

# Wireless Mobile Robot Single Chip Robot

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**Abstract**—A robot is an electro-mechanical machine that is guided by computer programming. Various kinds of robots have been built across the globe for performing several tasks and can be found easily in factories. We are designing a robot which is connected to an android app. via Bluetooth so that we can control the robot motion with the app. We applied Bluetooth technology to provide a means of communication between controller and android. Controller is interfaced to the Bluetooth module using UART protocol. The motion of the robot is controlled according to the commands received from the android. Pick and Place robots are reprogrammable and tooling can be interchanged in order to complete multiple tasks.

**Keywords**—Bluetooth; Android; Smartphone; Robot; Single Microcontroller Chip.

## I. INTRODUCTION

In today's modern world smart phones became more powerful with reinforced processors, huge data storage capacity, advanced entertainment functions and powerful communication methods. Bluetooth is one of the major data exchange technology used mainly used. This Bluetooth technology was created by Ericsson in 1994[1], and shows its advantage by combining with smart phones. It changed the traditional wired digital devices into wireless devices. A host Bluetooth device can be connected up to seven Bluetooth modules at the same time via one link [2]. As it has a normal working range of eight meters, it is useful especially in home environment. Because of Bluetooth and other similar technologies, smart phones are converted into an all purpose portable device [3][4]. Today in most of the smart phones, an open-source platform Android has been widely used [5]. Android consists of a complete software package including an operating system, middleware layer and core applications. Different from other existing platform like iOS, it comes with a software development kit (SDK), which provides essential tools. Using Smartphone technology and combining it with a robot's architecture to function as the "brain" is already an active research field with several promising possibilities. In our project model, we try to control robot's working with the help of smart phones using Bluetooth. The movement of the robot in upward, backward, left and right direction is controlled by the android application.

## II. PURPOSE

The aim of our research work is mainly focused on to connect robot's complex architecture with Bluetooth technology, in order to replace the wired junctions, and also to increase the range of working of robot. The main objective of this research is to eliminate the wires used for sending commands with the present Bluetooth technology provided by Android smart phones. This project is also useful for educational purposes as students can build their own robots with low cost and use them as a platform for several educational experiments. The following components are discussed below in this article.

### A. AT89S52 Microcontroller

The AT89S52 is especially designed for low-power consumption and for high performance output. It is a CMOS 8-bit microcontroller having 8KB of flash memory. AT89S52 is a combination of high density, nonvolatile memory technology and is well-suited with the industry standard 80C51 instruction set. The AT89S52 is a dominant microcontroller which is a highly flexible and cost-effective solution to many embedded control applications. The AT89S52 is equipped with 8KB of flash memory, 256 bytes of RAM, 32 I/O lines, Watchdog timer, two data pointers, three 16-bit timer/counters, full duplex serial port, on-chip oscillator, and a clock. The AT89S52 is designed with static logic for operation down to zero frequency and supports two software selectable power saving modes. The power down mode saves the RAM contents but freeze the oscillator, by disabling all other function until the next interrupt is reset.

### B. HC Serial Bluetooth

This product consists of Bluetooth serial interface module and Bluetooth adapter. This module has two modes: master and slaver device. The device is named after even number is defined to be master or slaver when out of factory and can't change to the other mode. But for the device named after odd number, users can set the work mode (master or slaver) of the device using AT commands.

HC-06 Specifically includes:

- Master device: HC-06-M, M=Master
- Slaver device: HC-06-S, S=Slaver

The main objective of Bluetooth serial module is to replace the serial port line, such as:

One is connected to the Bluetooth master device while the other one is connected to the slave device. Their connection can only be done once the pairing is completed between them. This Bluetooth connection is like a serial port line connection with RXD, TXD signals and they can communicate with each other.

- When MCU has Bluetooth salve module, it can easily communicate with Bluetooth adapter of laptops and smart phones.
- The Bluetooth devices available in the market are mostly salve devices. So, we have to use master module to make pair and communicate with slave devices.
- Bluetooth serial module’s operation doesn’t need any drive, and can communicate with the other Bluetooth devices also. Communication between two Bluetooth modules requires minimum two conditions:
  - The communication must be between master and Slave.
  - The password must be accurate.

C. L293D

The L293D is a dual H-Bridge motor driver IC. Motor drivers works as current amplifiers since they take a low-current control signal and convert them into a higher current signal. This amplified current signal is used to run the motor. L293D is designed to provide bidirectional drive currents of up to 600-MA at voltages from 4.5V to 36V. It is used to drive inductive loads such as relays, solenoids, dc motors and bipolar stepping motors, as well as other high-current/high voltage loads in positive supply applications. On the L293D, external high-speed output clamp diodes are used for inductive transient suppression.

D. DC Motor

Almost all mechanical movements that we see around us is accomplished by an electric motor. Motors converts electrical energy into mechanical energy. Electric motor is used to operate numerous devices that we use in our everyday life.

E. Universal Asynchronous Receiver-Transmitter (UART)

UART is an individual integrated circuit used for serial communications in which data format and transmission speed is configurable. The electric signaling levels and methods are handled by a driver circuit external to a UART. A UART is a part of an IC which is used for serial communications over a computer. UART are now commonly integrated in microcontrollers.

III. BLOCK DIAGRAM

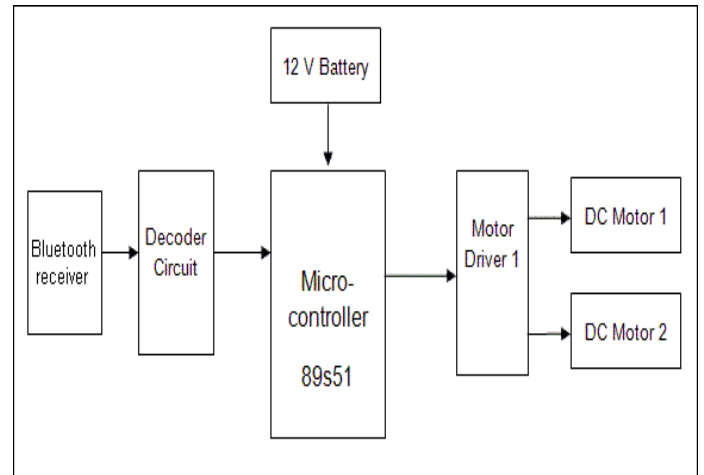


Fig. 1: Block Diagram of Bluetooth Controlling 89s51 Microcontroller.

IV. APPLICATION INSTRUCTIONS

- Firstly, pair your mobile with HC-06 Bluetooth module. Use default password for pairing as '1234'.
- Choose "Select Drive" option.
- On selecting "Up Arrow", it sends the data "A" to the module connected. When controller detects "A", the robot moves forward.
- On selecting "Down Arrow", it sends the data "B" to the module. When controller detects "B", the robot starts moving in reverse direction.
- On selecting "Left Arrow", it sends the data "C" to the module. When controller detects "C", the robot turns in left direction.
- On selecting "Right Arrow", it sends the data "D" to the module. When controller detects "D", the robot turns in right direction.
- On selecting "Stop" button, it sends a data "E" to the module. When controller detects "E", the robot will stop working.
- "Disconnect" option is used to unpair Bluetooth module.



Fig. 2: Bluetooth RC Controller

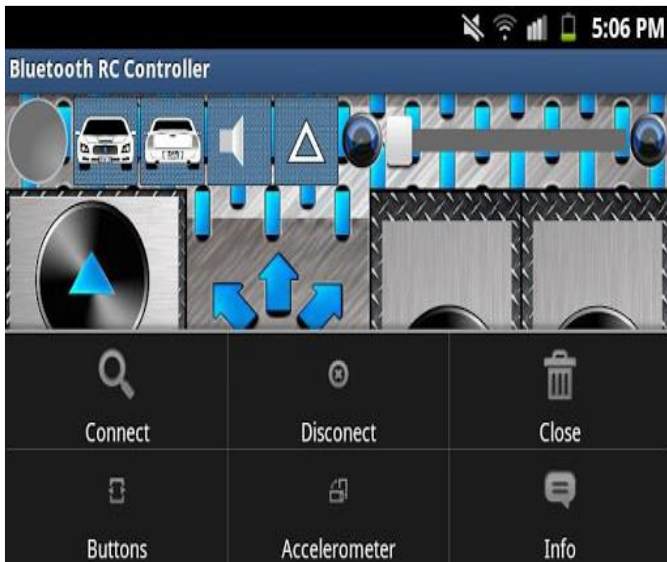


Fig. 3: Bluetooth Connection Search Panel.



Fig. 4: Moving (forward, backward, left, right) Options to Control the Car.

## V. CONCLUSION

The objective of the paper is to implement the knowledge of digital electronics and mechanical engineering into a new generation useful robot. For this combination, Bluetooth technology is used to provide a wireless connection. For a wireless robot, smart phones are a perfect choice for them, especially mobile robots. Android Bluetooth enable phones and robot to communicate via. HC-06. It is concluded that this combination can lead to smart living, so that, in coming future people can control their home or offices easily and wirelessly.

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