A Review Paper on "SECA (Smart Electricity Controller and Automator)"

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ABSTRACT: The purpose of this paper is creating a website so that the user can control electronic devices; see the amount of power consumption, current status of connected equipment, so the problem is the difficulty in saving electricity can be resolved. Home automation system is increasingly used due to the wide manufacturer brands and various available technologies. From a social point of view, residents are admitted to smart homes for comfort, luxury, improving quality of live, and for providing security against intrusion and burglars. In the era of IoT, it is possible to connect to the things around us so that we can access anything at any time and any place in a user friendly manner with economical operation and enhanced efficiency.

Automation of the devices, appliances at home and office is having wide scope of research with the advancement of technology in communication era. Misuse of power energy can be curtailed by automating the devices and appliances. Mobile communication and internet are playing a big role in the field of automation. Android phones are powered with application programs to automate the required devices. This study focused to automate the home appliances using the Bluetooth,IR Remote and manual switching for controlling of connected equipment from short range while using internet for controlling of equipment from longer ranges. The status of the devices is linked to the local internet to enable the graphical user interface (GUI) for device monitoring.

KEYWORDS: Home Automation, IoT, Bluetooth, IR.

I. INTRODUCTION

The rapid growth of wireless communication motivated us to use mobile communication and internet to remotelycontrol various equipment connected to a particular switch board. In this paper we describe a remote appliance control board which can control different household appliances by sending the response of the user from remote location via the internet. The microcontroller would then control and device based on the information given to it. The proposed solution will need to be easy to use, simple, secure, robust and be useful for the wide area of users.

This project named "SECA" is basically the alternative of the traditional switch boards which only allows the user to operate connected equipment by means of manual switching. "SECA" board looks like similar to the traditional switch but will provide advance functionality including the controlling of equipment from any possible distance wirelessly via internet, Bluetooth and IR signals from IR remote. It is aimed to make the controlling of the equipment more easy by providing various way to operate the equipment as per the comfort of the user.

It also accounts various security features which makes it a safer and advanced replacement of the traditional board. The main concept behind the project is to improve efficiency of power consumption along with making the controlling of equipment more comfortable.
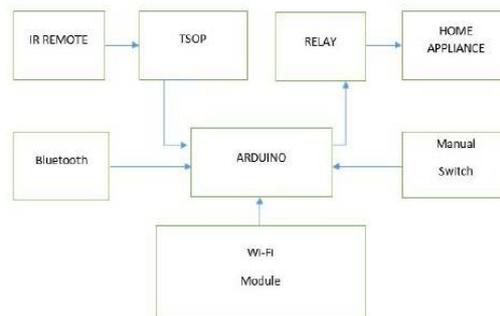
II. EXISTING SYSTEM

Figure 1: Block diagram of the "SECA" Board.

Existing alternatives for the automation of equipment mainly at homes and offices lags in various ways depending on the path that has been chosen for the purpose of automation. During the review process it has been noted that the main area where the existing system is not able to make significant foot prints are reliability and cost. The reliability of system is affected by various factors like cyber security, functioning of device and handling while cost is affected due to costly arrangements of electronic components including microcontroller, various modules and other peripherals. Cheaper alternatives restrict the user in terms of functionality and features like automation using IR remote only allows user to operate the equipment from a smaller distance and doesn't provide any interface through which user can keep a track on device status along with power consumption. These lags in the system, making the automation still to hit the common mans' life style.

III. PROPOSED SYSTEM

The proposed system consists a switch board through which one can connect any equipment. The board will be loaded with microcontroller (ATmega328p) board named as Arduino board which will receive the responses of the user via internet (by means of a website), Bluetooth (by means of a mobile based application), IR signal (by means of IR Remote) Or the manual power switches thus allowing the user to control the same equipment via four different ways as per his/her comfort.

The user can see the status of the equipment either on the LCD screen mounted on the board or by making log in to the web site by entering a valid log in id and password, the use can also see the power consumption of equipment in real time through the web site which allows him/her to keep a watch over the power consumption along with the accounting of bill.

This board simply allows one to replace the traditional switch board with it which can be seen a quick alternative of automation of the connected equipment just by making a replacement of board.

IV. SYSTEM ARCHITECTURE

Fig. 4.1 is showing the block diagram of the "SECA" Board. The Arduino board is used which consists of ATmega328p microcontroller which will be programmed using embedded c language, users' response can be received by microcontroller by means of IR module, Bluetooth module or Wi-Fi module and thus generate the output signal after processing which will be fed to the relay module which is responsible to make the switching at 220V on the basis of signal received from the microcontroller. System is based on two way communication thus the information regarding

status of the equipment and power consumption will be received by the Arduino and same will be transmitted to the web server.

V. CIRCUIT DIAGRAM

In "SECA" board various circuits are used as different section as shown in Fig. 5.1 (circuit diagram of relay module), Fig. 5.2 (Connections of LCD to Arduino), Fig. 5.3 (Connections of Bluetooth module to Arduino) and Fig. 5.4 (Connections of Wi-Fi module to Arduino).
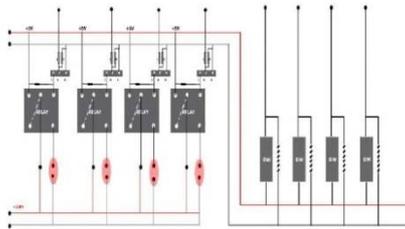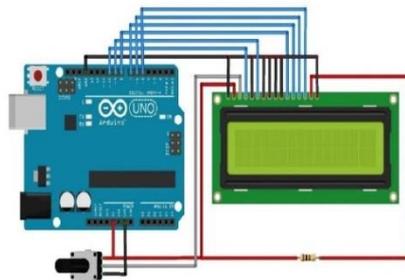

Figure 2: Circuit Diagram of Relay Module.
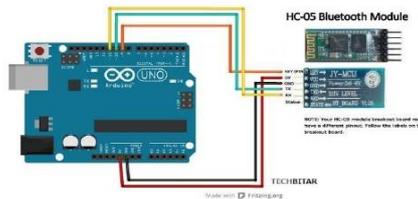

Figure 3: Connections of LCD to Arduino.

Figure 4: Connections of HC-05 to Arduino.

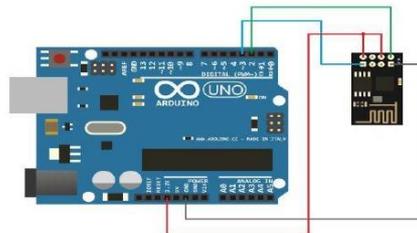

Figure 5: Connections of LCD to Arduino.

VI. CIRCUIT WORKING

The circuit primarily consists of 2 stages, one based on electronic components and the other is server-deployed program that allows us to control the operation, optimization and forecast the future outputs. The first section makes used of ATMega328p microcontroller in conjunction with the ESP8266 communication controller (that communicated wirelessly through LAN network, with the server), Bluetooth Module (HC-05), TSOP and manual switches and the second section consist of the relay module along with the connected equipment Once two sections are coupled properly the control and automation becomes a breeze.

The first section will receive the response of the user and will transmit it to the Arduino UNO board that will process it as per the program and provide the desired output at the output terminals that will lead to the controlling of the equipment by user's end.

For an instances user logs-in to the web site, after successful login now the user will be able to see the control page from where he/she can control the equipment and can keep a watch over the power consumption of the equipment along with the duration of its operation in real time.

Figure 6: Actual View of SECA Board.

Similarly the user can operate the equipment by means of mobile using Bluetooth or by means of IR remote as well as by means of manual switching for small distance operation.

VII. FUTURE SCOPE

The current work on the embedded systems and in the field of the automation shows that we are surely going to see some unbelievable ways of the controlling of our equipment. This project is just a glimpse of the future technology where the systems will be far more efficient and reliable along with the more number of operation performed by them. "SECA" and such products will provide a new alternative system for operation of the equipment in homes offices and other work places with the aim of more economical and efficient use of power. The Board can be promoted as the alternative of traditional switch boards and can avail automation facilities to the consumer simply by replacing the traditional switch board with the "SECA" board.

VIII. CONCLUSION

In the age of technology the embedded system is taking place of various traditional systems with the aim of providing a more efficient alternative with enhanced performance and reliability. During the review process it have seen that there are many flaws in the existing system mainly the cost and reliability. The project is improved version of

existing system in terms of reliability, efficiency, and performance as it is providing four different ways for the operation of an equipment as per the comfort of the useralong with the real time accounting of the power consumption.

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