Android App Based Robot

Aiman Ansari [*1], Yakub Ansari[*2], Saquib Gadkari[*3], Aarti Gokul[#4]

Department of Computer Engineering
Xavier Institute of Engineering, Mumbai, India

Abstract- **Today human-machine interaction is moving away from mouse and pen and is becoming much more pervasive and much more compatible with the physical world. With each day passing the gap between the human and the machines is being reduced with the introduction of new technologies to ease the standard of living. The purpose of this project is to design and implement a Vacuum Robot. Vacuum Cleaner Robot is designed to make cleaning process become easier rather than by using manual vacuum. The main objective of this project is to design and implement a vacuum robot prototype by using Arduino Uno, Motor Shield L298n and to achieve the goal of this project, knowledge about the sensor, controlled motor circuit and compatible software need to be determined. Vacuum Robot will have several criteria that are user-friendly, organized and efficient, which meets human needs.**

Key Words - Vacuum Cleaner, Smart Phone, Bluetooth.

1. INTRODUCTION

Robots are smart machines that can be programmed and used in many areas such as manufacturing, industry, production lines, or health, etc. These robots performs hard, dangerous, and accurate work to facilitate our life and to increase the production because they can work 24 hours without rest, and performs like human but more precisely and with less amount of time. Assistive mobile robots that perform different kinds of work over everyday activities in many areas such as industry, product lines, manufacturing, or health, etc are very commonly used to improve our life. The idea behind this research is to exploit robotics usage in household work.

A Smartphone is a mobile phone built on a mobile computing platform, which has more advanced connectivity and computing ability than what a feature phone has. Smartphone's are a more efficient and affordable hand held devices which can be used to support collaborative activities in a community. It is a result of a huge and remarkable advancement in the field of mobile phones technology. Human beings are anxiously working on finding new ways of interacting with machines. Vacuum cleaner is designed to make cleaning process become easier for human task. This project is a combination of hardware and software which has microcontroller, motor shield, sensor, an android application and finally a Bluetooth module via which the hardware connects the software.

Smartphone, a small yet powerful device is rapidly changing its traditional ways of human-machine interaction. Nowadays, Modern smart phones are embedded with Bluetooth module, accelerometer sensor and are powered by different operating systems such as Symbian, Bada, and Android OS etc. Among all available

mobile operating systems Android OS has gained significant popularity after being launched in the year 2008, overtaking all its previous competitors due to performance and open architecture Android platform brought a big revolution in the field of application development for cell phones, opening for technical exploration. The Android Smartphone can be freely rotated in space, temporarily varying 3D signal data is obtained from the phone's 3-axis acceleration sensor. This data is transmitted via Bluetooth module of Smartphone using an android app to the robot. Further, this data is processed by a microcontroller embedded on the robot to perform desirable motions. In this context, a robot is similar to any machine that is controlled by man varying from a simple toy to heavy machinery. Robots have replaced humans in performing various tasks that human are unable to perform due to physical disability, extreme environments or size limitation. Smartphone's have proved to be of much more aid than being a device just for making calls. The large world is merging together into the palms of humans in the form of a Smartphone. A lot of research work in this context has been explored and presented in the next section.

In this section i.e. section 1 we gave a brief introduction about how the vacuum cleaner will operate via a mobile application to make human life easy. In section 2 we will discuss about the background details about the project which includes about the android platform, connectivity, dc motor, l298n motor shield and Arduino uno board. In section 3

2. BACKGROUND

This section takes a vast look at Android smart phones and its features, hardware components, and how Smartphone will help to develop a community in the environment it is used in.

2.1. Android Platform

Android Platform is powerful mobile computer and they become more and more popular smart phones used worldwide. They become more and more popular for software developers because of its powerful capabilities and open architecture; also it is based on JAVA programming language. Because android uses JAVA programming language getting started with the Android API is easy; the API is open and allows easy access to the hardware components. Android device provides numerous communication interfaces like USB, WI-Fi, Bluetooth that can be used to connect to the robot. It is a great platform for robotic for robotics system control, because it is much cheaper than any other ARM-based processing unit. We have chosen android platform because it is the

widest used platform in the world and runs the largest number of smart phones worldwide.

2.2. Connectivity

For the communication of the robot with the cell phone or a mobile we are using the Bluetooth device. The Bluetooth device (HC-06) is attached to the robot that receives the data from the mobile and also it can transmit the data. It is used for converting serial port to Bluetooth. It has two modes: Master and Slave.

Bluetooth: Bluetooth is a wireless communication protocol running at the speed of 2.4 GHz with the architecture of client-server and which is suitable for forming personal area networks. It is designed for devices such as mobile phones (low power).

Bluetooth is the only appropriate communication protocol because there is no fear of getting the frequency interference. Bluetooth protocol uses the MAC address of the device. Bluetooth gives the connectivity between two devices using their MAC address.

2.3. Dc motor

Almost every mechanical movement that we see around us is accomplished by an electric motor.

Electric machines are means of converting conventional energy. Motors take electrical energy and produce mechanical energy. Electric motor is used to power hundreds of devices we use in everyday life. An example of motor used in day to day life is automobiles, food blenders and so is vacuum cleaner.

2.4. L298n Motor Shield

Double H driver module uses L298N dual full-bridge motor driver, an integrated monolithic circuit in a 15- lead Multi watt package. It is a high current dual full-bridge driver, high voltage designed to accept standard TTL logic levels and drive inductive loads such as DC, stepping motors and relays. Two enable inputs are provided to enable or disable the device independently of the input signals. The emitters of the lower transistor of each individual bridge are connected together and the corresponding external terminal can be used for the connection of an external sensing resistor. An additional supply input is given so that the logic works at a lower voltage.

2.5. Arduino Uno Board

The Arduino Uno 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 ceramic resonator, a USB connection, a power jack, an ICSP header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with an AC-to-DC adapter or battery to get started.

3. DESIGN

The Android app is generally developed using JAVA language. The app controlling this vacuum robot can be built without having the knowledge in java language. It is called as "BLUEARD" developed by MIT App Inventor. Shown below is a diagram which shows the interface of the app. The app shown below has 5 buttons and all the

button gives 5 different bytes in the output that is to be fed to the microcontroller to further process. For e.g. if we press Go! Button, the Bluetooth module will give 1 byte at its output.
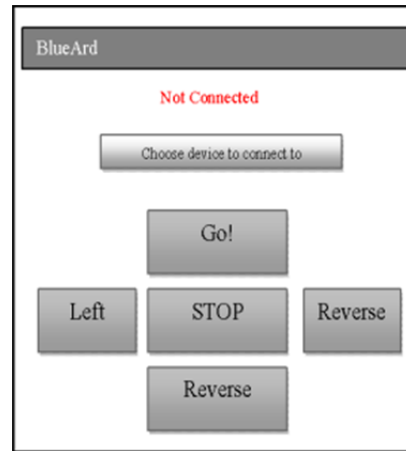
Figure 3.1:- . Application Display 1

The app invented by these searches for the Bluetooth devices along with their MAC addresses. The user just needs to select a particular MAC Address.

When a particular MAC is selected, the status shown on the screen is "Connected". Now all the buttons are active and the app is now connected with the robot and mobile phone can control the robot, like shown below.
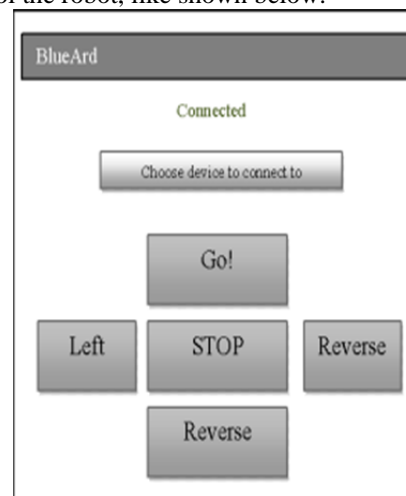
Figure 3.2:- Application Display 2

3.1. Block diagram

A smart phone android operated robot. Now here is a simple to control your robot using Bluetooth module HC-06 and Motor shield with your Smartphone device. The controlling device of the whole system is Arduino Board, Bluetooth module and dc motor is interacted to the device. The data received by the Bluetooth module from android Smartphone is fed as input to the controller. The controller acts according to the dc motor of the robot. The robot can be moved in all the four direction. In achieving the task the controller is loaded with program written using Embedded 'C' language. Android smart phone controller Bluetooth
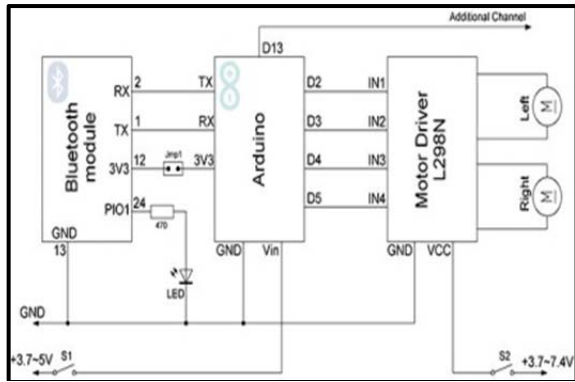
Figure 3.1.1:-   Block Diagram

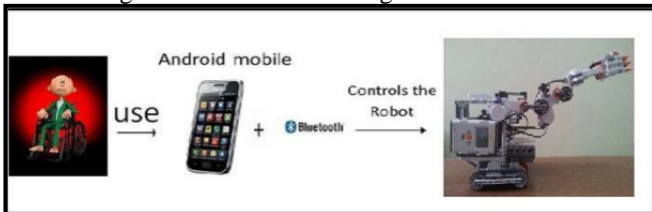Robot using Arduino is shown in figure below.

Figure 3.1.2:- Connectivity

Like the above diagram displays that the user controls the robot via the smart phone using and Bluetooth module through which he can give commands to the machine.

3.2.   Mobile Application

The mobile Application consists of 5 buttons viz. Reverse, Left, Go, Right and Stop
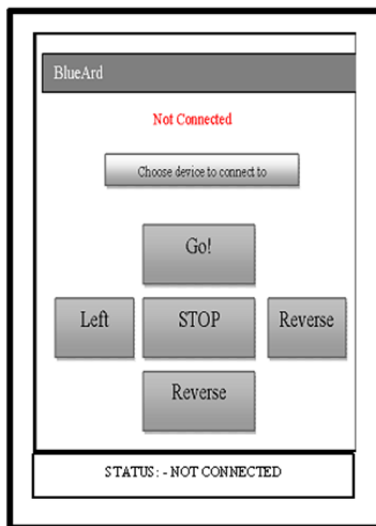

Figure 3.2.1:- Status Showing NOT CONNECTED

The above screen consists of an overlook of the app. Right now all the 5 buttons are disabled until the Bluetooth is connected.
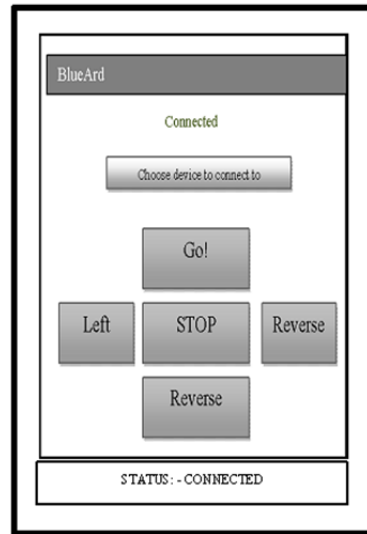

Figure 3.2.2:- Status Showing CONNECTED

Now Since the Bluetooth is connected to another Bluetooth Module the status shown is "Connected"

4.   CONCLUSION

We have surveyed different components that are going to be used in the project and have studied about the components. Completion of this project will bring a new product to the world to increase speed and efficiency. In developing this project, new and innovative solution were needed . Overall the learning objective of this project provided an opportunity to research beyond the academic requirements.

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