Literature Review on IoT Based Green Energy Healthy Roadways

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Abstract- *The universal concern to tackle the increasing demand of energy motivates to focus on renewable energy generation thus this project introduces an example of renewable energy source used for highway lighting. Due to high cost and weather dependency of the pure solar energy-based source system, it further introduces a source of energy which is a combination of multiple sources of energy, as a solution for highway lighting. In which Internet of Things (IOT) is playing an important role in controlling these multiple energy sources.*

This paper presents an IOT managed network solution to control the energy sources for improving the battery performance in a hybrid energy source which is fed to highway lighting system. The water irrigation system presents development in different places with water scarcity. In this way, advance management of watering system gives the best result at less amount of water.

This new era which is using latest technology, brightens the knowledge of world in the form of Internet of Things (IOT). The world with full of electronic components like sensors and other objects which will be communicating with the system will make human life far better and simpler than ever before.

Keywords- Renewable Energy, Green Roadways, Automated Roadside Water Plantation, IOT Based Management.

I. INTRODUCTION

We know according to accident and security purpose of people while travelling on roadways. We must have the street light beside roads, so here the power supply given to the street light comes from different type of energy sources. In night, light will glow at 30% intensity of its total capability but when vehicles travel on the road, intensity of street light increases to 100% of their total intensity with the help of LDR sensor.

Beside the roadway on both side there are several types of trees and plants which contributes in making of environment healthy. This trees and plants will be watered at regular interval of time automatically using sensing the moisture level of soil. Whenever soil gets dry, sensor detects it and gives signal to actuator to turn ON the water supply. Similarly, when soil gets moist enough according to preset level, actuator will operate according to the signal given by sensor and will turn OFF the water supply.This whole operation can be manually controlled as well as automatically operated by IOT, this watering system is implemented using hybrid energy sources.

The Internet of things (IOT) describes the network of physical objects that are embedded with sensors, software, and other technologies for the purpose of connecting and exchanging data with other devices and systems over the Internet.

IOT plays an essential role in controlling this energy generation and energy utilization system. Entire process of monitoring can be done using Internet. If any fault occurs at any of the Street light, then sensor will detect the fault and will give message on mobiles /computer system.

II. INFRASTRUCTURE

SMART STREET LIGHT

In this project, we propose street light of LED bulb as it consumes less power, based on smart control system. In this system we used sensor to measure sun light intensity. Traffic condition on road during day and night duration is observed by the smart control system,the intensity of LED Street light varies according these parameters. We have used two sensors that are LDR (light depending resistor) sensor and motion sensor. LDR sensor is used to control the switching ON/OFF of LED street lights depending on traffic condition. Motion sensor is used to change the intensity of LED light, when there is no motion of object at mid night on street then all the street lights are dimmed, to reduce the power consume. When there is sufficient sunshine in atmosphere then LDR resistance is minimum and when there is dark, the LDR resistance will be maximum.During mid night, there is comparatively less

trafficon road. Motion sensor will sense the motion of object within the range of ten meters. If there is no motion of vehicle on a road within defined time then light intensity will decrease to minimum value using PWM (Pulse Width Modulation) pulse. If any motion of an object detected on a road, then it will send a signal to the micro controller and micro controller generate PWM pulse to give LED lights with full intensity.
The proposal here is to design a smart street light system (SSL) which uses hybrid power supply to operate the controller, the operating module and to charge battery during day time. The charged battery will be used to operate at night. Therefore, the system is independent from electric power source.

SMART WATER PLANTATION SYSTEM

The secondary objective of this project is to provide water to plants and treeswhich are planted alongside of roadways automatically using Arduino Uno microcontroller.

There are several sprinklers connected to pipe having thread at inner side at any one of the ends which is connected to another pipe. The sprinklers are generally used for long length plants. As the method of dripping will reduce huge water losses it is a popular method which results in reducing the labor cost. When the components are activated, all the components will read and gives the output signal to the controller, and the information will be displayed to the user interface, control room, mobile applications etc.

HYBRID ENERGY SOURCES

In this project we introduce multiple sources of energy as a supply system. This energy sources are combination of Renewable type of energies like Solar, Wind, Piezo. During Day time solar rays are absorbed by solar panels placed at specific interval which results in electrical energy. This energy is utilized for purpose of this project in day time as well as excessive energy is stored in battery which can be used during night time.

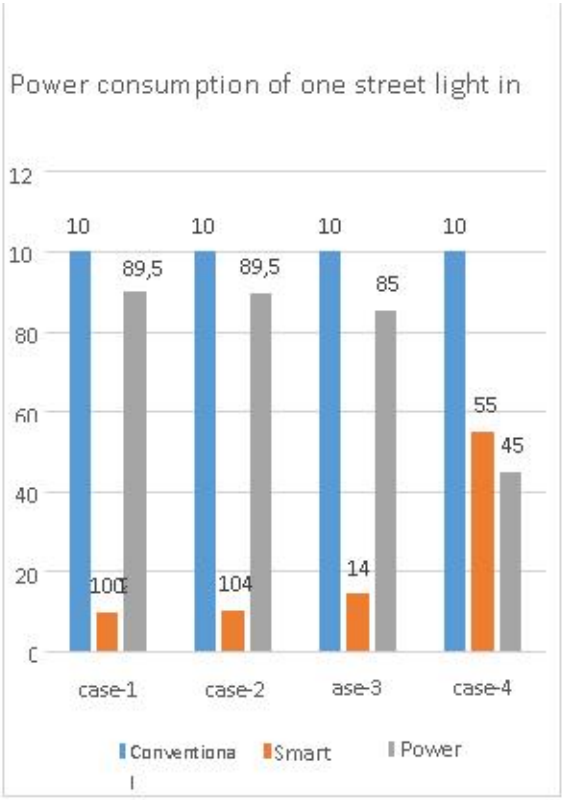
Second source of energy in this hybrid energy system is Wind or Tidal. Wind turbines are installed at specific interval alongside of roadway. Whenever wind blows and when a vehicle travel on road it disturbs wind and this tends turbine to rotate, which further generates Electrical energy. This energy is further utilized for purpose of this project, excessive energy is stored in battery.

Piezo Electrical Cells are installed at specific interval on roadway. Whenever vehicle passes over this piezo cells, due to mechanical pressure they generates Electrical energy. This energy is further utilized for the purpose of this project. This energy generated with the help of Piezo Electric Cells is one of hybrid energy source. As this hybrid energy sources are Renewable energy, generation of them does not harm environment. So the pollution ratio is zero that's why it is eco-friendly project.

III. MODELLING

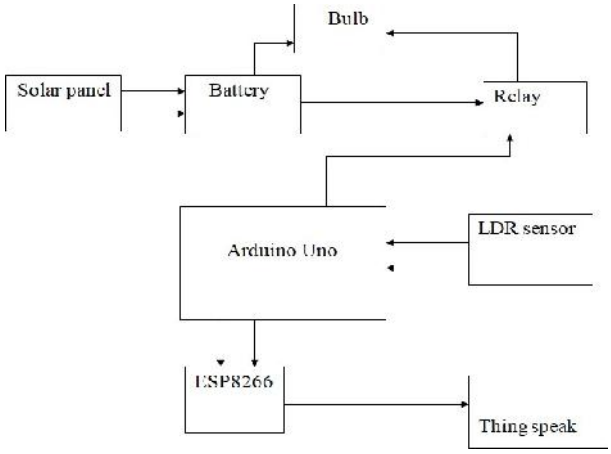
SMART STREET LIGHT

A. Power consumption graph

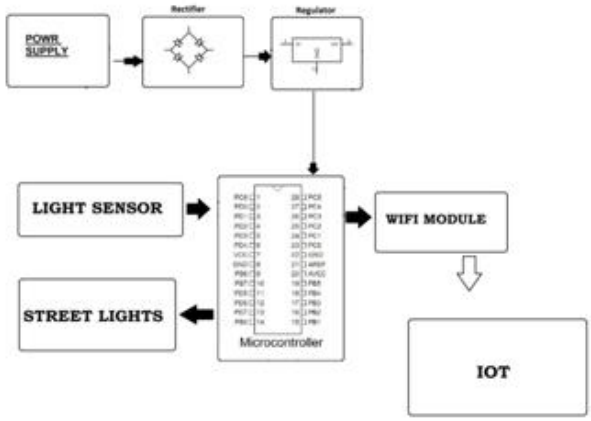


Street Light Power Consumption in One Watt

B. Block diagram

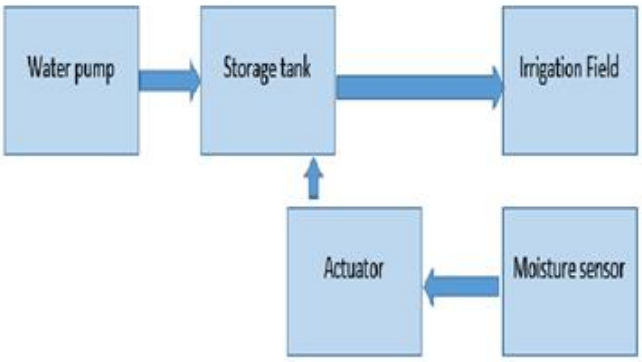


C. Micro controller model



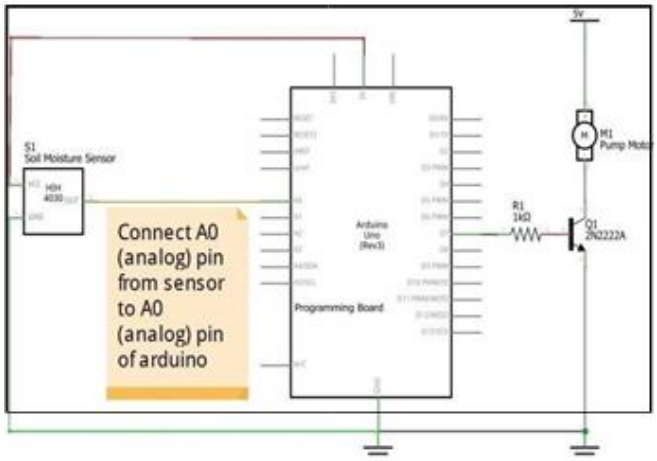
ROAD SIDE PLANTATION

A. Block diagram



B. Micro controller structure of plantation

The circuit is based on PIC microcontroller and also a soil moisture sensor. A properly configured soil moisture sensor can save large amount of water used in irrigation. The designed system can also be used in small garden place, garden alongside roadways.



Soil Moisture Irrigation System

IV. CONCLUSION

Considering the urgent need of energy conservation, Solar Smart Street Light System with IOT is an effective solution. It combines safe lighting protocols with consumption of a minimal amount of power. The future scope of this project expands into speed detection of vehicle and customize illumination of specific area. Despite of higher initial cost of LED bulbs, they are a perfect option as they consume less amount of energy. This phenomenon will further result in energy saving and reducesthe operational cost as well as maintenance cost.

The project is named as "IOT Based Green Energy Healthy Roadways". Generally, street lights are switched on for whole night and during the day, they are switched off. But during the night time, it is not necessary to keep street light ON at full intensity throughout the time when there is no traffic. As a result, it saves electricity costs, increases the life span of street lamps and other equipment as well as saves labour costs required during maintenance and replacement of materials. This whole IOT controlled system is connected to a network system whichgives report the status of the system continuously.

The main aim of this project is to save the power. This can be used in long roadways between cities. By this advanced technology we can design many more systems

having similar objective and working principle. This project motivatesin such a way that, renewable energy source can also be used in purpose of transportation.

Automated Irrigation system based on soil moisture using Arduino has been developed by integrated features of several hardware components used.The moisture sensors measure the moisture level (water content) of the different plants. If the moisture level is goes below the pre-set level, the moisture sensor sends the signal to the Arduino board which triggers the Water Pump to turn ON and supply the water to respective plant using the Rotating. Platform/Sprinkler. When the desired moisture level is reached, the system halts on its own and the water Pump is turned OFF.

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