

## **A MOTION CONTROLLED ROBOT DRIVED BY TWO INTERNAL ROTORS**

Gisha Elizabeth George

K. Preetha. M.E.

**Abstract-** This paper presents a motion planning for a robot actuated by two internal rotors and is controlled by android smart phone using Bluetooth module. Additionally to the features, can find the robot position using a Global Position System (GPS) navigator and the PIR Sensors is used to control the robot movements. The automatic obstacle detection while moving of robot is sensed using two ultra-sonic sensors. The powerful DC motor having an internal rotor to carry the body of robots, its movement can be controlled externally by sending signals through wireless communication. For the security purpose, it will alert the indication whenever the fire present in the environment by the sensors, the light is sensed by LDR sensor. Stimulation and experimental results are providing to validate the proposed system.

**Index Terms**— Android Smartphone, Robot, Bluetooth Module, microcontroller chip

### **1. INTRODUCTION**

A robot is usually an electro-mechanical machine that is guided by computer and electronic programming. In recent years, there are a unit growing demands on artificial intelligence all told sectors attributable to the age quake, silver society and man power shortage. They're thought to be nonconventional wheeled locomotion machines that may be useful once the usage of ancient vehicles is restricted or

undesirable. Currently artificial intelligence is therefore advanced with device, mechanism and machine intelligence; it's expected to create abundant wider applications to sector. There has been a good deal of activity within the generation of economical motion designing algorithms for robots. 1st driven by the theoretical challenges display by these systems was supported by the sensible relevancy of nonholonomic behavior, that arises, and should be restricted, in several advanced robotic systems, like wheeled mobile robots, dextrous manipulation mechanisms, and area robots. the sort of robots that you just can encounter most often area unit robots that work that's too dangerous, boring, onerous, or simply plain nasty. They'll be found in motor vehicle, medical, producing and area industries. Nowadays android phones have become a lot of powerful with reinforced processors, larger storage capacities, richer entertainment perform and a lot of communication ways. Bluetooth is principally used for information exchange; add new features to android phones. Bluetooth technology, created by telecom seller Ericsson in 1994[1], shows its advantage by group action with sensible phones. It modified however people use digital device reception or workplace, and has transferred ancient wired digital devices into wireless devices. a number Bluetooth device is capable of communicating with up to seven Bluetooth modules at same

time through one link [2]. Considering its traditional working space of among eight meters, it's particularly helpful in home surroundings. impart for Bluetooth technology and other similar techniques, with dramatic increase in Smartphone users, android phones have bit by bit turned into AN general-purpose transportable device and provided individuals for their daily use [3][4]. In recent years, AN ASCII text file platform golem has been wide utilized in android phones [5]. Golem has complete software package package consisting of a package, middleware layer and core applications. Totally different from alternative existing platform like iOS (iPhone OS), it comes with software package development kit (SDK), that provides essential tools and Application. During this paper we have a tendency to gift a review of current robots controlled by transportable and discuss a closed loop management systems victimization audio channels of mobile devices, like phones and pill computers. This text is organized as follow: Section two describes the motivation of the work, Section three describes our experimental setup, Section four depicts a discussion about our experimental setup and Section five presents our conclusions.

## 2. PURPOSE

The purpose of our analysis is to produce less complicated robot's hardware design however with powerful procedure platforms in order that robot's designer will specialize in their research and tests rather than Bluetooth affiliation

infrastructure. This easy design is additionally helpful for educational artificial intelligence, as a result of students will build their own robots with low price and use them as platform for experiments in many courses.

Common control architectures: the subsequent list shows typical robot control architecture:

### 2.1 PIC 16F877A

This powerful (200 nanosecond instruction execution) yet easy-to-program (only 35 single word instructions) CMOS FLASH-based 8-bit microcontroller packs Microchip's powerful PIC® architecture into an 40- or 44-pin package and is upwards compatible with the PIC16C5X, PIC12CXXX and PIC16C7X devices. The PIC16F877A features 256 bytes of EEPROM data memory, self programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, the synchronous serial port can be configured as either 3-wire Serial Peripheral Interface (SPI™) or the 2-wire Inter-Integrated Circuit (I<sup>2</sup>C™) bus and a Universal Asynchronous Receiver Transmitter (USART). All of these features make it ideal for more advanced level A/D applications in automotive, industrial, appliances and consumer applications.

### 2.2. HC Serial Bluetooth

HC Serial Bluetooth product consists of Bluetooth serial interface module and Bluetooth adapter. Bluetooth serial module is employed for changing port to Bluetooth. This module has 2 modes: master and slaver device. The device

named when even variety is outlined to be master or slaver once out of manufacturing plant and can't modified to the opposite mode. except for the device named when odd variety, users can set the work mode (master or slaver) of the device by AT commands. HC-06 Specifically includes:  
Master device: HC-06-M, M=Master  
Slaver device: HC-06-S, S=Slaver  
The main perform of Bluetooth serial module is exchange the port line, such as: One connects to Bluetooth master device whereas the opposite one hook up with slaver device. Their association may be engineered once the try is created. This Bluetooth association is equivalently likable to a port line association together with RXD, TXD signals. And that they will communicate with every other.

### 2.3 L293D

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

L293D contains two inbuilt H-bridge driver circuits. In its common mode of operation, two DC motors can be driven simultaneously, both in forward and reverse direction. The motor operations of two motors can be controlled by input logic at pins 2 & 7 and 10 & 15. Input logic 00 or 11 will stop the corresponding motor. Logic 01 and 10 will rotate it in clockwise and anticlockwise directions, respectively.

Enable pins 1 and 9 (corresponding to the

two motors) must be high for motors to start operating. When an enable input is high, the associated driver gets enabled. As a result, the outputs become active and work in phase with their inputs. Similarly, when the enable input is low, that driver is disabled, and their outputs are off and in the high-impedance state.

Almost each mechanical movement that we have a tendency to see around US is accomplished by an electrical motor. Electrical machines are suggests that of changing energy. Motors take electrical energy and turn out energy. Motor is used to power many devices we have a tendency to use in lifestyle. An example of tiny motor applications includes motors used in vehicles, robot, hand power tools and food blenders. Micro machines are electrical machines with elements the size of red blood cells and realize several applications in medicine.

### 2.5 UART

A universal asynchronous receiver/transmitter, abbreviated UART is a piece of computer hardware that translates data between parallel and serial forms. UARTs are commonly used in conjunction with communication standards such as EIA, RS-232, RS-422 or RS-485.

The universal designation indicates that the data format and transmission speeds are configurable. The electric signaling levels and methods (such as differential signaling etc.) are handled by a driver circuit external to the UART.

A UART is usually an individual (or part of an) integrated circuit used for serial

communications over a computer or peripheral device serial port. UARTs are now commonly included in microcontrollers. A dual UART, or DUART, combines two UARTs into a single chip. An octal UART or OCTART combines eight UARTs into one package, an example being the NXP SCC2698. Many modern ICs now come with a UART that can also communicate synchronously; these devices are called USARTs (universal synchronous/asynchronous receiver/transmitter). Several fashionable ICs associate with a UART that can conjointly communicate synchronously; these devices are known as UART.

### 3. BLOCK DIAGRAM

A smart phone Android operated robot. Here may be a simple to manage your robot using HC Bluetooth module and PIC 16F877A microcontroller along with your android Smartphone device. The whole system is controlled by microcontroller. Bluetooth module, DC motors and all alerting sensor are interfaced to the microcontroller. The data receive by the Bluetooth module from android smart phone is fed as input to the controller. The controller acts accordingly on the DC motor of the robot. In achieving the task the controller is loaded with program written using Embedded 'C' Languages. Android smart phone controller Bluetooth robot using microcontroller is shown in figure 1.1.

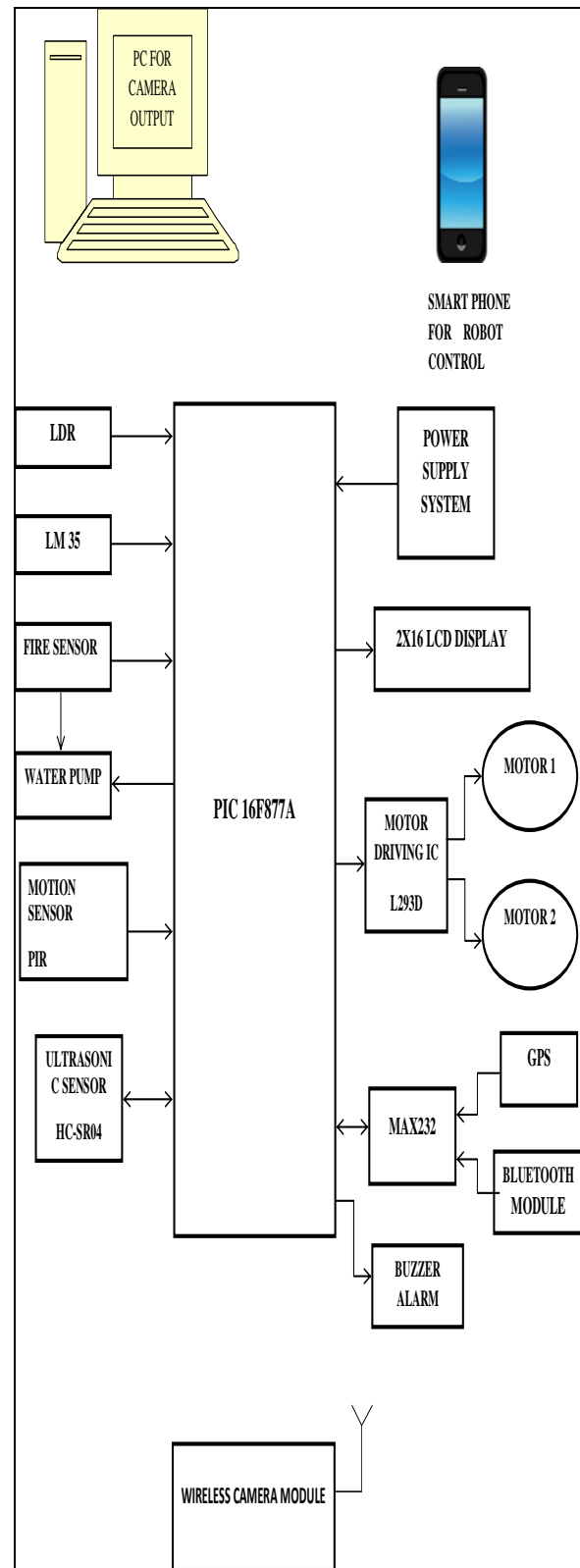


Figure 1.1: Block diagram of android smart phone controller Bluetooth robot using PIC16F877A microcontroller

#### 4. APPLICATION INSTRUCTIONS

**4.1** Initial ensures your HC-06 Bluetooth module is paired together with your mobile. The default password for pairing is “1234” or “0000”. Check the manual of Bluetooth module

**4.2** Click on “SELECT DEVICE” icon to pick paired Bluetooth module.

**4.3** Once press “up arrow” it sends the info “A” to Bluetooth module connected with the circuit. When microcontroller detects “A” the robot moves FORWARD.

**4.4** Once press “DOWN ARROW” it sends the info “B” to Bluetooth module connected with the circuit. When microcontroller detects “B” the robot moves REVERSE.

**4.5** Once press “LEFT ARROW” it sends the info “C” to Bluetooth module connected with the circuit. When microcontroller detects “C” the robot turns LEFT.

**4.6** Once press “RIGHT ARROW” it sends the info “D” to Bluetooth module connected with the circuit. When microcontroller detects “D” the robot turns RIGHT.

**4.7** Once press “STOP” button that is within the centre of remote it sends the info “E” to the Bluetooth module connected with the circuit. Once microcontroller detects “E” the robot gets stopped

**4.8** Click on “DISCONNECT” icon to disconnect paired Bluetooth module



**Figure 1.2:** to Bluetooth connection on to move the robot forward, backward, left and right direction

#### 5. CONCLUSION

Design of New motion controlled robotic system provides the techniques have been developed for motion controlling using android Smartphone. PIC receives data from gps receiver module and identifies its position. The output of the ultrasonic sensor gives the information about presence and distance to any obstacle in front of the robot. PIC controls Bluetooth module to establish a wireless communication with the server PC to send sensory information and get robot movement control signals. Sensors like fire sensor and light sensor are used to alerting threads.

The technology could be easily integrated into industrial, medical, military etc. This simulation tool has enabled us to study the impact of various factors on the effectiveness of in agricultural field and behavior, and to make valid predictions with accurate value.

## REFERENCES

- [1] S. Bhattacharya and S. Agrawal,  
“Spherical rolling robot: A design and  
motion planning studies,” IEEE Trans.  
Robot. Autom., vol. 16, no. 6, pp. 835–  
839, Dec. 2000.
- [2] A. Javadi and P. Mojabi, “Introducing  
glory: A novel strategy for an  
omnidirectional spherical rolling robot,”  
ASME J. Dyn. Syst., Meas., Contr., vol.  
126, no. 3, pp. 678–683, 2004.
- [3] Heidi Monson (1999) bluetooth  
technology and implementations, John  
Wiley & Sons.
- [4] Piyare, R. and Tazil, M. (2011) “  
bluetooth based home automation system  
using Android phones”. IEEE 15TH  
International symposium on consumer  
electronics (ISCE), 14-17 june 2011,  
Singapore.
- [5] Potts, J. and Sukittanon, S. (2012) “  
Exploiting bluetooth on android mobile  
mobile devices for home security  
application”, proceedings of southeastcon,  
15-18 March 2012, orlando, florida,USA.
- [6] HC-06 bluetooth module , [http://www.  
Lanwind.com/files/hc-06 en.pdf](http://www.Lanwind.com/files/hc-06_en.pdf).
- [7] Arduino, ios, android and technology  
tit bits, [http://  
sree.cc/google/android/using-bluetooth-in-  
android](http://sree.cc/google/android/using-bluetooth-in-android).
- [8] Smart phones android operated robot,  
<http://www.sooxmatechnologies.com>