

A REVIEW OF WIRELESS HOME AUTOMATION SYSTEM USING VOICE RECOGNITION, GSM AND A WEB PORTAL BASED ON ZIGBEE

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ABSTRACT

Home automation needs to be simpler and easy to use and yet cost effective to be widely acceptable. Wireless home automation today needs to use the latest technology advances in order to be user friendly and powerful. There have been a lot of work done already in this area. In this project, current technology components will be used and home automation will be implemented using the communication technologies like GSM, Internet and speech recognition. The project will research and evaluate different user interface possibilities for home automation for mobile devices. The automation centers on using relatively cheap ZigBee wireless communication modules. The intended home automation system will control the lights and electrical appliances in home using voice commands, GSM messaging and web portal.

KEYWORDS: Home Automation, Zigbee, Voice Recognition, GSM, Web Portal

INTRODUCTION

The ability to be able to control every appliance in your home in much the same way--not just from one location but from every room in house and even remotely is the promise of home decades. Now-a-days, a house hold has a reach to broadband Internet access, home networks, and more sophisticated computer and consumer electronics products. The digitization of entertainment is sparking new interest in ways to tie together all of the systems within your home and make life more convenient and enjoyable. Also, there is a need to provide supporting systems to elderly and disabled. Conservative home automation solutions are mostly based on power line or wired communication technologies [1]. These are complex, expensive, inflexible, and involved with time-consuming installations [2]. Wireless home automation concept has been incorporated immensely to the new home and renovation projects due to the better improvements it provides in many domestic applications [2].

The home automation needs to make use of latest technological advancements. The project aims to design and develop a home automation system which is wireless and can be controlled in multiple ways to give more accessibility and control over the system. The purpose is to develop and design an automation system which is accessible remotely at the same time locally in a user friendly way. Yet cost effective, robust, portable and easily operable so that it could be widely accepted for multiple needs. A single monitoring and control system will be developed which could be used, consumed by multiple user interfaces providing accessibility and control to the user. The objective of the proposed method is to use current technology components and implement it with communication technologies like GSM, Internet and speech recognition and to research and evaluate different user interface possibilities to provide more accessibility and control on home automation. Wireless communication in home automation is centered on low-power RF Zigbee wireless

communication modules. Voice commands, GSM messaging and web portal are to be used to control the automation of household electrical appliances.

LITERATURE REVIEW

Home automation industry is growing rapidly [1]. There is a need to design a user friendly system which will be utilizing the latest technologies for home automation. The home automation has been done using various technologies. The home automation can be implemented using latest wireless technologies. The technologies include usage of low power, low cost Zigbee modules. The home automation has been implemented using voice commands. The voice commands are used to control all the electric appliances in household or office environment [1].

In the proposed work, the same technology i.e. voice commands will be used for home automation along with two more technologies. Introduction of Wireless Home Automation (WHA) has proved to be a positive inspiration for the new home and renovation projects, as it increases the quality of life and comfort of the inhabitants and also facilitates energy conservation and environmental sustainability. The evaluation of emerging wireless technologies and their suitability for smart home networks has been studied [2].

It basically states the various applications of home automation and evaluates wireless technologies on various parameters like power consumption, communication range, security etc. In the proposed work, application of home automation i.e. light control and parameters like security etc. will be studied. Wireless home automation networks include wireless embedded sensors and actuators that enable monitoring and control applications for user comfort and efficient home management. Various use cases of wireless home automation and various architectures or technologies related to home automation which includes Zigbee, Z-wave, Wavenis etc. were studied [3]. In the proposed work, latest technology i.e. Zigbee will be used for wireless communication.

Wireless smart home system only can cover up to a certain range of area that is limited by the range of wireless module. Usage of multi-hop communication for home automation provides unlimited range of communication for the system as long as there are intermediate nodes that will pass the data from one node to another until it reaches the destination [4].

In the proposed work, since the required range is limited, not exact use of multi-hop communication but use of similar wireless communication using Zigbee will be done. Fault identification system was designed to help the user to ensure that their home appliances had gone exactly ON or OFF or undergone FAULT by getting the status from load end, unlike the other design that gets the status at user end which may give a false indication, when power supply is not available for the particular load or when load get open circuited (due to wire discontinuity or open fuse condition) [5].

The system was particularly designed for physically disabled people. The system provides authentication using RF ID and has a special feature of fault identification for particular appliance. In the proposed work, similar type of authentication will be provided to the user for the purpose of security.

RESEARCH METHODOLOGY

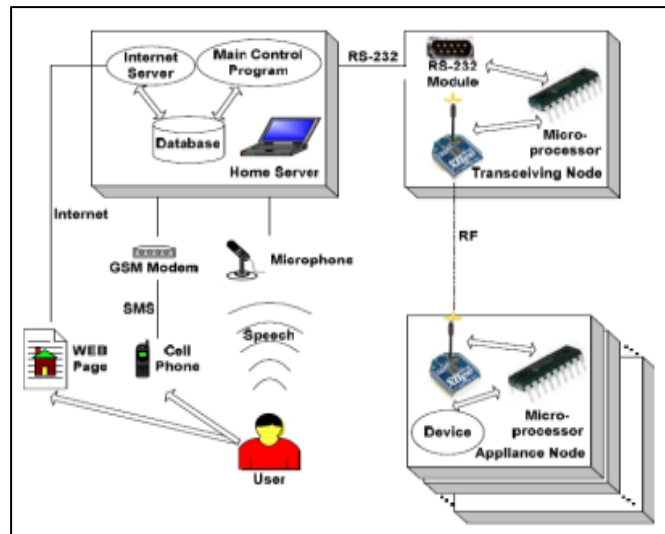


Figure 1: Block Diagram of the Proposed System

Above diagram shows that a user will be able to send voice commands, SMS and web request to home automation setup. The request will be received by host pc the main control program will process these commands and send further to Trans-receiving node having a microprocessor which will process the data obtained from host pc serially and transmit the signal using Zigbee transmitter. It is further received by appliance or device node using Zigbee receiver. The relay circuit on the device node will change the status of the device accordingly. The changed status will be sent back via the Zigbee transmitter of appliance node to the Zigbee receiver of trans-receiver node and will be recorded by the host pc. The changed status will be made available to the user via any of the three interfaces.

The implementation will be based on following algorithms and programs:

- SMS Read Algorithm
- SMS Extract Algorithm
- Control signal program
- Speech recognition program

Control signal program will be developed to send a commands to a microcontroller with an address byte and command byte information. This command is further transmitted over the Zigbee protocol to another Zigbee trans-receiver and passed to the relay driving circuit connected to the relays attached to the electric appliances.

GSM: The SMS Read and extract algorithms will be developed on top of the Control signal program so that the GSM text commands are mapped to control signal program via GSM modem.

Speech Recognition: A speech recognition program will be developed to process voice commands with the help of Microsoft Speech SDK. This program will then send commands to Control signal program.

Web Pages: Web pages giving graphical user interface of electrical devices will be developed using ASP.Net and C# on.Net framework. These pages will also then send commands to Control signal program to carry out operations further down the pipeline.

The device statuses, GSM command and voice commands will be persisted using a database.

CONCLUSIONS

The project intends to research on wireless home automation topic with Zigbee protocol implementation and multiple user interfaces to signal and control the automated devices. The home automation here will be implemented using voice recognition, also using GSM and web pages i.e. the internet. The expected outcome will be the low power, low cost and powerful wireless home automation system.

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