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Android Based Home Automation System

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Abstract— **This project has been undertaken with the aim to address various issues regarding electric load handling. It involves the use of an android device which is responsible for providing functionality to homes and offices by optimizing the switching operations of various applications. A Bluetooth receiver is interfaced with microcontroller in order to accept the commands and then it reacts accordingly. This paper also deals with controlling various domestic applications and in industrial setups.**

Keywords – Android Smart Phones, Bluetooth Module, Operating System, Electrical Appliances

INTRODUCTION

In the present scenario the majority of switching operations are manual and do not imbibe the idea of IOT and the interconnection of various applications to help optimize operation. These days there is a clear divide between electrical and software systems, and this leads to inefficient and often incompatible processes. To solve this dearth in integration of a variety of applications, this project of Home Automation aims to use a modem that brings all switches and control to the user in one place.

LITERATURE SURVEY

[1] Amul Jadhav developed an application in a universal XML format which can be easily ported to any other mobile devices rather than targeting a single platform.

[2] Shiv Kumar designed a prototype in which the master controller of smart-home system supports both Bluetooth and Internet connectivity.

[3] Er. Vikram Puri has proposed a working protocol of PIC Technology utilizing PIC 16F877A microcontroller. Also their wireless communication ranges from 10m – 30m.

[4] Prof.H.B.Shinde, Abhay Chaudhari, Prafull Chaure, Mayur Chandgude, Pratik Waghmare designed a model using Arduino Atmega328 controller and ESP8266 Wi-Fi module for wireless communication.

[5] Alper Gurek, Caner Gur, Cagri Gurakin, Mustafa Akdeniz, designed an Android based home automation system that allows multiple users to control the appliances by an Android application or through a web site.

[6] Mohd Nor Azni designed a home automation system in which web interface has framework known as Restful Api and function as to control Raspberry Pi using an http request. Besides that, Android apps will exploit the services provided by Restful Api for controlling gpio of Raspberry Pi.

[7] 1P.Siva Nagendra Reddy, 2K.Tharun Kumar Reddy the main feature of their system is to cont the voltage levels of home appliance in home like speed of fan based on temperature, intensity of light based on light intensity etc. and another feature is we may get the status of our home appliances from our android mobile phone.

OVERALL SCHEMATIC

As far as automation goes, ergonomics is the essence of all function. Therefore in our project we implement the usage of a modem that follows such a philosophy.

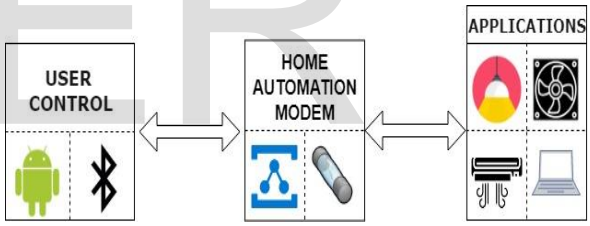

Figure 1: Overall Block Diagram

The above diagram shows the overall schematic flow that illustrates user control, the modem's functions and the end applications to be operated. First we see that the user operates an android based smartphone on which an application geared towards automated control is installed. This Android application includes support for the Bluetooth network stack through which it allows data transfer and control of another Bluetooth device and its parameters.

Then we see the heart of the project, the Automation Modem wherein a combination of a microcontroller, fuse and a relay system form the processor that takes in input data such as Bluetooth packets and voice data and then sends it to a rely system that is responsible for interfacing with applications. This relay system uses a relay driver that drives four relays used to drive four external applications.

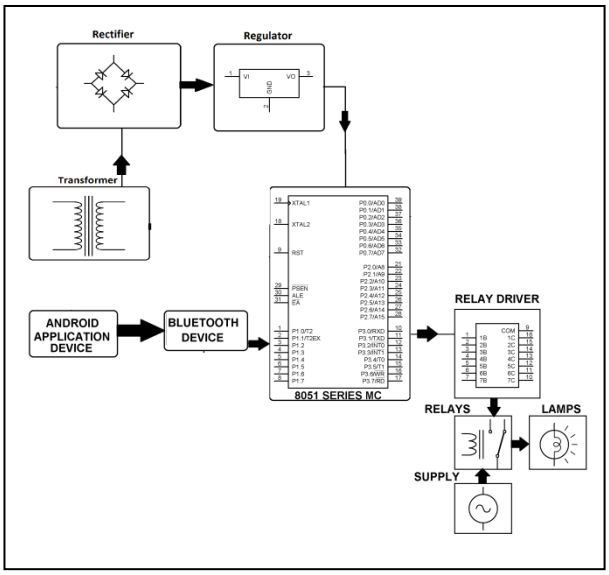

Figure 1: Circuit Diagram

ANDROID & BLUETOOTH FUNCTION

The first aspect of this project deals with granting the user external control with the aspect of an android application that uses Bluetooth capabilities to control a module which in turn helps relay relevant information to external applications.

Android's user interface is based on manipulation, using touch inputs that loosely correspond to real-world actions, like swiping, tapping, pinching and reverse pinching to manipulate on-screen objects.

Figure 3: Android Touch UI

The Android platform includes support for the Bluetooth network stack, which allows a device to wirelessly exchange data with other Bluetooth devices. The application framework provides access to the Bluetooth functionality through the Android Bluetooth APIs. Using these functionalities we can scan for other Bluetooth devices, Establish RFCOMM channels and transfer data to and from other devices. To find other devices we use two methods namely, through device discovery or by posing a query to the already paired devices. When you have successfully connected two (or more) devices, each one will have a connected Bluetooth Socket.

As shown in the figure, an android based application has channeled communication through the wireless medium of Bluetooth.

MODEM

We begin with what this module is comprised of: We have a 5 switch circuit relay board, along with an AT89S52/8051 microcontroller responsible for processing, Bluetooth module HC-05 as well as a fuse that poses as a preventative measure. (Elecrow)

Figure 4: Applications using Modem [11]

An 8051 microcontroller is used in this system. The Bluetooth receiver is interfaced with microcontroller in order to accept the commands and then react accordingly. It operates the loads through a set of relays using a relay driver IC. Relays are used between loads and the control unit.

The power supply setup of the system contains a step down transformer of 230/12V, used to step down the voltage to 12VAC. To convert it to DC, a bridge rectifier is used. In order to remove the ripples, a capacitive filter is used and it makes use of 7805 voltage regulator to regulate it to +5V that will be needed for microcontroller and other components operation.

BLUETOOTH MODULE

The Bluetooth module HC-05 is a MASTER/SLAVE module. Of course the manufacturing plant setting is SLAVE. The Role of the module (Master or Slave) can be arranged just by AT COMMANDS. The slave modules can't start an association with another Bluetooth gadget, yet can acknowledge associations. The Master module can start an association with different gadgets. The client can utilize it just for a serial port substitution to build up association amongst MCU and GPS, PC to your implanted venture, and so forth.

RELAY

A relay is an electrically worked switch. Current moving through the curl of the relay makes an attractive field which pulls in a lever and changes the switch contacts. The curl current can be on or off so transfers have two switch positions and most have two-fold toss (changeover) switch contacts. They enable one circuit to switch a moment circuit which can be totally separate from the first. For instance a low voltage battery circuit can utilize a relay to switch a 230V AC mains circuit. There is no electrical association inside the hand-off between the two circuits; the connection is attractive and mechanical.

RELAY DRIVER ULN2003

ULN2003 is an IC which is utilized to interface the microcontroller with the relay since the yield of the smaller scale controller is 5V high with too minimal current conveyance and isn't practicable to work a really with that voltage. ULN2003 is a relay driver IC comprising of an arrangement of Darlington transistors. On the off chance that rationale high is given to the IC as info then its yield will be rationale low however not the other way around. Here in ULN2003 pins 1 to 7 are IC sources of info and 10 to 16 are IC yields. On the off chance that rationale 1 is given to its pin no. 1 the relating pin 16 goes low. On the off chance that a transfer loop is associated from +ve to the yield stick of the uln2003 (the hand-off driver) at that point the hand-off contacts change their situation from ordinarily open to close the circuit as appeared underneath for the heap on (say a light to begin shining). In the event that rationale 0 is given at the info the hand-off switches off. Correspondingly up to seven transfers can be utilized for seven distinct burdens to be exchanged on by the typically open (NO) contact or turned off by the ordinarily shut contact (NC).

SOFTWARE REQUIREMENTS

Keil an ARM Company makes C compilers, large scale constructing agents, ongoing parts, debuggers, test systems, incorporated situations, assessment sheets, and emulators for ARM7/ARM9/Cortex-M3, XC16x/C16x/ST10, 251, and 8051 MCU families. Keil improvement instruments for the 8051 Microcontroller Architecture bolster each level of programming designer from the expert applications specialist to the understudy simply finding out about installed programming advancement. When beginning another venture, just select the microcontroller you use from the Device Database and the µVision IDE sets all compilers, constructing agent, linker, and memory choices for you. Keil is a cross compiler.

Compilers are programs used to change over a High Level Language to object code. Work area compilers create a yield question code for the fundamental microchip, yet not for different chip, i.e., the projects written in one of the HLL like 'C' will order the code to keep running on the framework for a specific processor like x86 (hidden microchip in the PC). The compiler gets its name from the way it works, taking a gander at the whole bit of source code and gathering and revamping the instruction. A cross compiler is like a compiler but we compose a program for the objective processor (like 8051 and its subordinates) on the host processors (like PC of x86). It implies being in one condition you are composing a code for another condition is called cross advancement. Also, the compiler utilized for cross improvement is called cross compiler. So the meaning of cross compiler is a compiler that keeps running on one PC yet delivers object code for an alternate sort of PC.

IMPLEMENTATION

We have implemented a minimal effort and proficient shrewd home framework in our outline. This framework has two principle modules: the hardware interface module and the software communication module. At the core of this framework is the AT89s52 microcontroller which is additionally equipped for working as an interface for all the hardware modules. All communication and controls in this framework go through the microcontroller. The shrewd home framework offers changing functionalities to control lighting, fans/aeration and cooling systems, and other home machines associated with the transfer framework. All these can be controlled from the Android advanced mobile phone application.

Figure 5: Project Module

CONCLUSION

Smart Home Systems give interface between different kinds of home and electrical devices like bulbs, TVs, fans, curtains and so forth. This system gives control and convenience of the devices to the client according to client's requirements. Subsequent to breaking down other existing frameworks, we propose the novel system for better human association and for giving better usage of android and arduino. By utilizing home computerization framework we can oversee cost, adaptable and vitality proficient savvy homes.

The home computerization framework has been tentatively demonstrated to work palatably by associating test machines to it and the devices were effectively controlled from a remote cell phone. The Bluetooth customer was effectively tried on a huge number of various cell phones from various producers, accordingly demonstrating its versatility and wide similarity. This undertaking won't just give accommodation to the normal man yet will be a help for the elderly and debilitated.

FUTURE SCOPE

This project can be additionally created by coordinating it with the web to screen your home while sitting in a remote region. By doing this, one can watch out for his or her home through a web associated with the client's cell phone or PC. This won't just enhance the security of your home in this advanced world however will likewise aid preservation of vitality like in the event that you exited any home apparatus exchanged on by botch, at that point you can check the status of the machine on the graphical interface made on your versatile and can turn it off utilizing the web availability.

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