



ARM PROCESSOR WITH RTOS IMPLEMENTATION CONTROL SYSTEM USING ANDRIOD APPLICATION

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Abstract

With the openness, *flexibility* and features that Android offers, it has been extensively use in the applications beyond just Smart Phones. This project is the design and implementation of a low cost yet compact and secure Android smart phone based Bluetooth control system. This design is based on the popular ARM Microcontroller where the sensors and are connected to the input/output ports of the board. In order to enhance the system response and to make it system more flexible, we've integrated a popular and open source RTOS ,which is part of operating system we can say. The controlling application which has been developed for Android devices can also be easily developed on other popular Smart Phone operating systems like Apple's iOS, Microsoft's Windows operating system and BlackBerry OS. Pattern based password protection or key based password protection is implemented to allow only authorized users to control the system. Another add-on included is the integration of temperature sensor & real time clock with lcd display to interface with it.

Keywords: ARM Microcontroller, RTOS, Android Application, Bluetooth

I. INTRODUCTION

With the promotion of Android as a Smart Phone Operating System by Google Inc, Smart Phones are becoming very much popular around the world. Currently, Android has grown to more than 75% of Smart Phones/Tablets user base. This mass choice of Smart Phones has fulfill a

demand for applications both soft and hard. Today, Smart Phones are not a just Phones to dialing & receiving the calls, they're now the main Human Interaction Devices and users thus want to control/accomplish most of their day to day need from their Smart Phones rather than conventional ways. Today smart phone have number of wireless facilities like Bluetooth, Wi-Fi. So people are very use to wireless devices and its becomes very much needed in day today's life With the exception of few low cost devices, Bluetooth can be found in almost all Android based devices which have been very popular over years for wireless data transmission with ease. Control systems are one of the major adopters of Bluetooth technology. Here, we propose a control system based on Bluetooth technology Some of the factors that influence the design of a control system include the scalability of the system, the ease of integrating new devices into the system and security. Also important is the ease of use and user friendly controlling interface. A cost effective system would qualify it for mass adoption.

II. LITRATURE SURVEY

The capabilities of Bluetooth are more than enough to be implemented in the design. Also, most of the current laptops and smatphone phones are come with built-in Bluetooth adapter. It will indirectly reduce the cost of this system. Extensively search has been carried out of past & related work in the field of rtos , android operating system & Bluetooth Protocol. Internet is the main source to carrying out this literature survey.

- A. Bluetooth based home automation system using cell phone was implemented by *Suva, Fiji & Tazil*. in which they presented the design and implementation of a very simple & minimum cost application. The design is based on a stand alone Arduino bluetooth board and the home appliances are connected to the output ports of this board via relays. The communication between the cell phone and the Arduino & bluetooth model is wireless. This system is designed such that it should be low cost and very flexible allowing variety of instrument to be controlled with minimum changes to its core. Password protection is being implemented to only allow authorised users from accessing the appliances at home.
- B. **S. Ramanarayana Reddy** he had implement that how to choose rtos depending upon our application .in which he has written the characteristics that will guide to Selecting the RTOS based on different parameters.so it is very usefull to find out and implement operating system in this system.so its saving of tremendous computing resources and time.
- C. N. Sriskanthan explained the model for home automation using bluetooth via PC. In this system he has explained the system without mobile.
- D. Pradeep G proposed home automation system by using bluetooth which saves power and time using facilities like to save the preloaded list by not making it to setup connection all the time when required.
- E. Jitendra R. showed that with the ZigBee network how to used to reduce wiring and system become more simple. There is also much amount of power saving is possible, operating range is more than Bluetooth

This is generalised block diagram of implemented system. In this block diagram we can see implemented different blocks.

The detailed explanation of each and every block are explained below.

Android application “Serial Bluetooth Controller “.is made and then it is upload to the android app store. With the help of this application we control this system. In this application we have to send command like “light on & off” to control the system.

The Communication of system with android application is done with help of “HC-05” Bluetooth module. This module is controlled by Microcontroller with the help of “AT” command. Interface between microcontroller & Bluetooth module is serial interface i.e. UART.

In this system ARM core microcontroller is used. ARM stands for Advance Risk Machine. We have ported operating system on that microcontroller. Operating system is ported because of enhance the system responsiveness and system make it more dynamic.

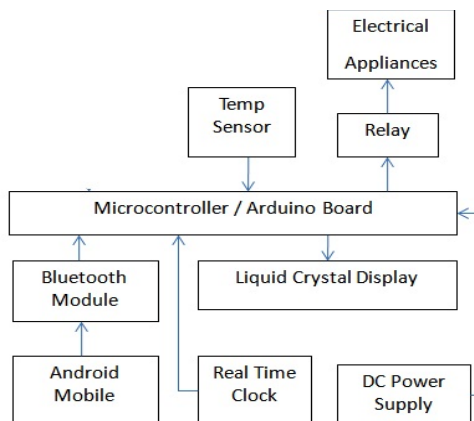
Microcontroller received command from android application via Bluetooth module. After receiving command according to command microcontroller take proper action. it means that Microcontroller ON-OFF the respective relay.

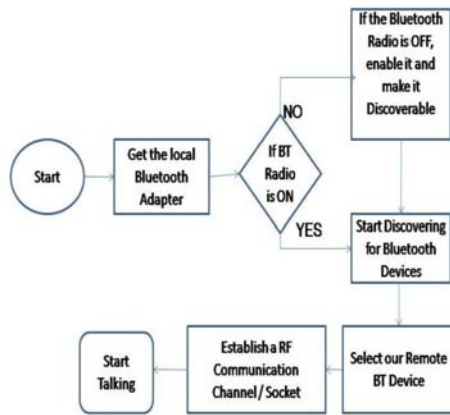
LM 35 is temp sensor is used to sense the temp. The output of temp sensor is buffered through op-amp. signal conditioning is done to output of sensor because of stable & accurate output is required. This output is applied to Analog to Digital converter. this Microcontroller have internal adc.so we have used that adc.ADC convert that analog signal into digital value and passes to the microcontroller. Microcontroller’s firmware convert that value into proportional temperature. If temp exceeds above the 50 degree Celsius it send signal over temperature to the LCD.

Additionally RTC (Real Time Clock) is used to show the current date & time. This all parameter will send to lcd. So it can easily understand the status of the system.

Software flow chart for connection and scanning Bluetooth model with microcontroller is shown below.

III. PRAPOSED SYSTEM





Android application is searching the Bluetooth device for pairing. If the system is power on then its show the other available device with HC-05 module. If we pair that device with mobile then we can start the communication.

IV. CONCLUSION

Design this is a low cost system to improve standard of society. The remote control function provide by smart phone is ease to use. This system can be used in different different application like this can be used as home automation system, also in industry this can be used to control variety of application. This system can be made on large scale owing its simplicity and ease of design. Further enhancements can be implemented on the system such as the integration of an more powerful controller is used to control the various home devices based on various factors like, temperature. Also, we can easily integrate Google's latest offering, Google Cloud Messaging to control our home systems from the Internet, thus making it possible to monitor our home appliances or other devices from anywhere in the world. So that it can be used to variety of application. also GUI of android application can be made with speech recognition voice control.. all further improvement can be made without not much extra cost.

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