International Research Journal of Engineering and Technology (IRJET) e-ISSN: 2395-0056
Volume: 05 Issue: 10 | Oct 2018 www.irjet.net p-ISSN: 2395-0072

Solar based Auto Intensity Control Street Light using Arduino

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Abstract *- This project plays vital role in for saving of energy. Solar energy generation is the best option to replace conventional energy, which was responsible for energy saving .This paper presents a "SOLAR BASED STREET LIGHT WITH AUTO INTENSITY CONTROL" is the appropriate technology should be implemented in India. This technology is the perfect solution for saving of energy. Therefore, in this paper, an attempt has been taken to summarize the concept of technology and scope of Solar Based Street Light with Auto Intensity control technology.*

Key Words: **Solar panel, Battery, IR Sensor, Arduino UNO, Solar Module, LDR**

1. INTRODUCTION

The main consideration in the present field technology are Automation, Power consumption and cost effectiveness. Providing street lighting is one of the most important and expensive respnsiblities of a city. Energy efficient technologies and design mechanism can reduce cost of the street lighting drastically. There are various number of control strategy and methods in controlling the street light system to ensure that it consumes less energy and efficient in terms of money and usage. Nowadays with growing population and energy demand we should take a renewable option of energy source. Therefore, non-conventional energy sources such as ocean tides, geothermal, sun and wind are good option. Because of intensity control by detection of object Power will be save in the battery. Power is use when object is detected. Because of solar only 25% energy will be gain therefore efficiency is less. In area point of view, this project is more efficient and much better than the traditional solar light. In this case solar street light with auto intensity control could be the best one for us and also more efficient. The 21st century is striving hard to save electrical energy. Street lights are essential, but expensive, therefore there is need to optimize the system in a way that it is affordable and efficiently conserves energy. Manually controlling the street lights is a time taking and tedious process. Working and destructions.in such manner could sometimes result in large disasters

1.1 PROBLEM STATEMENT

1. The main problem that manual controls on the street lights face is that there would be a lot time taking during evening times when they are to be switched ON and a significant waste of energy is done at morning at all could not be turned OFF together at once.
2. Another way in which the wastage is done is that at midnights lights glow at full intensity although there is not much traffic. Therefore, there is a need to come up with a system which overcomes the problems of existing systems. A system which reduces manual control and would efficiently save energy. This could be done by using low power, robust and efficient components.

1.2 OBJECTIVE

The 21st century is striving hard to save electrical energy. Street lights are essential, but expensive, therefore there is need to optimize the system in a way that it is affordable and efficiently conserves energy. Manually controlling the street lights is a time taking and tedious process. Working in such manner could sometimes result in large disasters and destructions. The main problem that manual controls on the street lights face is that there would be a lot time taking during evening times when they are to be switched ON and a significant waste of energy is done at morning at all could not be turned OFF together at once. Another way in which the wastage is done is that at midnights lights glow at full intensity although there is not much traffic. Therefore, there is a need to come up with a system which overcomes the problems of existing systems. A system which reduces manual control and would efficiently save energy. This could be done by using low.

2. CONCEPT

The solution to the above stated problem is to create a system which does not consist of any expensive hardware which if fails could be easier to replace. Another solution is to make a system which senses the brightness in the environment and adjusts the intensity as per the same. It should eliminate time slot as there would not be any need as the intensity would be according to the environment. Just the time to switch OFF the lights needs to be specified. The principle used to decide the intensity of the street light is the brightness in the surrounding environment. Sensors are affixed to sense the luminosity. The system uses Arduino, LDR, IR sensors for controlling intensity. A cluster of LEDs acts as a streetlight. . Figure 3 shows the circuit diagram of this proposed solution. Worldwide concerns have been raised with respect to the measure of force devoured by HID (HIGH INTENSITY DISCHARGE) lights and by expansion, the measure of air CO2 discharged because of such power utilization. On account of this LED cluster brightening has gotten consideration as of late as a vitality decreasing light source.

Driven street brightening requires around 33% to one portion of the electric force required for HID lighting. The life cycle of an LED can be more than three times the length of a HID (HIGH INTENSITY DISCHARGE) light. Driven

brightening could lessen the measure of time expected to trade damaged apparatuses and it is normal that an LED framework would be nearly support free.

This thusly, implies LED framework could be viewed as suitable for use on detached islands or in high rugged areas. In such a background and as a consequence of the critical enhancements to luminescent effectiveness lately, LED lighting can be relied upon to completely supplant beforehand utilized light sources inside of our lifetimes.

The expected improvement of LED brightening is appeared in lighting frameworks, especially inside of people in the general area, are still outlined per the past guidelines of unwavering quality and that they don't as a rule benefit of most recent mechanical improvements. As of late, in any case, the expanding weight connected with the crude material costs, furthermore the expanding social affect ability to CO2 emanations are prompting grow new systems.

3. COMPONENT

- Solar panels
- Arduino
- LEDs
- Battery
- LDR
- IR (INFRARED) sensor
- solar module
- Stems for connecting the panels

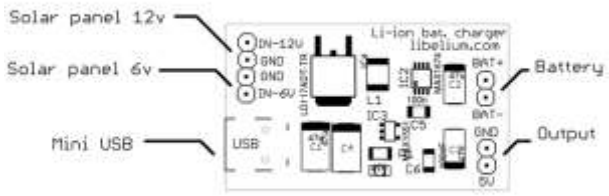

Fig 1: Supply for solar to arduino

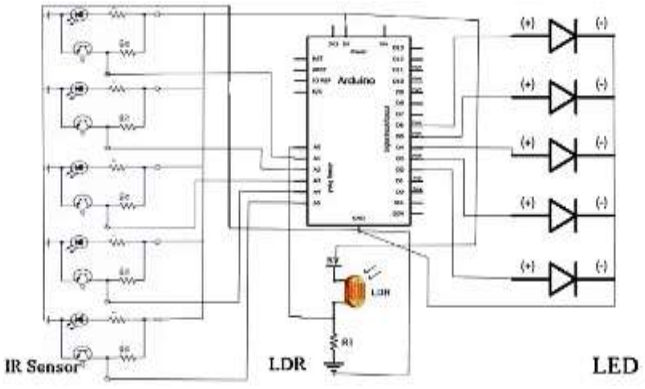

Fig. 2 – Schematic diagram of connection

4. WORKING

1). hardware implementation of the system. It consists of IR sensors, resistors, one LDR (Light Detecting Resistor), an Arduino board, a cluster of LEDs (Light Emitting Diodes).

2). The IR sensors is connected to two resistors from which one is ground and other is 5 volt, same way LDR is connected to one resistor with one end grounded and other 5 volt. LEDs are connected to a IR sensor. The IR sensor is connected into arduino board pin 9 and LDR is connected on pin A0.

3). The proposed system does not contain time slots, but works according to the darkness. The luminosity of LEDs increase as the darkness increases. Figure 1 represents the graph of luminosity, darkness and time. Time remains 0 as it is not a time slot based system so it shows us that as darkness in the environment increases, the luminosity of LEDs also increases accordingly.

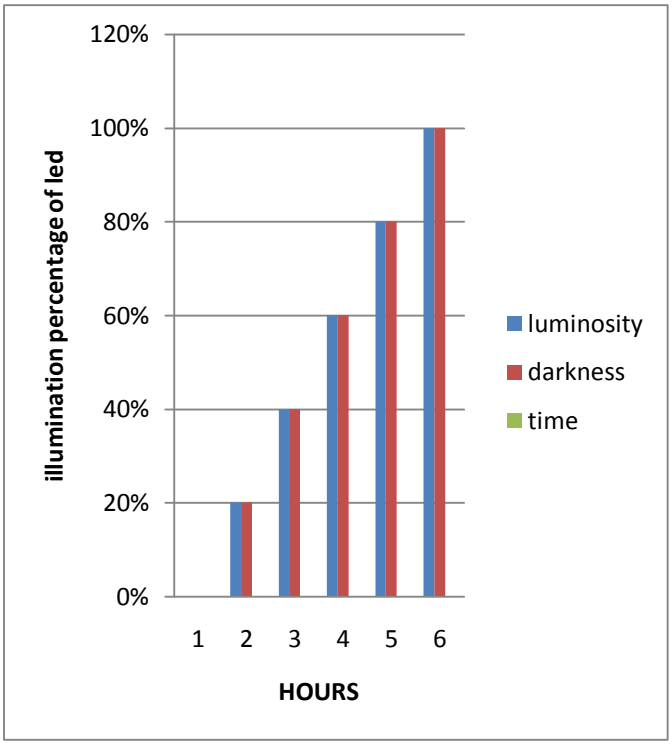

Fig 3: system illumination of LED vs time graph

5. OBSERVATION

1). Scenario During Day Under Full Brightness

At day time due to full environmental brightness, no LEDs are ON and the value of LDR remains almost constant. The intensity varies as time changes. Time and Intensity under full brightness at day could be seen .

2). Scenario during Night under Full Darkness

At night due to zero environmental brightness, all LEDs are ON at their full intensity and the value of LDR here too remains almost constant as the LDR would not sense any

light all night. Time and Intensity under full darkness at night could be seen. Table 1 shows the value of power and on the other hand the value of intensity. With the help of Table 1 we got a graph as shown in Figure 9. By looking at the graph we could say that as the power increases the intensity of the LEDs also increases and reached to peak when full 5 volt is applied. Table 2 shows the value of LDR which is referred as external brightness and on the other hand the value of intensity. With the help of Table 2 we got a graph as shown in Figure 1. By looking at the graph we could say that as the external brightness increases the intensity of the LEDs decreases and as the external brightness decreases the value of LEDs increases. When it is totally dark outside the Intensity reaches to the peak.

Table 1

Power (in volt)	Intensity (in watt/square meter)
0	0
1	113
2	226
3	339
4	454

Table 2

External Brightness	LED Intensity
62	514
54	534
51	542
210	119
211	117

6. CONCLUSION

The solution to energy conservation is to eliminate time slot and introduce a system that could sense brightness environment and act accordingly so that seasonal change would not affect the intensity of street lights. Also, LEDs should replace HID lamps
due to their dimming feature, another reason are that they are more reliable.

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