

# International Journal of Innovative Research in Science, Engineering and Technology

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## Smart Home Automation System using Ethernet Technology

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**ABSTRACT:** Smart Home Automation System (SHAS) is a new trade of modern home automation system, in which a communications network that connects the electrical appliances and services allowing them to be remotely controlled, monitored or accessed. This paper presents implementation of new home automation system that control home devices from a central control point, that can be used to remotely switch on or off any household appliance, using a microcontroller to achieve hardware and also a low cost but yet flexible and secure Ethernet based home automation system.

**KEYWORDS:** Smart Home Automation System (SHAS), Ethernet, microcontroller, automation.

### I. INTRODUCTION

Nowadays home and building automation systems are used more and more, because they provide not only increased comfort especially when employed in a private home but also allow centralized control of heating, ventilation, air condition and lighting when employed in a commercial buildings. It is an emerging concept and lot of research has been going on for more than a decade now in order to increase the power efficiency at the consumer level of the power management systems. A residence that integrates technology and services through home networking to enhance power efficiency and improve the quality of living is nothing but the Smart Home system [1, 2]. Automation systems are plays very important role in different areas, as shown in figure 1, like Office automation (refers to the varied computer machinery and software used to digitally create, collect, store, manipulate, and relay office information), Building automation (functionality to control the appliances of building), Power automation (control and monitoring of power plants), and Home automation (automation of household appliances and features in residential dwellings).

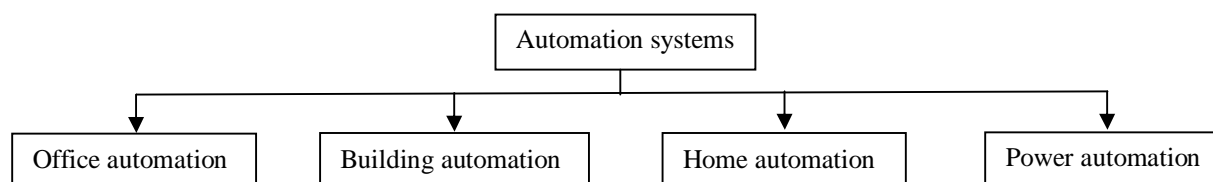


Figure 1 Automation systems.

This paper develops the home automation system, which is very useful to improve the lifestyle of the control of the home devices in short. This type of automation Control system is combination of computer and information technology to control the home appliance like telephones, TV outlets, electrical power, broadband wire, a doorbell and door lock.

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This type of system provides energy efficiency, security and ease but also is made to reduce the manual worker [3]. In this paper introduction section provides the different automation system where as the section two i.e. literature survey provides an overview on Smart Home Automation System developed in the recent year and section three provides the Architecture and working of proposed system. Next Section provides the result and conclusion.

## II. RELATED WORK

Rajeev Piyare and Seong Ro Lee [4] present a low cost and flexible home control as well as monitoring system. In this system an embedded micro-web server is used for accessing and controlling devices and appliances remotely, using Android based Smart phone app. The proposed system architecture is divided into three layers: home environment, home gateway and remote environment. The proposed home automation system two types of software; one for server application (it is a library implementation of a micro Web-server running on Arduino Uno using the Ethernet shield to communicate between remote user and the Home Gateway) and other is for microcontroller firmware.

Basil Hamed [5] presents the hardware implementation of a multiplatform control system for house automation using LabVIEW and consists of five parts; security systems (include fire alarm system and burglar alarm system), lighting system (include the internal lighting of the house, and the ceil lighting outside the house), remote control system, temperature system and fifth subsystem is Main house power switching system. All these five parts are connected to LabVIEW software. This proposed system contains computer interfacing and remote control unit interfacing. Here LabVIEW software is the main controller unit which receives data from house sensors, process information and updates data for the difference systems, and transmit controlling signal to house systems and switching output devices.

## III. PROPOSED SYSTEM AND ARCHITECTURE

As the system uses Arduino, Ethernet are the main part of the project here the Ethernet shield acts as a server and Arduino microcontroller for programming. As per the Programming done in the Microcontroller, the Web page is displayed on the screen in which the buttons are viewed as On/Off. When clicked on buttons (On), this feedback is given to the microcontroller. There are 4 pins which are defined in the microcontroller i.e. pin 9, pin 10, pin 11, pin 12 are connected which are given to the 4 relays as shown in the setup figure 2 and 3 . Through Html language when the on button is pressed, the data is passed into C language to the server. When clicked on button, pin 9 goes high (1) and this goes to the ULN 2003 driver IC which converts the 5 volt from arduino to 12 volt which is given to the Relay. Relay will operate, led will glow on and the device will operates and same process will continue same for pin 10, pin 11, pin 12. The communication used in Ethernet is SPI communication through Pins 10,11,12,13 are chip select (CS), Master in slave out (MISO), Master in Slave in (MISI), serial clock (SCLK).

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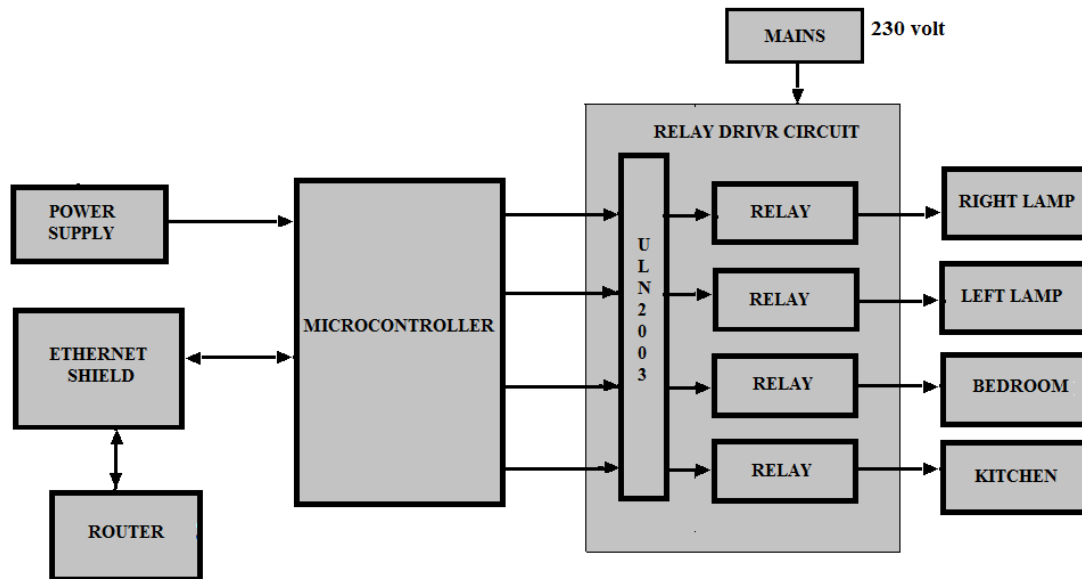


Figure. 2 proposed system

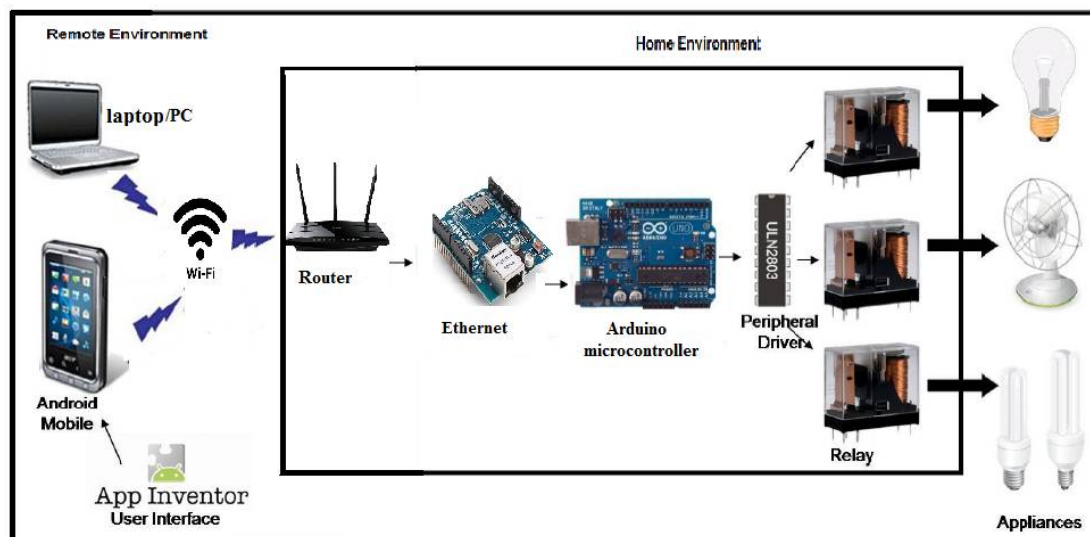


Figure. 3 System Architecture

## IV. EXPERIMENTAL RESULTS

The Microcontroller is programmed using HTML which is passed using 'C' language. Here a webpage has been created to continuously monitor the home appliances through Wi-Fi and it is enabled by w5100 Wi-Fi module. The first screen that will be displayed to the user wherein the user has to establish connection with Wi-Fi network for remotely

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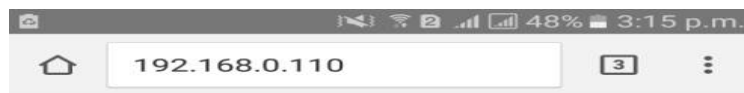
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accessing appliances. Figure 2 shows the browser page which we designed using HTML language as a home page, Once the home page is loaded, the user need to enter Ip address(192.168.0.110) to facilitate the further access to control home appliances.

In the proposed system three devices are considered for demo purpose Light, bulb, mobile charger, fan on this page we can control 4 devices just by clicking the menus on the web page, initially all devices Light, bulb, mobile charger will be in off State i.e. '0' state. The user can access this system using PC/Mobile. Using this GUI, user interacts with the system to control devices. On successful establishment of connection, user can either operate devices (ON/OFF) (energy consumed by each device) about devices.

When we click on button it will switched on the appliances and so on then we can switch off the appliance, here we have taken bedroom as a part of example where it will control all the appliances which are present in the bedroom, similarly for kitchen also. when '0' state means the device will OFF when '1' state means device will be 'ON'. So in this way we can turn on and off the appliances present in our homes.



## Ethernet Switching

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\*\* - Ethernet based Home Automation

Fig. 4 Screen shots of the proposed smart home app

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Figure 5 Setup of the Smart home System



Figure 6 Home automation System

## V. CONCLUSION

In this paper the design and implementation of Smart Home Automation System (SHAS) that control home devices has been established. The home automation using Ethernet shield has been experimentally proven to work satisfactorily by connecting simple appliances to it and the appliances were successfully controlled remotely through Wi-Fi.





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