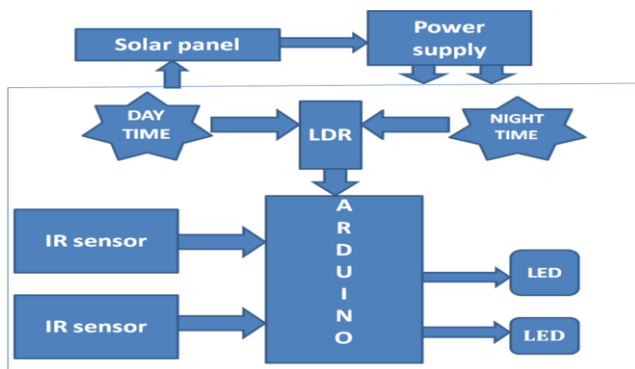
Fig-1 Block Diagram

This will work because of the power supply, shear the energy to run all the components as shown in fig: 1 .In power supply all the components are connect so to charge the power supply, solar penal is connect. In day time with high intensity of sun light will touch the penal in which sun energy will convert into electrical energy to charge the power supply [6].

3. CIRCUIT OPERATION

As per the circuit diagram shown in Fig.2-Firstly, the Arduino will always in ON state for the input/output (I/O) response. In this circuit LDR module sensor (Light Dependent Resistor) play the basic operation while the light falls on the surface of the LDR the resistance will decrease on increasing light intensity. The LDR sends analog single and it convert into digital high or low by comparing incoming input signal to form desire output with help of LM393 (IC) it is inbuilt in LDR module. The LDR sends the digital output high or low to the Arduino Uno board and response the input signal according the program compiled if the high state the Arduino sends the high pulse to activate IR (Infrared sensor). In this region if the any obstacles come to detect then its output will be high and sends to Arduino board again Arduino board will send required voltage to glow LED (Light emitting Diode) [7].
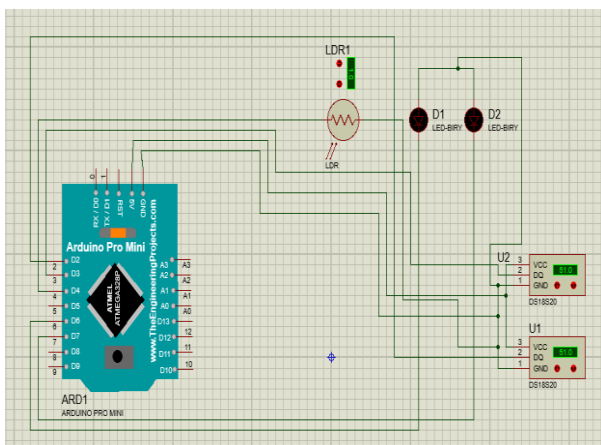

Fig-2 Circuit Diagram

4. COMPONENTS USED IN THE CIRCUIT

a. Arduino Uno Board
Arduino Uno Board having a single microcontroller which can be erasable and programmable module. It is open-source platform and can peripheral by desire input and output programming the microcontroller inserted on board. The code can loaded via the USB cable inserting to the Arduino board the USB cable can be also used as a power supply [8]. Arduino board has the inbuilt voltage regulator IC so it provides the required power to board. Provably the board will not damage on the voltage flotation. Arduino Board has 14 digital input and output pin [9].

b. IR (Infrared sensor)
IR sensor is an electronic sensor it measures infrared light radiating from objective in its field of view.

c. LDR (Light Dependent Resistor)
LDR (Light Dependent Resistor) works on the light intensity fall on the surface of the LDR sensor. The higher intensity of light increases the resistance of the LDR sensor and decreases of light intensity decreases of resistance and output as analog [10].

d. LED (Light Emitting Diode)
A led is a semiconductor device. It emits a light when current flows through it and it is used here for the prototype demonstration of the project [11].

5. RESULT AND ANALYSIS

The prototype of this project is been designed by using the proteous software and also been tested practically in breadboard and finally in the result we were able to save the energy in a more efficient way. Fig-3 Shows the outcome of our work which is just a prototype but can be adopted or implemented in the future.
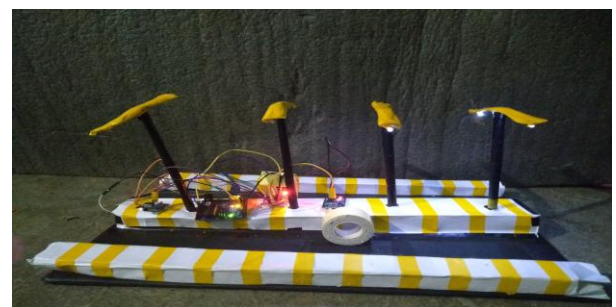

Fig-3: Model

The comparison of our work with [1] also shows the same idea of energy conservation from the street light system by using the latest technology as the controller as well as the street light. Proposed Work: In this work we have done certain changes like addition of solar panel which leads to have a really great output in the result. In the day time it will conserve the energy in the solar panel and in the night time the conserved power is used for the street light system.

6. FUTURE SCOPE AND CONCLUSION

The advancement of street light system is continuously progressing on by using latest technology. The design of our work can be implemented in the future to save the energy in the large amount by doing certain changes in the programming of the controller to add some advance features in the existing system. There are already many street light systems were designed and been implemented. This project have a advancement which will save the energy in more efficient way by using the lower power consumption ICs as per the Nano technology fabrication and the saved energy can be used to recharge the vehicles, running on battery in future. This street light system can be adopted in the rural as well as in the urban areas for irrigation and pumping water.

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