Smart Home using Internet

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Abstract– This paper presents a lowcost, flexible home devices control and monitoring system using an embedded arduino micro-web server, with real IP connectivity for accessing and controlling devices and appliances remotely using Android based Smart phone app running on android platform. The proposed system does not require a dedicated server PC with respect to similar systems and offers a novel communication protocol to monitor and control the home environment with real time graphical interface. Devices such as light switches, temperature sensors, smoke/gas sensors and sirens can been integrated in the system to increase the feasibility and effectiveness of the proposed smart home system. However every load of the home can be controlled using SENSOR SWITCH. Sensor switch is integrated with the Ethernet system. Therefore in proposed system real time interface is possible.

Keywords: Internet of Things; Wi-Fi; Sensor Switch.
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I.   INTRODUCTION

Today, wireless technologies have replaced the ubiquitous cable connections which tend to grow under the consumer's desk. Moreover, Wi-Fi has enabled easy communication between various digital devices.

One of the major appliances of Wi-Fi technology is in home automation. It can link digital devices within a range of 100 to 300 m at the speed of up to maximum net data rate from 5Mbit/s to 110Mbit/s depending on the device class. We propose a home automation system based on Internet of Things technology.

There are few issues constraints while designing a home automation system. The system should be compatible with new devices. It should provide a user- friendly interface on the host side, so that the devices can be easily setup, monitored and controlled. The real time feedback is used to track down problems in the system, if any. The sensor switch is hardware switch, used to control the appliances at home manually. Moreover the overall system should be fast enough to realize the true power of wireless technology. The system should be economical in order to encourage its application in home automation.

Developmentof Wi-Fi based system and Sensor Switch to control the everyday home appliances is the aim of the project. The system offers users an easy & effective means of controlling their various home appliances from a remote location i.e. without physically being present at home as well as controlling using sensor switch. The wireless technology, Wi-Fi can be used for remote access for various home appliances. Now-a-days, the people are realising about the importance of the electricity, water etc. and hence trying to minimize the wastage of such things. This project is a small attempt toreduce the human work for saving these energies.

II.   OBJECTIVE OF SYSTEM

- Communicating between the Smartphone application and the system
- Transmitting data wirelessly between Smartphone application and Ethernet module
- Integration of microcontroller with sensor switch
- To form wireless network with help of Ethernet module
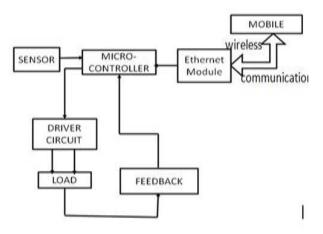
III.   BLOCK DIAGRAM

Fig:Block diagram

The system works using the Smartphone application and sensor switch. The Smartphone application is nothing but an android application which is the main source for giving the instruction to the Ethernet module. The transmitter of Wi-Fi transmits the data given by the application using radio waves technology. The Ethernet shield works on Ethernet protocol, as the data to be passed through Wi-Fi is converted into the electromagnetic signal which is then sent using the antenna. This signal is received and decoded by the router at

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the receiving end. This signal is passed to the controller which is an arduino controller.

The Sensor Switch is the Switch which works on the technology of IR sensor. Signal of Sensor circuit is passed to the arduino controller.

The arduino further operates the received information and performs operations on the appliances, which are driven by the driver circuitry.

IV. DESIGN COMPONENTS

The system contains both hardware & software components which are classified as follows.

HardwareComponents

A.Microcontroller:
The microcontroller is the CPU of the system and receives the command executed on the server and give instructions to control home appliances.

B.Ethernet module:
This machine connects the user and various home appliances and also acts an interface to microcontroller.

Specifications of module:

- Ethernet module : IEEE 802.3af
- Range: 30m to 140m
- Data transfer rate of Wi-Fi 160Mbps
- Bandwidth of Wi-Fi 20MHz

C.Sensor Switch:
Sensor switch is the sensor module which have IR sensor, analogto digital convertor and opto-coupler circuits. Digital signal of sensor module is passed to micro-controller.
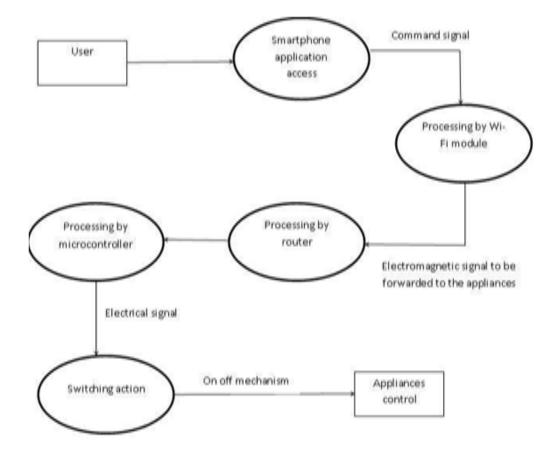
D.Driver circuit (RELAY):
Driver circuit is a switching circuit that connects circuits to the appliances. The relay is used for switching purpose.

E.Home Appliance:
The home appliances must always be connected to main supply.

The various aspects of the system which can be controlled are.

    a. Status (ON/OFF)
    b. The output power
    c. The time for which the appliance is running

V. DATA FLOW DIAGRAM

Fig: Dataflow diagram

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VI. ADVANTAGES

- **Convenience-**With the help of Wi-Fi connectivity home appliances can be connected to a remote machine to control home appliances.
- **Real-time   Control-**Adjust the   connected appliances as and when needed.
- **Addition of appliance-** Adding a new appliance to the system is easy and simple.
- **Security-** Cameras can be connected to the system for security purposes. The status of these cameras can be monitored from a remote location & can be used to gather security information about the home in general & take the required measures for the same.

VII.   LIMITATIONS

Connectivity-Due to loss of internet connection the circuit may stop responding to the user's commands.

VIII. CONCLUSION

The Home Automation system has large scope and limitless application. The system can be made efficient bymodularizing each and every component of the system hence ensuring that it can be integrated with a varied range of devices. To provide convenient and secure system is the aim of the system.

This Project showcases use of Wi-Fi based communication as a low cost microcontroller based embedded system. This method uses Ethernet and Wi-Fi network to transfer data between Host and the system. The communication is based on TCP data transfer and it utilizes an *Ethernet Module* to switching circuitdata and to the Wi-Fi network. The SPI communication simplifies the implementation between embedded systems.

IX.   ACKNOWLEDGEMENT

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