Smart City

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Abstract— This project is carried out to proposal implement on solar tracking, smart street light with motion sensor & smart charging point. Therefore, the need to improve the energy efficiency of PV solar panel through building a solar tracking system. The methodology employed in this work Resistors (LDRs) are used to sense the intensity of sunlight and hence the PV solar panel is adjusted accordingly to track maximum energy. The mechanism uses dc gear motor to control the movement of the solar panel by Arduino. The result of this work is that the tracking solar panel produces more energy compared to a fixed panel. Now a days the amount of power consumed by lighting and streets shares a major energy demand due to always bright in night condition, To overcome this issue, The proposed work is like that, street light will be off in day & in night it will be bright when pedestrian or any vehicle moments at sides on the roads. A smart charging point is placed for charging of electric vehicles like e-rikshaw, e-car etc.

Keywords: Solar Tracking, Motion Sensor Street Light, Smart Charging Point, Arduino, LDR & IR Sensor, DC Gear Motor

I. INTRODUCTION

This system is used for maximum utilization of solar energy by solar tracking system. In this project the PV panel is move according to movement of sun direction. When the sun light is incident on the LDR sensor & the difference of both sensor output is given to arduino then arduino give the signal to motor & motor moves pv plate according to command.

For energy conservation purpose motion Sensor Street light is used. Which is bright only when detect any vehicle movement at night.

Charging port is provided for charging of e-vehicles.

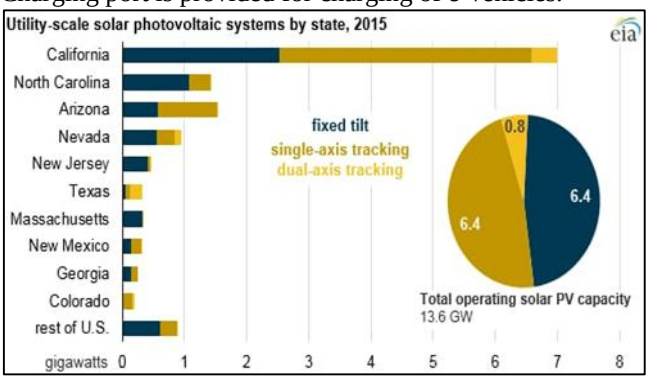


Fig. 1: Utility scale solar PV system

II. HISTORICAL BACKGROUND

We offer standard size and customized tracker to our customers from more than 150 countries and areas. All structure components are hot-dip galvanized with 25 years' service life. With high-accuracy solar position algorithm, the tracking sensor catches the sun ray automatically without any manual intervention and debugging. So the efficiency of the energy output is to be promoted by 40 percent.

The first patent requests for intelligent street lighting stem from the late 1990s. But it wasn't until April 7, 2006, that Europe experienced the first large scale implementation of a control network in a street lighting application. The implementation took place in Oslo (Norway) and it was expected to reduce energy usage by 50 percent, improve roadway safety, and minimize maintenance costs.

The Oslo project triggered interest from other cities in Europe, and formed the basis for other sustainability initiatives, such as the E-Street initiative. This research group focused on ways to reduce energy usage in outdoor lighting systems in the European Union (EU). The E-Street group strongly influenced EU standards and legislation for intelligent outdoor lighting systems

III. SYSTEM OVERVIEW

A solar tracking system is a specific device intended to move the PV modules in such a way that they continuously face the sun with the aim of maximizing the irradiation received by the PV array. A solar tracking system is composed of three well-differentiated components: the mechanism, the driving motors, and the tracking controller.

Nowadays, street lightning system in industries or cities are growing rapidly. The important considerations in the field of different technologies like electrical and electronics are cost effective, automation and power consumption. There are different street lighting systems are developed to maintain and control the lighting systems. These lighting systems are used to control and decrease energy consumption. This article illustrates the street light that glows on detecting vehicle movement. Street light controlling is one of the most developing system in India to conserve the energy.

A. Solar Tracking

This system is tracking for maximum intensity of light. When there is decrease in intensity of light, this system automatically changes its direction to get maximum intensity of light. We are using two sensors in two directions to sense the direction of maximum intensity of light. The difference between the outputs of the sensors is given to the Arduino. It's give command to L293D IC which rotates the motor to receive maximum intensity of light from the sun.

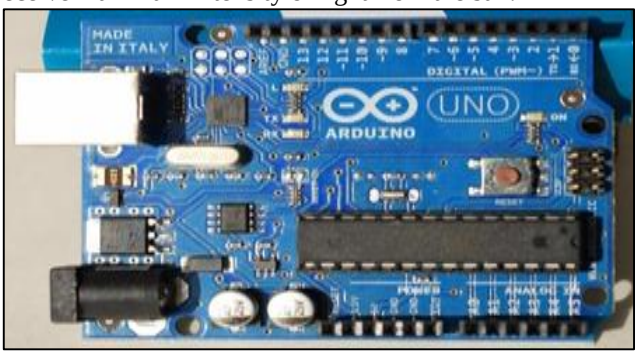


Fig. 2: Arduino

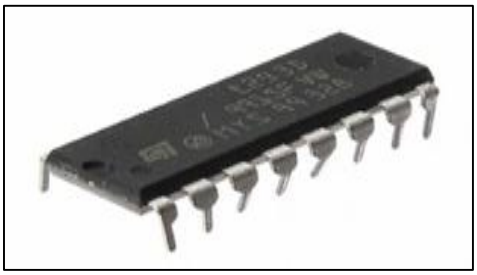


Fig. 3: Motor driver IC (L293D IC)

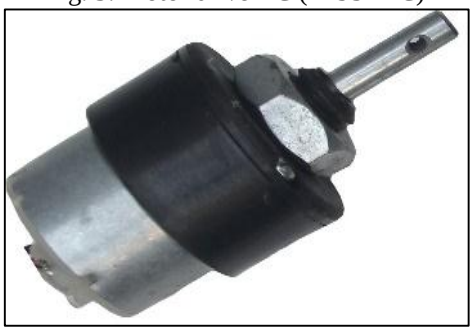


Fig. 4: DC gear motor

B. Motion Sensor Street Light

During the night time all the lights on the highway road remain on throughout the night, so the energy loss will be high when there is no movement of vehicles. This project gives a solution for saving the energy. This is attained by detecting an approaching vehicle by turning ON the street lights. As the vehicle passes away from the street light, then the lights get turn OFF. If there are no vehicles on the road, then all the lights will turn OFF.

The IR sensors are placed on each side of the road that are used to detect the vehicle movement and send the logic signals to a Arduino to turn on/ off the LEDs for a specific distance. Therefore, this way of dynamically switching ON and OFF the street lights helps in reducing the power consumption.

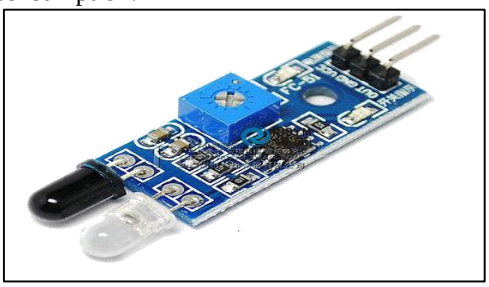


Fig. 5: IR sensor

C. Smart Charging Point

A smart charging point is available in smart city for charging of electric vehicles like e- rikshaw, e-car etc. The main aim of providing smart charging point is to reduce conventional energy source vehicle like as diesel & petrol vehicle because the stock of diesel & petrol are reduces rapidly day by day & another reason behind providing smart charging point is that to promote use of pollution free vehicles for healthy environment.

These smart charging point are placed in the bus stops & vehicle stop point.

In the charging point voltage regulator (IC-7805) is used.

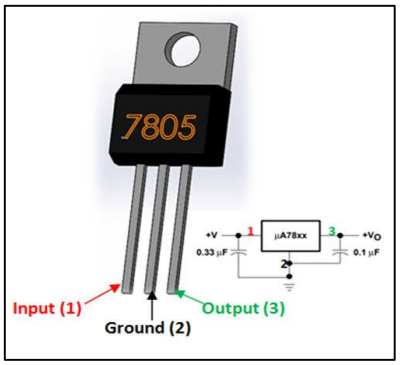
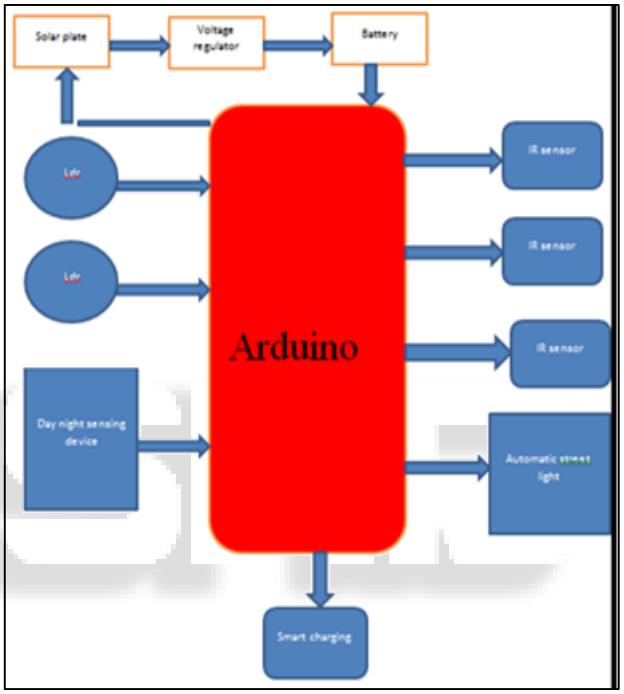


Fig. 6: Voltage Regulator (IC-7805)

IV. BLOCK DIAGRAM



V. WORKING

Two light dependent resistors are arranged on the edges of the solar panel. Light dependent resistors produce low resistance when light falls on them. The DC gear motor connected to the panel rotates the panel in the direction of Sun. Panel is arranged in such a way that light on two LDRs is compared and panel is rotated towards LDR which have high intensity i.e. low resistance compared to other. DC gear motor rotates the panel at certain angle.

When the intensity of the light falling on right LDR is more, panel slowly moves towards right and if intensity on the left LDR is more, panel slowly moves towards left. In the noon time, Sun is ahead and intensity of light on both the panels is same. In such cases, panel is constant and there is no rotation.

The DC gear motor is driven by L293D IC which is also known as motor driver IC.

In motion sensor street light the infrared sensors are placed on each side of the road that are used to detect the vehicle movement and send the logic signals to a Arduino to turn on/ off the LEDs for a specific distance. Therefore, this

way of dynamically switching ON and OFF the street lights helps in reducing the power consumption.

In day condition the street light are always in off condition & in night condition it will bright when sensors detect any movement on the road.

In smart charging point a voltage regulator (IC 7805) is used for obtaining 5 volt DC supply.

VI. CONCLUSION

A solar panel tracking system was designed and implemented. The aim of the solar panel tracking system is to track the position of the sun for better efficiency of the solar panel has shown in the experimental results. This work can be executed on an industrial scale which be beneficial to developing countries like Nigeria and Sub-Sahara Africa countries. Our recommendation for future works is to consider the use of more sensitive and efficient sensors which consume less power and which are also cost effective. This would increase the efficiency while reducing cost.

The implemented model is a less cost, pragmatic, eco friendly and the most secure approach to save energy. As per the statistical information 35%-40% of electrical energy is currently utilized by the national highways, state highways and local street lights. The initial investment cost and erection may be the disadvantage, but with the bulk production of the module the overall cost of investment can be reduced further due to advancement in innovation and technology the cost of the project can be further reduced. The project has scope in different applications like providing lighting for office building, grounds, walking paths and parking garages of large shopping centers. This can also be utilized for security surveillance in corporate buildings, businesses centers, school premises etc.

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