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# A Survey on Wireless Sensing Car Using Android Application

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**ABSTRACT:** This car is an electro-mechanical machine that is guided by computer and electronic programming. The car which can be controlled using an Application for Android Mobile. We are developing the Remote Buttons in the Android App by which we can Control the Car motion with them. Here we use Bluetooth Communication to Interface MicroController and Android device. Controller can be interfaced to the Bluetooth module through UART. According to commands received from android the robot motion can be controlled. The consistent output of a robotic system along with quality and repeatability are unmatched.

**KEYWORDS:** Arduino Circuit (Arduino uno, L293d Motor Driver, SRF04 Ultrasonic distance Sensor, HC-05 Bluetooth Module, Usb cable, Vehicle kit, Electronic Speaker, Servo motor).

### I. INTRODUCTION

Nowadays smart phones are becoming more powerful with reinforced processors, larger storage capacities, richer entertainment function and more communication methods. Bluetooth is mainly used for data exchange; add new features to smart phones. Bluetooth technology, 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 transferred traditional wired digital devices into wireless devices.

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 8 meters, It is especially useful in home environment. Thank for Bluetooth technology and other similar techniques, with dramatic increase in 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 smart phones. Android has complete software package consisting of an operating system, middleware layer and core applications. Different from other existing platform like iOS (iPhone OS), it comes with software development kit (SDK), which provides essential tools and Application. Using a Smartphone as the "brain" of a car is already an active research field with several open opportunities and promising possibilities. In this project we present a Wireless controlled car by mobile phone and discuss a control systems using audio channels of mobile devices, such as phones and tablet computers.

### A. OBJECTIVES

1. To provide guidelines for the implementation of cooperative controls involving both drivers and automation.
2. To demonstrate automated driving in complex traffic environments. Test integrated applications in all possible scenarios taking into account the full range of automation levels.
3. To enhance the perception performance in complex scenarios by using advanced sensors supported by cooperative and communication technologies.
4. To decrease in car related fatalities and Potentially save Economy.
5. To Save Million Lives per decade.
6. This project outlines the strategy adopted for establishing two kinds of communications :



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- a). One for wireless communication between a mobile Robot and a remote Base Station.
- b). Another for serial communication between a remote Base Station and a GUI Application.

## II. COMPONENTS REQUIRED

### A. Hardware Components :-

Microcontroller [PIC16F877A]

Bluetooth HC-05(Master & Slave)

DC Servo Motor

DC Geared Motor

Motor Driver [L293D]

Smart phone [Android 2.3+]

### B. Software Components :-

Micro C programming software

Android Studio

## III. LITREATURE SURVEY

Paper	Name of paper	Author	Research Gap
Control eng pract vol.24	Autonomous driver	Hossein Sartipizadeh & Mohammad Haeri	Controls current, but no work on controlling of co2 gas from vehicle.
IEEE-[2007]	Ethical decision for automated car	Kang Yong Lee & group	Ethical Decision Making During Automated Vehicle Crashes,
Factor Ergon soc. Annu meet vol.57		c.gold	How long does it take to get driver back into loop



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IEEE[2010]	Design of Digital Control System for GMAW	Qingle Pang group	Work on voltage and current, but no work on other parameter
Irm.i.cmc.usp	Autom ground vehicle	Huang Jiankang & group	Autonomous ground vehicle how speed automation.
NOKIA	Car connect to cloud	Auther Of NOKIA	Parameters with Automakers supplies to connect car to cloud.
General Motor	Future vision on urban mobility	A. Z. Loko & group	Work for future vision for future urban mobility.

## IV. RELETED WORK

Similar systems with android and Arduino interaction have been proposed earlier. Different modes using different prototypes are implemented for different applications. An system named Andro RC.very well implemented the modules with android and Arduino communication for search mission. The system (Andro RC) requires two different Arduino boards (Mega and Uno) for RC unit. The motion is constrained to four directions due to use of servo motors for turning.

A vision-based obstacle avoidance algorithm is also implemented for a small indoor mobile robot built from low-cost and off-the-shelf electronics where vision-based obstacle detection algorithm is fast and works with very low resolution images. Ultrasonic sensor (US) is widely used sensor in mobile applications for distance measurements which helps in obstacle detection.Using the Ultrasonic sensor (US) is also implemented that system is intended to be use by the elderly and people with vision impairment. Another system proposed by is a system with obstacle detection Technique, based on stereo range measurements, that does not rely on typical structural assumption on the scene.

## V. EMBEDDED SYSTEM

### a. Definition:

Embedded System Any sort of device which includes a programmable computer, but itself is not intended to be a general-purpose computer.

### b. What is an Embedded System:-

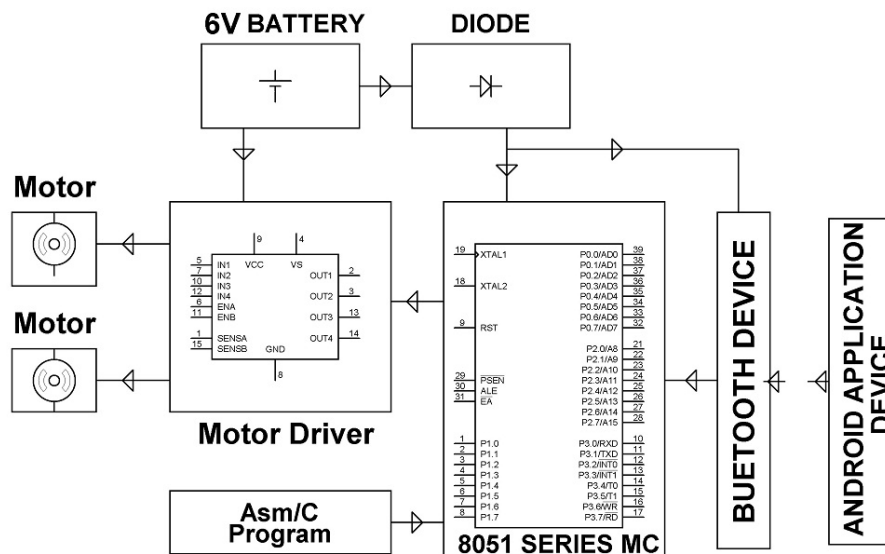
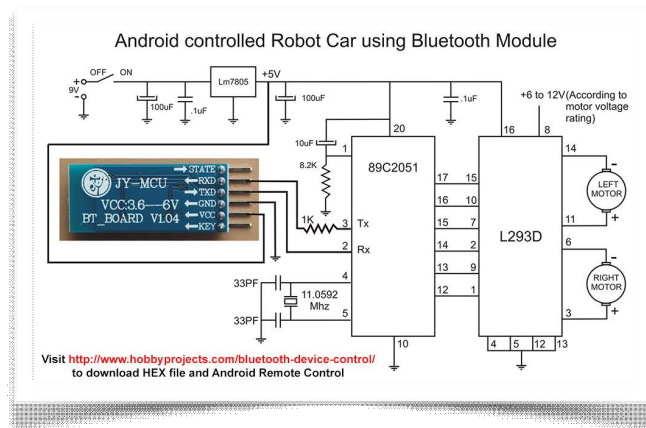
An embedded system is a Microcontroller / digital signal microprocessor based system that is designed to be flexible and built to control or monitor the functions of equipment, machinery, plant and many devices in common use today.

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## BLOCK DIAGRAM

## USER INTERFACE

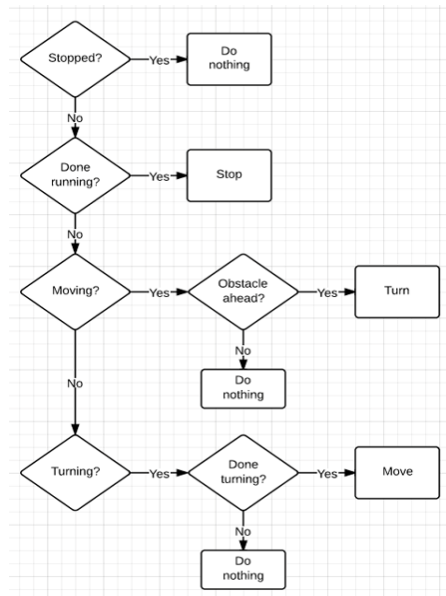
The user interface, of the overall system, is provided using the custom made android application using Graphical User Interface (GUI). The GUI provides user, the various control modes, to Control dynamically the robot unit. The real-time camera streaming data, from the RC unit is shown to user through this interface. The start of android application, forces connection establishment with RC unit through Bluetooth. The user interface is also responsible for obstacle detector distance measurement and other settings of robot unit. The GUI of android provides a user friendly realtime experience to the user, to control the robot. Fig. 2 Main Blocks of Android Application.

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## VI. ALGORITHM

### HARDWARE COMPONENTS

#### A. Arduino uno R3 :-

Arduino Uno is a Microcontroller board based on the AT mega 328P ([datasheet](#)). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), 6 analog inputs, a 16 MHz quartz crystal, 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 a AC-to-DC adapter or battery to get started.. "Uno" means one in Italian and was chosen to mark the release of Arduino Software (IDE) 1.0.

Uno board and version 1.0 of Arduino Software (IDE) were the reference versions of Arduino, now evolved to newer releases. The Uno board is the first in a series of USB Arduino boards, and the reference model for the Arduino platform; for an extensive list of current, past or outdated boards see the Arduino index of boards.

#### B. L293D Motor Driver :-

The Device is a monolithic integrated high voltage, high current four channel driver designed to accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoids, DC and stepping motors) and switching power transistors. To simplify use as two bridges each pair of channels is equipped with an enable input. A separate supply input is provided for the logic, allowing operation at a lower voltage and internal clamp diodes are included. This device is suitable for use in switching applications at frequencies up to 5 kHz.

#### c. DC MOTOR :-

Two DC motors are used to rotate the wheels of the machine simultaneously. Geared DC motors can be defined as an extension of DC motor. A geared DC Motor has a gear assembly attached to the motor. The speed of motor is counted in terms of rotations of the shaft per minute and is termed as RPM .The gear assembly helps in increasing the torque and reducing the speed. Using the correct 3 combination of gears in gear motor, its speed can be reduced to any desirable figure. This concept where gears reduce the speed of the vehicle but increase its torque is known as gear reduction. This Insight will explore all the minor and major details that make the gear head and hence the working of geared DC motor. At the first sight, the external structure of a DC geared motor looks as a straight ex-



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pansion over the simple DC ones. The lateral view of the motor shows the outer protrudes of the gear head. A nut is placed near the shaft which helps in mounting the motor to the other parts of the assembly.

## D. Servomotor :-

A servomotor is a rotary actuator that allows for precise control of angular position. It consists of a motor coupled to a sensor for position feedback, through reduction. It also requires a relatively sophisticated controller, often a dedicated module designed specifically for use with servomotors. Servomotors are used in applications such as robotics, CNC machinery or automated manufacturing. As the name suggests, a servomotor is a servomechanism. More specifically, it is a closed-loop servomechanism that uses position feedback to control its motion and final position. The input to its control is some signal, either analogue or digital, representing the position commanded for the output shaft. The motor is paired with some type of encoder to provide position and speed feedback. In the simplest case, only the position is measured. The measured position of the output is compared to the command position, the external input to the controller. If the output position differs from that required, an error signal is generated which then causes the motor to rotate in either direction, as needed to bring the output shaft to the appropriate position.

## E. Bluetooth Module :-

HC-05 module is an 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 04- External single chip Bluetooth system with CMOS technology and with AFH(Adaptive Frequency Hopping Feature). It has the footprint as small as 12.7mmx27mm. Hope it will simplify your overall design/development cycle

## ANDROID PLATFORM

Android devices are powerful mobile computers and they become more and more popular smart phones used worldwide. They becomes more and more popular for software developers because of its powerful capabilities and open architecture, also it's based on the java programming language. Because Android uses the Java programming language getting started with the Android API is easy; the API is open and allows easy access to the hardware components. Android devices provide numerous communication interfaces like USB, Wi-Fi and Bluetooth, that can be used to connect to the robot. We think it is a great platform for a robotic system control, because it's much cheaper than any other ARM-based processing unit. We use android platform because it is the widest used in the word and runs the largest number of smartphones worldwide.

## VII. DESIGN OF ANDROID APPLICATION

The Android app is generally developed using JAVA language but this Android app can also be build without knowing the Java language. This app was developed in "App Inventor" developed by MIT .This app inventor is designed specifically for Non – Computer Science students those who don't know the JAVA language. The figure shown below is the block diagram back- hand design for the application. The app shown below has 5 buttons and all the buttons gives 5 different bytes in the output that has to be fed to the Microcontroller to process. For eg. if we press forward button ,the Bluetooth Module will give 1 byte at its output as shown in the figure. The app consists of the option in the main screen whether to use the accelerometer of the phone or to use the buttons to control the Robot. This app inventor brings out the revolution in the Embedded Systems & Robotics. The app invented by this searches for the Bluetooth devices along with their MAC addresses. The user just has to select the 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.



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## SYSTEM FEATURES

### A. Obstacle Detection :-

The system uses obstacle detection mechanism, using which the obstacles in front of the RC unit can be detected. An IR sensor is used, which get exact value of obstacle when an obstacle is less than Specified distance in front of sensor. The Arduino board gets the distance value, and checks if the obstacle distance is less than the threshold value. If the obstacle distance is less than the threshold value, the RC unit stops at its position.

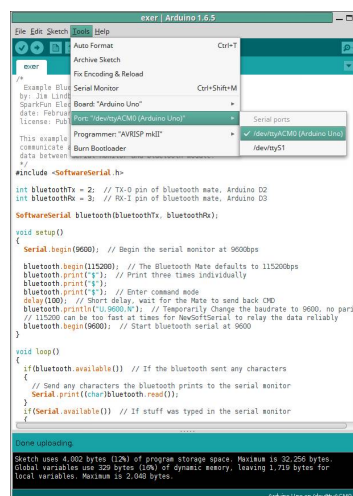
### B. Video Streaming :-

The RC Car unit is fitted with a Wi-Fi camera that transmit Real-time video data to Smartphone, or any other display device. The video streaming can give real- time information about the objects in front of the car unit. This data may be used for preventing obstacles, or can be useful for its application, like Human Search Mission.

### C. Control modes :-

The Android infrastructure allows user to design superior user interface along with full resource utilisation. Different controlling modes can be provided to user, like accelerometer control, joystick control or button control. Along with these, special modes like voice control with voice Reorganisation or gesture control can be provided using android capabilities and Google, API's. The technologies of Google, which are currently in development process like Virtual Reality (VR), can be used in future to enhance system control.

## ARDUINO CODE







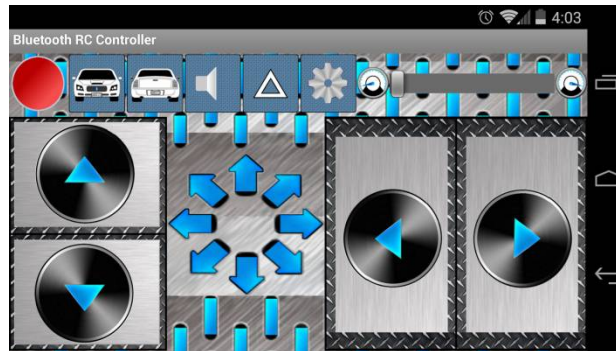
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## CONTROLLING APPLICATION



## SOCIAL RELEVANCE

If you consider the potential impact, there is a \$1.3 trillion benefit for the US economy from the introduction and implementation of autonomous vehicles (Including the expansion of Electrical Cars).

The same study has shown that 75 billion hours are spent commuting in cars, thus optimisation would create savings of around \$422 billion per year in US alone. 250 million cars to only 2.5 million in the US alone through a transportation sharing model

9 billion gallons of gas to 190 million gallons – road congestion leads to wasted-fuel; eliminating this would lead to a savings of \$158 billion. 8 million traffic accidents to 1.1 million.

It is estimated that Pollution may be Reduced 15% directly and another 5% due to process optimisation and Utilisation of Electric Cars.

## VIII. CONCLUSION

So by doing this project we try to control the car with the help of Android application in Smartphone. Thus reducing the effort of controlling car in rough terrain and it also helps in reducing the difficulties of parking a car in tight parking conditions. The communication between the car and Smartphone is done with the help of Bluetooth communication. The commands are sent to the Bluetooth module in Microcontroller with the help of Bluetooth in Smartphone.

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## BIOGRAPHY

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