

Unmanned Ground and Aerial Vehicle Remote Controller for Security Applications

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Abstract : This paper describes the android smart phone to control the unmanned ground vehicle. The Unmanned Ground or Aerial Vehicle mainly used in secured places. Today android system is very popular. The controller can run the software and touch the screen on the smart phone to drive the vehicle. The vehicle is connected via wireless technology with help of smart phone application software. When a person or motor enters a monitored area, camera capture the image which is continuously sends to the control room. Camera connected to microcontroller keeps on capturing at the secured places and views all information of the secured section images by PC or TV. Voice communication also enable by using mike.

IndexTerms - Unmanned Ground or Aerial Vehicle, Wireless Technology, Android.

I. INTRODUCTION

An unmanned ground or Aerial vehicle is a vehicle that operates while in contact with the ground and without an on-board human presence. Unmanned ground or aerial vehicle is actively being developed for both civilian and military purpose. Generally, the vehicle will have a set of sensors to observe the environment and will either autonomously make decisions about its behaviour or pass the information to a human operator at a different location who will control the vehicle through teleoperation. Unmanned ground or Aerial vehicle is one of typical solution for army and home application. This project describes the design and implementation of a prototype teleported unmanned ground or Aerial vehicle for security applications which is remote controlled using high speed secure wireless connectivity. This connection is enabled by wireless technology and using smart phone communication is given to vehicle. The vehicle is provided with video cameras which will be recorded and transmitted to the operator for further action by the robot. This vehicle can be operated in multiple terrains and then vehicle can be moved in all directions.

II. EXISTING SYSTEM

More and more mobile robots are working around us and they will help us a lot in daily lives. Normally, unmanned ground vehicle is used in war field. Whereas unmanned Aerial vehicle is used for aircraft maintenance, aerial photography, search and rescue, counting wildlife, filming etc. The communication between device and vehicle is established by ZIGBEE technology and the robot is controlled by PC (or) Computer. This robot can be used in any of the terrain.

III. PROPOSED SYSTEM

In this modern environment everybody uses smart phones which are a part of their day-to-day life. They use all their daily uses like newspaper reading, daily updates, social networking, and all the apps like home automation control, human body anatomy, health maintenance, etc. has been designed in the form of applications which can be easily installed in their hand held smart phones. This project approached a robotic movement control through the smart phones. Hence a dedicated application is created to control an embedded robotic hardware.

The application controls the movement of the robot. The embedded hardware is to be developed using Arduino Processor and to be controlled by Smartphone on the basis of Android platform. Microcontroller is to receive the commands from the Smartphone and takes the data and controls the device. The device can move forward, reverse, left and right movements. The Smartphone will be interfaced to the device by using Bluetooth technology. Te device can also detect the temperature and humidity level from the air. A wireless Camera is mounted on the device for security purpose.

IV. ANDROID APPLICATION

Today word Android is very familiar in the world. There are millions of devices running on the android operating system and millions of devices are being developed daily. Google has made open android development platform for all the people in the word.

V. WIRELESS TECHNOLOGY

Wireless technology is an alternative to wired technology which is commonly used for connecting devices in wireless mode. **Bluetooth** is a technology for wireless local area networking with devices. It is a wireless technology in a short range communications system that aims to replace cables connecting portable. Bluetooth has a range of about 100meters. Devices that can use Bluetooth technology include personal computers, video-game consoles, phones and tablets, digital cameras, smart TVs, digital audio players and modern printers.



Fig: HC-05 Bluetooth module

VI. OPERATION OF THE SYSTEM

The project is designed to control a robotic vehicle using an android application. Wireless device is interfaced the control unit on the robot for sensing the signals transmitted by the android application. An Arduino processor is used in this project as control device.

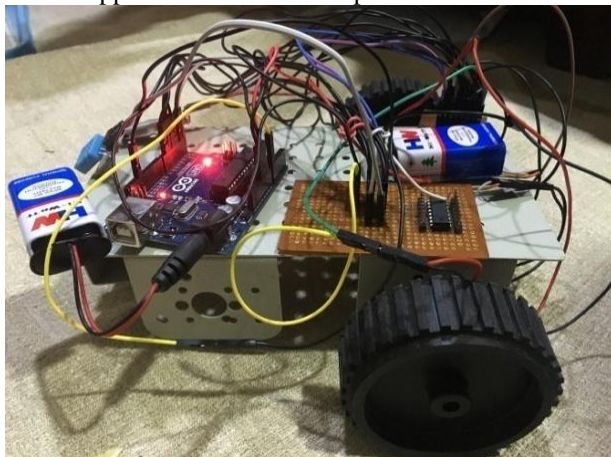


Fig: Vehicle Robot

Remote operation is achieved by any Smart phone with Android OS, upon a GUI (Graphical User Interface) based touch screen operation. Transmitting end uses an android application device remote through which commands are transmitted.

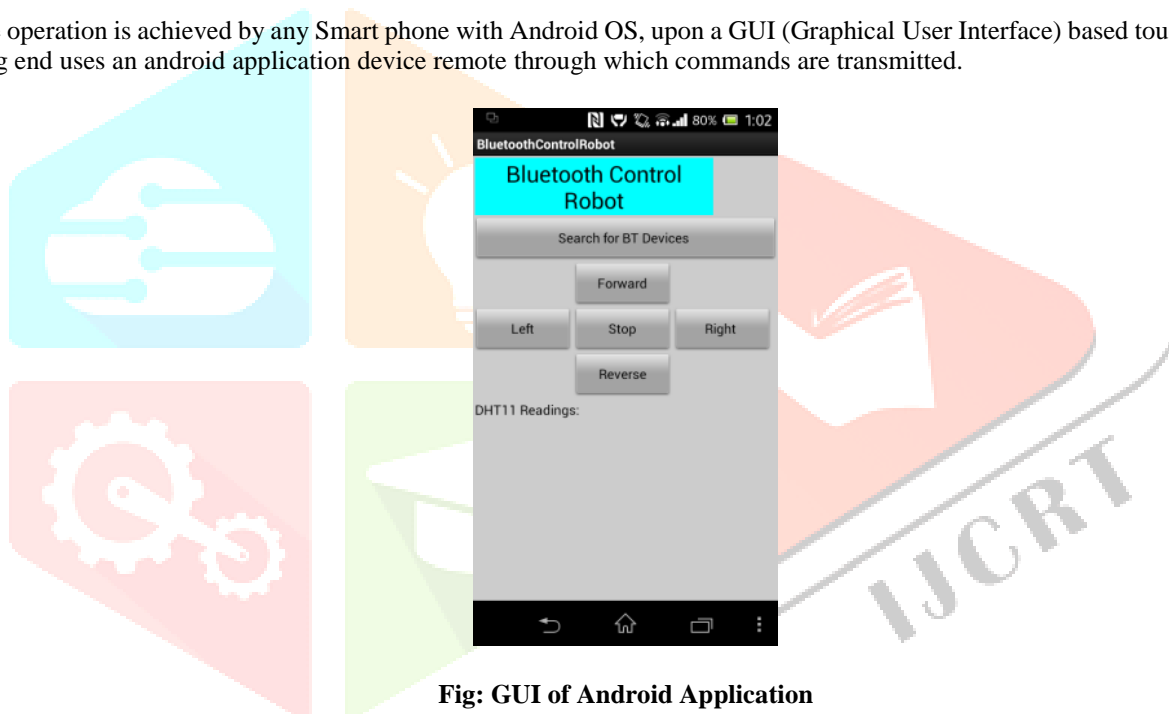


Fig: GUI of Android Application

At the receiver end, these commands are used for controlling the robot in all directions such as forward, backward and left or right and capture the video and transmit to android device at the receiving end the movement is achieved by two motors that is interfaced to the Arduino. Serial communication data sent from the android application is received by a wireless receiver interfaced to the Arduino. The program on the Arduino refers to the serial data to generate respective output based on the input data to operate the motors through a motor driver IC. The motors are interfaced to the control unit through motor driver IC.



Fig: Phone to Phone Monitoring

VII. COMPONENTS

i. MOTOR DRIVER IC

A Driver is an electronic component which is used to control other components such as high power transistor. The L293D is a popular motor driver IC that is usable from 6 to 12V, at up to 1A total output current.



Fig: L293D Driver circuit

ii. ARDUINO

Arduino is an open source electronics prototyping platform based on flexible, easy-to-use hardware and software. Arduino is a small microcontroller board with a USB plug to connect to your computer and a number of connection sockets that can be wired up to external electronics, such as motors, relays, light sensors, laser diodes, loudspeakers, microphones, etc.

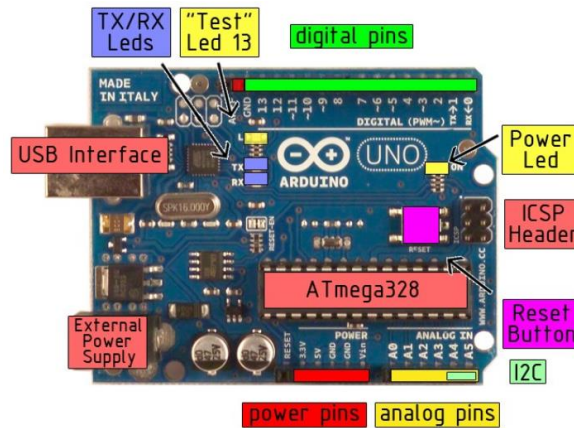


Fig: Arduino UNO Board

iii. TEMPERATURE SENSOR

The LM35 series are precision integrated-circuit temperature devices with an output voltage linearly-proportional to the Centigrade temperature. The LM35 device has an advantage over linear temperature sensors calibrated in Kelvin, as the user is not required to subtract a large constant voltage from the output to obtain convenient Centigrade scaling.

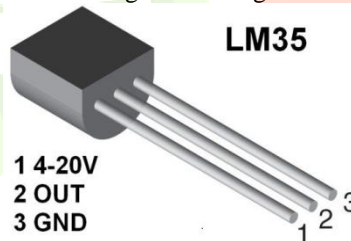


Fig: LM 35 Sensor

VIII. COMPONENTS

In this project, we achieved control both wireless communication between the mobile Robot Android GUI applications. The main task of this project makes a security robot which can be control by emerging android technology. It gives versatile operation of robot controller which need not modify the hardware.

IX. FUTURE SCOPE

This system can further be developed by enhancing the performance and by adding more features. We are going to make it for both Unmanned Ground Vehicle (UGV) and Unmanned Aerial or Drone Vehicle (UAV). The visuals captured by the camera will be shown on the android device. We are going to use such a wireless technology using which we can extend the range of the device even wider than existing. The development of this system has wide area of applications such as in Law enforcement, home appliance, Industrial and in Disaster management and so on.

X. REFERENCES

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