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IoT Based Energy Management System

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ABSTRACT: Nowadays manufacturing circumstances, rising energy costs, increased concern for the environment, and changes in the practice of consumers promoting green manufacturing organizations. The remarkable increase in modernization in recent years requires an economical, productive and smart solution such as transportation, management, the state, personal satisfaction. Energy demand for IoT applications is growing. In this particular situation, energy management is an important issue because of high energy savings and efficient energy crisis reasons. At that time, we will provide a structure for combining reservations and increasing energy efficiency in energy management based on IoT. The energy management planning and the second include wireless power transfer from IoT implements in the energy management. The situation energy management industrial facilities have shown as a contextual analysis including progress considering the balance of energy supply and demand, unsolved issues also discussed in the field of IoT based energy management system. In one another research, researchers have developed Android based Smart home system for monitoring the usage of power to avoid any kind of anomaly.

KEYWORDS: Internet of Things, IR sensor, Arduino nano, LDR .

I. INTRODUCTION

As rapid change in technology always aims to serve the mankind, the expectation for living a simple yet advance life keeps on increasing. Internet has become an important part of human's social life and educational life without which they are just helpless. The Internet of things (IoT) devices not only controls but also monitors the electronic, electrical and various mechanical systems which are used in various types of infrastructures. These devices which are connected to the cloud server are controlled by a single user (also known as admin) which are again transmitted or notified to the entire authorized user connected to that network. Various electronics and electrical devices are connected and controlled remotely through different network infrastructures. Web browser present in laptop or smart phone or any other smart technique through which we can operate switches, simply removes the hassle of manually operating a switch. Now a day's although smart switches are available they prove to be very costly, also for their working we required additional devices such as hub or switch. As there is rapid change in wireless technology several connectivity devices are available in the market which solves the purpose of communicating medium with the device and the micro-controller. Starting from Bluetooth to Wi-Fi, from ZigBee to Z-wave and NFC all solve the purpose of communicating medium. RF and ZigBee are used in most wireless networks. In this project we have taken ESP8266 NODE MCU Wi-Fi module which is programmed through Arduino UNO to control various devices. This will save lots of electrical energy. The system also uses solar panel and wind turbines to charge batteries. In this way this system will manage energy for right duration using IOT techniques.

II. METHODOLOGY

In the existing system, Street lights and water irrigation usage is done by human workers. This requires a number of workers to manually ON and OFF street light and water Pump. In case of any delay energy and lots of water will waste. It can be time-consuming, restricted and slowed down due to adverse environmental conditions in which workers may not be able to visit some areas. These eventually increase the energy provider's operation cost which trickles down to electricity bills being increased. This project introduces a solution to address the problem. This work uses the IOT technique and the features of embedded systems in order to implement the desired functionalities. The Arduino and IR sensors are used to detect presence of human or vehicle. This will automatically switch ON streetlights when vehicle or person detected. A user can turn ON or OFF streetlights using smartphone application. In case of any network fault or failure in embedded system manual operating also available. There is automatic irrigation used for watering plant using

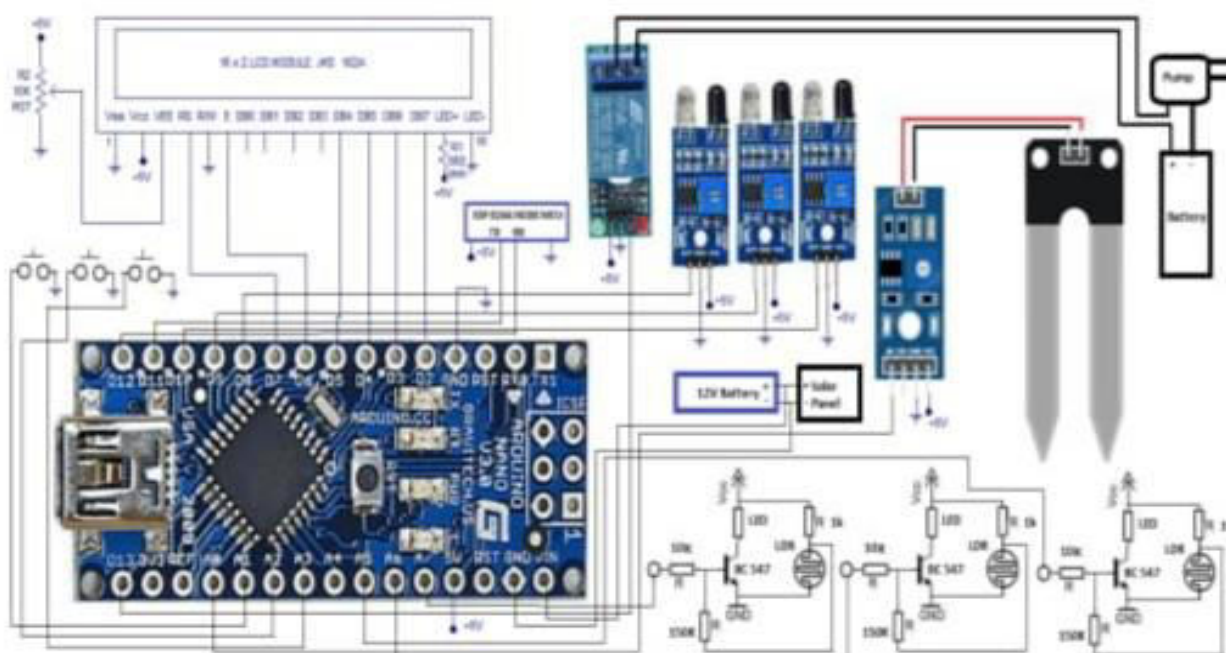
soil moisture sensor. System uses LDR in order to switch OFF street lights during day time. There are solar panel and wind turbine by which batteries can store electrical energy. The desired functionalities. The arduino and IR sensors are used to detect presence.

Block Diagram:



Figure 3.1.a: Block diagram

Schematic:





Circuit Working:

When system switched on Arduino initializes LCD, Wi-Fi module and starts reading data from switches, moisture sensor and IR sensors. If moisture level is low then Arduino switches relay ON by which motor pump turn ON. If moisture level is high then Arduino switches relay OFF by which motor pump turn OFF. If Vehicle or person comes near first IR sensor then its output goes HIGH. The change in IR sensor output detected by Arduino and it switch ON transistor by which first street light becomes ON. Similarly When second and third IR sensor output state changes it Switch ON second and third street light respectively. In case of any emergency situation user can push button present of each pole. When switch is pushed it send emergency help notification to mobile phone through Wi-Fi module. The street lights can be turn ON and OFF using smartphone application. Arduino receives data from smartphone application using WiFi module. According to switches data streetlights can be switch ON and OFF. During day time Street lights turn OFF using LDR. The switches present on street poles enables switch ON and OFF street lights manually. When no vehicle or person present on street then street lights activated with low intensity. System uses solar panel and wind turbine to charge batteries. In this way system will save lots of electrical energy.

Application:

- └ System can be modified to use speed sensor and automatic traffic lights to avoid road accidents.
- └ It can be used in real time safety system.
- └ System can used in street areas where no electricity available.
- └ This safety system technology can be used in various other industries as well.

III. CONCLUSION

Energy Management is current trend with the development of IoT. Lot of work been reported in regard to controlling the appliances also on monitoring the electrical parameters towards hazard. Also work reporting in controlling the appliance for energy consumption. So with all these work reported, we here have developed an better IoT system for Energy Management which take street light and water irrigation into consideration and accordingly IR sensors and moisture attached with Arduino Microcontrollers for controlling the usage of water and street lights. This information is computed all through the day and same uploaded in cloud server too. This ultimately achieves in energy consumption of every household resulting in Energy Management using IoT. The system so developed is fully automatic for controlling only streetlights and water pump.

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