Implementation of Driver Framework in Controlling and Monitoring Through Android

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Abstract - **This project describes the controlling the robot using wireless Bluetooth technology via android application. The application robot control interaction display. We fix the camera to the robot for monitor the robot through android mobile. The prototype of the mobile robot is based on the wireless technology. This kind of robot can be helpful for spying in war fields.**

Index Terms - **Android mobile, Bluetooth technology, mobile robot**

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I. INTRODUCTION

The advent of new high-speed technology and growing computer capacity provides opportunity for new robotic controls. This technical improvement together with the need for high performance robots created faster, more accurate and more intelligent. Similarly mobile devices also exponentially growing on market. They also expanded from telephonic conversations into small pocket personal computers with operating systems, and also expand from touch driven devices to voice command devices.

Android is not only using GSM/UMTS cellular phone networks, it also using wireless technologies like Bluetooth, Wi-fi, Nfc, etc. In general robots are controlled through wired networks. The programming of robot takes time if there any changes in programming its has to reprogram again. Thus they are not user friendly and worked along with user preferences. All this possibilities created another eco-system and manufactures of various construction kits are using mobile device as remote control. In this modern environment everybody uses smart phones which are apart of their day-to-day life. This project approached a robotic movement control through the smart phones.

Hence the dedicated application is created to control an embedded robotic hardware. The application controls the movement of the robot. The embedded hardware is developed on beagleboard-XM and to be controlled by a smart phone on the basis of android platform. Beagleboard-XM is to receive the commands from smartphone takes the data and control the motors of robot by the motor driver L293D. Smartphone is interfaced to the device using Bluetooth . Bluez is installed in beagleboard-XM for make it a Bluetooth compatible device. Then the communication is done between the smartphone and the beagleboard-XM.

II. ANDROID APPLICATION DEVELOPMENT

It is a process by which application software is developed for low-power handheld devices, such as mobiles phones or tablets. Mobile app development has been steadily growing both in terms of revenues and jobs created.

This software development is the process by which new application are created for the Android operating system. Applications usually developed in the Java programming language using the Android SDK. The officially supported IDE(integrated development environment) is Eclipse using the Android Development Tools(ADT) plug in.

Eclipse is an IDE which contains a base workspace and an extensible plug in system for customizing the application environment. Written mostly in java , Eclipse can be used to develop application in Java. By means of various plug ins, Eclipse may also be used to develop applications in other languages. The Android SDK includes a comprehensive set of development tools. It includes libraries, debuggers etc. This application is interfaced with Bluetooth communication and acts as a remote controller for the robot.

III. DRIVER FRAMEWORK

Porting:

In this project the processor is ARM Cortex A8 which can run under the LINUX Operating System. Because of the open source provided by the Linux it's easy to write the driver programming for Bluetooth. For making the beagleboard-XM as a standalone kit porting should be done. In porting we can have image files. Dump that image files in beagleboard-Xm so the board is run on Linux operating system.

Blue Z:

For communication between the linux and android the BlueZ is used. It is a Bluetooth stack protocol. This Bluez contains RFcomm, L2CAP, HCI protocols., so the controller can control the robot by using any protocols. So the user should install Bluez in linux it creates a .img file, dump that file also in beagleboard-Xm. By using the drivers in beagleboard-XM, it acts as a small computer we cannot add external devices like Bluetooth module HC-05/HC-06 for the communication. The BlueZ image in beagleboard-XM acts as a Bluetooth.

Device Driver:
Finally writing the driver program for Bluetooth according to the application so Bluetooth is compatible for the beagleboard-XM. The transmitting and receiving of the data is done by the help of Bluetooth.

IV. PROPOSED SYSTEM

In existing systems were used the RF transmitter and receiver and GSM based   Robotic control. It has a drawbacks such as the system requires more energy, cost consumption also high. The controlling unit and robot unit must be in line of sight. For changing the mobile phones the controlling unit must be reprogrammed so the operation of control unit is based on mobile phones.

To overcome from those problems a new system is proposed to perform the robotic control by a smart phone. Which acts as a transmitter unit and it interfaced with robot by Bluetooth module. The AT commands are given by the android application through Bluetooth for robotic control. Thus a motion video is captured by the camera it will transmitted to an android mobile via Bluetooth.

Our proposed system is dividing into two units transmitter unit and receiver unit. In transmitter unit the android mobile is transmitter and receiver unit is robot unit. The communication is done bi directionally. The block diagram of receiver and transmitter unit is shown in fig.
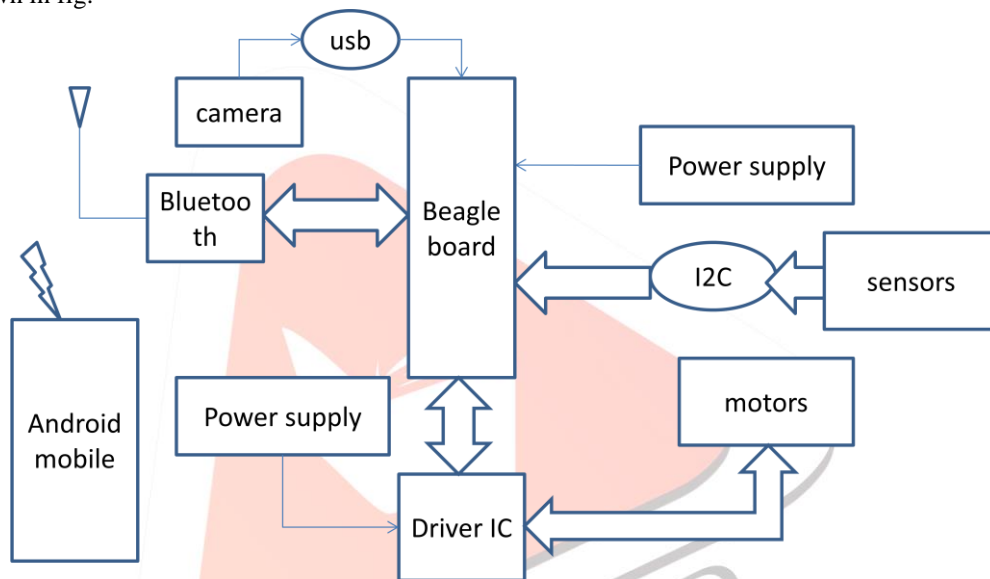

Fig1:Block diagram for proposed system

V. WORKING OPERATION

1. Robot unit

In this proposed system the communication done bi directionally. The android mobile is act as a transmitter, through an android application the robot can be control the whole system is communicate through Bluetooth. In the transmitting end the mobile is having Bluetooth it capable to cover 100-200 meters. AT commands are given by the android mobile those commands are transmits through the Bluetooth.

In receiver end the AT commands are received by the Bluetooth module by those commands the robot is controlled. When the AT commands are received by the Bluetooth it sends that commands to beagleboard-XM from that the commands are decode transmits to the motor driver/driver IC. By the help of motor driver the servo motors are rotating. There are two motors connected to the motor driver one motor is controls left wheels and another is controls right wheels.

From the transmitter, controller pressed the left button in receiver side left motor is stop and right motor is switch on. If controller pressed the right button in receiver side right motor is stop and left motor is switch on. For forward and backward both the motors are switch on. The L293D motor driver is used to control the system. It is used to make rotate the servo motors.

Camera is mounted on the robot for monitoring the location of the robot through the Bluetooth it transmits the video image to the android mobile application. It captures video up to 50 meters distance. By that video image we can control the robot movement. Sensors are connected to the robot sensors like temperature sensors, metal detecting sensors etc. So those sensors sense the objects and given that info to the beagleboard-XM from there through Bluetooth it transmits that info to android mobile. In android the notification/alert should be given to the controller.

2. Android unit

Android is a very familiar word in the world today. millions of devices are running Google android OS and million applications are developed daily. The android application is developed by the help of Java IDE with android SDK plug in. In first phase all the ingredients include elements like a screen for app, buttons for movement, images, labels, animations and more. In GUI we can made graphically and through Java we can set the length and breadth of a buttons.

The video viewing is runs at background. Through the Bluetooth both movement control and video capturing is transmits and receive.
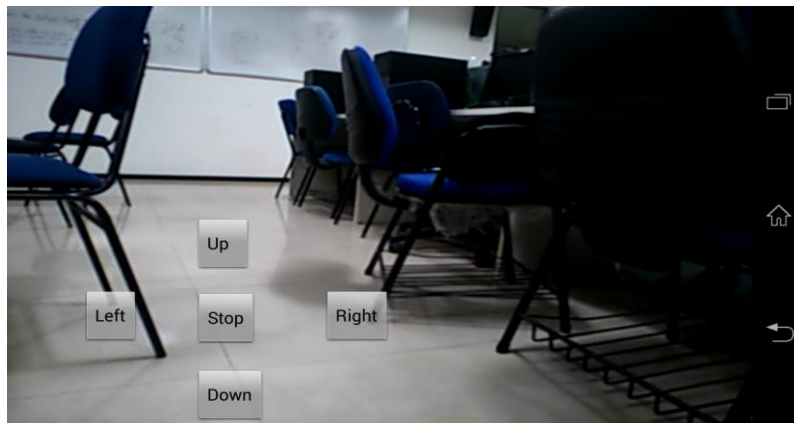

Fig2: Android application

VI. CONCLUSION

In this project we achieved control both wireless communication between the mobile robot Android GUI Application. The main aim of this project to make a surveillance robot which can control by the emerging android technology.

This system can further be developed by enhancing the performance and adding more features. Further development like robot can be control by using ZiGbee, attach some sensors like gas ,thermal, connecting robotic arms.

The development of this system has wide area of applications such as in military and Law enforcement and industrial and in Disaster management and so on. Using the device drivers in this system the work is distributed and becomes easy to handle everything.

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