

CS684 Readme



CS684 – 2010 Project

Project: Controlling Firebird V using an Android based phone via Bluetooth.

Students:

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Project Objective

To develop an application on the Android phone which will sense the tilt of the device and send this data over Bluetooth to FB5. Depending on the direction of the tilt the FB5 will move in the corresponding direction. Speed of the FB5 will be determined by the extent of tilt in given direction. FB5 currently does not have a Bluetooth support, so adding it will further enhance FB5 capabilities.

Hardware Platform

1. Android 2.1 OS based mobile with Bluetooth and Accelerometer Sensor.
2. Firebird V ATMEGA2560
3. LM400 bluetooth module
4. LM317 voltage regulator
5. Serial communication through UART2 of ATMEGA2560.

Software

1. Android SDK with Android 2.1 platform for Linux.
2. Eclipse IDE 3.5 for Linux with the Android Development Tool – ADT 0.9.9.

3. WinAVR.
4. AVR Studio 4.

Code Description

Code Files:

Filename	Purpose	Executes on
Android_FB5.java	Main program	Android phone
BluetoothComm.java	Contains Bluetooth communication modules	Android phone
AccelerometerReader.java	Contains modules to read accelerometer values and take appropriate actions.	Android phone
Firebird_BT.c	Process the data from Bluetooth module and corresponding actions are taken on FB5	FB5

Deliverables

Filename	Contains
Android_FB5.tar.gz	Source codes for mobile application to read accelerometer and send commands to FB5 via Bluetooth.
Firebird_BT.tar.gz	Source codes for controlling FB5 robot. Contains header files and main executable programs.

Execution Instructions

Instructions for installing Android_FB5 application:

1. Attach the phone with PC using the USB cable.
2. Copy the Android_FB5.apk file found in /Android_FB5/bin/ and paste in some location on the memory card of the phone.
3. Go to that location and open the Android_FB5 file.
4. It will ask the option to “install”, click on “Install”.
5. The application icon appears along with other software.

6. Open the application and feed in the Bluetooth MAC address of the Bluetooth module connected to FB5 in the text box provided. Now click “Connect” to establish connection between phone and FB5.
7. Now tilting the phone in different directions will cause FB5 to move in corresponding direction.
8. The arrow on the UI indicates the direction of movement and colour indicates the speed. For higher speed colour starts turning reddish.

Instructions for editing the Android_FB5 source code:

1. Install Eclipse IDE 3.5 (for Linux). Instructions on how to install can be found here..
<http://www.eclipse.org/downloads/download.php?file=/technology/epp/downloads/release/helios/SR1/eclipse-java-helios-SR1-linux-gtk.tar.gz>
2. Install Android SDK with Android Platform 2.1. Instructions on how to install can be found here..
<http://developer.android.com/sdk/installing.html>
3. To view source files, open the required file from
/Android_FB5/src/com/iitb/android_fb5/
4. To edit the source file and recompile them, make a new project and copy following files to the working project directory:
 - a. /Android_FB5/src/com/iitb/android_fb5/Android_FB5.java
 - b. /Android_FB5/src/com/iitb/android_fb5/BluetoothComm.java
 - c. /Android_FB5/src/com/iitb/android_fb5/AccelerometerReader.java
 - d. /Android_FB5/res/main
 - e. /Android_FB5/AndroidManifest
 - f. Copy paste all icon files from /Android_FB5/res/drawable-hdpi/ to the corresponding location in working project folder.
5. Now edit the code as required and build.
6. Install the application as described earlier.

Configuring and Interfacing Bluetooth module (LM400) with FB5

For reception of the command via Bluetooth ,we have used Bluetooth module LM400. The interface of LM400 to host system is UART.

1. LM400 works on 3.3V supply & Firebird V has 5V supply so for LM400 power supply is designed using LM317 voltage regulator IC.
2. LM400 has to be first configured before connecting it to Firebird V .For that LM400 UART pins are connected to PC-serial port through MAX232 IC and LM400 UART receiver's pin is given input through potential divider circuit as shown in below figure so as to make TTL logic level 5V to 3.3V.
3. LM400 is configured using the TERMINAL software of PC through which PC's serial port can be accessed. By default LM400 has baud rate of 19200 and hardware flow control. For communicating with FB5 it has to first set at the baud rate of 9600 with no hardware control. For this from the terminal of PC ATL1 is sent to the

module through serial port of PC for making its baud rate 9600 and ATC0 for disabling flow control. Now the module is ready for interfacing with FB5.

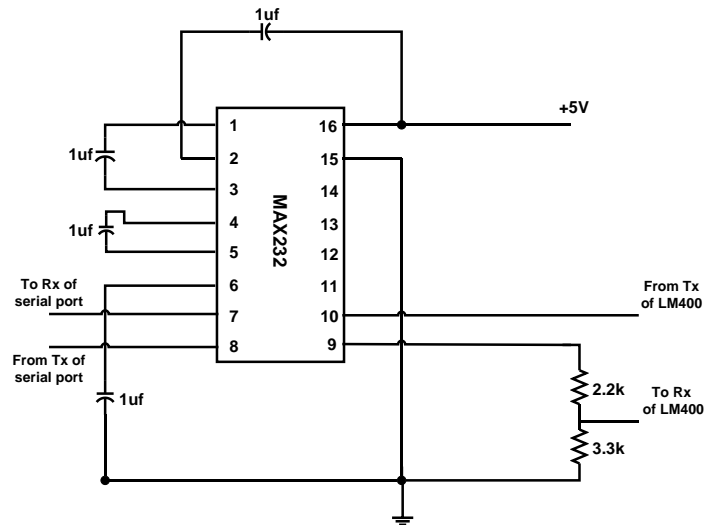


Fig: Interfacing ckt. of LM400 with PC-serial port

4. Bluetooth module is interfaced with FB5 through expansion slot present in FB5. UART2 of ATMEGA2560 is used for serial communication with module. Rx & Tx pin of LM400 is connected to pin 1 & 2 of expansion slot respectively. Power supply is taken from pin 21 & 23 of expansion slot. Also jumper J1 of FB5 is to be changed so that UART2 of ATMEGA2560 gets connected with expansion port of FB5 (refer FB5 hardware manual).

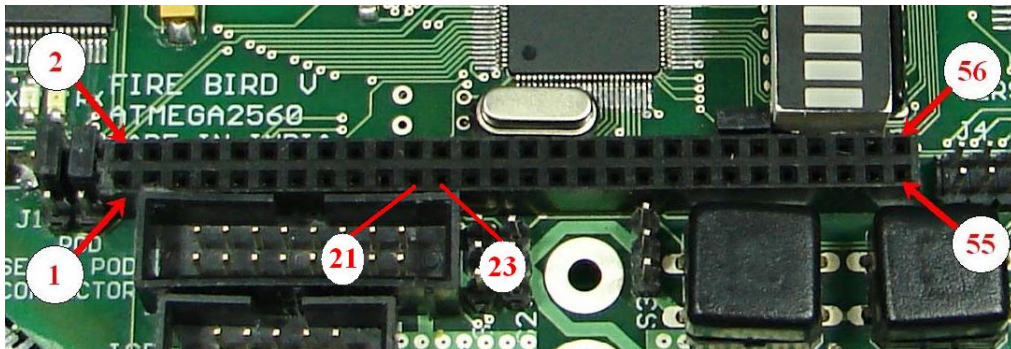


Fig: Expansion slot of FB5

Now FB5 is ready to get instruction from Bluetooth module.