

Unmanned Armed Ground Vehicle

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Abstract- Robotics has been a staple of advanced manufacturing for over half a century. As robots and their peripheral equipment become more sophisticated, reliable and miniaturized, these systems are increasingly being utilized for military and law enforcement purposes. Mobile robotics plays an increasingly important role in military matters, from patrol to dealing with potential explosives. With suitable sensors and cameras to perform different missions, mobile robots are operated remotely for reconnaissance patrol and relay back video images to an operator. With the development of modern technology such as zigbee technology aims to exchange data wirelessly at a short distance using radio wave transmission comprising features to create ease, perception and controllability. This paper presents a modern approach for surveillance at remote and border areas using multifunctional robot based on zigbee technology used in defense and military applications. The robotic vehicle works both as a manually controlled vehicle using zigbee as communication medium. This robotic vehicle has ability to substitute the soldier at border areas to provide surveillance. The robotic vehicle works by manually controlling robotic vehicle by using zigbee as communication medium. And this multisensory robot is mainly used to detect bomb, defense soldier and it can act as a spy robot.

Index Terms- Zigbee; metal detection Sensors; robotic vehicle.

I. INTRODUCTION

In today's age robotic has the fundamental key for new invention. The development of human-machine communications on an everyday basis has made the people to utilize the technology. Instead of giving rational methodology physical methods have been welcomed by everyone. Coding to some 100's of pages requires more instance, capital and power so to overcome that gesture recognition is enhanced. Using gesture recognition coding can be easily made by everyone. For gesture recognition many active devices such as a —trackball, remote, joystick. Some

of the devices are used for giving motion recognizer but gesture recognition has the foremost utility. So gesture recognizer like accelerometers with 3- axes is extensively used. Gesture can be captured by wearing gloves or having wrist band attached with the MEMS whereas using vision system and data glove is very expensive hence not utilized. To have a balance of precision data collection, —Micro Inertial Measurement Unit is developed for recognizing the gestures in 3 dimensional axis x, y, z.

Robotics is the branch of mechanical engineering, electrical engineering and computer science that deals with the design, construction, operation and application of robotics, as well as computer systems for their control, sensory feedback and information processing. The aim of developing a high-tech technology serves the purpose of achieving high speed technology, advanced capacity to control the robots and to device new methods of control theory. The realization of above standards some technical improvement along with the need of high performance robot is required to create a faster, reliable, accurate and more intelligent robot which can be devised by advanced control algorithm, robot control devices and new drivers.

The robot is basically electro-mechanical machine or device that is controlled either by computer program or with electronic circuit to perform variety of physical tasks. As the terror is always remains India's first enemy so, the robots are going to use for saving human life. Countries like India are still facing and confronting with regular threats from terrors. Both Kashmir and Mumbai terror attacks have consummated that as far as possible the future of warfare will be handle by robot and unmanned machines to protect human life. Currently, the Indian Army has Daksh Military robot to combat in battle field. As the technology proliferate rapidly in automation field by incorporating Military Robots as

Soldiers in war field to reduce grievance and demise in war fields.

Unmanned aerial vehicle have a tremendous growth in many fields, specifically in the field of military and civilian applications [5]. For example UAV navigation [6], UAV controller design [7], multi-UAV position estimation [8], and cooperative air and ground surveillance [9]. UAVs are also used for various purposes which includes volcano monitoring, real estate photography, coastal zone studies, anti-piracy operations, significant application, real time video telemetry for controlling sand mining. For this process of video Surveillance opencv, an open source computer vision library is used. For using opencv program, which can be integrated only with the micro controller kit known as raspberry pi which uses ARM 11 board the core frequency is set to 700MHz. It has the ability to boot from the SD card. It uses GPIO where its header consists of 17 pins. These pins could be connected to simple LED drivers, relay modules through driver transistors, or even stepper motor or servo motor drivers. The use of microcontroller board, raspberry pi is only possible only when the provided operating system is linux either ubuntu or some linux based operating system where ubuntu 13.3 raring ringtail is considerably suitable for this application.

PuTTY is a free and open-source terminal emulator, serial console and is mainly used in network file transfer applications. PuTTY is a program for Microsoft Windows that allows you to control a computer running a Linux or Unix-based operating system via SSH using a command-line interface. PuTTY's Key Generator is broken into three main functions: generating, importing, and exporting keys. If you will be receiving a key from another source, you will import the key into the PuTTY Key Generator and then export a PuTTY key for use with the PuTTY applications. If you will be creating your own key, you will be generating a key and then exporting to the key type needed by the recipient. If the key will be supplied for you, the key will need to be imported and a PuTTY key will need to be exported.

II. RELATED WORKS

The existing robots are whole operated with the help of remote control. This operation is sometimes tedious, less efficient and has no guarantee for its

security. The existing system consists of trade-off between processing speed, insecure communication and cost. With growing trends, controllers are developing tremendously. Hence we can make use of advanced controller in controlling the operation of robot. The proposed project can be built further to work as a HUMANOID[3]. It can have many uses in practical fields. This project can be helpful in wars as a part of spying. It can be further improved to have more decision taking capabilities by employing varied types of sensors and thus could be used in big industries for different applications.

A. Block diagram

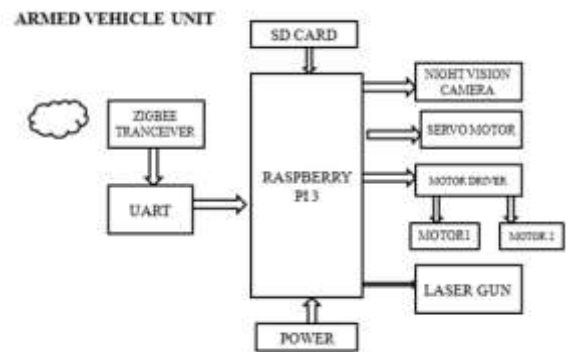


Figure1: Surveillance Robot block diagram



Figure2: Transmitter

III. DESIGN AND IMPLEMENTATION

3.1 Raspberry Pi 3

Raspberry Pi is used for making robot wireless and web based.ge Raspberry Pi and then the videos are transmitted wirelessly from the robot to the user's monitor, from where the user can conveniently control the robotic vehicle's movement and also the robotic arm movement. Raspberry pi is connected with the dongle which enables raspberry pi to transmit over the web network. Raspberry-Pi Module Raspberry Pi uses an SD card for booting and for memory as it doesn't have an inbuilt hard disk for storage.

Raspberry Pi requires 5 volt supply with minimum of 700- 1000 mA current and it is powered through

micro USB cable. ARM11 only requires 3.3 volt of supply which it takes with the help of linear regulator. 5 volt is required for the USB ports. It operates at 700M Hz. We use python or embedded C to write code into the raspberry pi. It has a strong processing capability due to the ARM11 architecture and Linux-based system. In terms of interface and control, it has 1 SPI, 1 UART, 1 I2C and 8 GPIO, which basically meet the control requirement. There are easy to use open source peripheral driver libraries.



Figure 3:Raspberry pi 3

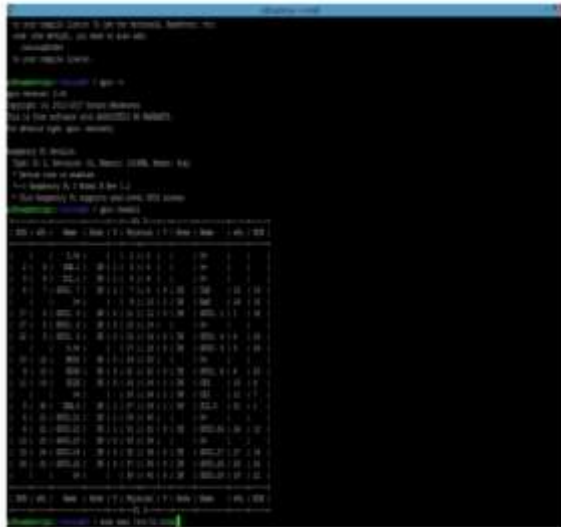


Figure 4: Terminal Window of Raspberry Pi

3.2 MOTOR DRIVER IC L298N

The L298N H-bridge module can be used with motors which have a voltage range of between 5 and 35V DC. With the help of L298N H-bridge module, it is quite easy to control one or two DC motors. First, connect each motor to the A and B connections on the L298N module. Ensure that the polarity of the motors is the same on both inputs if you are using two motors for a robot or anything. Otherwise, you

may need to exchange them over when both motors are set to forward and one goes backward. Next, connect the power supply to pin number 4 on the L298N module and negative/GND to pin number 5 of the L298N module.

In this project, we have two DC motors, therefore digital pins D9, D8, D7 and D6 will be connected to pins IN1, IN2, IN3 and IN4 respectively. Then connect D10 to pin number 7 on the module (remove the jumper first) and D5 to pin number 5 of the module (again, remove the jumper). The direction of the DC motor is controlled by sending a HIGH or LOW signal to the drive for each of the motors. For example for motor one, a HIGH signal to IN1 and a LOW signal to IN2 so that motor will be turning one direction, and a LOW signal to IN1 and HIGH signal to IN2 will move the motor in other direction. However, the motors will not move until a HIGH signal is set to the enable pin (7 for motor one, 12 for motor two). And they can be turned off when the LOW signal is set to the same pin. However, if you need to control the speed of the motors, the PWM signal from the digital pin connected to the enable pin.

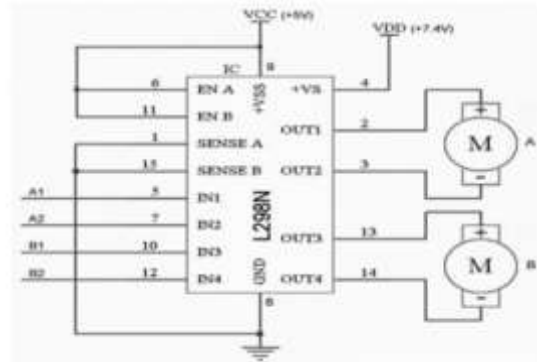


Figure 5.: Pin IC Diagram of L298N



Fig 6: L298N Module

ZIGBEE

ZigBee is an open global standard for wireless technology designed to use low-power digital radio signals for personal area networks. ZigBee operates

on the IEEE 802.15.4 specification and is used to create networks that require a low data transfer rate, energy efficiency and secure networking.

SERVO MOTOR

A servomotor is a rotary actuator or linear actuator that allows for precise control of angular or linear position, velocity and acceleration. Servomotors are used in applications such as robotics, CNC machinery or automated manufacturing.

3.3 WHY SSH?

SSH is also known as secured shell. It is a network protocol by which we can communicate one computer with another in an encrypted way. This is a kind of tunnel with the help of which we can remotely access one computer from other or we can securely send our files or documents to public Wi-Fi. For example, if you want to send a confidential file to your friend and both of you are connected to same public Wi-Fi. In this case, as many other people are also connected with that public Wi-Fi, there is the fair possibility that someone can access your data, so the file you wanted to share with your friend can be hacked by the middle person. To avoid this and to overcome this drawback we can use a secure shell protocol. SSH uses public key cryptography, so whatever message you send, it will be first encrypted and that message will be decrypted in the receiver end. For encryption and decryption, sender and receiver have a secured key so that middle person cannot hack your data because he will not have the address of the secured key. In this way, we can communicate from one computer to another with the help of SSH protocol with fair security through cryptography.

IV. NETWORK IMPLEMENTATION

Bot consists of a web camera, voltage regulator circuitry with L298N motor driver and raspberry pi. The real time video and control are displayed in the webpage which can be viewed from anywhere in the world using internet or within the Wi-Fi range and one can control it using those control provided. Setting up the raspberry pi and installation of Operating system from raspberrypi.org. Here we are using raspbian OS. Install the required packages in the pi using suitable commands in terminal window

and connect the raspi cam to slot beside the Ethernet port. Now design the control page that provides a way to control our robot this page is designed HTML and python and write the controlling of the robot code based on the L293N IC logic we have used. Connect to a network through on board Wi-Fi. Once it is connected through putty software configure we got the IP address we can use it for controlling purpose.

V. PROGRAMMING

Python programming is used here. Software design is divided into 4 codes namely: Webcam Server is the code run in the Raspberry Pi to capture the images and stream them over the internet. Here the images will be compressed into .jpg format to reduce their size prior to their transmission over the internet. They are sent using byte array over the UDP socket. Webcam Client is run by the user to receive this images in the form of byte array. They are then displayed on the monitor at a rate closer to 5 images per second so that they appear like a continuous video. Motor Server is run by the user. Monitoring the video, the user manoeuvres the robotic vehicle or the robotic arm accordingly. This is done by accepting input either from the keyboard or the webpage. It is done by checking the key press events. Motor Client as per the input from the user, either the robotic vehicle or the robotic arm move. This is done by making High or Low the desired GPIO pins of the Raspberry Pi. 4 GPIO pins are connected to the 4 servo motors and 4 to the motor driver IC L293d.



Fig 6.: Terminal Window

VI. RESULT AND DISCUSSION

This robotic vehicle with different sub modules can widely be used as surveillance robot for security purpose. Where human cannot footpace and user will be able to alert prior to intruder in his premises. It can also be used as a spy robot in case of border areas. By using the Metal detection sensor it can be used to detect bombs in its path etc. And its Laser gun can be used to attack enemies. It is user friendly. The captured photographs are given below,

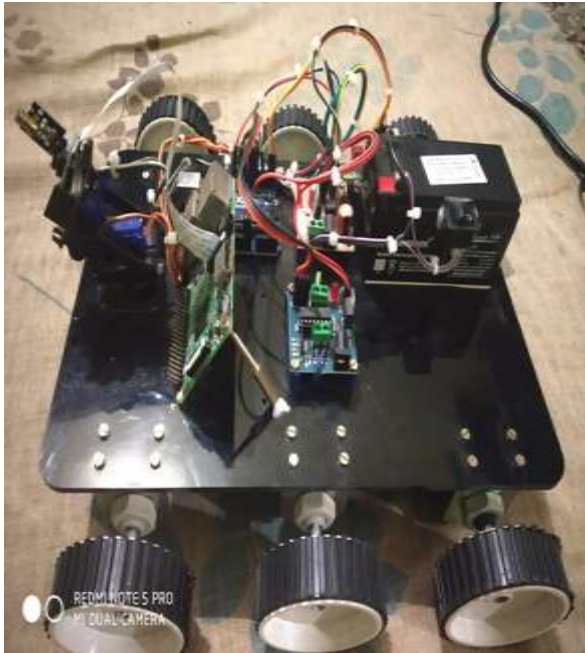


Fig 6.: Robot Setup

The output window shows the video of truck that stealing soil from the riverbed also with the latitude, longitude and the speed of the UAV. After viewing the video the police will take the intended action to take control action over the sand theft. This work proposes the control measure over the sand mining in the riverbed, which is one of the best application using unmanned aerial vehicle. The port 8081 displays the real time video

VII. CONCLUSION

It is very satisfying to implement this project and see it to function. The specifications are met and goals have been achieved. Thus, a wireless zigbee controlled robot was designed and it can be used for many applications as expected. The system developed multifunctional robot based on zigbee and

by using arduino microcontroller. In order to strengthen the security and defence in any big country like ours we desperately require robotic system which will forearm our defence system. Hence in order to make this world a beautiful place to live we desperately require robot which will assist us in our endeavor. With advancement of this system, we will have a revolution in military and defense applications that changes society as once did by industry revolution.

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