



Design and Fabrication of Surveillance Rover

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Abstract - Nowadays Surveillance rover is the biggest concern in many parts of the world. There is still a fear in alone areas for women as well as men. So here we propose a security patrolling robot using Raspberry PI. The system uses cameras and mic mounted on robotic vehicle for securing any premises. The robotic vehicle moves at particular path and is equipped with camera and sound sensors. It uses a predefined line to follow its path while patrolling. It stops at particular points and moves to next points if sound is detected. The system uses IR based path following system for patrolling assigned area. It monitors each area to detect any problem using combination of two HD cameras. It has the ability to monitor sound in the premises. Robot hears Any sound after area is quite and it starts moving towards the sound on its predefined path. It then scans the area using its camera to detect any human faces detected. It captures and starts transmitting the images of the situation immediately to the IOT website. Here we use IOT gecko for receiving transmitted images and displaying them to user with alert sounds. Thus we put forward a fully autonomous security robot that operates tirelessly

and patrols large areas on its own to secure the facility

Key words: - Surveillance Rover, Monitor, Images, Patrolling

1. INTRODUCTION

The Surveillance Rover is used for spying of an information, the word spying means collecting an information secretly against any organization which work terroraly or observing movements of an enemy. In this robotic vehicle, two pic microcontrollers are used namely pic 16f877a, one is used at receiver circuit and another is at the transmitter. By using transmitter, commands are transmitted to the robotic vehicle ,according to that commands the robotic vehicle will move forward ,backward ,left and right .There are four dc motors are used for the movement of vehicle. The RF based night vision camera which is mounted on the robotic vehicle, will captures an images and send these images to the IR receiver which is connected to the T.V. or laptop and we can see these images on the laptop or T.V. We can keep watch remotely by using these camera we can see at

night also. so it is very useful for surveillance purpose.

Rover is a moving platform or vehicle equipped with different electro-mechanical gadgets. It is a hybrid product of electronics and mechanics. Rovers are mainly used for collecting data or materials from places where accessibility is poor or dangerous. Rovers contain different type of sensors and even mechanical facilities for various applications. Sensors are normally meant for detecting physical conditions of the area like heat, electric shock, smoke or even detecting the presence of live human body. Camera and voice transmitter capture and transmit the video and audio information from surroundings Rovers carried by the aero-space vehicles are used to explore the geography of other planets.

2. LITERATURE REVIEW

"Surveillance Rover: The Future of Defense" (Praphulla M P, Sushma M, Gayathri M A) Paper focuses on the Surveillance robots prove to be advantageous in defensive environment. This project provides real-time surveillance at hazardous terrain and borderline by means of versatile robot based on Lab VIEW software, for safeguarding the frontier. It works in real-world environment and no conditioned scenario is required by it. Various peripherals like vision camera for live system tracking, inductive proximity for metal detection and radar for obstacle detection are implemented [1].

"Smart Surveillance Robot for Real-Time Monitoring and Control System in Environment and Industrial Applications" (Anand Nayyar, Vikram Puri, Nhu Gia Nguyen, and Dac Nhung Le) The intension of this paper is to reduce human victims in terrorist attack. The unique feature of this surveillance robot is that it can travel both on land

and water. In this paper we are using the raspberry pi to control the entire robotic module and we are using the ultrasonic sensor to sense the obstacles in the path. Surveillance area critical features include the ability to follow a search instruction plan, rigorous terrain mobility, and the capacity to classify and map underwater mines and other potential threats, communication, obstacle avoidance, and sensor payloads remain critical issues to be resolved for successful operation. Robot have been widely used to perform variety of tasks which reduce the manual work specifically in remote areas where human accessibility is unimaginable. The main applications where the robots have exhibited their excellence include surveillances, tracking targets for objective behind developing this robot is for the surveillance of human activities in the war field or border regions in order to reduce infiltrations from the enemy side [2].

"A Rover and Drone Team for Subterranean Environments: System Design Overview" (Dylan Reynolds, JB Darr, Jonas A. Bredu, Eric Lagnese Yu Gu and Jason N. Gross) Paper provides a concept overview of a rover and drone team for the exploration of subterranean environments that is currently under development. Recently, significant advances have been made in the field of autonomous robotics. These advances span from high-level semantic scene understanding to low-level efficient optimization. Through the utilization of these advances, autonomous robotic platforms are starting to leave the research laboratories and beginning to permeate novel environments. One such example of a novel environment is a subterranean tunnel, which presents not only commercial applications (e.g., the utilization in tunnel infrastructure monitoring) but also safety critical applications (e.g., the fast and

efficient response to a tunnel collapse). The safety critical applications in subterranean environments provide many novel challenges for the robotics community (e.g., robust navigation in highly dynamic environments in the case of a robotic first response to a cave collapse) [3]

“SMART SECURITY SURVEILLANCE ROVER” (International Journal of Pure and Applied Mathematics Volume 116 No. 12 2017, 67-75) Paper focuses developing robot for the surveillance of human activities in the war field or border regions in order to reduce infiltrations from the enemy side. The robot consists of night vision wireless camera which can transmit videos of the war field in order to prevent any damage and loss to human life. Military people have a huge risk on their lives while entering an unknown territory. The robot will serve as an appropriate machine for the defense sector to reduce the loss of human life and will also prevent illegal activities. It will help all the military people and armed forces to know the condition of the territory before entering it [4]

3. OBJECTIVE

1. Design Surveillance Rover with quality and available materials.
2. Programming the code required for the rover
3. Compile and see if the program has any fault
4. Try and perform active surveillance with the rover

4. SYSTEM REQUIREMENTS

- Hardware Components

Motor Driver (L293D)

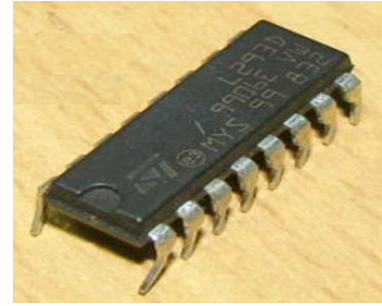


Fig 1: Motor Driver

L293D is a dual H-bridge motor driver integrated circuit (IC). Motor drivers act as current amplifiers since they take a low-current control signal and provide a higher-current signal. This higher current signal is used to drive the motors.

DC Motor

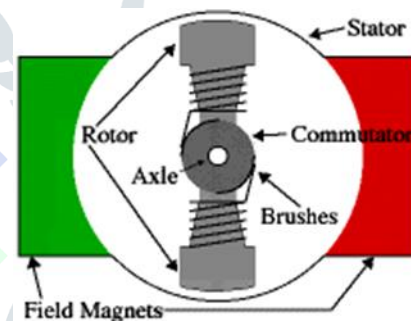


Fig 2: DC Motor

A DC motor is an electric motor that runs on direct current (DC) electricity. In any electric motor, operation is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; when this is then placed in an external magnetic field, it will experience a force proportional to the current in the conductor, and to the strength of the external magnetic field.

WIFI Modem

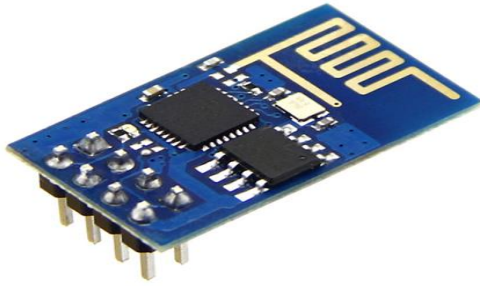


Fig 3: Wifi Modem

The ESP8266 WiFi Module is a self contained SOC with integrated TCP/IP protocol stack that can give any microcontroller access to your WiFi network. The ESP8266 is capable of either hosting an application or offloading all Wi-Fi networking functions from another application processor. Each ESP8266 module comes pre-programmed with an AT command set firmware

Voltage Regulator 7805

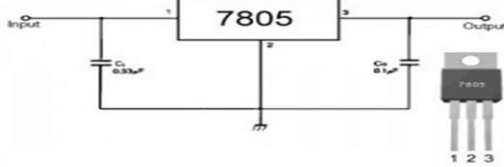


Fig 4: Block Diagram of Voltage Regulator

The LM78XX/LM78XXA series of three-terminal positive regulators are available in the TO-220/D-PAK package and with several fixed output voltages, making them useful in a Wide range of applications.

Lithium-ion Battery

Lithium-ion batteries are the fastest-growing type of rechargeables; there are probably lithium-ion batteries in your cellphone, MP3 player, and laptop computer. What's so good about lithium? It's a lightweight metal that easily forms ions, so it's excellent for making batteries. The latest lithium-ion

batteries can store about twice as much energy as traditional NiCd rechargeables, work at higher voltages, and are more environmentally friendly, but don't last as long.

LED

A light-emitting diode (LED) is a **semiconductor** light source. LEDs are used as indicator lamps in many devices, and are increasingly used for **lighting**. When a light-emitting **diode** is forward biased (switched on), **electrons** are able to **recombine** with **holes** within the device, releasing energy in the form of **photons**.

1N4007



Fig 5: 1N4007 diodes

Diodes are used to convert AC into DC these are used as half wave rectifier or full wave rectifier. Three points must be kept in mind while using any type of diode.

1. Maximum forward current capacity
2. Maximum reverse voltage capacity
3. Maximum forward voltage capacity

Resistors



Fig 6: Resistors

A resistor is a two-terminal electronic component designed to oppose an electric current by producing a voltage drop between its terminals in proportion to the current

Capacitors

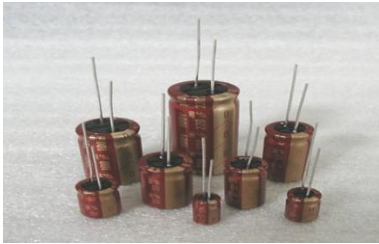


Fig 7: Capacitors

A capacitor or condenser is a passive electronic component consisting of a pair of conductors separated by a dielectric. When a voltage potential difference exists between the conductors, an electric field is present in the dielectric. This field stores energy and produces a mechanical force between the plates. The effect is greatest between wide, flat, parallel, narrowly separated conductor

Push Buttons

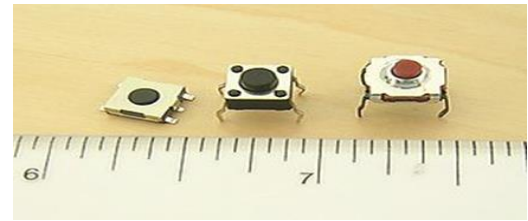


Fig 8: Push Buttons

A push-button (also spelled pushbutton) or simply button is a simple switch mechanism for controlling some aspect of a machine or a process. Buttons are typically made out of hard material, usually plastic or metal. The surface is usually flat or shaped to accommodate the human finger or hand, so as to be easily depressed or pushed. Buttons are most often biased switches, though even many un-biased buttons (due to their physical nature) require a spring to return to their un-pushed state.

6. 3D MODEL

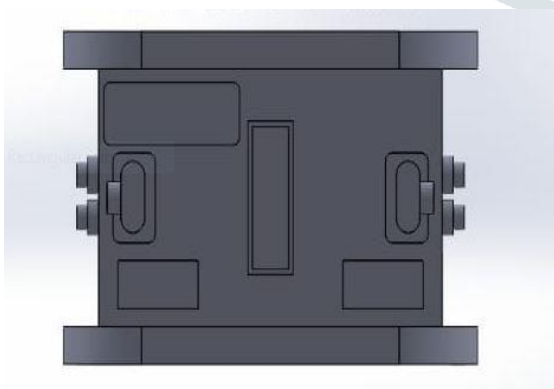


Fig 9: 3d Model Top View

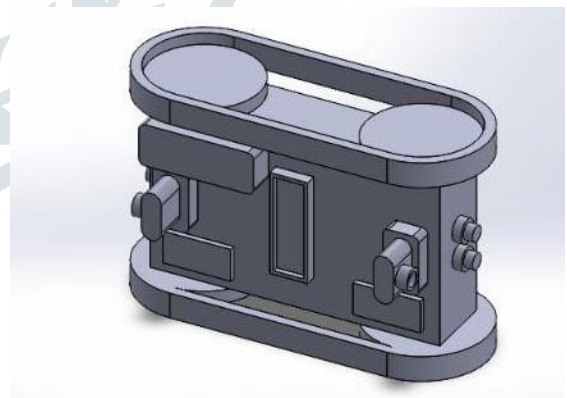


Fig 10: 3d Model Trimetric View

7. Final Model

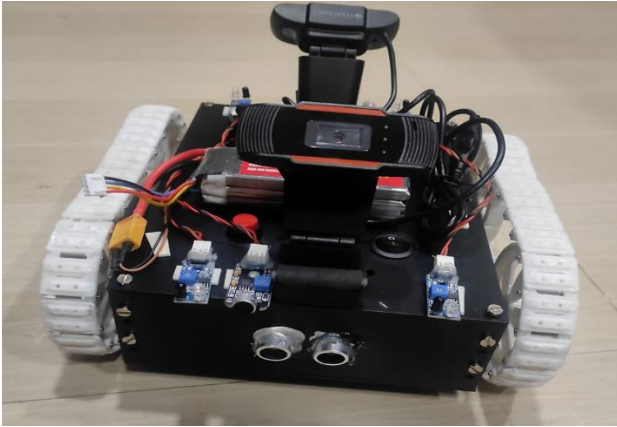


Fig 11: Surveillance Rover (Front View)

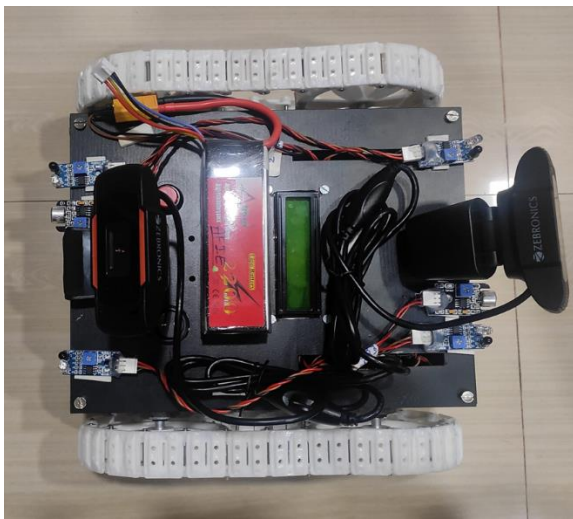


Fig 12: Surveillance Rover (Top View)

8. CONCLUSIONS

While the programming part of the system is done at block diagram panel in LabVIEW software, the results are displayed at front panel for user's convenience. Direction controls make sure that the vehicle travels according to user commands. The live video captured by webcam occurs at the window in front panel where we can view and analyze the area/surroundings, where vehicle is travelling. Radar is mounted at front end of the chassis which detects the speed of object travelling towards/away from vehicle and displays at front panel. Inductive proximity sensor is mounted downwards such as it faces the land. Whenever there is detection of any

metal object it alerts the user. The whole operation is conducted wirelessly by dumping the programmed code into myRIO and controlling all the operations from PC via Wi-Fi, making it a stand-alone device. Inbuilt Wi-Fi capability of NI-myRIO enables this feature of the system.

It is apparent from the above result that the accuracy of the system is satisfactory. The minimum accuracy of the system is 24% and the maximum accuracy of the system is 74%. The accuracy of the system is measured in terms of image transmission capabilities. The comparison between actual frame rate that is captured from the surrounding and the frame rate after transmission to the operator determines the accuracy of the system. Distant controlled robot has a huge scope in distant engineering education and distant treatment of patients. Mainly this developed robot can be used in: Surveillance based application, long distance observation of any equipment, device or machinery, control of any process/system from far, observation of office, home, classroom environment, road traffic and security system monitoring, remote image capturing and processing, hazardous environment situational image and control, track mapping for any desired location as well as satellite mapping for further decision making etc.

9. FUTURE SCOPE

The rover can be made more miniature in size. One of the limitations of this rover is the range of the rover. The bluetooth module used here has a limited range and thus this robot cannot be operated over far distances. To increase the range many other modules such as Wi-Fi and Zigbee can be used. In future, the robot may also consist of gas sensors to detect the poisonous gases in the environment. The robot may

also include a bomb disposal kit in order to diffuse bombs in the war field.

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