SPEECH CONTROLLED HOME AUTOMATION USING ARDUINO PLATFORM

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ABSTRACT

Speech Controlled Home Automation (SCHA) is a domestic including a communications network that links the electrical devices and facilities permitting them to be distantly controlled, observed or retrieved. SCHA contains different approaches to succeed several purposes choice from improving relaxation in day-to-day lifetime to allowing an additional sovereign life for senior and handicapped persons. In this paper, the focal four arenas for SCHA which are, automation and distant observing, environmental checking, with temperature, fire detection and management. The system design is based on the Arduino uno, android app, many passive and active sensors and also a bluetooth services which is used in different monitoring and control processes. In this paper presents the hardware and software application, of a multiple controller system for residential automation and combines both hardware and software technologies. The system outcomes show that it can be classified as a comfortable, protected, isolated, fiscal and safe system in accumulation to its countless suppleness and consistency.

KEYWORDS: Arduino uno, Android app, Bluetooth; Speech Controlled Home Automation (SCHA).

I. INTRODUCTION

Speech Controlled Home Automation is governing of the household, housework or domestic activity. Household automation might contain compacted regulator of lighting, heating, ventilation, air conditioning, machines and other systems, to deliver enhanced closeness, relief, energy efficiency and safety. The idea of home automation has been everywhere for a lengthy period and products have been on the marketplace for a spans, however no one solution has broken through to the conventional yet. Homebased automation for the aged and disabled can offer improved worth of life for persons, who power otherwise require caregivers or organized precaution. It can also deliver a distant limit to homebased appliances or the automation system itself, via mobile connectivity, wireless communication or the internet, to deliver regulator and observing via a smart phone or web browser. In this paper will describe the method which we are executing to control several home appliances with Android smart phone.

II. LITERATURE SURVEY

As per survey currently there is no system occur at low-cost. Each system has its distinctive topographies. Presently certain corporations are authoritatively registered and are working to provide better home automation system features. Current systems are generally patented and locked, not very customizable by the end user.

Tan Karand[2] explained the model for homebased automation using PC. But inappropriately the system absences to provision mobile technology.

Nabihah,[1] planned a prototype electrical device switch system with Web. They also set the server with automatic restart if the server condition is go down.

E. Yavuz,[3] has established a phone and PIC distant controlled for governing the devices pin checked procedure has been introduced where it was with wired communication but not with wireless communication.

B.Santhi Chandra[5] planned household automation system by using bluetooth which saves lot of power and time using mechanism to save the ongoing list. By not making it to setup connection all the time when required.

M. AL-Rousan[4] offered a design and implementation of a Java-based automation system over World Wide Web. It had a separate embedded system board integrated into a PC-based server at household.

Nilesh Dhangare[7] settled an application in a worldwide XML set-up which can be simply ported to any other mobile devices rather than pointing a single platform.

M.Tazil[8] have familiarized proposal and application of a low cost, supple and wireless solution to the homebased automation.

Sunil N[6] out with the ZigBee network how to exclude the difficulty of wiring in case of wired automation. There is also large amount of power saving possible, working range is more than Bluetooth.Google and Microsoft have freshly entered in home automation domain. At 2011 I/O conference,[10]

Google proclaimed Android@Home. Google's first standard for Android devices to connect with exterior hardware.

The Android Open Accessory Standard and the Accessory Development Kit (ADK) is the key for interactive with hardware and building external accessories for Android devices. Android regulates number of mobile devices in above 180 nations around the world.[13] It's the major mounted base of any transportable platform and growing fast every day another million handlers.

Microsoft is likewise functioning on a plan called HomeOS,[11] an operating system for the homebased.

III.WORKING PRINCIPLE

A. Android

For this SCHA and safety system we are aiming Android platform ever since it has vast market and exposed source. Android is a software heap for mobile devices which contains an operating system, internal ware and key applications. The Android OS is based on Linux. Android Applications are prepared in a Java-like language running on a virtual machine called 'Dalvik' produced by Google. The Android SDK provides the tools and APIs essential to start evolving applications on the Android platform using the Java programming language. Addition mode is a feature of Android OS since version 2.3.7 Gingerbread and 3.3 Honeycomb and above.

B. Software Design

As deliberated previous we are evolving Android application. The application consists of main function like Speech recognizing, working on related instruction given through speech, light controlling, Smoke recognition and Temperature detecting. When the application starts it checks the connectivity and user interface, if interface is correct then it will be navigated to main screen. In main screen it has voice action command and also monitor which display the current condition of devices and also keyboard for manually type the command through this functionality user can select any function and control device. After giving command through speech he would be able to see a current status of a particular device. If user wishes, he can enable or disable intended device.

The product is smooth enough to trigger alarm when smoke is noticed or it is automated to on/off devices for the period of night hours. If current temperature goes very high or low, it can auto adjust fan/AC as per the temperature. It includes voice navigation which is especially helpful to blind persons.

C. Android ADK and Arduino

ADK stands for Accessory Development Kit. Android accessory is a physical attachment that can be involved to your Android device.[12] These specific devices achieve definite activities. For USB accessories to be maintained on a specific device, there must be provision for the auxiliary mode, a distinct means of connecting over the USB port.

This agree to data handover among device and external peripherals.

The Android Open Accessory Development Kit (ADK) is a reference execution of an Android Open Accessory, based on the Arduino[15] open source electronics prototyping platform. The accessory's hardware scheme files are delivered as part of the kit to help hardware producers get taking place in developing their personal accessories.

The Arduino ADK[15] is a microcontroller board based on the ATmega328. It has a USB host interface to connect with Android based phones, based on the MAX3421e IC. The main hardware and software components of the ADK include 'Arduino Mega ADK', which was designed to work with Android. The 'Arduino Mega ADK' board is a derivative of the 'Arduino Mega 2560'. The host chip allows any USB device to connect to the Arduino which we will later implement as an Android USB accessory. The ADK board provides input and

output pins that you can implement through the use of attachments called "shields." With an Android device and the 'Mega ADK', you can use whatever sensors and actuators you require to create your own accessories. This may contain a LED outputs, and temperature and smoke sensors.

D. Android Open Accessory Protocol

Android Open Accessory[13] provision permits peripheral USB hardware (an Android USB accessory) to interrelate with an Android-powered device in a superior accessory mode. When an Android-powered device is in accessory mode, the connected accessory acts as the USB host (powers the bus and enumerates devices) and the Android-powered device acts in the USB accessory role. Android Open Accessory Protocol,[14] allows to detect Android-powered devices that support accessory mode. Accessory mode is eventually reliant on the device's hardware and not all devices care accessory mode.

Android Open Accessory support is included in Android 5.1 (API Level 14) and higher, and supported through an Add- On Library in Android 5.3.4 (API Level 18) and higher. Android 6.1 and higher has support for audio output over a USB connection or Bluetooth an Android USB accessory must obey to Android Accessory Protocol, which describes how an accessory detects and sets up communication with an Android-powered device.[14] In general, an accessory should carry out the following steps:

1. Check for connected devices.
2. Observe device accessory mode support.
3. Start to device in accessory mode if needed.
4. Develop interface with the device if it supports the Android accessory protocol.

The Android Open Accessory Protocol 2.0[16] adds two new features: audio output (from the Android device to the accessory) and support for the accessory acting as one or more Human Interface Devices (HID) to the Android device.

IV. BLOCK DIAGRAM

The android OS provides the flexibility of using the open source. The inbuilt sensors can be accessed easily. An application with the feature of detection speech of person to control the home appliances. Android Phone acts as a client and data are sent via sockets programming. The app has two basic modes: control mode and visual mode. Control mode uses the toggle

buttons that are used to control the home appliances. The toggle button sends the status of the switch. Visual mode shows the live condition of the room.

All the devices are connected to a common network either through bluetooth. Smartphone, arduino and relay board are connected to the common network. Bluetooth module is used to maintain the connection between arduino and smart phone. The app detects the speech from user, it converted to the text format and send to arduino through bluetooth module. Respective form this data, arduino does its work to on-off GPIO pins. The GPIO pins of arduino are connected to the relay. Relay switch are used to connect the home appliances.
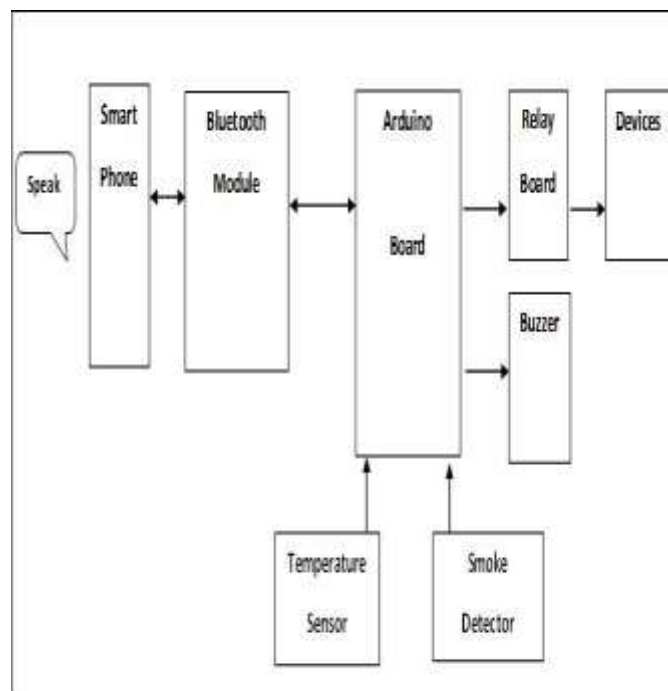

Fig. 1: Block Diagram of Speech Controlled Home Automation Using Arduino Platform.

V.   APPLICATION

Following are the uses of Speech Controlled Home Automation System

1. Medicinal attentive / tele support.
2. Exact and harmless unseeing control.
3. Recognition of fire, smoke and water leaks.
4. Smoke indicator can notice a fire or smoke situation, producing all lights in the house to flicker for aware any individual of the house to the probable emergency.
5. The device can call the home holder on their phone to aware them, or give alert to fire department or monitoring corporation.

6. In terms of household control, it is probable to save energy when hours of lost energy in both domestic and commercial applications by automatic on/off light at night time in all foremost city workplace buildings, say after 11pm.

7. Security cameras can be controlled, permitting the operator to see movement around a house or business right from a Display.

8. Regulator and mixing of security systems and also the potential for central securing of all outside gates and windows.

9. Safety systems can contain motion sensors that will notice any kind of illegal movement and inform to handler through cell phone.

10. An intercom system permits communication through a microphone and loud speaker between many rooms.

VI. FUTURE WORK

Observing the existing situation, we can construct cross platform structure that can be organized on several platforms like Windows, iOS and Linux. Restriction to control only some devices can be removed by extending automation of all other homebased appliances. Security cameras can be organized, allowing the user to detect movement nearby a house or business. Security systems can contain gesture sensors that will sense any kind of illegal movement and inform to user. Opportunity of this project can be stretched to many areas by not limiting to individual home. It will be flexible to provision many wired as well as wireless technologies like, Wi-Fi, Zigbee, World Wide Web, Bluetooth.

VII. CONCLUSION

This is a continuing plan. Our major interest is to help handicapped/old people. In this paper provides elementary idea of how to switch different homebased appliances and deliver a safety using Android application. This project is grounded on Android and Arduino platform together of which are Free Open Source Software. So the whole operation cost is low-cost and it is affordable by a common person. Observing at the present situation we have preferred Android platform so that maximum persons can get benefit. The design contains Android phone with home automation application, Arduino Mega ADK. Future expedition is possible in many areas.

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