



## Android App Based Car Controller Using Bluetooth Communication

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**Abstract**—The mobile operated vehicle is a concept where a human being can control a vehicle by an android app by remote or wireless operation, without physically being seated inside it. The project comprises of a vehicle powered by a battery and a controller which has a Bluetooth connectivity. The system consists of a controller equipped by Bluetooth communication IC, it will be connected to the motors and other parts of vehicle. When an android app which will be connected to this system by Bluetooth is switched on one can operate the vehicle by wireless commands given from app. The operation range of Bluetooth is around 10 meters or 33 feet approximately.

**Keywords**—Bluetooth module, Motors, Battery, Vehicle, Controller.

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### I. INTRODUCTION

Nowadays smart phones are becoming more powerful with reinforced processors, larger storage capacities, richer entertainment function and more communication methods. Smartphone, which is a small yet powerful device is rapidly changing the traditional ways of human-machine interaction. Smartphone users, smart phones have gradually turned into an all-purpose portable device and provided people for their daily use. In recent years, an open-source platform Android has been widely used in smartphones. Android has complete software package consisting of an operating system, middleware layer and core applications. Different from other existing platform like iPhone OS, it comes with software development kit (SDK), which provides essential tools and Applications.

The DC motors are widely used for variable speed drive system in industrial applications such as industrial automation, electric traction, aircraft, military equipment, hard disk drives because of their high efficiency, silent operation, compact, reliability as well as low maintenance as in [2]. Due to the advancement of wireless technology, there are several connections are introduced such as GSM, Wi-Fi, ZIGBEE and Bluetooth. Each of the connection has its own unique specifications and applications. Among these wireless connections, Bluetooth technology is often implemented.

Bluetooth is mainly used for data exchange. It adds new features to smart phones. Bluetooth technology was created by telecom vendor Ericsson in 1994, shows its advantage by integrating with smart phones. It has changed how people use digital device at home or office, and has also transferred traditional wired digital devices into wireless devices as in [3]. A host Bluetooth device is capable of communicating with up to seven Bluetooth modules at same time through one link. Considering its normal working area of within eight meters, it is specially very useful in home environment. The speed control was implemented using Bluetooth Technology to provide communication access from smart phone. Communication plays a major role in day today's life and can be used as a better tool in control system. It deals with wireless communication and is used to control the motor movement direction.

The system consists of a controller equipped by Bluetooth communication IC, it will be connected to the motors and other parts of vehicle. When an android app which will be connected to this system by Bluetooth is switched on one can operate the vehicle by wireless commands given from app. The vehicle can move left, right, front and back.

Using case statement the diodes switches to the corresponding function, for forward movement both motor will rotate in the same direction and to move it in backward direction both the motors will rotate in opposite directions to that of forward direction. To move left and right, either of the motors will rotate and to stop both the motors will stop. Motors are given instructions, in the way user commands them through his mobile app.

### II. BLOCK DIAGRAM

The block diagram of the proposed system consists of Microcontroller, LCD display, Bluetooth module, Metal Detector, IR sensors, Mobile app, Battery and Relay Driver.

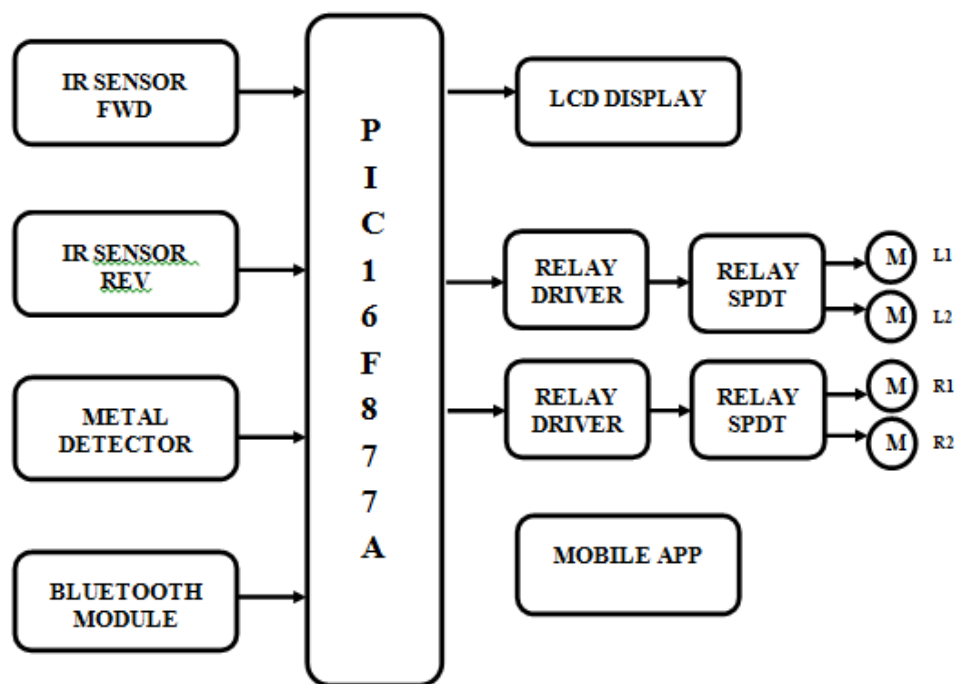


Fig. 1: Block Diagram

- **Microcontroller**

We had different choices of microcontroller like PIC, 8051 and ARM. But ARM based controller has limited voltage range and generally used for mobile applications. So we decided to use PIC controller. It has wide operating range (2.0 V-5.5 V). It has sinking and sourcing capability of 25 mA. We are using PIC16F877A microcontroller. It is the heart of circuit. The system consists of a controller equipped by Bluetooth communication ic, it will be connected to the motors and other parts of vehicle. When an android app which will be connected to this system by Bluetooth is switched on one can operate the vehicle by wireless commands given from the app. The vehicle can thus move left, right, front and back.

- **LCD display**

Here we are using 16x2 LCD display. LCD stands for liquid crystal display. They come in many sizes 8x1 , 8x2 , 10x2 , 16x1 , 16x2 , 16x4 , 20x2 , 20x4 , 24x2 , 30x2 , 32x2 , 40x2 etc . Many multinational companies like Philips, Hitachi, Panasonic manufacture their own special kind of lcd's to be used in. All the lcd's performs the same functions.

- **Bluetooth Module(HC-05)**

HC-05 module is easy to use Bluetooth SPP (Serial Port Protocol) module, designed for transparent wireless serial connection setup. Serial Port Bluetooth module is fully qualified Bluetooth V2.0 +EDR (Enhanced Data Rate) 3Mbps Modulation with complete 2.4GHz radio transceiver and baseband. It uses CSR Bluecore External Single chip Bluetooth system with CMOS technology and with AFH (Adaptive Frequency Hopping Feature).

- **IR Sensor**

IR Photodiode is used as sensor. Photodiodes are PN junction diodes designed specifically to harness the photoelectric effect. This means the device exposes the junction region of the PN diode to incoming photons which results in conducting the transfer of electrons across the junction. They are used for obstacle detection at both front and back sides.

- **Metal Detector**

Metal Detector is an electronic device that gives an audible or other signal when it is close to metal, used for example to search for buried objects. They consists of a handheld unit with a sensor probe which can be swept over the ground or other objects. If the coil comes near a piece of metal the device indicates with ringing of buzzer and light indication. We desire to detect the metal in the mining areas and thus after detection of it buzzer is turned on.

- **Relay Driver (ULN2803)**

ULN2803 is a High voltage, high current Transistor Array IC used especially with Microcontrollers where we need to drive high power loads. This IC is widely used to drive high loads such Lamps, relays, motors etc. It is usually rated at 50v/500mA.

### III. CIRCUIT DIAGRAM

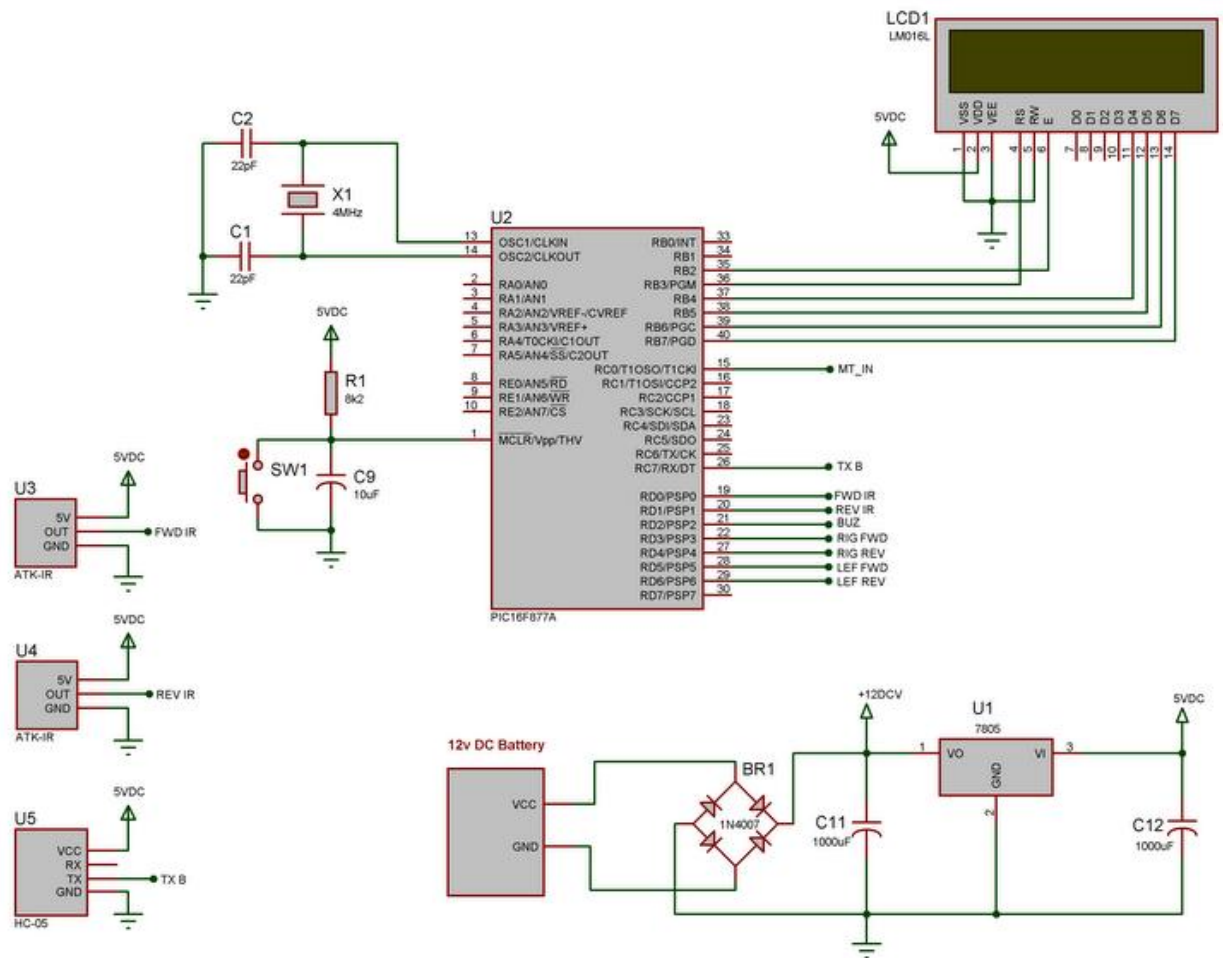


Fig. 2 : Circuit Diagram

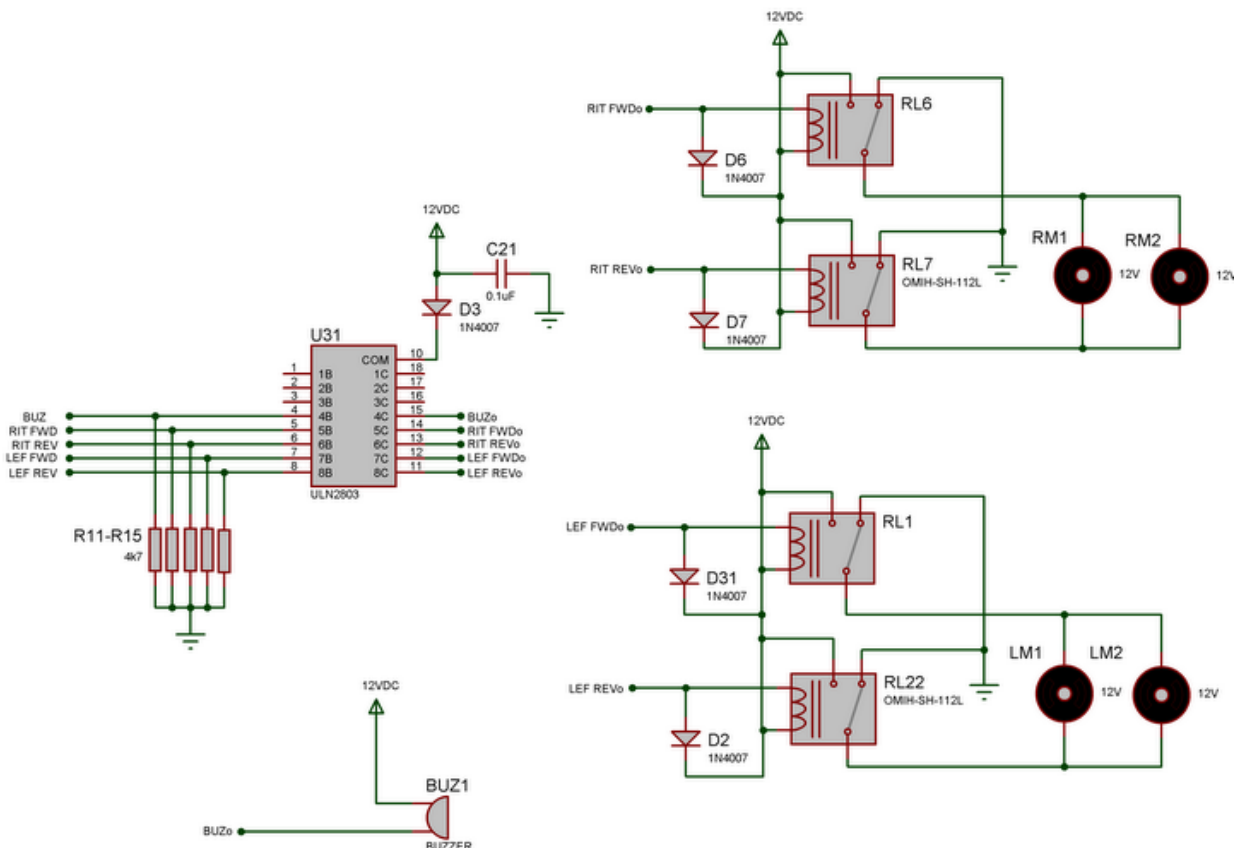


Fig. 3: Circuit Diagram

#### IV. ANDROID APPLICATION

Android is an open source mobile application development platform whereas Windows mobile and Apple's iPhone applications are built on proprietary operating systems that prioritize native application. Android applications are easy to develop and distribute. These days, low cost android mobiles are available in market. These services are inspiring developer to develop application for android. GUI of application is shown in Fig. 4 It comprises of five buttons for all directions and one for stop.

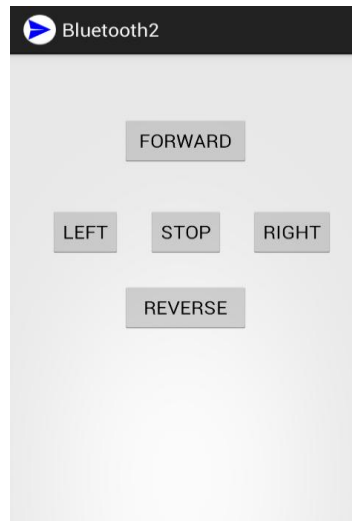


Fig. 4 : GUI of application

#### V. CONCLUSION

Wireless control is one of the most important basic needs for all the people all over the world. But unfortunately the technology is not fully utilized due to a huge amount of data and communication over-heads. Android Bluetooth enabled phones and Bluetooth module via HC-06 and communication among Bluetooth devices. The instructions from Bluetooth module are given to the microcontroller which plays an important role and it sends its output to Motor driver so that motor can rotate and hence the car can be moved from one location to another.

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