Computerized Reconnaissance Robots

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Abstract - *Considering the current circumstances in the surveillance robot systems, it is necessary to make a system which can perform accurate operations at high altitude geographical locations like Siachen with inclement weather conditions like temperatures drifting between -10 to -60 degree Celsius, which stand against human survival and surveillance. In this system, we have included an avalanche detection & enemy attack or human detection system in order to enhance the qualities of the surveillance robot at high altitude regions. A sound sensor will be used for avalanche detection and pi-camera with Raspberry pi for object or human detection. Also, the movements of the robot will be controlled using the Blynk app. Thus, this system aims at expanding the reach of monitoring with cameras replacing immediate subjection of the soldiers to such inclement weather conditions at high altitudes, which minimizes the impact of these situations on soldiers' physique. It is an effective system to lower the number of people killed or injured.*

Key words: Surveillance, Raspberry pi, Avalanche detection, human detection, sound sensor, Blynk app.

1. INTRODUCTION

The perception of technology has shifted over the past few decades. To excel in the field of combat, our Army must have the latest technologies and a strong innovation base. Taking into consideration the problems of our soldiers, such as having to face harsh weather conditions, tiring patrolling throughout the day and avalanches in the hilly terrains, which result in huge loss of lives in the region, efforts have been made to help our soldiers to use automatic systems to ease their work overload.

These types of devices aim at minimizing the casualties and thereby reducing human interference.

It is a low level tracking system which analyses and predicts suspicious occurrences and improves surveillance range. It can be used in mobility systems such as walking, flying, swimming and artificial intelligence. It helps in mapping and navigating in remote environments.

2. LITERATURE REVIEW

There have been many works to implement the idea of making a Computerized Reconnaissance Robot

2.1 "SARRI: A SmArt Rapiro Robot Integrating a framework for automatic high-level surveillance event detection"

Author- Daniela D'Auria, Bruno Siciliano, Fabio Persia, Fabio Bettini and Sven Helmer

This robot enhances the video stream quality. The camera of the mobile helps in capturing footage from various angles. A robotic platform takes immediate steps anytime a dangerous situation is foreseen. Complete monitoring starts from the bottommost layer to the topmost layer. The human and system interaction are possible at all levels. Design and development of complicated and prominent events can happen using this robot. This can be run in both online and offline modes.

2.2 "Implementation of Spy Robot for A Surveillance System using Internet Protocol of Raspberry Pi"

Author- Ghanem Osman Elhaj Abdalla, T. Veeramani Kandasamy.

In this research, a Raspberry pi-based operating system is responsible for remote tracking and control steps using IoT. This rescues humans, downsizes physical miscalculation & safeguards our nation against trespassers. This arrangement consists of a Raspberry Pi (which is a compact and one computer board), night vision pi camera and sensors. Data relating to living object recognition by PIR sensor sends the user notification via the net. The pi camera captures the moving object embedded in the internet site all at once. The workstation operator avails the robot using wheel drive command switches on the webpage. Robotic control gestures are automated with the help of sensors which detect obstacles, in order to avoid collision. Just one camera installation on the robot allows it to have a higher degree of freedom for manoeuvring, so that pictures can be captured at different angles

2.3 "Wireless Controlled Military Combat Robot system"

Author- Dr. Sreedhar A Joshi, Mr. Girish Kumar Aravalli, Ms. A.K. Vidyashree, Ms. Sampada Ranade, Mr. Shivalingappa S Badami

Robot in this system, is operated by a Radio Frequency (RF) sender & receiver module linked to the encoder and decoder IC's. Here, transmitter block comprises push buttons, RF transmitter and encoder. The destination section comprises Radio Frequency receiver, relay unit, decoder, driver section, sensor section and buzzer (or alarm or siren). This device identifies harmful gaseous substances are utilized for fighting fires sensors using sensing devices. Small camera is supplemented along the device to capture footage & audio sent later for transmission to the control room. Robot has a chain wheel attached to motors for device motion in different paths. Gas sensors put in service permits the robot to impart the alarm signal to alert using the sound buzzer in the presence of any harmful gases. It also fights with fire by detecting fire with the help of temperature sensor.

2.4 "Unmanned Ground vehicle for surveillance"

Author- Dr. Maheswaran S, Dr. Murugesan G, Dr Prakash Duraisamy, Vivek B, Selvapriya S, Vinith S, Vasantharajan V

The robot presented in this paper monitors the surrounding with least human intervention. It is controlled using an application installed in the mobiles/PCs of authorized users. Firstly android phone and Node MCU is connected to a Wi-Fi network .User will be asked to enter a valid IP address to connect it to the Node MCU.MIT App also consists of four control buttons to control the movement of the robot which will then record the videos of the premises ,detect the presence of toxic gases in an environment and if found will be updated to the user to check the suspicious activities.

2.5 "Surveillance Robot using Raspberry Pi"

Author- Rutuja Dhumal, Kalyani Deshmukh, Kajal Patil, Varsha Surwase

The aim of this paper is to describe a guarded alert device operated by Internet of Things that helps users and warns when detects motion and afterwards sends images to a cloud server. The images captured are directly showed to a cloud assistant, when the cloud assistance is not available at that time the stored data are put in the memory on a Raspberry Pi. Here, Raspberry Pi with added value of Open-Source Computer Vision (Open CV) software handles processing of images and algorithms which is used then sends captured images to authorized persons' email using

Wi-Fi module. Gas sensor MQ-6LPG is used to detect the presence of harmful gases and other emission so the system can automatically shut down on detection of gas concentration from 2000 to 10000pm. Ultrasonic senso HC_SR04 is used to calculate the distance of the obstacles using ultrasonic waves. It uses a single ultrasonic unit for emission as well as reception. They used a CCD camera which functions the same way as an ordinary digital camera but is made to link with any web site. This device is a low-cost as well as efficient for surveillance which is competent to capture and store images or video and transferring to the internet. It is encrypted as well as authenticated device.

2.6 "Night Vision Security Patrolling Robot Using Raspberry Pi"

Author- J.N. Amrutha, K.R. Rekha

This paper directs at designing a robot to monitor the premises during night time. It is equipped with Node MCU and night vision pi camera to capture the activities in darkness. It also consists of sound sensor to detect acoustic signal and directs the robot to move towards the sound. DC motors performs the function of rotating camera 360 degree and capture the videos and   images and send it to the user.

2.7 "Development of surveillance Robot to monitor the work performance in Hazardous Area"

Author- Sushmasirasanagandla, Mounisha Pachipulusu and Ramesh Jayaraman

Here, robot is used to keep track of the way the activities are executed in risky regions, so the work for human in hazardous area is reduced. This robot comprises of camera, sensors for identifying human, object, or any movement and as this robot works in hazardous area it is equipped with gas sensors to sense the harmful chemicals present in surrounding area. The functionality of this machine is done by coupling it to the Wireless Fidelity unit using Blynk app. Also, the robot can identify the face of trespassers with clarity and stores the data. So, here the robot stores the data continuously in an isolated place.

2.8 "Wi-Fi surveillance bot with Real time Audio and Video streaming through Android mobile"

Author- Diksha Singh, Pooja Zaware, Dr Anil Nandgaonkar

Here, the robot is operated using Wi-Fi unit by appropriate web page. The movements of the robot in all directions are controlled by using Android mobile. Here two android mobiles are used one is for audio and the other is for video. Also, blynk is used to control the Node MCU unit and is also

used to generate the one-time password through mail provided, so that this system cannot be opened or hacked by other intruder, and also provides high security. The components used are Arduino Uno R3, DC motor, Android Mobile of RTS Pi camera, Node MUC ESP8266 Wi-Fi unit.

The specialty of this robot is to capture and store real time audio and video in the folder provided and can be seen any number of times. And cost efficient and works effectively in dangerous area.

2.9 "Wireless Sensor Network for Landslide Detection"

Author- Maneesha V. Ramesh, Sangeet Kumar, and P. Venkat Rangan

It uses a non-wire connected sensing network for spotting landslides. A heterogeneous network is used, which consists of wireless sensor junctions, Wireless Fidelity and ends of a satellite for actual information conveyance to the data monitoring and control hub. Sensors used for monitoring rainfall are pore (or outlet) pressure transducer (or a photoelectric cell) sensor & dielectric (or insulated) humidity sensor for recording the original place computations. The alarming structure contains strain (or sheer) gauge (or meter), and tilt (or rotating) meter (or device) used for calculating in-situ gradient of slope change. Geophone is used for analysing the vibrations which happen in the surrounding. A network devoid of wires passes on data (or information) gateway to FMC (Flexible Metal Conduit), an external (or outside) antenna (or radiating wire) & a point of accession.

3. CONCLUSION

The Automated Surveillance Robot explained in this paper, includes sensors for harmful gases, temperature detection and management, identification of dubious undertakings and human detection in the battlefield from the enemies and from the hazardous environmental conditions. As we came across many components to make this robot, it's suitable to use Raspberry Pi, Pi Camera, DC motor and Arduino software for programming purpose. These types of devices are cost efficient which explores maps and navigates in remote areas. They can be used in artificial intelligence, mobility systems and for vision, sensing and perception.

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