International Journal of Emerging Technology and Advanced Engineering
Website: www.ijetae.com (ISSN 2250-2459, ISO 9001:2008 Certified Journal, Volume 4, Issue 2, February 2014)

Android Play Station

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***Abstract*— Using Android operating system lot of applications can be developed which help to human for operating different devices easily & efficiently. Here we have used a simple and efficient approach for implementation of android work station by making use of Android operating system which allowed to interface with USB interfacing, LED, keypad, Wi-Fi, touch screen display. Finally we go through application such as home appliances control system using Bluetooth wireless communication protocol. The result we have delivered by using this technique is to control the home appliances as well as how to interface the above mentioned devices with android operating system.**

***Keywords*— Android Work Station (AWS), Android Operating System (AOS), Bluetooth (BT)**

I. INTRODUCTION

Android is Linux-based operating system designed primarily for touch screen mobile devices such as smart phones and tablet computers. Google releases the Android code as open source, under the License. Additionally Android has a large community of developers writing applications that extend the functionality of devices written primarily in a customized version of Java [1].

A. Objective

Project has mainly following objectives

- How to interface LED, keypad, Wi-Fi, touch screen display with android by using TINY 6410 board.
- Controlling home appliances such as fan, tubes, machines by using Bluetooth & android operating

B. Theme

Project based on android operating system and developed on Tiny6410 development board (Arm architecture base microprocessor s3c6410). Home appliances are controlled by using Bluetooth, Arduino controller board, relays.

Project is divided into following parts

- TINY 6410 Board
- Arduino Controller Board
- Bluetooth Shield
- Relays
- MCT 6 Optocoupler
- Arduino Complier

C. Why Android

1) Memory Management. Android manages the apps stored in memory automatically: when memory is low, the system will begin killing apps and processes that have been inactive for a while, in reverse order since they were last used. This process is designed to be invisible to the user, such that users do not need to manage memory or the killing of apps themselves.

2) Hardware. The main hardware platform for android is 32 bit ARMv7 architecture. There is support for x86 from android-x86 project and Google TV uses a special x86 version of Android. In 2013 Freescale announced android on its i.MX processor, i.MX5X and i.MX6X series. In 2012 Intel processor began to appear on more mainstream android platforms, such as phones.

3) Development. Android is developed in private by Google until the latest changes and updates are ready to be released, at which point the source code is made available publicly. This source code will only run without modification on select devices, usually the Nexus series of devices. There are proprietary binaries which have to be provided by manufacturer in order for Android to work.

4) Open source community. Android has an active community of developers and enthusiasts who use the android source code to develop and distribute their own modified versions of the operating system. These community-developed releases often new features and updates to devices faster than through the official manufacturer channels, albeit without as extensive testing or quality assurance provide continued support for older devices that no longer receive official updates or bring Android to devices that were officially released running other operating systems, such as the HP Touch Pad numerous others [2].

5) Security & Privacy. Android applications run in a sandbox, an isolated area of the system that does not have access to the rest of the system's resources, unless access permissions are explicitly granted by the user when the application is installed. Before installing an application the play store displays all required permissions [2].

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6) *Licensing.* The source code for Android is available under free and open-source software licenses. Google publishes most of the code including network and telephony stacks under the Apache license version 2.0, and the rest, Linux kernel changes under the GNU General public License version 2. The open Handset Alliance develops the changes to the Linux kernel, in public; with source code publicly available at all times [2].

7) *Market Share.* Research company canals estimated in the second quarter of 2009 that Android had a 2.8% share of the worldwide Smartphone shipments. By the fourth quarter of 2010 this had growth to 33% of the market, becoming the top selling Smartphone platform. By the third quarter of 2011 Gartner estimated that more than half 52.5% of the Smartphone market belongs to Android. By the third quarter of 2012 Android had a 75% share of the global Smartphone market according to the research firm IDC.

II. Android Play Station

The Tiny6410 Board Computer is a high-performance controller board introduced. It is designed based on the S3C6410 microprocessor, 256MByte DDR SDRAM, 1Gbyte NAND Flash, RTC, Audio and net on board. It has integrated RS232, USB, Ethernet, Audio In/Out, Keyboard, LCD, CVBS, TV out, camera in, SD card and more other functions on board. So many hardware resources provided by the expansion board, it becomes a solid reference board for customer design. The S3C6410X is a 16/32-bit RISC microprocessor, which is designed to provide a cost-effective, low-power capabilities, high performance Application Processor solution for mobile phones and general applications. It also includes many powerful hardware accelerators for tasks such as motion video processing, audio processing, 2D graphics, display manipulation and scaling [3].

Fig. 2.1 Tiny 6410 Board

Many applications we can easily run on Android operating system. By using Tiny 6410 board here we are showing some of these applications.

A. Touch screen

It is a one wire capacitive touch screen having on boot calibration. The work station support different sizes of screen such as 3.5,7...etc

B. USB Interface

In Tiny6410 board, it has 5 USB interface, there are 4 USB host, and the other is USB slave interface.Which is used for external storage device connection. All USB ports work at the same time.

C. Keypad

The work station having eight keys, each key contains its own functionality**.** Here in android work station we refer keys as k1, k2, k3, k4, k5, k6, k7, k8.

D. ADC Testing

Board has 2 channel A to D converter. By using this we can co we can able to test the analog signal & also convert it into digital signal. It is used for analog sensor calibration & testing.

E. PWM Buzzer

The Buzzer in the board was controlled by PWM. It is used for user alert acknowledgement.

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F. Temperature Sensor

The board has a temperature sensor. By using it we can measure the temperature of surrounding.

G. USB Bluetooth

Board supports USB Bluetooth. It is for file transfer and other Bluetooth applications.

Also board support IR sensor & WI-FI interface for future expansion.

III. Application Work

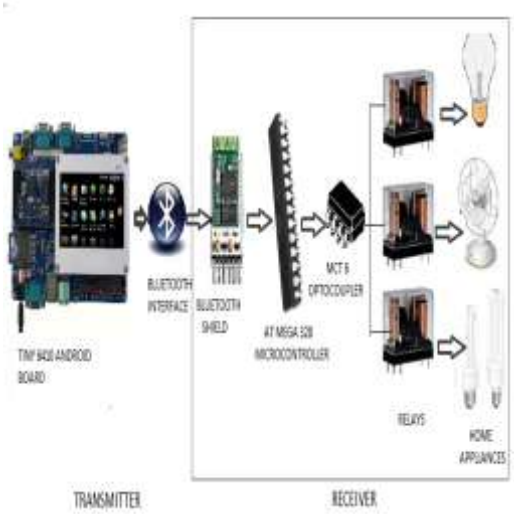

Fig 3.1 Block Diagram

TINY 6410 board has a Bluetooth device which is used to transfer the commands given by the user. Other device specifications are as follows.

A. Bluetooth Shield

Fig 3.2 Bluetooth Shield

The Bluetooth Shield integrates a Serial Bluetooth module. It can be easily used with Arduino for transparent wireless serial communication. We can choose two pins from Arduino D0 to D7 as Software Serial Ports to communicate with Bluetooth Shield. D0 and D1 is Hardware Serial Port. Up to10m communication distance in house without obstacle. It has UART interface with programmable baud rate having a default baud rate factor 38400.The frame contains 8 data bits, 1 stop bit with no parity [4].

B. Arduino Controller Board

Fig 3.3 Arduino Atmega328 Controller

The Arduino is a microcontroller board based on the ATmega328. It has 14 digital input/output pins of which 6 can be used as PWM outputs, 6 analog inputs, a 16 MHz crystal oscillator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support to microcontroller simply connect it to computer with a USB cable or power it with AC-to-DC adapter or battery to get started. It differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega8U2 programmed as a USB-to-serial converter [5].

C. MCT 6 Optocoupler

The MCT6 is a two channel optocoupler for high density applications. It is used to control relays. Each channel consists of an optically coupled pair with a infrared LED and silicon NPN phototransistor. Signal information including a DC level can be transmitted by the device while maintaining a high degree of electrical isolation between input and output.

D. Relays

Relays are used to control on and off operation of devices. These relays are controlled by MCT6. In this project relays are used as a switch to control the 230V AC supply.

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IV. IMPLEMENTATION

A. Bluetooth Interface

In the transmitter Bluetooth firstly we have to activate the Bluetooth .First step is to click on setting then following dialog box will appear on the display.

Fig. 4.1 Bluetooth Setting

Next step is to click on the wireless & networks. In the wireless & network we will get the Bluetooth option. To activate the Bluetooth tick in square in front of Bluetooth option.

Fig. 4.2 Bluetooth Connection

After activating the Bluetooth it will search the device by using the option scan for device and it will find the Bluetooth shield at the receiver side. Then click on the device name the following dialog box will appear on the display.

Fig. 4.3 Bluetooth pairing

After appearing this window we have to enter a valid and secured password which is given in the receiver side by using controller programming. After matching the password a small LED on Bluetooth shield of receiver side will continuously blink which indicates that the Bluetooth connection was successfully established between transmitter and receiver. Now we can give the commands from transmitter for on and off the relays and according to that it will on and off the appliances connected across the relay.

B. Arduino Compiler

In this project we have used Arduino compiler for microcontroller programming. The programming is done in the Embedded C language [5].

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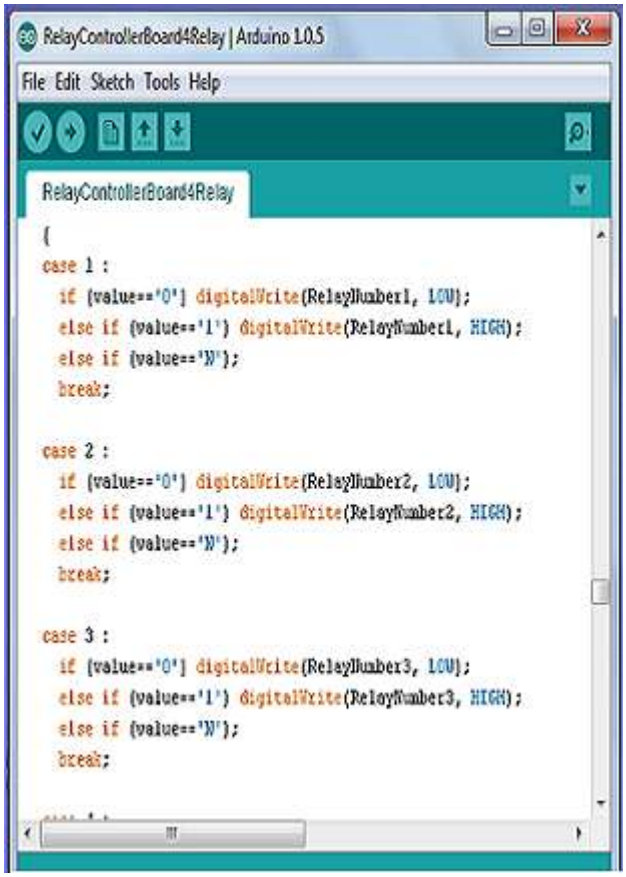

Fig. 4.4 Arduino Compiler

Fig 4.4 shows the programming written in the Arduino compiler by using Embedded C language. When the Bluetooth connection was established between transmitter and receiver, transmitter is ready to transmit the commands given by the user. The Bluetooth shield of receiver accepts these commands and forwards it to microcontroller through its TX pin. Microcontroller receives these commands through the RX pin. Microcontroller matches these commands with the codes or programming written in Arduino compiler. When the valid command is received by the controller it will take necessary action for MCT 6 optocoupler. The MCT 6 optpcoupler is connected to Microcontroller through port B. Solid state relays are connected to optocoupler which are used as switch for on and off the appliances connected to it.

V. RESULT

TABLE I

keys	Relay	Device	Function
K1	relay 1 on	bulb	turn on
K2	relay 1 off	bulb	turn off
K3	relay 2 on	fan	turn on
K4	relay 2 off	fan	turn off
K6	relay 3 on	tube	turn on
K7	relay 3 off	tube	turn off

VI. CONCLUSION

By using Android operating system lot of applications can be easily run. With the knowledge of new techniques in 'Electronics' we are able to make our life more comfortable. One such application of electronics is used in Android as a Play Station. Bluetooth controlled appliances using Android is automatic versatile system. It can be implemented in industry, home, agricultural field, remote and hazardous applications. It provides the flexibility & system reliability with low cost as well as less maintenance. It provides remote access to the system to deliver service at any time of the day. With this system, we can control as well as monitor the devices at remote location.

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