

Real Time Monitoring And Controlling System

¹Prof.R.A.Kadu, ²P.P.Dekhane, ³S.J.Dhamanwala, ⁴A.S.Awate

¹Professor, Department of E&TC, Pravara Rural Engineering College, Loni

^{2,3,4}UG Student, BE E&TC, Pravara Rural Engineering College, Loni

-----ABSTRACT-----

In recent years, the number of network enabled digital devices at homes, use of android smart phones and internet has been increasing fast. The owners have been requesting for monitoring and control of home appliances remotely, when the user is away from the place. In this paper, "Real time monitoring and controlling system" allows multiple users to control and monitor home appliances simply by an Android application installed on mobile phone. The system has four hardware components: ARM processor to transfer signals to home appliances, an android smart phone as a Web server to store records and support services to the other components, user's android mobile with running Android application and Bluetooth module to provide wireless remote access from smart phone to ARM controller. In the smart phone applications the user can see the real time status of home device's switch i.e. switch is on or off and select actions what should happen with devices in the home. Use of Android phone provides flexibility to the system. The system intended to control electrical and/or electronic appliances in house by multiple home users irrespective of their locations with relatively low cost design, user-friendly interface and ease of installation.

Keywords--*Real time monitoring and controlling system, Home appliances, Bluetooth, Android*

Date of Submission: 23 January 2015



Date of Accepted: 05 February 2015

I. INTRODUCTION

The real time monitoring and controlling system using android smart phone is based on the concept of home automation. Although home automation is not a new thing in 21st century but most advanced home automation systems in existence today allows us to control household appliances like light, fan, door etc. the android based real time monitoring and controlling system is developed to reduce human efforts and to control home appliances from anywhere.

The main objective is to help handicapped and old edged people and to monitor and control home appliances even if you are not present in the home. This system is energy efficient and time saving. We are using android smart phones at transmitter and receiver side because android mobile is a commonly used, cheap and easy to operate. Also android phone has built-in Bluetooth and GSM modules. Bluetooth provides wireless connectivity up to 100 meters at speed of up to 3Mbps. Because of features available in android smart phone the cost of system is reduced to great extent.

II. SYSTEM OVERVIEW

The design is based on a standalone microcontroller board and the home appliances are connected to the input/ output ports of this board via relays. The communication between the smart phone and the board is wireless at the receiver side. This system is designed to be low cost and scalable allowing variety of devices to be controlled with minimum changes to its core. Android smart phones are used at both transmitter and receiver side. Smart phone is connected to the ARM controller via Bluetooth module. This enables wireless system communication with graphical user interface (GUI) on smart phone. It will display the status of different home devices which we are going to monitor and control. These devices are controlled by ARM controller through relay driver circuit. User can switch on/off devices using android application on the smart phone. This phone will communicate with smart phone at receiver side through TCP/IP protocol. So the distance never matters here.

Fig 1 illustrates the functional block diagram of the system. According to block diagram, system comprises mainly three methods for monitoring and controlling.

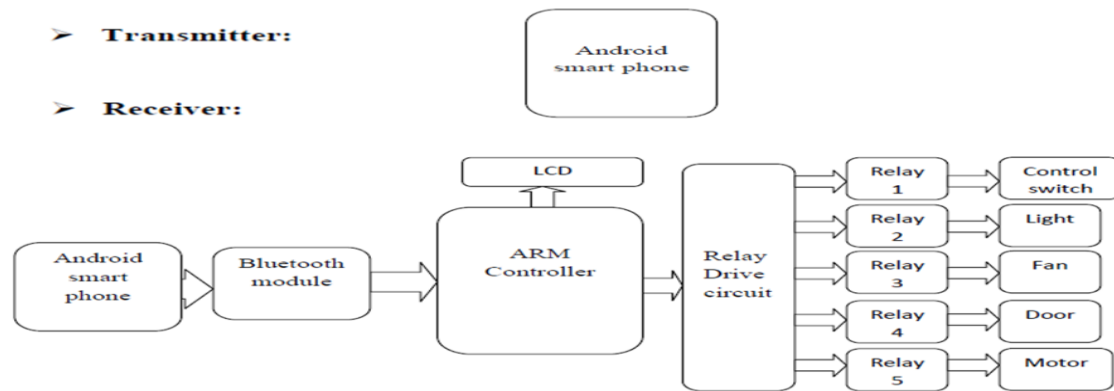


Fig1. Functional Block diagram of the System

The very first is android smart phone as a controller at user's side and another act as a server at home. Therefore, no need to stay at one place and ease of handling light weight phone instead of PC/Laptop. As Bluetooth is built-in adapter in most of cell phone, is used to connect directly the control board to server. The second comprises of android application installed in smart phone to provide GUI to users. The users can just touch the switch on the screen of the phone in application. As shown in Fig 2.



Fig2. GUI interface of application on Phone

The third consist of relay driver circuit to drive the home appliances. It is connected to main control board. So according to the command received particular appliances status will be changed. This wireless/ portable method is able to assist controlling of home appliances without a walk to switches on the wall. So safety of human is possible from electrical shock in case of wet hands.

III. HARDWARE DESIGN

As discussed in System Overview about idea of this paper, this part mainly describes about hardware layout. It is clarified in Fig 3 i.e. Connecting Diagram of all hardware components connected to ARM. LPC2138 Microcontroller, i.e. ARM7 is used due low power consumption and provides In-System and In-Application Programming. LCD (16x2 LCD display) is used to display the text messages during debugging mode. The relay interface circuit is used to connect the smart phone with the household electrical appliances. The circuit comprises of a relay (5v, 5A), a freewheeling diode, a transistor to drive the relay energizing input and connectors to interface parallel port. Relays are connected to the p0.10, p0.11, p0.12, p0.13, p1.23 and output side of the relay loads fan, bulb, pump, door, switch are connected. Switch is used as common controller for all loads. MAX232 is used for serial communication. It converts serial level to TTL level. Program is downloaded through UART0. For connection between ARM7 and smart phone, Bluetooth module HC-05 is chosen. Pin no. 4 of Bluetooth module is connected to the RXD1 of the controller and Pin no. 5 of Bluetooth module to that of TXD1 of controller. It provides auto-pairing and auto-reconnect in 30 minutes when disconnected (beyond the range of connection). The basic step in the designing of any system is to design the power supply required for that system. The steps involved in the designing of the power supply are as follows;

- 1) Determine the total current that the system sinks from the supply.
- 2) Determine the voltage rating required for the different components.

Power supply section consists of voltage regulator, transformer, bridge rectifier etc. Transformer selection is based on requirement of 12V to drive relay. 5V and 3.3V DC output is regulated to fulfill the voltage required

for specific components. Bridge rectifier is used to remove AC ripples. The hardware design of the system provides ease of installation eliminating wiring installation on wall.

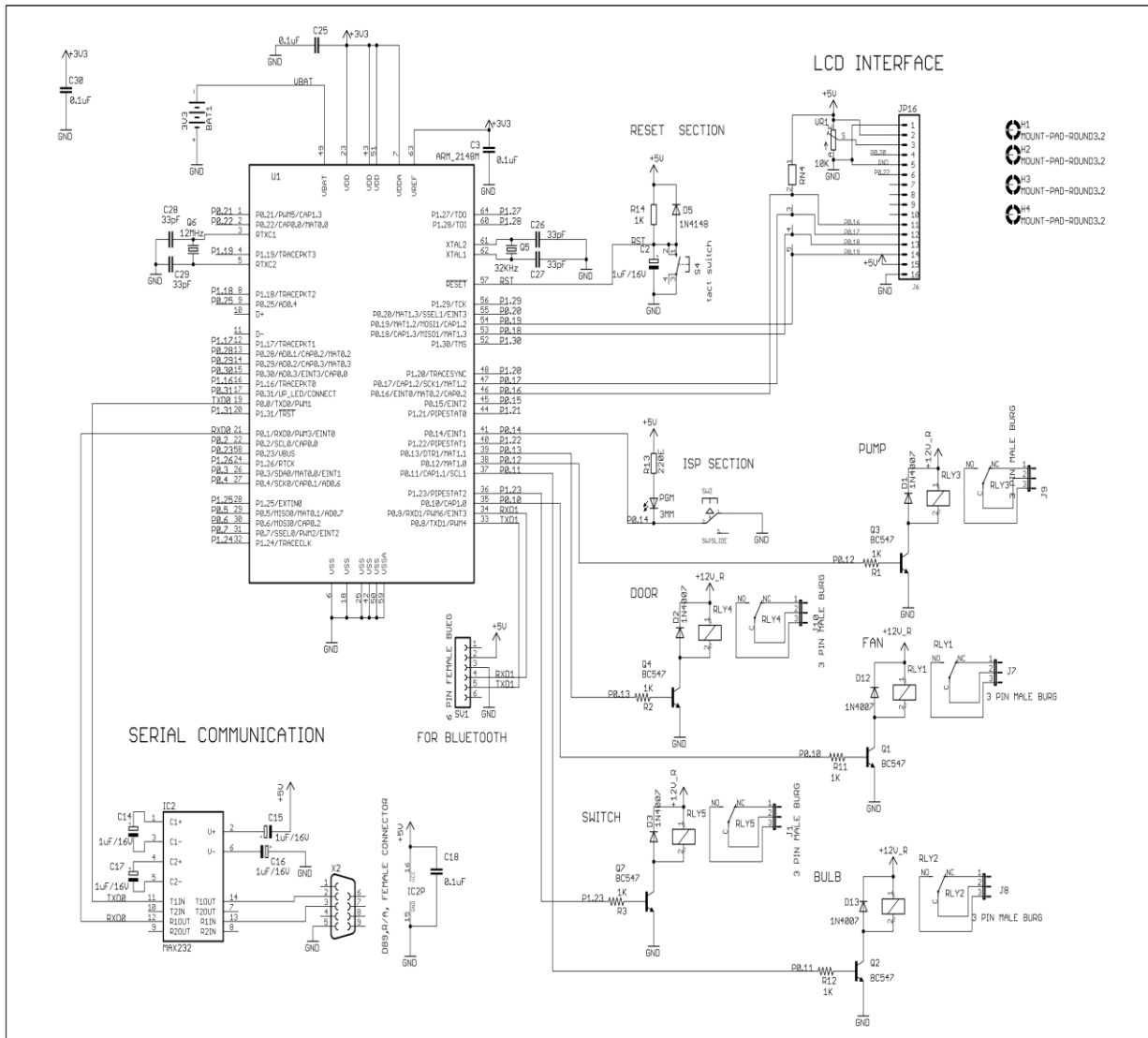


Fig3. Connecting Diagram

IV. SOFTWARE DESIGN

It includes functions and programming required to illustrates the process of “Real Time Monitoring and Controlling System”. Programming mainly includes designing of Android application. The application is mainly designed in Android version 2.2 with API level 8. The application is designed in low APL level so the devices with higher version are compatible with it. Its simple interface (as shown in Fig 4) provide user to simply touch on the icon to ON/OFF the appliances after connection to ARM.



Fig4. Smart Phone GUI

The application is supposed to work as a remote controller or a control panel interfaced with a server via Bluetooth. Application is as shown in Fig 5. Design provides user-friendly interface.

When we click on Connect button, connection is established between ARM and Smart Phone via Bluetooth. The status of appliances connected to ARM is displayed on GUI.

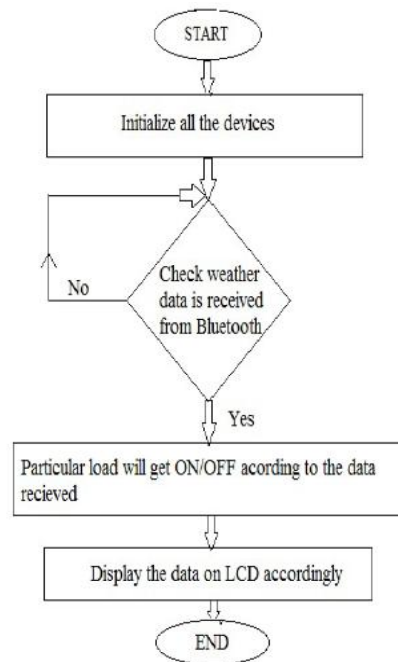


Fig5. Application Flowchart

V. CONCLUSION

All home appliances which are connected to ARM controller were successfully controlled from different wireless android mobile devices. Internet is compulsory required to establish communication between transmitting and receiving android phones. This project will provide convenience to the common working man by enabling them to monitor home appliances from anywhere. It will be a boon for the elderly and disabled. Thus by making the above changes we have reduced the cost and complexity of the whole system.

VI. ACKNOWLEDGEMENT

One of the rewards in doing project such that as it provides an opportunity for discussing and testing ideas with both colleagues and teachers. Every work is an outcome of group planning, continuous and organized efforts .and thanks directly and indirectly those involved in progression of project.

REFERENCES

- [1] Gowthami.T, Dr.Adilinemacriga.G: Smart Home Monitoring and Controlling System Using Android Phone, Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 3, Issue 11, November 2013)
- [2] R.A.Ramlee, M.H.Leong, R.S.S.Singh: Bluetooth Remote Home Automation System Using Android Application, The International Journal of Engineering And Science (IJES) ||Volume|| 2 ||Issue|| 01 ||Pages|| 149-153 ||2013||
- [3] Deepali Javale, Mohd. Mohsin, Shreerang Nandanwar: Home Automation and Security System Using Android ADK, International Journal of Electronics Communication and Computer Technology (IJECCCT) Volume 3 Issue 2 (March 2013)
- [4] N. Sriskanthan and Tan Karand. "Bluetooth Based Home Automation System". Journal of Microprocessors and Microsystems, Vol. 26, pp.281-289, 2002.
- [5] Muhammad Izhar Ramli, Mohd Helmy Abd Wahab, Nabihah, "TOWARDS SMART HOME: CONTROL ELECTRICAL DEVICES ONLINE," Nornabihah Ahmad International Conference on Science and Technology: Application in Industry and Education (2006)
- [6] "Author Guidelines" <http://googleblog.blogspot.in/2011/05/android-momentum-mobile-and-more-at.html>

BOOKS:

- [1] Andrew Sloss, "Arm System Developer Guide"
- [2] Frank Vahid, "Embedded System Design"
- [3] Rajkamal, "Embedded System"