INTELLIGENT HOME MONITORING AND WIRELESS CONTROL SYSTEM

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ABSTRACT

This paper presents a design and prototype implementation of new home automation system that uses Wi-Fi technology as a network infrastructure connecting its parts. The proposed system consists of two main components; the first part is the server (web server), which presents system core that manages, controls, and monitors users' home. Users and system administrator can locally (LAN) or remotely (internet) manage and control system code. Second part is hardware interface module, which provides appropriate interface to sensors and actuator of home automation system. System supports a wide range of home automation devices like power management components, and security components. This paper mainly focuses on the monitoring and control of smart home remotely and providing security, when the user is away from the place. The personal computer is used to monitor the various parameters in the proposed system. In this system android phone is used to monitor and control the various parameters. The proposed system is better from the scalability and flexibility point of view than the commercially available home automation systems.

Keywords*— *Home automation, Wireless LAN, Wi-Fi, AVR Microcontrollers, Android Phone

I. INTRODUCTION

Nowadays, home automation became more modern and precise to monitor the fields. There are so many challenges in the modern home automation such as Temperature, gas, light, fan, obstacles and human healthcare for smart home. An embedded board physically connected all home automation devices and through integration with a personal computer (PC) based web server, provided remote access to the system.

There are some published home automation examples such as [1] where the system was based on a dedicated network. [2] proposed another approach where the research was only based on a model and without any implementations. Recently [3] introduced a low cost Java-Based Home Automation System, without highlighting the low level details of the type of peripherals that can be attached. The home automation system has been proposed that includes home appliances and devices that are controlled and maintained for home management [4]. The major task is to improve performance. According to [5] there are three modules involving sensing unit for monitoring the complex applications. A processing unit, that is microcontroller and a communication module that uses GPRS modem or cell phone via serial port RS-232.

The SMS is used for status reporting such as power failure. The possible solutions are devised through various network technologies. Several issues affecting home automation systems such as lack of robustness, compatibility issue and acceptability among the old and disabled people are discussed [6]. In [7], the spoken commands are generated and sent in the form of text SMS to the control system and then the microcontroller on the basis of SMS takes a decision of a particular task.

II. SYSTEM DESIGN

As shown in Fig.1, the home automation system contains following components:

1. Cloud Server

Cloud server is used for central storage. Centralization gives cloud service providers complete control over the versions of the browser-based applications provided to clients, which removes the need for version upgrades or license management on individual client computing devices. Cloud server contains user databases, glass fish sever, glassfish is an open source application server which is designed to make the web services accessible in an efficient and easy way.

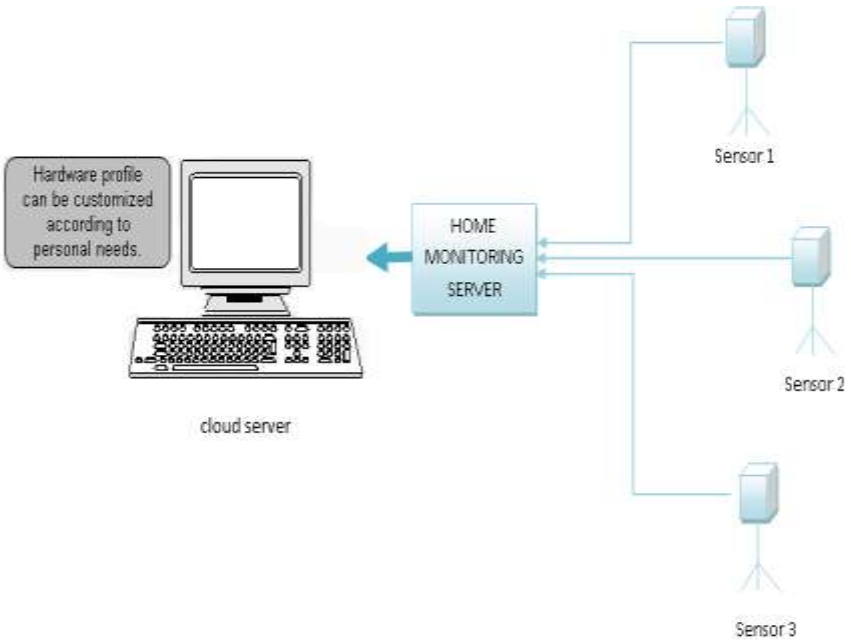

Fig.1 Cloud Server

2. Client

This is the remote user who wants to automate home appliances by using android mobile device or the client pc. Android is a Linux-based operating system primarily designed for mobile devices such as smart phones and tablet computers utilizing ARM processors

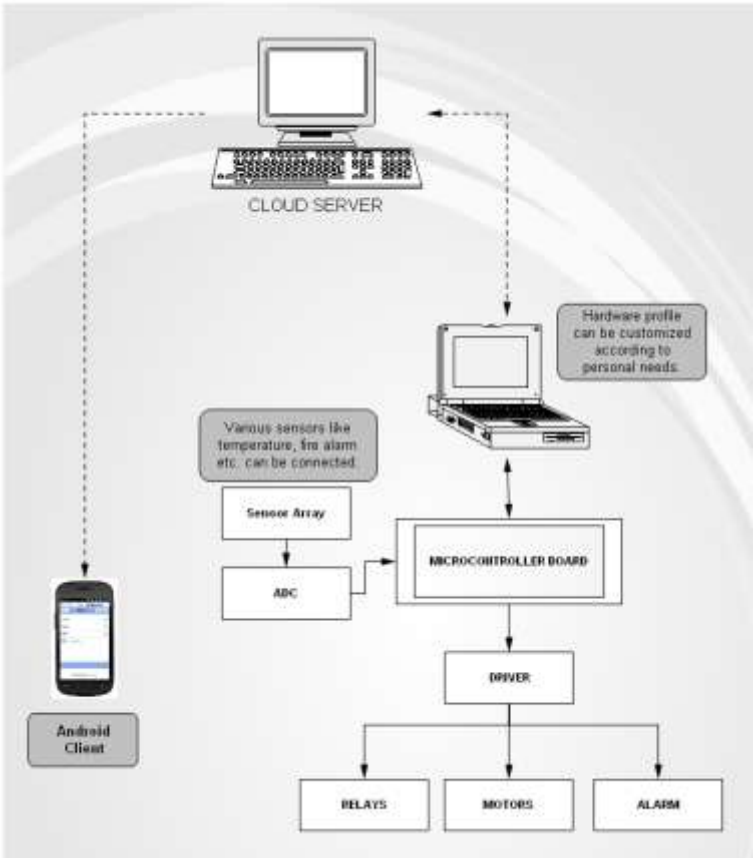

Fig. 2 System Architecture Of A Home Automation System Using Cloud Server

3. Remote View using Android

The local monitoring server sends the home appliances output using graphical user interface. Wi-Fi network is used us the communication between local monitoring server and android device. The architecture of remote view using android module is given in figure 3.

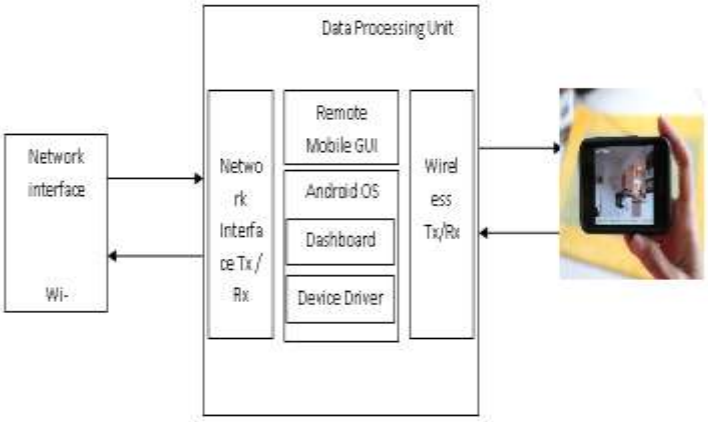

Fig.3 Remote View Using Android

4. ATmega32l Microcontroller

The ATmega32 is low-power CMOS 8-bit microcontroller based on the AVR enhanced RISC architecture. By executing powerful instructions in a single clock cycle, the ATmega32 achieves throughputs approaching 1 MIPS per MHz allowing the system designer to optimize power consumption versus processing speed. The ATmega32 provides the following features: 32K bytes of In-System Programmable Flash Program memory with Read-While-Write capabilities, 1024 bytes EEPROM, 2K byte SRAM, 32 general purpose I/O lines, 32 general purpose working registers, a JTAG interface for Boundary scan, On-chip Debugging support and programming, three flexible Timer/Counters with compare modes, Internal and External Interrupts, a serial programmable USART, a byte oriented Two-wire Serial Interface, an 8-channel, 10-bit ADC with optional differential input stage with programmable gain (TQFP package only), a programmable Watchdog Timer with Internal Oscillator, an SPI serial port, and six software selectable power saving modes. The ATmega32 AVR is supported with a full suite of program and system development tools including: C compilers, macro assemblers, program debugger/simulators, in-circuit emulators, and evaluation kits.

5. ULN2803 (Darlington Driver)

Featuring continuous load current ratings to 500 mA for each of the drivers, the Series ULN28xx high voltage, High-current Darlington arrays are ideally suited for interfacing between low-level logic circuitry and multiple peripheral power loads. Typical loads include relays, solenoids, stepping motors, magnetic print hammers, multiplexed LED and incandescent displays, and heaters. All devices feature open-collector outputs with integral clamp diodes.

III. RESULT

The system will allow the user to control appliances and lights in their home from a Mobile Device and PC from anywhere in the world through an internet connection. It will also allow the user to control their device units within their home from home server using GUI. The home server GUI will control over the system; if neither the Mobile nor PC will be able to control the device units in the home. Another feature provided is auto control. This feature allows the user to control their home units without any internet connection or without using the homes server. The system will turn appliances on and off such as: fan and television or any other home appliances. The system will refresh on the Mobile and PC every time the user chooses an option to control or monitor a specific unit.

IV. CONCLUSION

In the home automation system , by integrating multi-touch mobile devices, cloud networking, wireless communication, and power-line communication, we will be able to design and build a fully functional home automation system. It will allow the user to control various appliances and lights within their home from any location in the world through cloud network using 1) mobile devices, 2) PCs, or 3) in-home graphics user interface(GUI) on their home servers. Using this system as framework, the system can be expanded to include various other options which could include home security feature such as open-door and motion detection, energy monitoring, or weather stations.

Acknowledgment

We take this opportunity to thank all our teachers and our project guide Prof.Shubhangi Wankhede, whose constant encouragement made it possible for us to take up challenge of doing this project we express our deepest thanks to Prof.Kavita Jadhav**.** (Head of Department of Electronics and Telecommunication)

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