

Android Based User Defined Device Monitoring and Controlling System

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Abstract:

Rapid growth of various high-tech tools and equipments makes our jobs done comfortable and sophisticated. And the mobile phone is the inseparable part of human lives today. With the help of mobile phones human can do many works related to their civil life. At today's repaired technology the mobile phone is also become smart one. With the help of this smart gadget we can make our home smart one. Some products are commercially available in market which allows home appliances controlling through internet, GSM, Bluetooth, RFID, and Wi-Fi wireless technologies. The main purpose of this survey paper is to design an advanced electrical devices monitoring and controlling at home or offices remotely using android mobile. The controlling of electrical appliances is done wirelessly through Android smart phone using the Bluetooth feature present in it. Here in this project the Android smart phone is used as a remote control for operating the electrical appliances. The system also uses Power Line Carrier Communication (PLCC) from control section to the appliances section.

Key words:

Android application, Bluetooth module, Relays, TRIAC, PLCC module, ARM-7 microcontroller.

I. INTRODUCTION:

In Home automation systems there are collections of interconnected devices for controlling various functions within a house. Mobile devices are ideal in providing a user interface in a home automation system, due to their portability and their wide range of capabilities. Within the house, the user might not want to go to a central control panel, or not even to the laptop, but use the phone that is usually placed in closer proximity to the user.

When far from the house, the user might want to check its current status or even schedule actions for his return. But it lacks the true sense of real mobility, security and some limited range of connectivity. We proposed a new technology so that the ordinary services of the mobile phones can be used to communicate with and control the home appliances. Here, the switch board of our regular use is replacing by Android mobile application which will communicate with ARM microcontroller and the android based smart phone. The home appliances monitoring and controlling is done wirelessly through Android smart phone and also using PLCC module. Android is a healthy array of connectivity options, including Wi-Fi, Bluetooth, GSM and wireless data over a cellular connection. The advantage of controlling mechanism is the devices controlling and monitoring is available in two modes one from android application and data transmission from transmitter to receiver section we use PLCC module for controlling devices. The important part of this technique is that the appliances can be controlled using power line carrier communication module network and produce required output. Here all the devices which are to be controlled are connected to the ARM-7 LPC2148 Microcontroller.

II. LITERATURE REVIEW:

To fulfill the objectives of the project, we need to understand the basic elements of digital electronics. Several standard books were referred. The ARM-7 LPC2148 and PIC Microcontrollers and Embedded Systems Using Assembly and C by mazidi by using this we can learn basic knowledge of Embedded C, PIC microcontroller embedded systems by Muhammad Ali Mazidi. Due to an environment of the building appliances control system, the device selection mainly considerate the economy and stability. First, the house intelligent switch control system should be adapted to several types of voltage, and the stability and safety should be guaranteed as well.

Second, the system should have a strong anti-jamming capability and fast communication efficiency. Last, with long hours' work, any other electrical interferences and radio radiation should be kept away. Energy can be effectively conserved if we can control the home electrical appliances like lights, fans, refrigerators, AC, TV's etc.



Figure- 1.Image of Android application for device controlling system Android is an open source platform. Neither developers nor handset

III. NEW CHALLENGES AND METHODOLOGY:

PLCC, Power Line Carrier Communication, is an approach to utilize the existing power lines for the transmission of information. In today's world every house and building has properly installed electricity lines. By using the existing AC power lines as a medium to transfer the information, it becomes easy to connect the houses with a high speed network access point without installing new wirings. This technology has been in wide use since 1950 and was mainly used by the grid stations to transmit information at high speed. Now a days this technology is finding wide use in building/home automation as it avoids the need of extra wiring. The data collected from different sensors is transmitted on these power lines thereby also reducing the maintenance cost of the additional wiring. In some countries this technology is also used to provide Internet connection. Intelligent information appliance is the main direction of development in the appliance control field. Intelligent appliance network has small amount and low speed of data transmission using PLCC; there are many appliances in family and it needs more network capacity. manufacturers pay royalties or license fees to develop for the platform. The underlying operating system of Android is licensed under GNU General Public The Android framework is distributed under the Apache Software License (ASL/Apache2), which allows for the distribution of both open and closed source derivations of the source code.

Commercial developers (handset manufacturers especially) can choose to enhance the platform without having to provide their improvements to the open source community. Instead, developers can profit from enhancements such as handset-specific improvements and redistribute their work under whatever licensing they want. Android application developers have the ability to distribute their applications under whatever licensing scheme they prefer. Developers can write open source freeware or traditional licensed applications for profit and everything in between.

Network Connectivity :

It supports wireless communications using:

- » GSM mobile-phone technology
- » 3G
- » Edge
- » 802.11 Wi-Fi networks

We have presented a system that can be interconnected with the electrical devices and Arm-7 microcontroller using android application based on PLCC communicating network. The communication device used for the communication over the power lines is a MODEM, commonly known as Power Line MODEM (PLM). It works as both transmitter and receiver, i.e., it transmits and receives data over the power lines. A power line modem not only modulates the data to transmit it over the power lines and but also demodulates the data it receives from the power lines. By using modulation techniques, binary data stream is keyed on to a carrier signal and then coupled on to the power lines by PLM. At the receiver end another PLM detects the signal and extracts the corresponding bit stream. The PLCC transceiver module provides the communication mechanism between the user section from android mobile and the appliances section which are interfaced with ARM-7 LPC2148 microcontrollers.

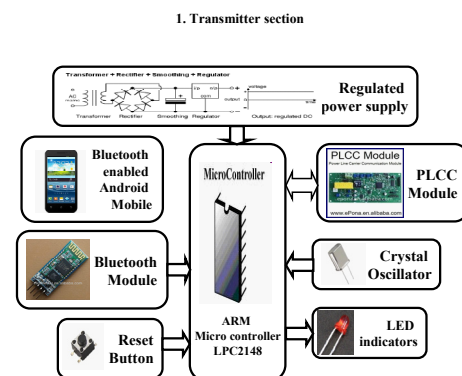


Figure- 2.Block diagram of transmitter section

The presented application is a low cost solution for electrical appliances controlling using android application with PLCC communication network. The present system uses an onboard mini computer named as ARM-7 LPC2148 microcontroller which consists of number of input and output ports. The input and output port of the micro controller are interfaced with different input and output modules depending on the requirements. The system provides solution which can be used in other types of application, where the information needed is requested rarely and at irregular period of time (when requested).

The microcontroller (ARM-7 LPC2148) takes the input from Android application when the user selects the devices using android application and using wireless Bluetooth connectivity. At the receiver section PLCC modules receives data and controls electrical appliances like lights, fans using relay, TRIAC switches. a. ARM-7 LPC2148 Microcontroller: In the presented paper Home automation system we used ARM-7 microcontroller which is RISC microprocessor architecture from Advanced RISC Machines Ltd. The ARM7 architecture is made up of a core CPU plus a range of system peripherals which can be added to a CPU core to give a complete system on a chip. It offers several architectural extensions which address specific market needs, encompassing fast multiply and innovative embedded ICE support.

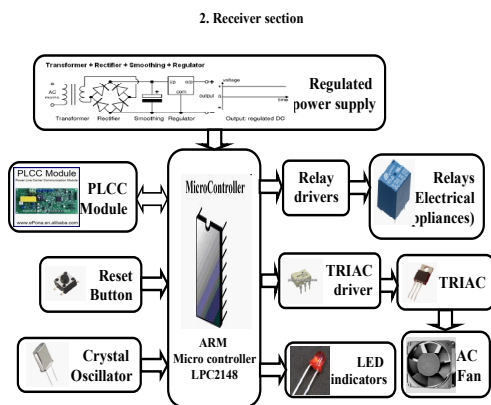


Figure- 2. Block diagram of receiver section

The controlling device of the whole system is provided using ARM-7 LPC2148 Microcontrollers. The entire model consists of two sections one controlling section interfaced with Bluetooth module, PLCC module. The receiver or appliances section consists of PLCC module, TRIAC and Relays switches are interfaced to the ARM 7 Microcontroller. The data received by the Bluetooth module from Android smart phone is fed as input to the controller. The controller acts accordingly on the Relays, TRIAC switches at the receiver section to control the connected electrical appliances like lights, fans etc. In achieving the task the controller is loaded with a program written using Embedded 'C' language. This system can be applicable in industrial environment, home automation and for any other commercial purposes.

IV. RELATED WORK:

The portable Electrical devices controlling system using android mobile, relay, TRIAC switches for controlling devices, Bluetooth receiver module, ARM-7 (LPC2148) micro-controllers and PLCC modules for communication between two sections.

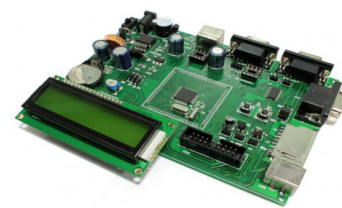


Fig.2 ARM-7 LPC2148 Microcontroller

b. PLCC module:

PLC Transceiver is the key component of a PLCC system. It is the device which transmits & receives data to & from the power lines and acts as a hub between the power stations and our Computers/Network utilization devices. They are wired with the electrical voltage lines at home or business and work on two modes – transmit mode and receive mode. In transmit mode, they simply receive data from receiver end installed on the same network and further transmit them. In receive mode, they work the opposite way. A number of companies provide PLC transceivers and other networking devices for PLCC communication. Power-line communication (PLC) carries data on a conductor that is also used simultaneously for AC electric power transmission or electric power distribution to consumers. It is also known as power-line carrier, power-line digital subscriber line (PDSL), mains communication, power-line telecommunications, or power-line networking (PLN).

Power line carrier communication modem is an OEM module which carries data on a conductor used for electric power transmission – i.e the AC lines. PLCC offers a “no new wires” solution because the infrastructure is already established. This module can be integrated into and become part of the user’s system. The unit can be easily integrated into other systems to successfully transmit data over the power lines.



Fig4. PLCC module

c. Relay and TRIAC:

A relay is an electrically operated switch. Many relays use an electromagnet to operate a switching mechanism, but other operating principles are also used. Relays find applications where it is necessary to control a circuit by a low-power signal, or where several circuits must be controlled by one signal. The first relays were used in long distance telegraph circuits, repeating the signal coming in from one circuit and re-transmitting it to another. Relays found extensive use in telephone exchanges and early computers to perform logical operations. A type of relay that can handle the high power required to directly drive an electric motor is called a contactor. Solid-state relays control power circuits with no moving parts, instead using a semiconductor device triggered by light to perform switching. Relays with calibrated operating characteristics and sometimes multiple operating coils are used to protect electrical circuits from overload or faults; in modern electric power systems these functions are performed by digital instruments still called “protection relays”.



Fig.5. Relay

A Triac and optically isolated Diac (Triac driver) based circuit controls the intensity of the high voltage 230volts lamp. This system also employs a zero crossing detector for smooth operation of lamp intensity. This project consists of a Microcontroller that takes input from speech recognition module and processes the request. Then it processes the data and takes necessary action on the lamp. The optical isolation system safeguards the microcontroller-based system from high voltages.

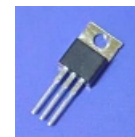


Fig.6. TRIAC

V CONCLUSION:

In the presented paper provides survey on an advanced home automation system using android and PLCC communication. Statistical report for PLCC and Android usage its reviews on how the technologies are used for designing a portal device. In Particular it’s helpful to identify the aspects of a product that people are happy. The paper provides highly advanced IC’s like ARM-7 Microcontrollers, Relays and TRIAC switches, PLCC module communication technology with the help of growing technology, the project has been surveyed successfully with a unique idea. The idea of the advanced home automation can also be extended for future using GPRS module. GPRS module can be used to monitor and control the appliances of multiple devices like lights, fans, coolers etc using predefined weblink. It can also be extended using driver circuits for controlling intensities, speed levels for lights and fans devices. Usage of Wireless Wi-Fi network, through which the devices can also be controlled using voice application and also touch application from android mobile.

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