

SURVEILANCE ROBOT USING RF (Transmitter and Receiver) and RASPBERRY PI

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Abstract: The primary goal of the paper is to secure the precious life of the patrols and reduce the causality of the terrorist and also to develop a cost effective easy to control defense robot through remote desktop for the implementation of military purpose. Since the risk factor in military border is too high causing threats to the leaves of soldiers at time patrol by both climatic condition and enemy nation which needs a replacement, that is done effectively by the defense robot that comprise the raspberry Pi (small single board computer), PI camera sensor and some other device. The information regarding the detection of living objects by PIR sensor and image capture moving object by pi camera and sensor. The information regarding the detection of the living object by Pi camera capture is posted inside the webpage simultaneously. The movement of robot is also controlled by the RF module this can be used for the safety purpose.

Index Terms: Raspberry Pi, PIR sensor, PI camera, VLC App.

I. INTRODUCTION

Robot is considered as an essential part in modern life. It is an automatically operated by machine that replaces human efforts though it may not resemble human beings in appearance or perform functions in a human like manner. By extension, robotics is the engineering discipline dealing with design, construction and operation of robots.

Robots can be classified into different types based on their environment and mechanism of interaction such as mobile and fixed robot of which mobile robot can be further classified into aquatic, terrestrial and airborne. The terrestrial robots are much in use and their application are vast in each and every field, they are of two types (1) wheeled and (2) legged each having different use. Main uses of robot in today's era is for surveillance and also mainly for military purpose.

The project main functionality is to deal with tough situations like detecting hidden bomb act. Such tough situation is occurring day by day in different parts of the world through terrorist attack. It is the kind of robot which works through commands and controls. Its structure is same as human, as it has arms and head, as it has wheels to move from one place to another. Raspberry Pi will be the processor to control camera, weapons and some sensor. And all joints and movement are controlled through RF Transmitter and Receiver, Robot Operating System (ROS) allows a user to easily control the mobile operations of robot. A camera is used is used to give input to the Raspberry pi. Wi-Fi is used to send the data from control to mobile using the IP address of the raspberry pi kit. Using a mobile, we can also control the robot movement. The monitored data will be sent to the user desktop. The proposed of system consist of three parts upper, middle and lower part in which upper part is controlled by Raspberry Pi middle and lower part is controlled by RF transmitter and Receiver where we have adjusted in joystick of play station in the device we have connected two receiver i.e. receiver.(1) and

II. ROBOT CONSISTS OF:

- i. Robot body
- ii. Head
- iii. Arms



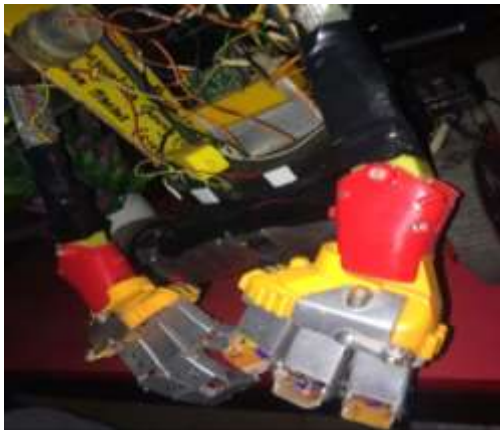
ROBOT BODY

Body of the robot is consist of some aluminum pipes, plastic and hardboard. Body is covered with thin aluminum sheets, arms is connected with aluminum pipes, hand is made from plastic and finger or end effectors is attached with it, which is made from aluminum in order to gripe. There are four wheels connected to the robot which can move throughout any direction.

HEAD

Head is the main part in which raspberry pi, camera and leds are attached which are usually used as human head. While raspberry pi is used or ON at that time the device gets heated so for that we install or fitted small fan in back side of the pi in order to keep the device stable.

ARMS AND GRIPPERS



Arms and gripper is made up by aluminum sheet and pipes used as strong frame in order to pick any stuff or objects. At end of the arms and gripper we have attached end effectors as human fingers purpose for pick and place.

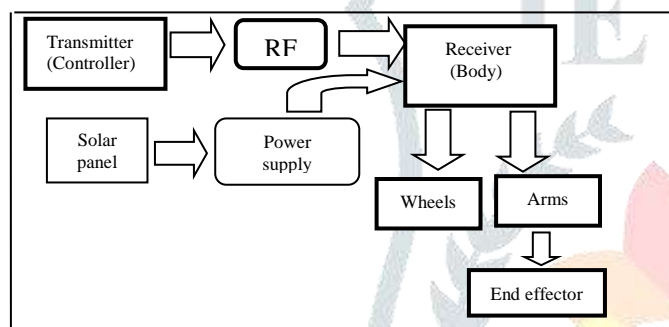


Fig.1. Block Diagram of Defence Robot

Fig.1 shows the block diagram of Defence robot as follows: -

- a. Transmitter
- b. RF (Radio Frequency)
- c. Receiver
- d. Wheels
- e. Arms
- f. End Effectors
- g. Power Supply
- h. Solar Panel

a) **Transmitter:** A transmitter or radio transmitter is an electronic device which produces radio waves with antenna. The transmitter itself generates a radio frequency alternating current, which is applied to the antenna.

b) **RF (Radio Frequency):** In wireless communication system, an RF signal generated by a transmit into free space and picked up by a receiver. The interface between the transmitter and between receivers by the antenna.

c) **Receiver:** A radio receiver also known as a receiver, wireless or simply radio is an electronic device that receives radio waves.

d) **Wheels:** Wheels is attached to give movement to robot, which can take in any direction.

e) **Arms:** Arms is a solid frame in which motors and end effectors is adjusted.

f) **End Effectors:** End effectors are the end of a rotating arms, designed to interact with the environment.

g) **Power Supply:** As usually power is important in electronic, without power there is no use of devices. In this project we use mobile battery as power bank usually mobile battery is output is 5 v which is advantage for electronic components, as many components require %v to get ON.

h) **Solar Panel:** In our environment there are many natural resources, in which we use sun light as a source of power to recharge the batteries. Sun energy is converted into electrical energy by the help of solar panel.

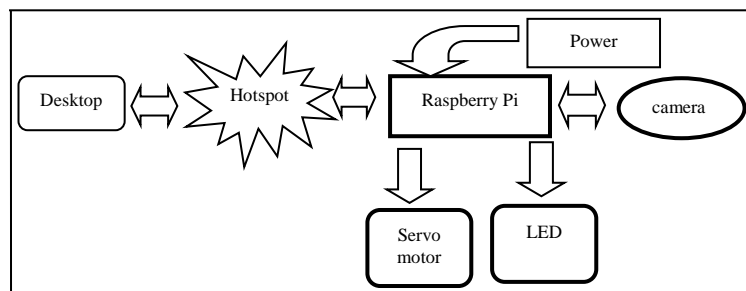


Fig.2. Block Diagram of Robot

Fig.2 shows the block diagram connected with Raspberry Pi which is attached hotspot and at same network we connect another device to control Raspberry Pi. This Raspberry pi board is used as an interface between the software and hardware and this has an inbuilt wireless controller and also a Bluetooth controller which supports the PI camera and connects all the sensors with the system hardware. PI camera is used to capture the images and motions of the object before it and this is set on the top of the system and it can be moved in and around to capture the images in different locations and it sends those recordings to the web server for later purpose. In raspberry pi there are 40 pins which is also known as GPIO, it can be use input and output. In this project we use pin 7, 9, 11, 2, 4 and 39 for servo motor, led. Servo motor is high-quality low-cost DC geared motor. It has steel gears and pinions to ensure longer life and better wear and tear properties.

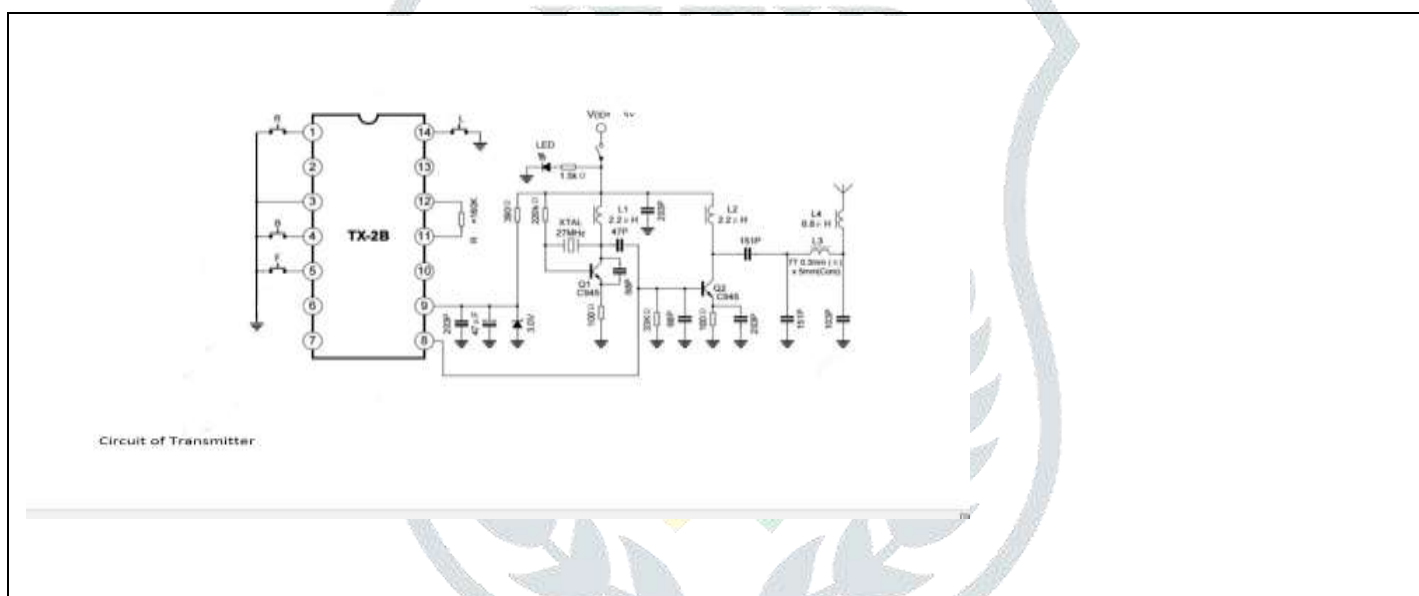


Fig. 3 Circuit Diagram of Transmitter

Fig 3: Show the circuit diagram of transmitter which helps to transmit the radio signals from one channels to the next another channel of the receiver. In this circuit, we see that the collection of all electronic components, circuit designed to convert the electrical signal to a suitable signal to transmit for many electronic components shown as transmitter IC, capacitors, registers, switches, wire and most important in both circuits is antenna. Antenna is used because it helps the signal to transmit and receive of wireless (RF).

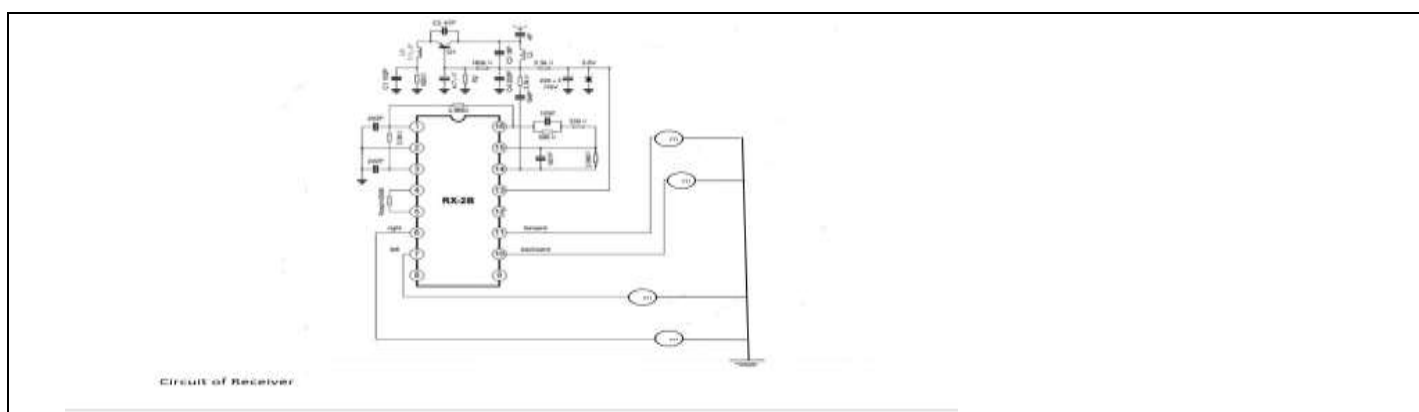


Fig. 4 Circuit Diagram of Receiver

Fig.4: Shows the circuit diagram of Receiver, in this circuit electronic circuit is used to accepts the transmitted signal from the channel and convert from electromagnetic wave to electric signal as motors, led, switches etc.

III. ADVANTAGES OVER EXISTING SYSTEMS:

- a. Mature Technology.
- b. No need environment comfort.
- c. Easy to control.
- d. Can save human life.
- e. Can be adopted in any factories.
- f. Low cost.

IV. RESULT

The prototype of this project is been designed by using the Proteus (PC software) or any other software and also been tested practically in breadboard and finally in the result we were able to enhance the controlling range of the robot using Raspberry Pi robot gives a 180 degree of rotation for twisting, rotating and gripping which helps the robot to pick & place the objects easily.

V. FUTURE SCOPE

As per the improvement of the latest technology the use of robots is also increasing day by day in our present life. The scope of robot is infinite and huge. In fact, the Robot will be the future of its automation. If someone wants to build his or her career in robot this particular field will automatically grow their career views. The field of Artificial Intelligence is one of the prospects and it includes the innovation level of decision making. Robots are playing a big role in decreasing the manpower in today's era but for the controlling of robots the presence of manpower are needed. So to overcome this problem the research in internet control robots are going on and our robot will play a big role in future to overcome this problem by adding some more upcoming technology and IP camera.

VI. CONCLUSION

Today we find most robots working for people in industries, factories, houses, security and laboratories. Robots are useful in many ways For instance; it boosts economy because businesses need to be efficient to keep us with the industry competition. Therefore, we will design robot helps in military, because robot can do work in place of human and if it get damage then it can be repair. Yet robots cannot perform every job, but can save human life. Finally, as the technology improves, there will be new ways to use robots which will bring new hopes and new potentials. The pick and place feature of this robot is also controlled by using cloud (Internet) and this robot also includes live monitoring feature by using PI camera.

VII. REFERENCES

- [1] D.Kalaiarasil, Pavithra .S2, Pratheeba .S3, Priya a dharshini .R.L4 "IoT BASED MOTION CONTROL SYSTEM OF A ROBOTIC CAR" International Research Journal of Engineering and Technology (IRJET) Volume: 05 Issue: 03 | Mar-2018.
- [2] M. S. Bin Bahrudin, R. A. Kassim, and N. Buniyamin, "Development of Fire alarm system using Raspberry Pi and Arduino Uno," 2013 Int.Conf. Electr. Electron. Syst. Eng. ICEESE 2013, pp. 43–48, 2013.
- [3] Fenfen Chen^{1,2}, Lujia Wang², Jue Lu¹, Fuji Ren³, Yang Wang², Xi Zhang², Cheng-Zhong Xu^{2,4} "A Smart Cloud Robotic System based on Cloud Computing Services" 1Wuhan University of Technology, Wuhan, P.R. China 2Shenzhen Institutes of Advanced Technology, Chinese Academy of Sciences, Shenzhen, P.R. China.
- [4] "How to Change the Direction of Rotation of a DC Motor? |Study Electrical | Online Electrical Engineering Study Site"[Online].Available:<http://www.studyelectrical.com/2015/07/how-tochangedirection-of-dc-motor.html>.
- [5] Zhao Wang, Eng Gee Lim, Wei wee Wang, Mark Leach, Ka Lok Man "Design of An Arduino-based Smart Car" Xi'an Jiao tong-Liverpool University, Suzhou, China.
- [6]C. Micheloni, G. L. Forest, C. Piciarelli and L. Cinque, "An Autonomous Vehicle for Video Surveillance of Indoor Environments," in IEEE Transactions on Vehicular Technology, vol. 56, no. 2, pp. 487498.
- [7] W. F. Abaya, J. Basa, M. Says, A. C. Abad and E. P. Dados, "Low cost smart security camera with night vision capability using Raspberry Pi and Open CV," 2014 International Conference on Humanoid, Nanotechnology, Information Technology, Communication and Control, Environment and Management (HNICEM), Palawan, 2014, pp. 1-6.
- [8] Wi-Fi Robot for Video Monitoring & Surveillance System By Pavan C & Dr. B. Sivakumar, International Journal of Scientific & Engineering Research Volume 3, Issue 8, August2012.
- [9] Arduino based Battlefield Assistive Robot By AhsanulHoque, Md. BaijidHasanShorif, ShekhNuruzzaman, Md. Eftekhar Alam Humanitarian Technology conference (R10-HTC) 2017.
- [10] Z. Wang, M. Zhou and N. Ansari, "movement of the robot ," in proceeding of IEEE Conference on Man and Cybernetics System Vol.4, pp.40454050, Washington DC, oct. 2003.
- [11] M .Senthamil Selvi, N. Suresh Kumar "Intelligent Smart Street Lighting System for the public and society", International Scientific Global Journal in Engineering, Science and Applied Research (ISGJESAR), Vol.1, No. 1, May 2016. pp. 18-28.