Recent Applications of Smart Home System in Smart City

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Abstract—**The paper 'Smart Home System in Smart City' aims at attaining complete automation of all electrical/ electronic devices of a household and simultaneously providing an integrated security mechanism for the home when the occupants are away. The eminent features of this work include control of all household devices in three different ways. First by using a single RF based remote control for all the devices, second using a central computer system- control from a single place through an innovative GUI or voice commands and third using internet to control the devices even while away from home. The latter two ways can be implemented using verbal instructions. Besides, there is a security system to catch any movement of an intruder while the system is in security mode. It also provides an easy and quick way to for sending e-mails.The hardware includes a microcontroller based remote control device using Radio Frequency transmitter, a Radio Frequency transmitter circuit fitted to the computer using the serial data communication port DB9 and a central microcontroller driven receiver that forms the heart of the deice control function. The software has been prepared using Visual Basic and provides a simple, innovative and efficient user interface with voice instruction feature. The home computer acts as a server while any remote terminal can send control instructions after installing the client software.**

Keywords -**Radio Frequency (RF), Graphical User Interface(GUI), Visual Basic (VB), Windows Socket(winsock).**

I. INTRODUCTION

The paper 'Smart Home' is an attempt to provide a modernized experience in home automation and security. It is a combination of hardware and software. The paper includes features like control of all household devices in different ways like using a single RF based remote control, control from a single place using a computer or using the internet to controlthe devices even while away from home. The latter two ways can also be implemented using speech instructions. Besides,there is a security system to catch any movement from an intruder while the occupants of the home are away. The project also provides an easy and quick way to for sending e-mails. Simple smart home system is shown in fig 1. where by using mobile phone, we can control our home applications very easily even though we are not in home.[1][2]
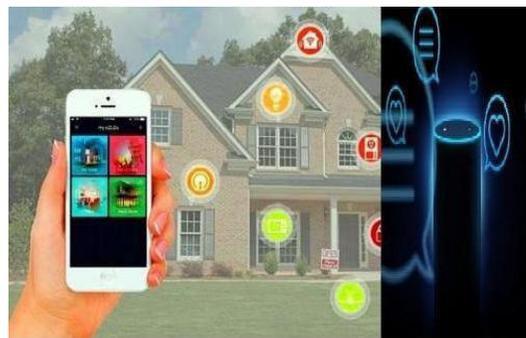

Fig. 1: Smart Home System

II. RF REMOTE

The RF remote is a small and portable device having LCD menu-driven user interface. The user can select the room, lights, fans and other devices to be switched on/off. The brain of this system is microcontroller which sends a different RF signal for every action.There is a central RF receiver. It is interfaced with the relays. The receiver receives the code. It also has a microcontroller which

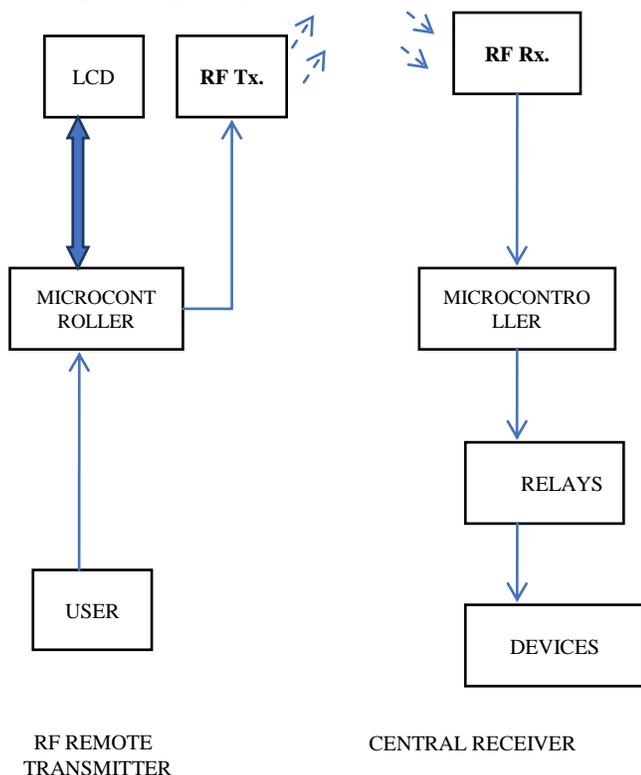checks the signal and sends signal to corresponding relay for the device control.[3[4]

RF REMOTE
TRANSMITTER

CENTRAL RECEIVER

Fig. 2: RF Remote

III. SECURITY

The security system shown in fig. 3 uses a web cam placed at a strategic position to monitor any movement inside the home. The   software keeps monitoring the pixel values being recorded by the web cam. As soon as there is a movement, i.e. change in the pixel values the software captures a picture of the intruder and stores it in a folder. The software then immediately sends an e-mail to a specified e-mail id given by the user. An SMS alert is also sent to the user's mobile phone or to some nearby caretaker so that appropriate action can be taken. The picture of the intruder can be used for identification. Concept: The motion detection module receives a camera image as input and computes the difference between consecutive images within a local field. [5][6]
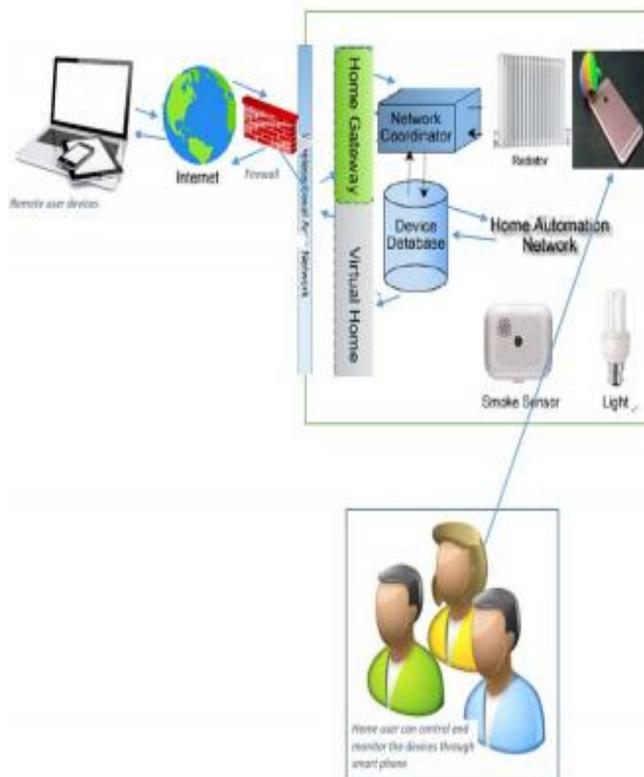

Fig.3:Security System

IV. PC INTERFACE

The user can also control the same household devices sitting on his computer. PC interface system is shown in fig.4 There is a graphical user interface with the image of his house and appliances. He just needs to click on the appliance to switch it on or off. This module simply consists of an RF transmitter working at 433 MHz, a MAX 232 IC and relevant circuitry to provide appropriate voltage levels. This module is attached to the DB9 port of the computer through which serial data communication takes place. The user provides the signals using the interface provided in the Visual Basic software through the computer and the RF transmitter transmits those signals.[7]
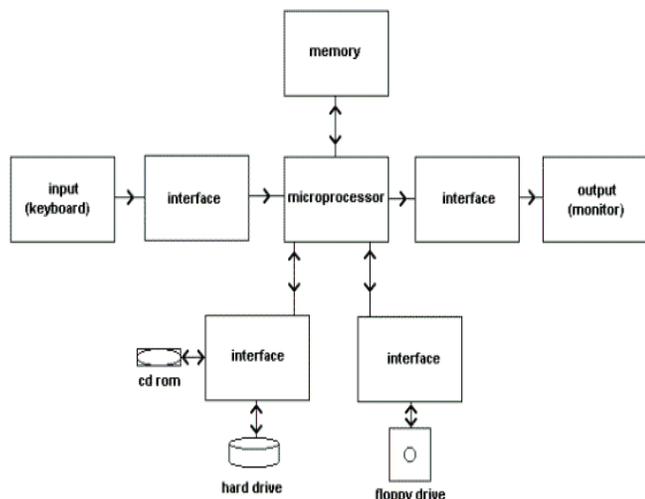
Fig. 4:PC Interface

V. VOICE COMMANDS

The software (visual basic) also provides a voice command feature through which the user can speak the commands he/she wants to execute, and these commands are followed. This feature utilizes the voice library of the Visual basic to recognize the commands. A curtailed library has been used to avoid the problem of normal voice being misinterpreted as commands. Block diagram of Voice command system is shown in fig 5.The voice over the microphone is monitored by the software and when a command is spoken, the command is executed. This allows the user to control the household devices by the means of his/her speech. The project uses the Microsoft SDK 5.1 for speech recognition [8].
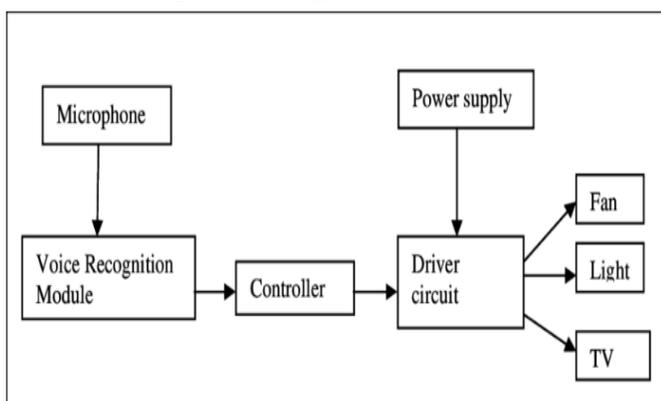

Fig. 5:Block Diagram of Voice Commands

VI. DEVICE CONTROL OVER INTERNET

Device control using internet in shown in fig.6 where device uses programming for connecting the remote computer to the home computer. The target home acts as a server and any remote pc can act as a client after installing the Smart Home Client software made in VB. This feature allows the user to automate the house devices even while he/she is away from home through the internet. The user requires a computer which on which the software needs to be installed. A server-client relationship is established between the computer at home and computer away from home respectively. The client can then use the software exactly like server and execute commands either by keyboard/mouse input or the voice input. [9-10]
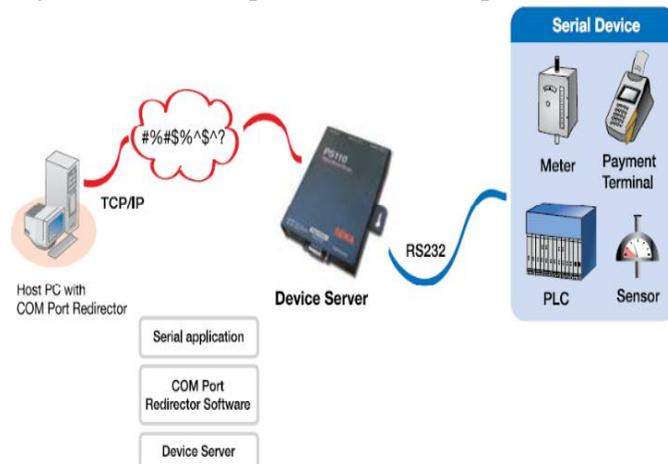

Fig. 6: Block Diagram of Device Control

VII. CONCLUSION

The 'Smart Home System' provides an integrated solution for home automation and home security. It provides the user with options to control the household devices in three different ways viz. using a remote controller, using the computer and using the internet. Voice commands can also be used to control the functioning of devices through computer. The system provides security against any intrusion in the absence of user by capturing the image of the intruder and alerting the owner about the same through SMS. The picture is also e-mailed to the e-mail id specified by the user for verification of the intruder. Another feature of the

system is that it provides an easy and quick way for sending e-mails.

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