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Camouflage Technique Based Multifunctional Army Robot

Amol kumar[1], K.Rajesh Bonaade[2]
Paher University, Udaipur Rajasthan

Research Article

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Abstract: Science is a rapidly developing field that creates technology that will improve human well-being. One such innovation is the robot. A robot is a computer that can be programmed to carry out intricate tasks. Military operations are seen to be the riskiest. The camouflage robot, when used in conjunction with other applications like online monitoring and land mine detection, is the way to minimize human casualties during such operations. The suggested architecture includes a metal object identification PIR sensor, an observation camera, and disguised RGBs. The robot uses this camera to determine the encompassing zone's shade and modifies it to blend.

Keywords: RGB, ZigBee, PIR sensor, camera, camouflage, color sensor, wireless robot, and Wi-Fi module

INTRODUCTION

The original concept of the Automatic Gun focused on framework was to use mechanization to identify and concentrate on any development or living thing in highly secure areas, like the border. Mechanization is a computerized weapon that concentrates on the sensor base's framework, which focuses on the living object within the sensor. PIR sensors, microcontrollers, and RF transmission and receiving units with weapon focus are essentially the foundation of programmed cylinder focusing. Up to that moment, the fringe zone is surrounded by Iron Spike wires and a watchtower from which a person continuously flashes the light day and night. They are fully responsible for outskirts security. The Programmed Gun Targeting System will share the most responsibility and reduce human error on the periphery, but it won't absolve its warriors of all responsibility. Any living element within the specified range will be able to be identified by the sensors. The Raspberry receives the sensor signal, generates the code, and sends it via an RF transmitter to the watch tower, where the RF receiver receives the code. The benefactor will concentrate on the living item while the collector side control microcontroller focuses on the firearm, signal, and engine driver circuit as indicated by the received code. The ringer will indicate that the target has been detected by the sensor. Accordingly, the person on the watch tower can easily understand the article's region. The program that focuses on computerized firearms may use computerization to enhance fringe protection, which can significantly reduce human efforts. The system may be further implemented in the future with the help of Bluetooth innovation and facial recognition, making it even more effective. The goal is to realize a face's framework and identify it from a plethora of stored appearances, some of which are ongoing. It provides us with a useful way to find the area underneath the measurements. Moreover, this computation may be extended to determine a person's sexual orientation or interpret their external appearance. A portable, Internet-controlled robot with a camera affixed and a PIR sensor to detect live things makes up this framework. Customers will be able to operate the robot remotely simply using the web.

LITERATURE SURVEY

A. Paper Title: Camouflage color changing robot

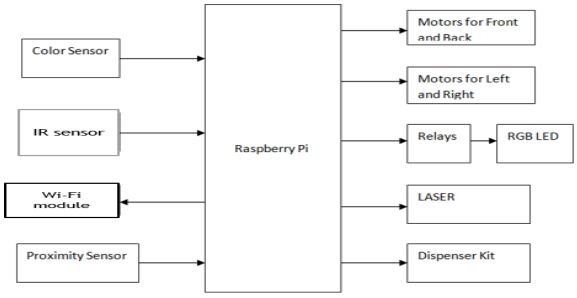
Science is a fast-paced area evolving, producing the technologies that will make life easier for humans. One such technology innovation is ROBOT. The word robot implies a machine programmable for doing complex arrangement of activities. Military activities are considered the most hazardous area in which to operate. The camouflage robot is the solution used in such operations to reduce the loss of human life by replacing it. The system proposed consists of one surveillance camera & one color sensing camera. Via this camera, the robot senses the ambient color & changes its color to blend in with it. This makes the enemy's unaided eyes hard to spot. The robot can be controlled remotely using a computer to establish the connection between them.

Each picture is characterized by its one of a kind arrangement of qualities. These highlights are selective to each picture, and subsequently help to recognize and segregate between pictures later on. Features might be characterized as the object of intrigue or a "fascinating" some portion of a picture, utilized as a beginning stage for certain PC vision computations.

Since segments are utilized as the underlying stage and fundamental hypothesis for coming about calculations, the general calculation should normally be in a similar class as its finder of highlights. The charming property for a component finder is in this way rehash capacity: independent of whether a similar element is found in at least two separate pictures from a similar scene. Distinguishing proof of highlights is an action that procedures pictures at low rates. That is, it is regularly proceeded as the fundamental procedure on an image, and investigates every pixel to check whether a part is available at that pixel. In the event that this is a piece of a bigger calculation, at that point the computation must check the image intermittently in the highlights spot. In PC vision and picture preparing highlight distinguishing proof implies methods for making sense of picture information considerations and choosing close by decisions at each image point whether there is a picture highlight of a given animal types around then .

At the point when an individual enters an observed zone, PIR movement finders are regularly utilized related to different pieces of the fighting field in executing automated framework. At the point when somebody enters made sure about spots, they will promptly send a sign by means of remote correspondence to the control room segment and are shown by caution to the control room. In the host zone, the individuals concerned ought to comprehend that an outcome has happened. Simultaneously, the microcontroller-associated web camera continues catching what's happening there at the host spot and sparing it into the PC. At the point when security individuals in the administrative room get a caution sign to the host area, they sign in by means of web to the host segment PC and view PC recordings of all fighting segment data.

In this paper, we alluded to the PIR sensor which is utilized to distinguish live articles (by identifying the degree of IR radiation) and which is most appropriate for checking. This paper derived fixing a camera on the robot. In this the government agent robot is worked with Raspberry Pi, We are utilizing this equipment since it is easy to actualize sensor and camera activity. It additionally alludes to robot working in uneven territory and delicate territories. It likewise assists with keeping up social control, perceive and screen dangers and is helpful to governments and law implementation to forestall or examine live observation of crime. In the security framework, the camera mounted on a robot goes about as a security patroller which can screen territories that cannot be gotten to by people. We can forestall loss of human life by utilizing observation robot. The robot can go toward any path. Utilizing Wi-Fi medium it tends to be worked remotely.



Late advancements in VLSI innovation and MEMS (Micro-Electro-Mechanical Systems) just as remote correspondence innovation have permitted sensor systems to be fabricated where enormous quantities of extremely little hubs are spread over specific situations to be detected and answered to a focal hub (client). There are numerous applications in Sensor systems. In the military, they are utilized for observing front lines, and following articles. Notwithstanding the production lines and stockrooms for following and checking, they are utilized for seismic information assortment and announcing.

METHODOLOGY

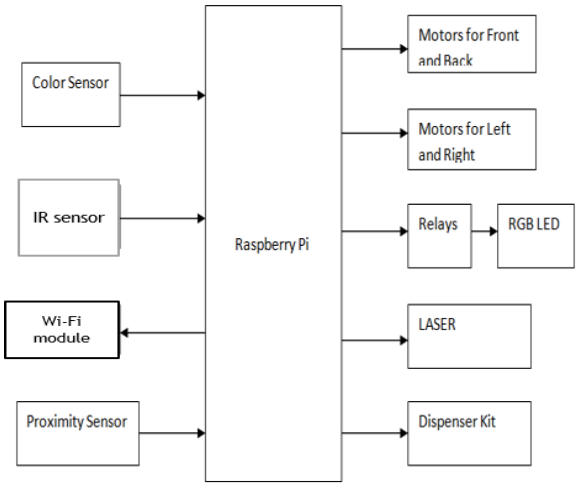
A. Hardware

a) Transmitter side:

Transmitter side has robot and screen control over live machine status and video captured by robot-installed camera. Wireless transmission of the data is achieved using Wi-Fi module.

*b) **Receiver side:***

Camera and motors can be operated by the receiver side user using motor driver. The metal sensor readings are received continuously through the Wi-Fi module at the user's end. Using colour sensors, the colour is sensed and a proportional value is fed using the Raspberry Pi to the led strip.



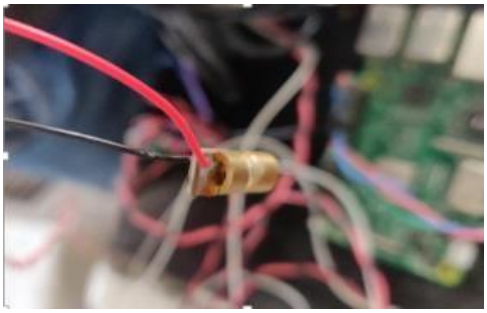


Fig 1. Sensors Connected to Raspberry Pi

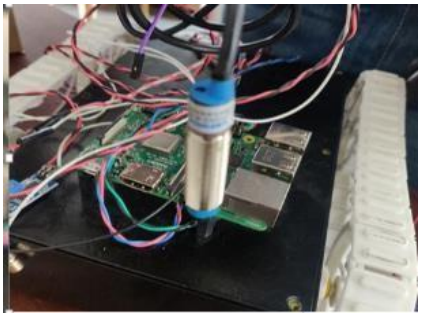
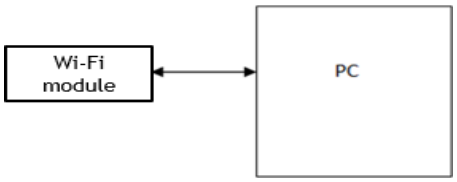


Fig 2. Controlling Through PC



B. Software

a) Linux

Linux is the most generally utilized and most popular open source working framework. As a working framework, Linux is programming that lives on a gadget under the various applications, acknowledges demands from different projects and transfers these solicitations to the equipment of the machine.

b) Python

Python is a programming language of high standard designed to be easy to read and simple to implement. It is open source, meaning it can be used freely, even for commercial applications. This is considered a structured language and is mostly used to construct interactive web content and web applications.

I. RESULT AND ANALYSIS

A. ***Camouflage Feature of Robot***

The RGB's are mounted on the robot chassis. Based on the 8-bit value the color of the RGB received is changed and the color of the robot is adjusted to the surrounding.

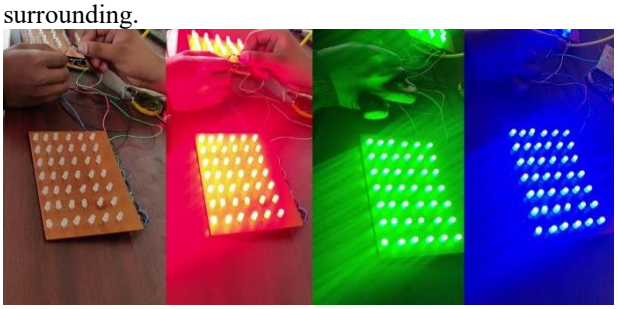


Fig 3. RGB's

B. Laser Dot and Landmine detection

Utilized for execution of Laser Guns. Voltage to work: 5V DC. Laser yield: 5mV. At the point when an object methodologies the attractive field, electromagnetic acceptance actuates an enlistment current (whirlpool current) to circle inside the objective. The enlistment current stream increments as the objective methodologies the sensor, which causes the heap on the wavering circuit to rise.

(a) (b)

Fig 4. (a) LED Trigger and (b) Proximity sensor

FUTURE SCOPE

The fundamental motivation behind the undertaking is to run a robot utilizing PC. The machine to identify the metallic nearness additionally, and the PIR sensor recognizes any human nearness in its manner, and if any human nearness is identified, it forestalls an alert framework and signals. The smaller scale controller is modified so that the robot moves brilliantly relying upon the squeezed key, and it distinguishes the nearness of metallic articles in mines and cautions by means of bell alert framework with the assistance of the metal location sensor. This current undertaking's downside is that robot status isn't known. This can be evacuated by getting a GSM module that gives robot working status. By adding remote camera to the robot, just utilizing GPRS and GPS would one be able to see the outside world from our PC.

By associating the temperature sensor to the robot one can get the temperature of risky territories on the PC itself as opposed to sending individuals there and confronting issues on the ground we can send the robot there and the sensor recognizes the temperature and gives the microcontroller data and the microcontroller furnishes the handset with the data from which we can acquire the information on the pc side. By interfacing the smoke sensor to the robot, the data identified with smoke or gas fixation can be gotten in the particular field, for example (coal mineshafts, risky zones, and so forth).

Sensor detects the data and offers it to the small scale controller and offers it to the handset and from that we get the data on the PC. By associating the separate instruments to the robot, it tends to be utilized for cultivating purposes in horticulture. This robot can go ahead and in reverse just as left and right contingent upon our headings so we can just utilize robot to do some piece of horticulture from pc. We can shoot the objective from pc by connecting the terminating instrument and remote camera to the robot. Here we can see the contrary objective by utilizing the camera and you can shoot the objective from your PC by squeezing the chose button so you can undoubtedly oversee circumstances like the Mumbai psychological oppressor assault without loss of human life and we can likewise the our officers' exertion.

CONCLUSION

Human life is replaced by the suggested framework. Since human existence is always more structured, this suggested robot serves as both a lifeline and a security framework. It creates and takes on a major role in detecting environmental elements and keeping an eye out for battlegrounds. The robot adjusts its shade based on the overall situation and avoids the adversary's awareness since it relies on the shifting influence of the chameleon's shading. Robot-to-robot communication is based on inclusion territory management. The robot is also difficult to recognize with the unaided eye due to the covering spotlight. As a result, the suggested architecture as a whole helps our security forces detect intruders. The robot may also be used in high-altitude areas where humans cannot reside.

REFERENCES

Hitesh Shinde, Kirti Sonawane, Pranit Rane, Atharva Pathak, Sumita chandak Atharva “Camouflage Colour Changing Robot” ISSN:-2321-9653, published on April 2018.

N Jayanthi and S Indu “Comparsion of Matching Techniques” International Journal of Latest Trends in Engineering and Technology Vol. (7) Issue (3), pp. 396-401.

Dr. Shantanu k Dixit and S B Dhayagonde “Design and Implementation of e-Survilannce Robot for Video Monitoring and Living Body Detection” International Journal of Scientific and Research Publications, Volume 4, Issue 4, April 2014 297 ISSN 2250-3153

Ghanem Osman Elhaj Abdalla and T Veeramanikandasamy “Implementation of Spy Robot for A Surveillance System using Internet Protocol of Raspberry Pi” 2017 2nd IEEE International Conference On Recent Trends In Electronics Information & Communication Technology, May 19-20, 2017, India.

Mokhtar Aboelaze, and Fadi Aloul “Current and Future Trends in Sensor Networks” Conference Paper April 2005.

Patrick Kinney “ZigBee Technology: Wireless Control that Simply Works”

[7] Priya B Patel and Viraj M Choksi “Smart Motion Detection System using Raspberry Pi” International Journal of Applied Information Systems (IJAIS) – ISSN : 2249-0868 Foundation of Computer Science FCS, New York, USA Volume 10 – No.5, February 2016.

[8] Sabrina M Varanelli “Multi-Weapon Auto Aiming and Trigger System for Rapidly Deployable Armed Support Robots” WORCESTER POLYTECHNIC INSTITUTE.