

**Android Based Robot**

Aachal Tayade¹, Utkarshaa Pandey², Ashish Mistry³, Mrs. Aparna More⁴

¹Electronics & telecommunication, P.E.S Modern College of Engineering

²Electronics & telecommunication, P.E.S Modern College of Engineering

³Electronics & telecommunication, P.E.S Modern College of Engineering

⁴Professor, Electronics & telecommunication, P.E.S Modern College of Engineering

Abstract—This electronic document is a “live” template. The various components of your paper [title, text, heads, etc.] are already defined on the style sheet, as illustrated by the portions Android is an open source platform which has a major application in smartphones. The purpose of our project is to provide powerful computational android platform with simpler Robot hardware architecture. This project describes how to control a Robot from a mobile using Raspberry Pi, as well as components of mobile and Robot. We present a review of Robots controlled by mobile phone via moving the Robot upward, backward, left and right side by the android application and Raspberry Pi. Project also aims at implementing the feature of video streaming & gas detection. Raspberry provides a two-way communication between the android and the Robot. The communication between the android and Robot is achieved by putting both the systems in the same network using Wi-Fi dongle, connected on Raspberry Pi of the Robot. We are developing remote buttons in the android application by which we control the movement of robot, record the video streaming as well as get the notification of gas detected.

Keywords-Android; wifi; raspberry-pi; robot; communication.

I. INTRODUCTION

All manuscripts must be in English. These guidelines include complete descriptions of the fonts, spacing, and related information for producing your proceedings manuscripts. Please follow them and if you have any questions, direct them to the production editor in charge of your proceedings at the Robots are being used in variety of industrial applications for various activities like pick and place, painting, assembling of subsystems and in hazardous places for material handling etc.

The security through camera based surveillance has been used for security and observation purposes and has come up to be the most efficient and more safety to us. And there is ever demanding applications even in defence. With the rapid growth of the internet, more and more intelligent devices or systems have been embedded into it for service, security and entertainment, including distributed computer systems, surveillance cameras, telescopes, manipulators and mobile robots.

Automated video surveillance is an important research area in the commercial sector. Technology has reached a stage where mounting cameras to capture video imagery is cheap, but finding available human resources to sit and watch that imagery is expensive. Surveillance cameras are already prevalent in commercial establishments, with camera output being recorded to tapes that are either rewritten periodically or stored in video archives. The robots are used for mining purposes where they detect gas, flame and temperature signals.

The main objectives of using robot:

a) Where human entrance is not possible

Robots have been put to use in complex environments that are too hazardous for man.

b) To rescue operations

Robots also work under dangerous conditions, for search and rescue operations. Robots are put to work in underground mines. A lot of research today is focused on improving rescue functions of robots.

II. Implementation

The aim of the project is to build a robot that can be controlled by an android phone. We are creating Wi-Fi network between the android phone and Raspberry Pi. Commands are given to the robot from the phone and the snapshots of the surroundings are sent to the android from the robot, which are visible to the controller. At the user side, we will have videos on an android application and also we are able to control the robotic movement and also the camera movement in vertical direction and horizontal direction. Communication is achieved via this network. The data is received through the network in both the directions.

The DC motors are also interfaced with the raspberry pi for their control and movement commanded from the android. DC motors are being used for the movement of robotic wheels i.e. to move right-left or to move in forward or backward direction. Raspberry Pi is used for video streaming and sending the processed video at the user side on the android phone with the help of Wi-Fi network. The images captured by the camera should be processed very fast to provide real time visualization of environment to the user.

Some of the reasons for the proliferation of ARM-based processors include: low cost, low-to-very-low power consumption, decent processing power, and open development environment. The Raspberry Pi is a credit-card sized computer that plugs into your TV and a keyboard. It is considered to be a small computer, highly capable that can be used in electronics projects, and for many of the things that your desktop PC does, like spreadsheets, word-processing and games. It also plays high-definition video.



Fig 1:Raspberry pi board

Raspberry Pi has a strong processing capacity because of using the ARM11 architecture and Linux-based system. In terms of control and interface, it has 8 GPIO, 1 UART, 1 I2C and 1 SPI, which basically meet the control requirement. There are simple and easy-used open source peripheral driver libraries.

The wheels are controlled by DC motors which are dependent on driving motor. Gas detector, detects & indicates the concentration of various harmful gases in air. Typically employed to prevent toxic exposure of fire, gas detectors are often battery operated devices used for safety purposes, they are manufactured as portable or stationary units and work by signifying high levels of gases through a series of audible or visible indicators, such as alarms, lights as a combinational signal.

A robotic arm is a type of mechanical arm, usually programmable, with similar functions to a human arm; the arm may be the sum, total of the mechanism or may be part of more complex robot. The links of such a manipulator are connected by joints allowing either rotational motion or translational displacement.

III. Block Diagram

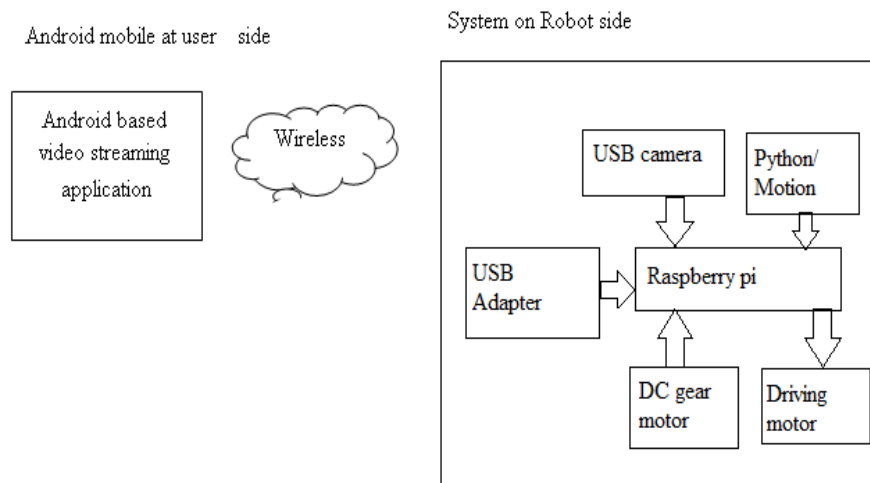


Fig 2: Block diagram

Major components of the system:

The system consists of following parts-

- 1) Android Smartphone
- 2) Wireless network
- 3) Raspberry Pi
- 4) DC motors
- 5) Driving motors

Functionality of the device:

The overall system functions in the following sequence-

3.1 Android Smartphone:

An application is specially designed that interfaces the android with the robot. The input commands are entered into the android that may consist of left or right movement of the robot, or the command to pick and place some small item. These commands are then executed on the robot side.

3.2 Wireless network:

A 12V battery is used as power supply for the robot. This supply is given to the regulator which steps it down to 5V and is then supplied to the Raspberry Pi that drives the motors of the robot. A Wi-Fi dongle is connected to the Raspberry Pi which creates a network and is interfaced with the android phone. The Wireless LAN is provided with an IP address which is locally declared.

3.3 Raspberry Pi:

It is also known as microcomputer. Basically used for video streaming purposes. A camera is interfaced on the Raspberry Pi that captures the video of surrounding environment and send it continuously to the android phone. Here also the transfer of video is successful through the Wi-Fi network. Also with the help of the application developed on the android phone the snapshots of the video can also be taken.

3.4 Driving Motors:

Driving motors are used to drive the DC motors. Each single driving motor can drive two motors. Since three DC motors are used to run, therefore total two driving motors are used. The driving motors require 5V of supply that is provided from the 12V battery after stepping it down.

3.5 DC Motors:

DC motors are used to drive the wheels of the robot. In all three DC motors are used, two for driving two legs and the third for driving robotic arm for the purpose of pick and place of an object. 5V power supply is required to drive the motor which is provided from the driving motor.

IV. Applications

4.1 War Field Spying Robot with Night Vision Camera:

A robotic vehicle is designed which consists of a wireless camera that can take images even in dark and wireless transmit these images to a TV receiver unit. These robots are frequently used in military to spy on enemy lands and send the information to the controlling unit. Here this robot is controlled using RF communication by a set of push buttons.

4.2 Fire Fighting Robotic Vehicle:

Robots can be used in many hazardous situations like when a fire accident occurs. Here such a prototype is demonstration which consists of a water pipe with a nozzle and a pump. The movement of the robot as well the spraying of water by the nozzle is controlled remotely using a set of push buttons and the commands are transmitted the robot through RF communication.

4.3 Pick N Place Robotic Vehicle with Soft Catching Gripper:

A robotic vehicle can be used to pick up objects and place it accordingly. For this purpose the robots consist of end effectors whose moment is controlled accordingly using motors. The robotic vehicle is controlled remotely by a set of buttons using RF communication.

4.4 Touch Screen based Remote Controlled Robotic Vehicle for Stores Management:

Here a pick and place robot is developed which is controlled using RF communication. A touch screen panel is used to give commands which are transmitted and received by the robot to give proper motion to the robot in the desired direction and control the pick and place operation.

V. Conclusions

We can control any system at remote side using the embedded hardware and software installed there using internet protocols. It is a real time portable system, since we are using internet connectivity on Android mobile. The application running on android mobile is user friendly. We can survey the particular area using the video streaming principle and can be used for spying purposes. The project can work in the area where the signal strength of respected mobile operator is sufficient. The cost of video streaming will be cost of internet plan provided by that mobile operator. Android application is generally compatible with the Android OS 4.1.2 and can be designed for lower version of Android OS.

VI. REFERENCES

- [1] Sarath Chandran.C' and Anjaly K², "Real Time Video Controlled Traction for Surveillance Robots In Coal", International Journal Of Innovative Research In Electrical, Electronics, Instrumentation And Control Engineering ISSN: 2321-2004(online), ISSN: 2321-5526(print), Vol.2, Issue 1, Jaunuary 2014.
- [2] Dr, Shantanu K. Dixit*, Mr. S.B. Dhayagonde**, "Design and Implementation of e-Surveillance Robot for Video Monitoring and Living Body Detection", International Journal of Scinetific and Research Publications ISSN: 2250-3153, Vol.4, Issue 4, April 2014.
- [3] Kiran Gautam, Pranit Chettri, Ravindra Singh Negi, Rangpo, Majhitar, Prerna Rai, "Wireless Surveillance Robot using Wireless Network", International Journal Of Engineering And Computer Science ISSN: 2319-11645, Vol.4, Issue 4, April 2014, Page no:11642-11645
- [4] A. Sivasoundrari, S.Kalaimini, M.Balamurugan, "Wireless Surveillance Robot wiioth Motion Detection and Live Video Transmission," International Journal of Engineering Science and Engineering(IJESE) ISSN: 239-6378, Vol.1, Issue 6, April 2013.