

MOBOT ROBOT MOVEMENT CONTROL USING ANROID SMARTPHONE

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Abstract :Nowadays smart phones are becoming more powerful with reinforced processors, larger storage capacities, richer entertainment function and more communication methods.andRobot is an integral part in automating the flexible manufacturing system that is greatly in demand these days.Robots are smart machines that can be programmed and used in many areas such as industry, manufacturing, production lines, or health, etc.in this project anroid act as remote for a robot.

I. INTRODUCTION

The project aims in designing a Robot that can be operated using Android mobile phone. The controlling of the Robot is done wirelessly through Android smart phone using the Bluetooth feature present in it. In the project the Android smart phone is used as a remote control for operating the Robot. The controlling device slave & sensors of the system is implemented by Microcontroller. Bluetooth module, DC motors are interfaced to the Microcontroller. The data received by the Bluetooth module from Android smart phone is fed as input to the controller. The controller acts accordingly on the DC motors of the Robot. In achieving the task the controller is loaded with a program written using Embedded 'C' language.Android is a software stack for mobile devices that includes an operating system, middleware and key applications. Android boasts a healthy array of connectivity options, including Wi-Fi, Bluetooth, and wireless data over a cellular connection (for example, GPRS, EDGE (Enhanced Data rates for GSM Evolution), and 3G). Android provides access to a wide range of useful libraries and tools that can be used to build rich applications. In addition, Android includes a full set of tools that have been built from the ground up alongside the platform providing developers with high productivity and deep insight into their applications.

2.System Design and Architecture

2.1 Bluetooth Module

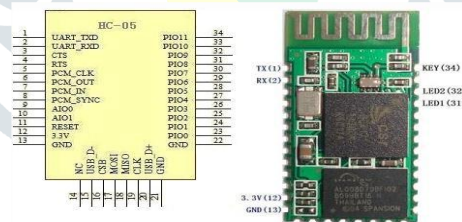


Figure 2.1 HC-05 Bluetooth

Bluetooth is a packet-based multi-layer wireless protocol with Master-slave model. In Bluetooth, one Master may communicate upto 7 slaves in a „piconet“. In this, RF Layer operates in unlicensed ISM band of 2.4GHz. In this paper, Bluetooth HC-05 is used which has a Chipset CSR BC417143. The Bluetooth version is V2.0+EDR. It has Flash 8Mbit and operates at voltage 3.3V [5]. The size of Bluetooth module is 26.9mm*13mm*2.2mm. The pin diagram of Bluetooth and Bluetooth module

2.2 DC Motor



Figure 2.2 DC Motor

Four Stepper DC motor is used to move the arm, gripper and vehicle forward or backward. A stepper motor is a brushless DC electric motor that divides a full rotation into a number of equal steps. The position of motor can be commanded to move and it holds one of these steps without any feedback sensor. It is an open-loop controller. When DC voltage is applied to their terminals, it rotates continuously. It converts a train of input pulses known as square wave pulses into a precisely defined increment in the shaft position. Each pulse moves the shaft through a fixed angle.

2.3 Microcontroller

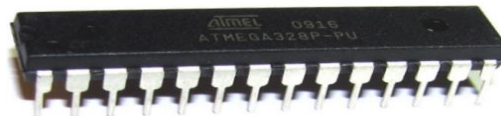


Figure 2.3 ATMEGA 328P-PU

A microcontroller is an entire computer manufactured on a single chip. Microcontrollers are usually dedicated device embedded within an application. For example, microcontrollers are used as engine controllers in automobiles and as exposure and focus controllers in cameras. In order to serve these applications, they have a high concentration of on-chip facilities such as serial ports, parallel input/output ports, timers, counters; interrupt control, analog-to-digital converters, random access memory, read only memory, etc. The I/O, memory, and on-chip peripherals of a microcontroller are selected depending on the specifics of the target application. The degree of control and programmability they provide significantly enhances the effectiveness of the application.

2.4 Power Supply



Figure 2.4 Battery

9V power supply is given to the system using the batteries.

2.5 Motor Driver



Figure 2.5 Motor Driver

Motor driver is used to drive the motors used in this project. Motor driver is connected to the microcontroller. Microcontroller gives the 5 milliamp output which is not sufficient enough to drive the DC motors that's why we use motor driver.

3. System Architecture

Robot is an integral part in automating the flexible manufacturing system that is greatly in demand these days. Robots are now more than a machine, as robots have become the solution of the future as cost labor wages and customers' demand. Even though the cost of acquiring robotic system is quite expensive but as today's rapid development and a very high demand in quality with ISO (International Standard Organization) standards, human are no longer capable of such demands. Research and development of future robots is movingly at a very rapid face due to the constantly improving and upgrading of the quality standards of products. Robot and automation is employed in order to replace human to perform those tasks that are routine dangerous, dull and in a hazardous area.

Android is a software stack for mobile devices that includes an operating system and key applications. Android applications provide access to a wide range of useful libraries and tools that can be used to build rich applications. Android also includes a full set of tools that provides developers with high productivity and deep insight into their applications. The data received by the Bluetooth module from Android smart phone is fed as input to the controller. Thereby, the controller acts accordingly on the DC motors to move in the entire robot in all the four directions using the Android phone.

An Android smartphone will act as remote controlled device for movement of the robot. An Android application will be developed for the same. The application will support only the 4.0 and above versions of Android Operating System. The Bluetooth module will act as an interface between Smartphone and microcontroller .This system will be using HC-05 Bluetooth module for the system, which can be used as either master or slave. Generally our master will be smartphone and slave will be Bluetooth module. Bluetooth module will give the commands given by smartphone to the microcontroller.

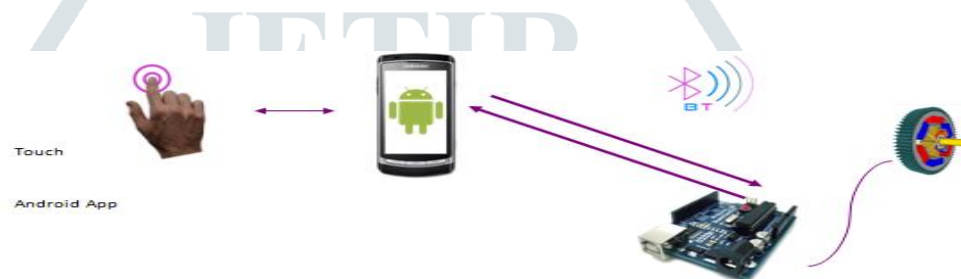


Figure 3.1 Architect

Diagram

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This is the architecture diagram of our project in which the android smartphone acting as remote to control the moment of robot. The android app provide touch interface to operate the working robot. The android app connects with robot using Bluetooth technology. The robot contains the microcontroller to control the whole operation of the robot.

3.3 Flowchart

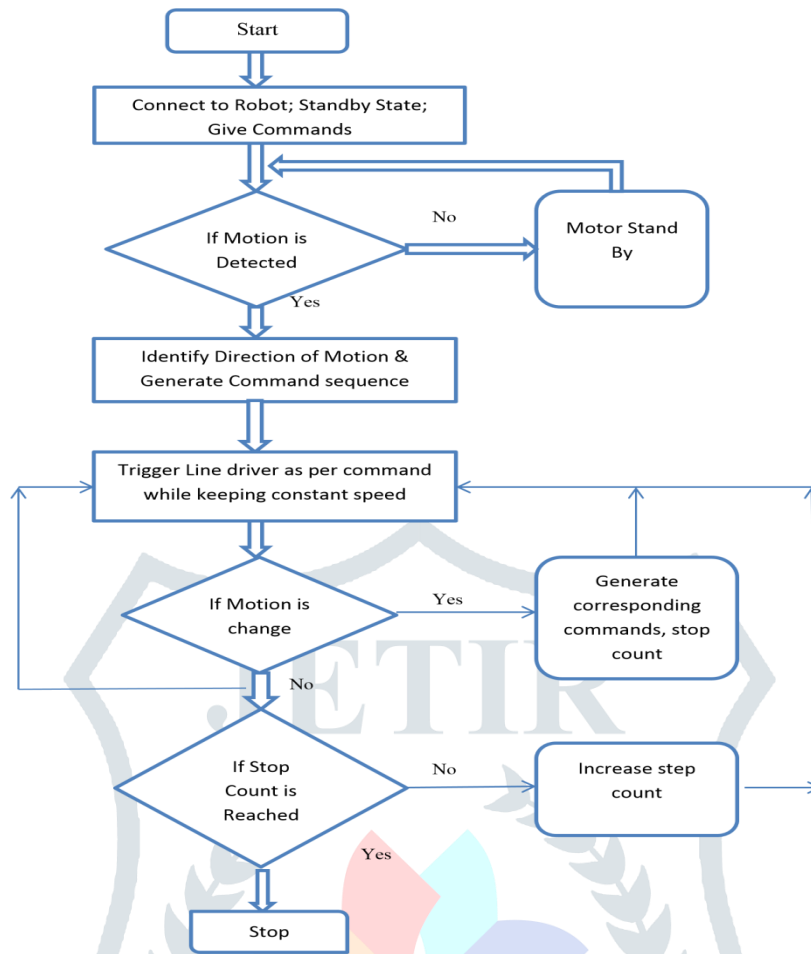


Fig-3.3 Flow Chart

4. Software Implimentation

4.1 Android Studio

Android Studio is the official IDE for Android app development, based on IntelliJ. Android Studio provides graphical tools for creating and managing Android projects, which contain everything that define your Android apps, from app source code to build configurations and test code. Each project contains one or more different types of modules, such as application modules, library modules, and test modules. On top of the capabilities you expect from IntelliJ, Android Studio offers:

- Flexible Gradle-based build system
- Build variants and multiple APK file generation
- Code templates to help you build common app features
- Rich layout editor with support for drag and drop theme editing
- Lint tools to catch performance, usability, version compatibility, and other problems
- Code shrinking with ProGuard
- Built-in support for Google Cloud Platform, making it easy to integrate Google Cloud Messaging and App Engine

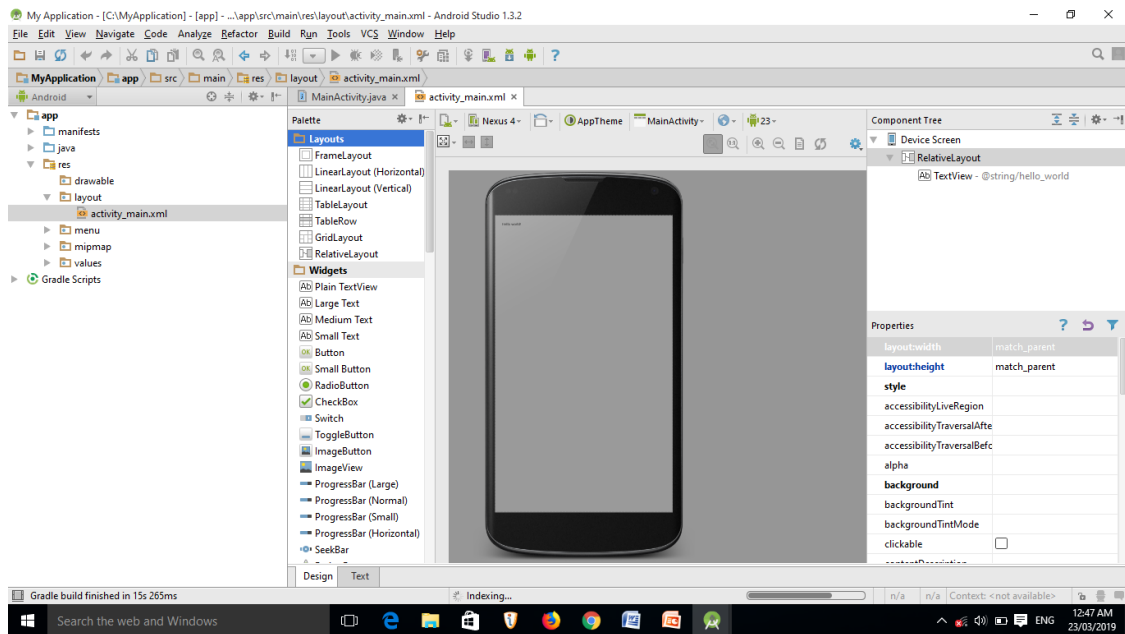


Fig-4.1 Android Studio

Android is very popular now, especially ADK (Android Open Accessory Development Kit), which allows external Open source hardware to connect with Android system by USB and interact with an Android-powered device in a special “accessory” mode. We keep working on it for weeks, and try to assemble some bata prototype and make a library for the communication between Android and Arduino by bluetooth and Freaduino for ADK. With the Google providing source files, To make the communication between Android and Arduino easy, we would like show you a new way that android interact with Arduino.

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6.3 Mobot Application



Fig-6.3 Front View

This is our Android application which is support to minimum android version 4.0.1 and above. This application contain 5 buttons such as forward, backward, right, left, stop which is used control movements of robot.

5. APPLICATIONS

1. The robot is small in size so can be used for spying.
2. This robot can be used in the borders for disposing hidden land mines.
3. The robot can be used for surveillance or reconnaissance.
4. Multiple uses like home automation, wheel chair, military application.
5. Easy interface to control the Robot.

6. CONCLUSIONS

For a proper analysis of positive points and constraints on the project, it can be concluded that, this project used an open source platform Android has been widely used in Smartphone. Android has complete Software package consisting of an Operating System. This project is to provide powerful computation Android Platform with Simpler Robot's Hardware Architecture. This project control a Robot using mobile through Bluetooth communication. It will work in various Industry and Military's we developed Android application “Mobot-Robot Movement Control Using Android Smartphone”.

7. FUTURE SCOPE

- It can be built further to work as a HUMANOID.
- It can have many uses in practical fields from teenager's robots to robots working in industries.
- It is helpful in wars as a part of spying.
- The proposed robot can be further improved in terms of decision taking capabilities by employing varied types of sensors and thus could be used in big industries for different applications.

8. REFERENCES

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