

Design and Implementation of Smart Living Room Wireless Control for Safety Purpose

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ABSTRACT: This research presents the microcontroller controlled smart living room system using Bluetooth wireless technology from mobile phone. An android apk is created in mobile for controlling the living room system. A 16F877A microcontroller is interfaced serially to a bluetooth module transceiver. It is used for controlling fan speed control, dim light control, lighting ON/OFF and window angle control. An arduino controller is used for keypad control door security. It is connected to DC motor control circuit and switching circuit for opening and closing of the door, keypad for entering password and serial LCD for displaying the update status of the door. User can control the home appliances by using bluetooth connection from mobile phone in its range. User can adjust the dim light, fan speed, window angle and light bulbs from android apk. An internal EEPROM is built in 16F877A microcontroller and it stores the last requested data of the appliances. If user wants to recover the former conditions of the appliances, he can recall them from android apk.

KEYWORDS: Arduino, 16F877A Microcontroller, Bluetooth, Android apk

1. INTRODUCTION

Microcontroller based living room control system using Bluetooth technology will provide effective and modernized living standard. Bluetooth is a wireless technology standard for exchanging data over short distances (using short wavelength UHF radio waves in the ISM band from 2.4 to 2.485 GHz) from fixed and mobile devices, and building personal area networks (PANs). Living room control system from mobile is one of the most popular forms of wireless control technology.

Researchers around the world are continuously improving our life by creating innovative applications of computing for our daily activities. Today, mobile phones come out of work place and are effectively used to communicate and to make our life easier and better than ever. In this living room control system, they are used to control the living room appliances via Bluetooth technology. Being inspired by the widespread use of wireless communication technology, we are proposing a concept of Smart Living Room System that will make our home convenient and smart. In this research, the door of the living room opens and closes by using keypad lock system. It is controlled by arduino controller and the status of the door is displayed on serial LCD.

The control of light bulbs, fan speed, dim light and window angle based on wireless Bluetooth technology and microcontroller are implemented. Users of the living room can interact with the devices by wireless mobile interface via Bluetooth. This system also requires a specialized android apk to control the living room appliances from mobile. Implementation of Smart Living Room system has several advantages. Door security system was built with a keypad that was controlled by arduino.

To open the door, user must enter the correct password and if the wrong password was entered, the door will be still locked. It can save the home from entering thieves and strangers. Old and disable persons can manage the living room without using too much effort. As fan speed can be adjusted, users can maintain the room temperature as the desire. User can also vary the lighting of the room by using dim light. There is also a window system that can be opened and closed between 0 and 180 degree as user desire. Furthermore, four light bulbs are also presented and user can switch on

and offthem. All the appliances in the living room can be controlled without using too much energy. It can be controlled easily by mobile from any place of the room. While user can't go close to the appliances immediately, he can do it by using mobile. It can reduce the loss of electrical energy and human effort. It can promote the living standard of human beings with the effects of wireless technology. This system can be used not only in living room but also in many other places for many purposes.

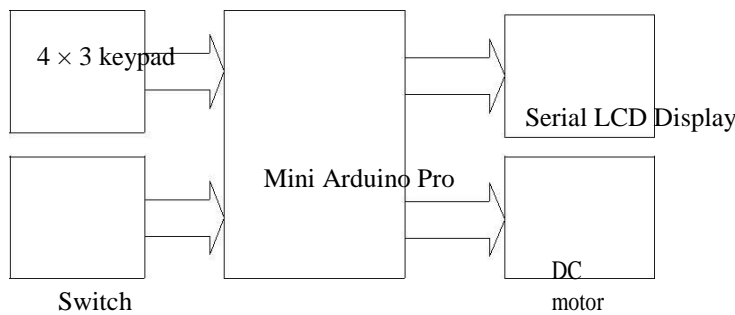


Fig:1 Block Diagram for Keypad Control Door Security

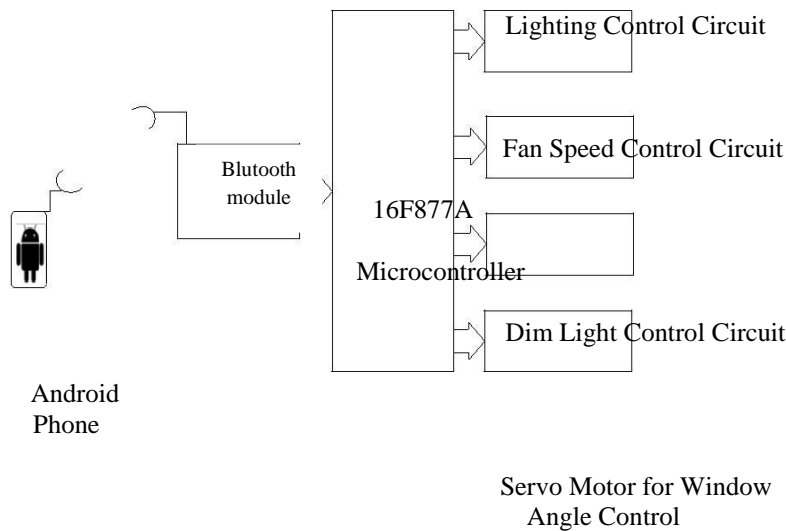


Fig:2 Block Diagram of Living Room Appliances Control

This section includes the total hardware overview where in the first subsection, the connections of arduino with keypad, DC motor driver circuit, DC motor, switching circuit and serial LCD are explained. Then, after that how to communicate between the PIC and the control circuits such as fan speed control circuit, dim light control circuit, lighting ON/OFF control circuit and window angle control circuit is described. In the next sub-section, it is presented how to connect Bluetooth module and android apk from mobile. The

last sub-section illustrates the overall hardware circuit diagram and its software flowchart.

II. PROPOSED SYSTEM DESIGN

The hardware configuration of the keypad control door security system is basically the configuring of arduino, keypad, DC motor driver circuit, DC motor, switching circuit and serial LCD. The main hardware components of the living room appliances control system are PIC 16F877A microcontroller, HC06 bluetooth module, android phone, servo motor, fan, light bulbs, IGBT, optocoupler and so on. The complete circuit diagram of the project can be divided into two different sections:

- Interfacing to keypad control door security circuit
- Interfacing to living room appliances control circuit

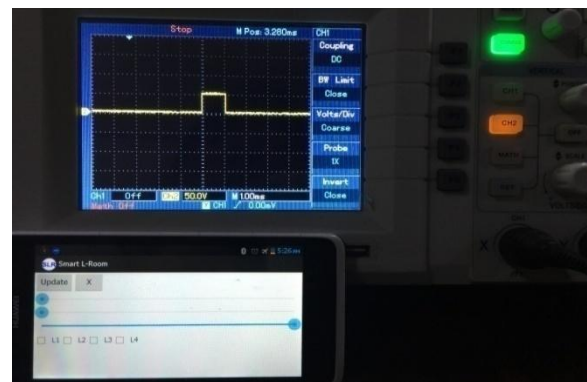
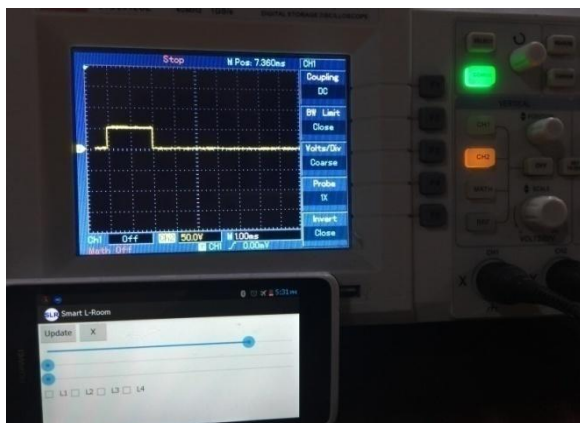
III. TESTS AND RESULTS

The prototype of the smart living room system is with the dimensions of 1ft 8in (length,width) and 1ft 2in(height). The prototype will be constructed. In this work, the control system is designed to control the prototype of smart living room system. This overall system is mainly controlled by Bluetooth technology. Since it uses mobile phone to communicate with the appliances, android apk is very essential in this system. To create an android apk, eclipse software is used. Arduino software is used to implement the program in arduino controller. The program of the PIC16F877A microcontroller is written in mikroC language using mikroC software. It is a powerful, developed feature rich tool for PIC microcontrollers. mikroC makes a fast and

reliable tool. Proteus software is used to test the simulation results of the living room appliances control using microcontroller. Fig:13 to fig:18 show the tests of the measurements of PWM (Pulse Width Modulation) for window angle control, fan speed control and dim light control. Four light bulbs for lighting on/off control are constructed with relay drivers.



Fig:16 Test of Dim Light with PWM (Low Brightness)



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Fig:13 Test of Servo motor for window angle with PWM (High Degree)

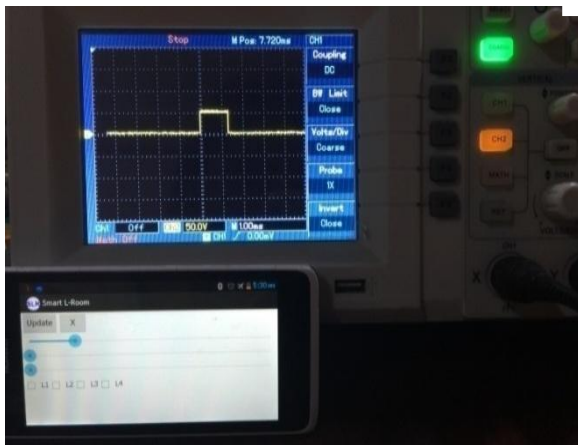


Fig:17 Test of Fan Speed with PWM (High Speed)

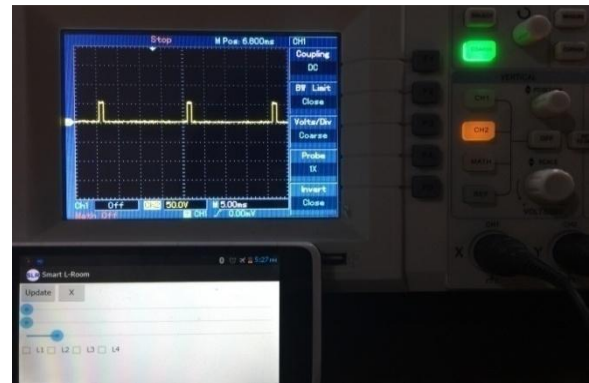


Fig:14 Test of Servo motor for window angle with PWM (Low Degree)

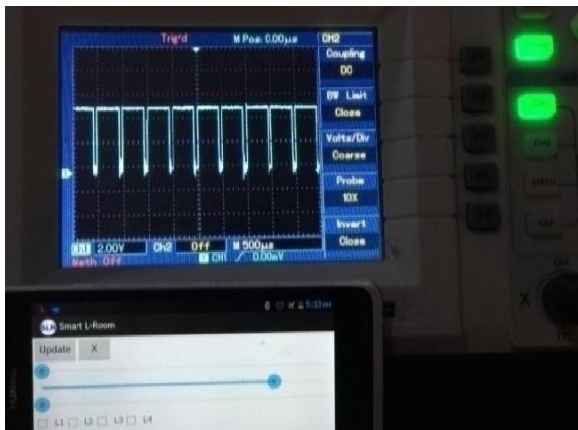
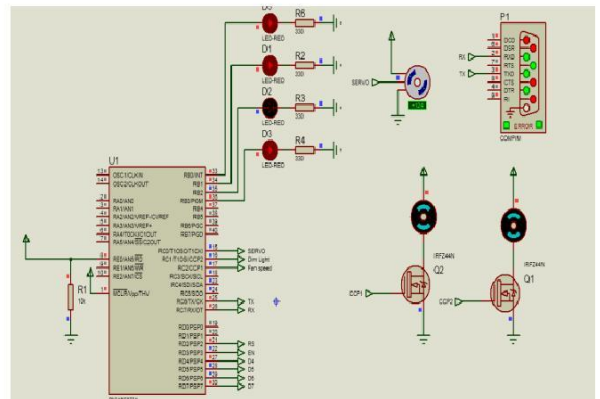


Fig:18 Test of Fan Speed with PWM (Low Speed)



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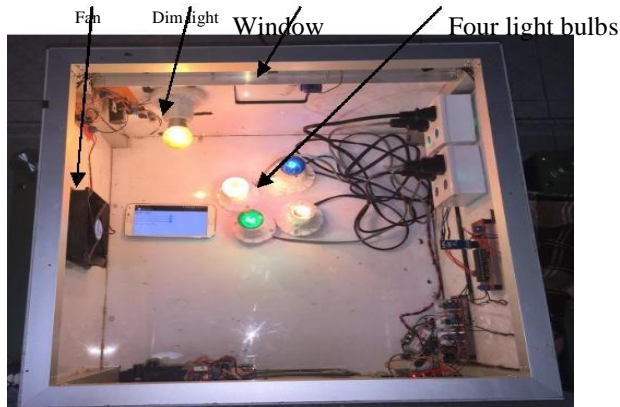


Fig:20 Constructed prototype of the Smart Living Room (Living Room Appliances Control)

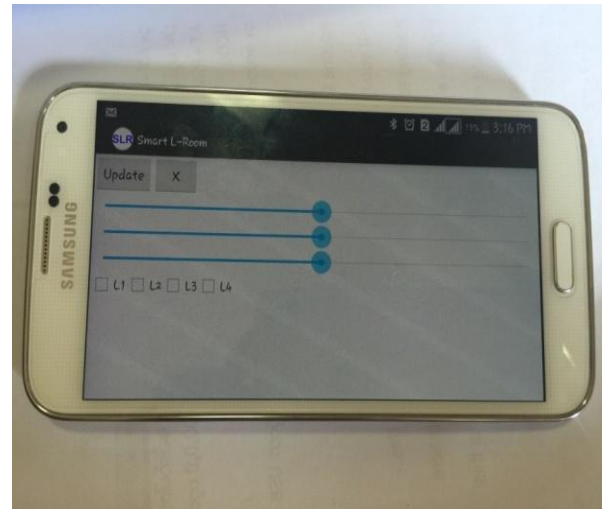


Fig: 23 Android Apk in Samsaung Galaxy S2

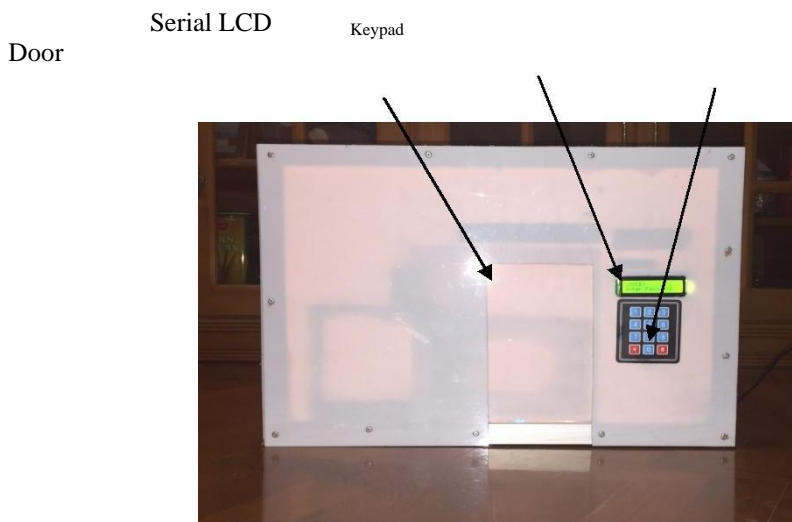
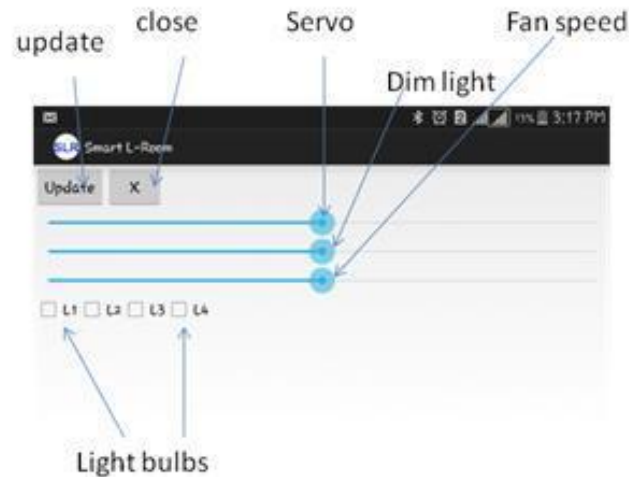


Fig:21 Constructed prototype of the Smart Living Room (Keypad Control Door)



the simulation test of the living room appliances control. The constructed prototype of the research is shown in fig:20 and fig:21. Fig:20 shows the constructed prototype of the living room appliances control and fig:21 shows the constructed prototype of the keypad control door. Android apk and android phone used in this project are shown in fig:22 and fig:23.

V. CONCLUSION

Smart living room wireless control using android phone is described. The components required for smart living room are chosen. The overall circuits for the research are designed and constructed. How to implement the PIC program is described with flowchart. The developed PIC program and designed circuit are tested with Proteus software. The connection between Bluetooth and android apk is also tested. Any kind of android phone which consists of bluetooth can be used by installing smart living room apk. Since this smart living room system can be controlled by mobile, it becomes reliable and convenient to use for user. It can reduce the loss of energy. This system makes the user comfortable and cost effective. It can provide high safety for the room. The proposed control system can be implemented to provide high standards of living by increasing the facilities of the living room.

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