Global Voice Controlled Home Appliances and Security

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ABSTRACT

This project presents the general design of cost effective Home Automation and Security system with wireless remote access. Designing a product using mobile technology are going to be beneficial to our community. This method is meant to fulfil the wants of elderly and disabled people in home. By using one among the emerging operating systems "android", we synchronize the house appliance status to our smart phone through Bluetooth and internet. The Bluetooth technology provides the access to main electrical device within the front room and internet won't to update and access the house appliances status to central database. Through voice commands, this technique fits to the blind people comfortably. This project provides safety features which have user authentication, door security and fire indication. Only authorized users are allowed to access the appliances reception.

I. INTRODUCTION

The popularity of home automation has been increasing greatly in recent years thanks to higher affordability and ease. People intended to install HAS in their home at the time of construction itself. At the identical time safety & security is an important criteria to be considered during this modern times. Most of the people dreamt to possess a wise home but the value of the system could be a huge obstacle. Even having advancements in HAS, blind people suffers thanks to lack of interaction with the system. For the developing countries like India, people like prefer to buy cheap and best products within the market often. Due to the advancement of wireless technology, there are several different of connections are introduced such as GSM, WIFI, ZIGBEE, and Bluetooth. Each of the connection has their own unique specifications

and applications. Among the four popular wireless connection that often implemented in HAS projected, Bluetooth is being chosen with its suitable capability. Bluetooth with globally available frequencies of 2400Hz is able to provide connectivity upto 100 meters at speed of up to 3Mbps depending on the Bluetooth device class [1]. In addition, a Bluetooth master devices able to connect up to 7 devices in a "Pico net" [2]

Based on the study of HAS project done by researchers and developers, [4] implemented Micro controller in wireless HAS for wireless connection; the system implemented a FM transmitter and receiver to establish a RF connection. The simplex connection between control board and controller limited that only one type of input (voice) to the system.[5] Implemented GSM, Internet and voice as wireless HAS. The system implemented

microprocessor and GSMSMS control method by a GSM modem. The system [5] mentioned as low cost but the cost of GSM modem and micro controller is not considered. Also, long term cost by the GSM is not fully accepted by every user. Not considered. Also, long term cost by the GSM is not fully accepted by every user. Project [3], [6-10] are Bluetooth based HAS design architecture. Where reference [6-8] proposed a Bluetooth based HAS that controls home appliances by a PC's GUI, but it does not provide portable remote function. For system [6-8], all the controls are performed only at the GUI on PC. [3], [9-10] are designed with cellular phone remote control to the system. Reference [3] implemented Arduino Bluetooth board in their HAS project with cell phone remote control. The project stated as low cost HAS system but the cost of Arduino BT board is not the best cost efficient solution. Moreover, the cellular phone control is implemented by Symbian OS application. It does limit the users of the system as the Symbian based cell phones in market nowadays are very less. While reference [9] did not mentioned the specific type of phone's OS implemented for their phone application. Meanwhile reference [10] mentioned the phone controls designed in JAVA application but it also did not mention the specific phone's OS for the application

From the overall papers reviews, HAS according to [3-9] never mentioned about the existing physical electrical switches in their system. Without the switches on the wall, the designed system limited the control only at the GUI. This issue brings inconvenient to the people in the house. In reference [10] never mentioned about the synchronized status of the low voltage activating switches. They used Bluetooth for communication. This makes a difficulty of accessing home appliances from outside the house. Internet is the only feasible solution for global accessing of home appliances. Internet is achieved through Laptop/PC. Internet usage is increasing drastically. Reference [10] uses Android application as an interface, this suffers the non-android mobile users

a plenty. By considering the flexibleness the websites are used for accessing. Voice UI is additionally added in android application for comfort accessing.

In term of cost, this system implemented low cost micro controller and Bluetooth module as the system main core. The total cost of one unit of this system hardware is estimated less than 3000 INR. With this low budget, this system is still performed with powerful remote functions to make our life in home become easier.

II. SYSTEM OVERVIEW

Fig.1 illustrates the overall flow of our system. In order improve the standard living in home, this system provides three different types of control methods to the Main Control panel

[1]. Basic physical switches as Low Voltage Activating Switches,

[2]. Modern Android smart phones Voice and GUI controls.

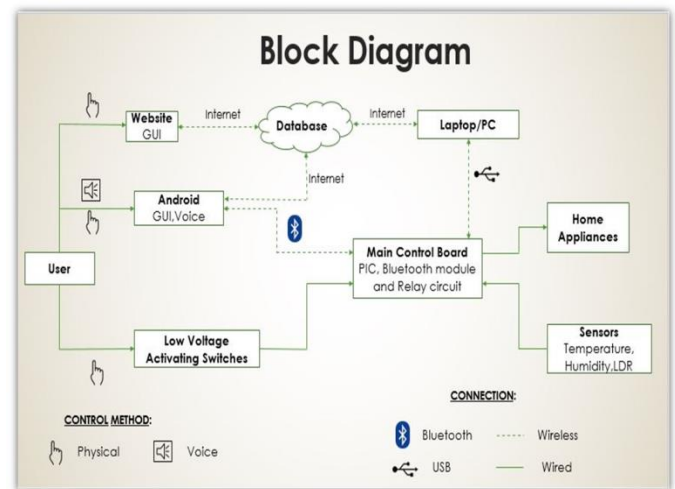[3]. Specially designed access via Website.
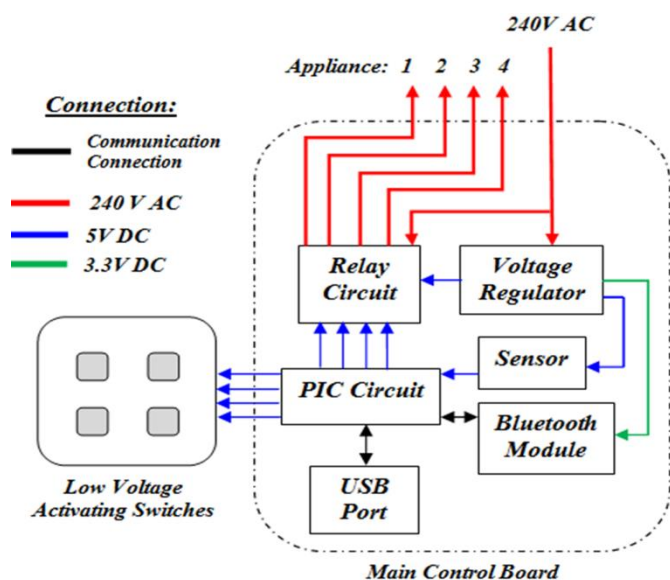

Fig. 1 Block Diagram.

Fig2. Main Control Board Hardware Block Diagram

Enhancing the possibilities to manage the appliances. The Main panel access the net (Online database Status) using the PC/Laptop. The PC/Laptop connected with Main electrical device through RS232 cable.

A Bluetooth module (HC-05) is included within the main control panel. The Bluetooth communication is a straightforward way of access and also to cut back the information usage while we are inside the house. The sensors are used for the safety measures within the home. This technique includes temperature and humidity sensor for calculating the space temperature and also to detect the hearth accident inside the house.

III. HARDWARE DESIGN

This section mainly discuss about the hardware construction of main control board. The Following fig.2 demonstrates the hardware block diagram in the main control board. PIC Microcontroller, PIC16F877A is chosen due to its capability to perform the both serial and USB features to establish the Bluetooth and USB connection to the GUIs. Forth sensor, HSM-20G Sensor Module is chosen because it is the low cost2- in-1combination of humidity and temperature modules. For the Bluetooth module, low cost HC-05Bluetoothmoduleischosentoestablish the Bluetooth connection between main control board

and Android UIs. And therefore the LDR is chosen mainly for Door Security purpose.

The electrical current is directly connect to the main control board whereby it separates the regulator and relay circuit. The relay circuit is connected with the appliances to regulate by physical switches.5Vand3.3VDC output is regulated in order to fulfil the voltage needs of the specific components in the main control board. Moreover, the low voltage activating switches will replace the existing switches. This system is designed to install parallel with the electrical switches on the wall. The installation of this system eliminates the complex wiring reinstallation and overhead wiring on the wall.

The existing switch connection is connected and controlled by the relay circuit inside main control board. For each room we'd like a separate controller board in home. Laptop acts as a medium between the net database and Main control boards. With these simple and low cost components, the main control board is constructed in pretty small size but still performs the strong functions and features of the system. By using low cost equipment's makes the merchandise cost efficiency and available for everybody
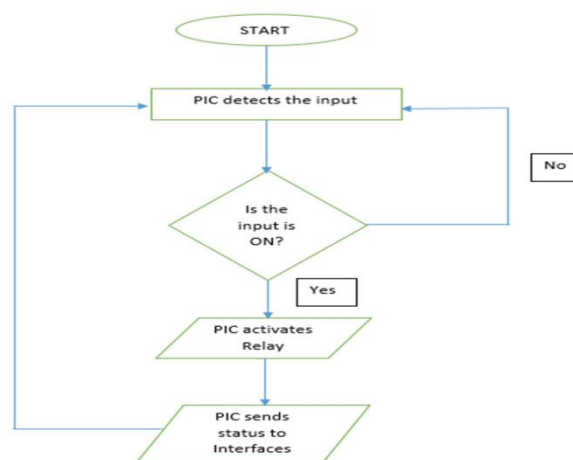
IV. SOFTWARE DESIGN:

Fig3. Working Process

Software design section includes the main functions of the system designed in the PIC micro controller and the two GUIs (Window and Android application).Fig3illustratestheprocessof the Low Activating Switches in the system. The switches detection function is performed by the microcontroller, PIC. The activating switches are designed by push buttons. Any input switch is pressed; it will interrupt the main function loop of the PIC. Then, the PIC will activate the relay and toggle the current appliance's switch status. At the moment, PIC also informs the change of switch status to all the GUIs that connected to the mainboard.

Android application is meant by two interactive user interfaces. During this system Voice UI and Graphics UI is implemented. In voice computer program, users have an interaction with android application by means of voice. Authentication, control and retrieval of status of is achieved through voice. It's designed with Text To Speech and Speech to Text API in android. Android provides the voice recognition service to finish users in keeping with place where they belong to. So there is no problem just in case of pronunciation which differs according to places. Additionally, it supports native languages like Hindi (India) etc. Basically VUI is meant especially for blind peoples.
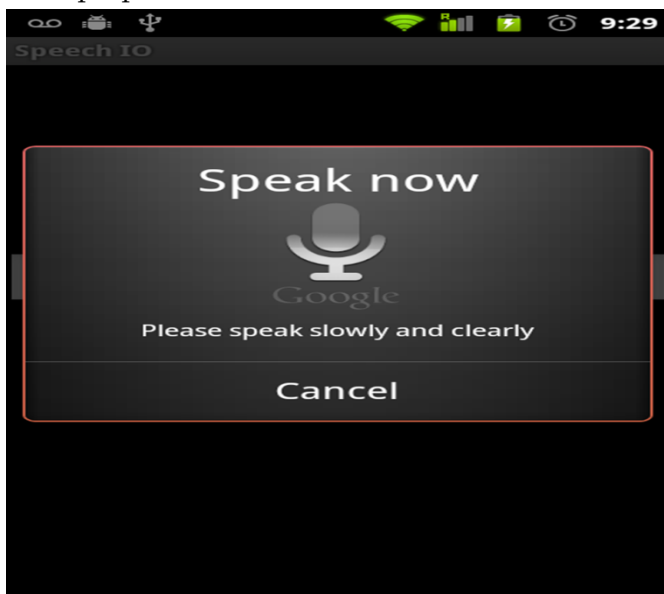

Fig4. SpeechToText

There is another choice in android application i.e. GUI. It's very useful to illiterate and dumb peoples. We often interactive graphical computer programme which incorporates all the status of appliances, current temperature of the space and also the toggle buttons to manage the applications.

For non-android users and low end devices, we implement website which is an interface to regulate and access the house appliances. We offer user authentication in website to present security to the user. So user can access the system through browser from anywhere.

In side end, we are using MySQL database in cloud. This database acts as a medium between all interfaces and PIC microcontroller. Laptop/PC is a medium for microcontroller. This database comprises User table and Appliances table for each user.
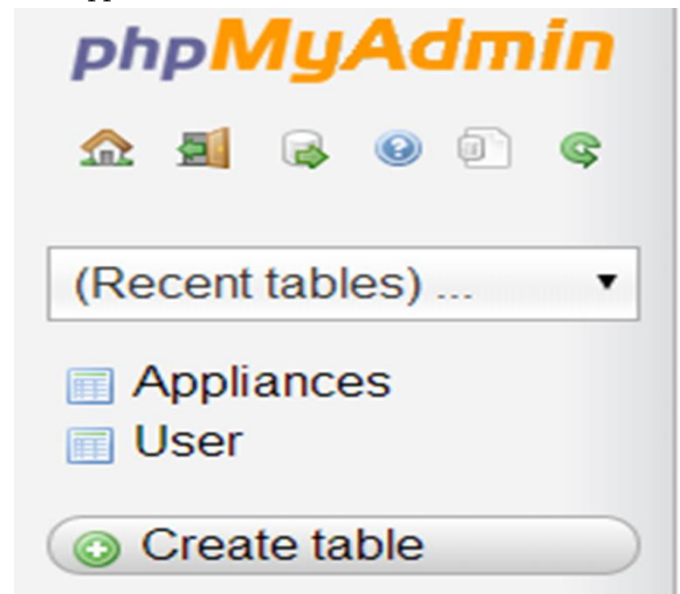

Fig5. PhpMyAdmin for MySQL Database

V. CONCLUSION

In conclusion, this low cost system is designed to improve the standard living in home with security. The remote control function by smart phone provides help and assistance especially to disabled and elderly. In order to provide safety protection to the user, allow voltage activating switches is replaced current electrical switches. Moreover, implementation of

wireless Bluetooth connection in control board allows the system install in more simple way. The control board is directly installed beside the electrical switches where by the switching connection is controlled by relay.

Because of using online database through internet. The status of the appliances also can also be examined at anywhere, anytime we want to understand. The system is designed in user-friendly interface. The easy to use interface Android GUI and voice command provides simple control by the elderly and disabled people. Voice interface could be a huge contribution mainly to blind peoples. Website provides a ways of access for lower end mobile users.

All the future work is expected without spend extra cost, even one cent from the present system. By using low cost equipment's makes the merchandise cost efficiency and available for everybody

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