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UTILIZATION OF SOLAR ENERGY TO OPERATE APPLIANCES VIA ANDROID APPLICATIONS

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ABSTRACT
In this paper we are focusing on android application which can control electrical appliances using solar energy. This application is used to control the appliances to turn ON/OFF. The android application indicates whether the appliances are ON or OFF. Android application will link that information with microcontroller through Wi-Fi module and it controls the appliances by android application. When the stored energy level goes below 50%, the system gives indication to user through the message. Though appliances we can run with available energy .In this project we are also focusing on the system to implement the utilization of solar energy. Solar energy is the renewable source of energy which is available free in nature and also reliable .The water and environment is very precious for us. In our system we are implementing solar panel as a source of our system. It also involves the automation and controlling of lightings, ACs, ventilations and security which also includes home apllicances such as dryers/washers, ovens or refrigerators/freezers which uses Wi-Fi for monitoring via remote. Home Automation must have compliance with all the household standards and ease of use. This paper focuses on flexible, cost friendly wireless home automation system which would be based on an Android App.

Keywords: IOT, Atmega 328, Wi-Fi module, Solar Energy, Mobile application.

I.   INTRODUCTION
Solar system is the smart technology choice of 21st century. For development in the renewable energy field and the increasing number of new uses of electricity generated a need to modernize the electrical system. Solar system is like any other electrical power generating system, just the equipment use in different than that used for conventional electromechanical generating system. By using PV cell system we generate electricity and this electricity used by our appliances, this paper describes the implementation of controlling various appliances with Android phone.

In the large area of application i.e. monitoring and control in the industry, household equipment i.e. home automation, water monitoring, health monitoring etc. data acquisition plays very important role. Recent years there is requirement to do the long distance monitoring. Hence remote monitoring based on web is known as internet of things (IOT) framework is a choice. In which work has been designed, implemented to control & monitoring of household equipment. Where the data monitoring is possible by web browser & can be access via web browser devices i.e. computer, laptop or small mobile phone [1]. This IOT that allows is objects to be sensed & controlled remotely across existing network infrastructure, creating opportunities for much direct integration of physical world into computer-based systems, & resulting in improved efficiency, accuracy & economic benefit .In it research we have integrated Solar based system to implement home automation [2]. Objective of research is Home automation using IOT within integration of Solar based energy system. Integration of sensing systems, connected to Internet, is likely to optimize energy consumption as a whole. It's expected that IOT devices would be integrated into all forms of energy consuming devices (switches, power outlets, bulbs, televisions, etc.)[3]. Android phone is used for application program to transmit the commands using Bluetooth or Internet connection [4].

II.   SOLAR ENERGY ELECTRIC POWER SYSTEM
Solar energy that is properly installed and adequately sized will not really require much in way of management. For those times of marginal sun or very large power requirements, it is important to understand relationship

between your battery charge level, amount of charge that they are receiving and power being withdrawn from system [5].

To make its relationship clear, and for those who might think solar energy is complicated, I designed and wrote its simulation to demonstrate basic operation of a solar energy electric power system. Only for three things need to be considered these are levels of charge on battery bank, amount of charging power coming in, amount of power being used. [6]

III. SOLAR SYSTEM SIMULATIONS.

This solar energy electric power system simulation is representative of small four Kilowatts solar energy system. Solar panel array is eight 100 watt panels or 800 watts total. Within an average solar day of 5 hours, 800 watts times 5hours equals 4000 watts or 4 Kilowatts (4KW). Battery bank capacity is 1000 Amp hours at 12 volts. Simulation might run at 5 different speeds including real time (1 second =1 second sim. time). At fastest speed, it might be a real challenge to keep things under control. Default speed of 1 second =1 minute of Simulator time is a good starting speed. Click drop down to change speeds. If you like these things to move along a little faster try 1 second = 10 minutes speed [7].

In a real solar energy electric power system, a single quality of multi-function meter is capable of displaying all readings of first 4 meters in simulator. To better see what is happening, Simulator displays all these readings of first 4 meters in simulator. To better see what is happening, simulator displays all these readings at same time. I added AC meter so you might easily see that power appliances use does not go into batteries [8].

IV. SYSTEM IMPLEMENTATION

The modules used in our project are communication module, user interface module and display module. The communication module describes how the connections are made with the microcontroller for Wi-Fi communications. For smart living concept, Wi-Fi technology has been one of the major technologies. It is a wireless technology developed to replace cables on devices like mobile phones and PCs. By using Wi-Fi, wireless devices are able to communicate with each other. Nowadays lot and lots of smart living applications have been developed which are based on Android and Wi-Fi. Android system provides SDK and APIs for developers to build new applications. Many smart living are constructed under Android system with Wi-Fi integrated into Android system.

V. ANDROID APPLICATION

Android application (apps) is most widely used by all smart mobile phones. The android applications built in PHP language. A signal is generated on clicking a specific buttons on the android application which shows the ESP8266 to is to do actions according to the predefined program. A software development kit (SDK) is typically a set of software development tools that allows the creation of applications for certain software framework, hardware platform, software package, computer system, operating system, or similar platform. It may be something as simple as the implementation of one or more application programming interfaces (APIs) in the form of some libraries to interface to particular Programming language or to include sophisticated hardware that can communicate with a particular Embedded. A typical Android app is designed for a smartphone even for a tablet PC running on the Android OS.
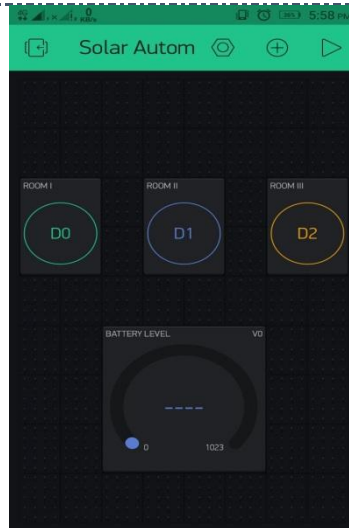
Fig: Android application snapshots

Receiving the message send from the android application and understanding and sending the commands to relay unit is described by messaging module. The android application is act as a user interface, through which the user can easily control the devices. The Figure shown above is the simple snapshots of our android application i.e. user interface module. The liquid crystal display is used to denote the commands sent by the android application. The figure shown above has different room features on the screen of android application the devices will turn ON/OFF the particular device. We can also turn ON/OFF all the devices at the same time by pressing all devices ON/OFF button.

The ESP8266 Wi-Fi module is a self-contained SOC with internet TCP/IP protocol stack that can give any micro-controller access to your Wi-Fi network the ESP8266 is capable of either hosting an application or off-loading all Wi-Fi networking functions from another application processor.

VI.   PROPOSED SYSTEM
As shown in the design, a low cost smart home system for remotely controlling also for monitoring the smart home environment is represented. The system consists of an app which is developed using Android platform and by using Ethernet based micro web-server. The micro-controller acts as a main controller that hosts and performs the actions which are necessary to be carried out. [9][10]

All the actuators/relays and sensors are directly interconnected to the main controller. Using the Smart home app, from a remote location it is possible to control and monitor the smart home environment. The app will communicate with the micro web-server via the internet. Any internet connection via Wi-Fi or 3G/4G network can be used device. [11]

This all automation and controlling of the home appliances and the alert systems can be done just with the human's voice using the voice/speech recognition.
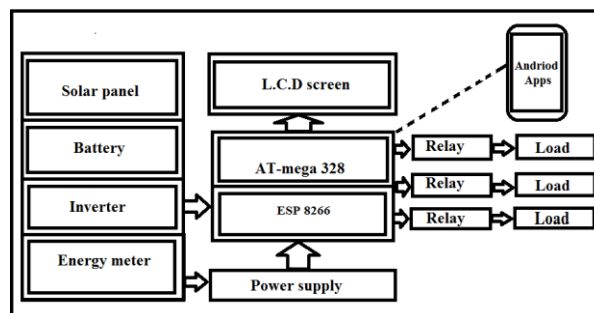

Fig : Block diagram of Proposed System using Wi-Fi Via Android apps

VII. PROPOSED METHODOLOGY

In today's world everyone has shortage of time and in this era of technology there should be a mobile app that could be used to control the home appliances with the help recognition. This project will use the home appliances and will be powered with the Bluetooth and the Wi-Fi making an inter connectivity between the devices and creating an internet of things. [12]

In this proposed project a mobile apps is created and it includes all the features of controlling the home appliances with the help of speech recognition and interconnectivity of devices.[12][13]

The mobile app that is created, contains all the commands like switching on/off AC, fan, Washing machine, etc. thus this concept basically contains the smart appliances in a home that can be controlled by Wi-Fi and Bluetooth and connected wirelessly with the mobile phones. The mobile app in the mobile phone will be containing the options to give different commands to the appliances and controlling it with our mobile app. [14] The main page of the app will be having the login page that will be used to authenticate the user using the IP address and the password. After successful login the user will be able to control all the appliances with the mobile app and the voice recognition. [15]

There will be switches provided in the app to control the appliances of the home and these switched can be customized manually or using voice by the user. [16]

VIII. CONCLUSIONS

In this paper, an internet based smart home system that can be controlled remotely upon user authentication is proposed and implemented. The Android based smart home app communicates with the micro web-server via internet. Any android supported device can be used to install the smart home app, and control and monitor the smart home environment. A low cost smart home system has been developed which does not require a PC as all processing is handled by the microcontroller. The system also uses the Google speech recognition engine thus eliminating the need for an external voice recognition module. Prospective future works include incorporating SMS and call alerts, and reducing the wiring changes for installing the proposed system in pre-existing houses by creating a wireless network within the home environment for controlling and monitoring the smart home environment

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