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RESEARCH ARTICLE OPEN ACCESS

Night Vision Patrolling Robot for Security Patrolling Using Raspberry Pi

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ABSTRACT
In this project, we propose a security patrolling robot manages the utilization of Raspberry pi to survey night patrolling in an area. These days' video reconnaissance significant as far as security. Top of the line cameras are required in business spaces, schools and clinics, stockrooms, and outside conditions. The robotic vehicle moves at specific intervals and outfits with night vision camera and sound sensors. It stops at specific points and moves to next points if sound is identified. It can screen sound in the premises. Any sound after working hours and it starts towards the sound on its predefined way. It scans the region utilizing its camera to detect any human appearances distinguished. It captures and starts transmitting the pictures of circumstance quickly on sound or human face identification. The undertaking clarifies the utilization of Raspberry Pi, a low-cost single onboard computer**.**

Keywords*: Night vision, patrol robot, sound sensor***.** *raspberry pi*

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I. INTRODUCTION

The total idea of this project is to protect the region of certain distance of area. If you get any type of sound resulting in sending notification to the user through the Blynk. Robot is consisting of night vision camera from which we can see the live video through the smart phone where it will capture the image and directly send to user. Night vision camera plays a very important role in this project in rendering the robotic device automatic. Robotic function as a computer.

The Primary security robot surveillance is proposed by Everett and gage, in the year 1999 in "Mobile Detection. Assessment and Response System (MDARS)" [1]. From that point forward security robots have become a developing interest with expanding improvements in exploration and application.

It will work partially indistinguishable from a PC. Different sorts of observation frameworks are accessible here, like screen, CCTV, and so forth In these sorts of frameworks, the individual who is fixed and arranged in that specific region can just see what's going on around there. What's more, here, he/she can keep track at the specific snapshot of what's going on in that specific spot. Likewise, it gives secrecy on the two sides, is another in addition to. Raspbian OS is another addition to. Raspbian OS is the working framework which is utilized here. Robots in our daily lives have found a discovered a rapidly expanding demand for a variety of jobs Although there are many studies and implementations of security robots, the technology used in security robots limits their affordability.

Autonomous robots are a new type of robotics that represents a breakthrough in future technology and surveillance. Guards patrolling the area with flashlights and batons never worked as well as today's protection devices, which are comprised of intelligent sensors and embedded systems, as well as mechanisms and mobile applications that can be used in dangerous environments such as minefields. it like harmful gas leaks, where use of personal is a risky thing.

A security robot dependent on Ultra-Wide Band innovation for indoor situating of obscure zones. It tends to be utilized in perilous conditions, as unsafe where utilization of staff is extremely hazardous [2]. A group of portable security robots watches various floors of a structure. During the event of a strange circumstance, the portable robot communicates the connected area (floor number) of the occasion to the directed PC [3]. Countless applications today are utilizing of versatile assistance security robots, including self-governing route, security watching, housework, search and salvage

activities, material dealing with, fabricating, and mechanized transportation frameworks. Notwithstanding the application, a versatile robot should utilize a powerful self-governing route framework. Self-governing route stays one of the essential difficulties in the portable robot industry; many control calculations and strategies have been as of late built up that mean to conquer this test [4].

The security watch robot will use a few sensors and engines to explore inside in self-sufficient mode. It can likewise convey and be controlled by means of Wi-Fi situation has send to the user. [5]

II. LITERATURE REVIEW

In the present dilemma of the world everyone possesses grate danger. By using the technology of combined minds of different fields we can make use of the robots. As you can see these robots are being used in wide range, both autonomous and manually. Robots are being used in military operations and transportation also. There are even few that will do things that no one can imagine.

Ahsanul Hoque etal in [9] used a robot with a remote controlled arm which can analyze a place or object using its sensor and send back the signal if anything occurred that alerts it danger protocol, by using the arm of the robot the particular area or object is scrutinized manually, in that they used SMS as signal but it can be developed by using processed image

As in the [18] they used artificial intelligence, that it works on the basis of the different data on criminals and the places where the crime rate is high [10] and it patrols in the consisted way using navigation system. The analysis on the criminals is done by their behavior, and the crime sensitive areas are also used in this data for easy patrolling and good safety for others.

As Alexander Lopez etal stated in a robot is put to work in a mall in order to interact with human and to ensure safety across the premises such as fire and violence. While the robot is through patrol if any disturbance is occurred in the area it analyses immediately and send distress signal with appropriate images with it [17].

For the use of the raspberry pi algorithms used by authors in [18] are adaboost, bagging, enhanced reweight. In this the error derivative of the weight is calculated to find all the hidden layers before the output.by this they got all of the hidden layers found before outcome and can be able to test different designs for the best results from the algorithm. it totally depends on external power supply, which can reduce their availability.

Authors' in [7] used MQTT for alerts as it only requires a smaller number of bytes as compared to the HTTP and also for the requests made by the multiple devices in HQTT needs a post action request as it is not required in MQTT and the request is distributed to each interested client.

A large number of some different sources accessible for lightning reason Headlights can be utilized as another light source, with this; the paper researches the outside sound system VO execution with the conditions in lightning its reach is 10 km of driving region for 30 hrs. In these different difficulties incorporate the perceivability range, a unique light source, force areas of interest, and so on [11]

This can have some trouble when some other picture, for example, bird or vehicle comes into the image. There is a planar reflection model is useful to get the force circulation of various pixels with an infrared camera. With that, a pixel-based arrangement is utilized to check the various pixels have a place with the street or not. Assuming just it decides street surface, the further cycle gets started.[12]

Creators in [13] it is utilized for wrongdoing examples and proof-based strategies. Wrongdoing dataset for wrongdoing examination by polices in England and Wales from 1990 – 2011 is taken to quantify the exhibition of the new technique. Procedures like Outlier identification utilizing distance administrator (k-NN), Genetic Algorithm utilized for improving of exception location administrator boundaries are utilized. The characterization was finished utilizing Decision Tree utilizing the GINI record and the testing and preparing done utilizing Sample Stratified.

Boosting - It is another procedure which is utilized to improve arrangement execution. It is a strategy which can be utilized to improve the exhibition of any feeble classifier. The broadly utilized boosting calculation is AdaBoost, which iteratively assembles a gathering of models [14]. Over-Sampling - The testing approach and builds the quantity of minority class model is to diminish the level of imbalanced conveyance. Irregular Over-Sampling (ROS) go under this inspecting [15].

III. BLOCK DIAGRAM

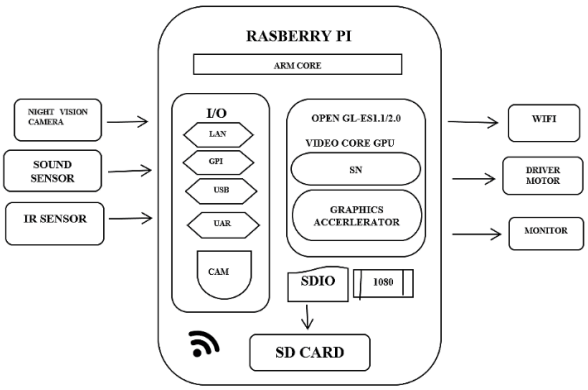

Fig.1. Block Diagram

3.1 Block Diagram Description

1. In this venture IR Sensor is utilized to make the robot move consequently following a particular way.
2. Sound sensor is utilized to know the sound in the specific territory.
3. IOT is utilized to send the catch picture to the individual.
4. Connect USB camera with raspberry pi
5. Connect power supply for Raspberry pi..
6. Plug the HDMI link in Raspberry pi from the monitor for power supply by using VGA to HDMI for Raspberry pi

3.2 Hardware Requirements

1.Rasberry pi
2.Night vision camera
3.IR sensor
4.Sound sensor
5.DC motor
6.SD card

3.3 Software requirements

1. Raspbian jessie
2. Python

3.4 Hardware Description

1.Raspberry Pi3

Broadcom BCM2835 Raspberry Pi is a little single board Computer made in UK by Raspberry Pi foundation to propel the training of programming in schools and in non-modern countries. Remarkable model become unquestionably more acclaimed than anticipated fixing outside of its goal market, for usages like robots.

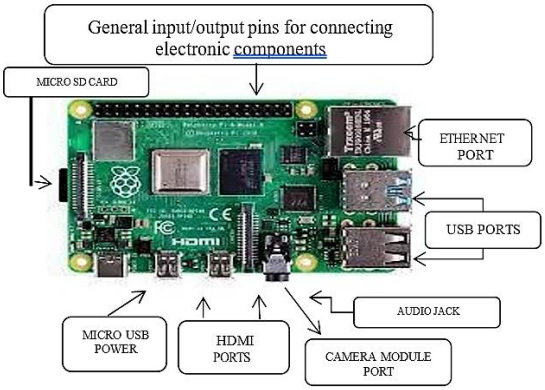

Fig.2. Raspberry pi3

2.Night vision camera

It has the ability to work in the low light conditions. A web camera is a cam that streams an image or video in real time to or through a computer to internet. Web cams are small in size which sits on a desk, attach to a monitor or built in a hardware webcams are used in video call session involving ore people with conversation with live audio and video.

Fig.3. Night vision camera

3.Sound Sensor

The sensor is a sort of module is used to perceive power the sound. The utilization of this module joins switch, security, checking. The sensor exactness can be changed for the effortlessness of usage. This sensor has a mouthpiece to give contribution to cradle top finder and a speaker

This sensor recognizes a sound and cycles an o/p voltage sign to a microcontroller. This sensor is capable to choose uproar levels inside dB's or decibels at 3kHz frequencies generally where human ear is sensitive. In PDAs, there is an application which gauges the sound level.

Fig.4. Sound Sensor

The sound sensor has a slight piece of material considered a diaphragm that vibrates when

hit by sound waves (like how your eardrum vibrates when hearing sound). The vibration of the diaphragm is changed over by the sensor into an electrical sign that is shipped off the LEGO block, which realizes that a sound has been heard. These days, a ton of safety occasions are started because of certain sounds like shots, forceful conduct, breaking the glass. However, cameras with inbuilt sound senor can add enormous estimation of the security frameworks. Since they alert consequently when genuine and potential occurrences happen.

4.Infrared Sensor

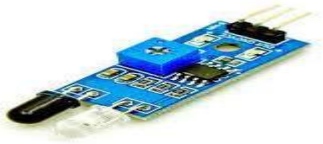

Fig.5. IR Sensor

An Infrared Sensor works in the underneath plan: infrared transmitter is used to discharge radiation of required recurrence. This radiation goes at the item and is reflected to back. The reflected radiation is perceived by the Infrared recipient .IR Receiver will be recognized radiation is then also took care of subject to its power. Infrared Receiver result is pretty much nothing and enhancers are used to increase the distinguished sign.

In this undertaking, we have utilized Infrared Transmitters and Infrared beneficiaries besides called photo diodes. They are utilized for sending and getting light. Infrared passes on infrared lights. Precisely when infrared shafts fall on white surface, it's reflected back and saved by photodiodes which makes some voltage changes. In this point the IR light falls on a dull surface, light is devoured by the faint surface and no columns are reflected back, these lines photodiode doesn't get any light or bars.

5.DC MOTOR AND L293D DRIVER

A machine that changes over DC electrical power into mechanical power is known as a Direct Current motor. DC motor working relies upon the current passing on conductor is set in an appealing field, where the conductor experiences a mechanical force. The heading of this force is given by Fleming's left-hand rule and its degree is given by

F=BIL

B = Magnetic flux density,

I = Current,

L = Length of the conductor within the magnetic field.

Utilizing this L293D engine driver IC is extremely basic. The IC deals with the standard of Half H-Bridge, however until further notice simply realize that H connect is an arrangement which is utilized to run engines both in clockwise and hostile to clockwise bearing. As we said before this IC is fit for running two engines at the any course simultaneously

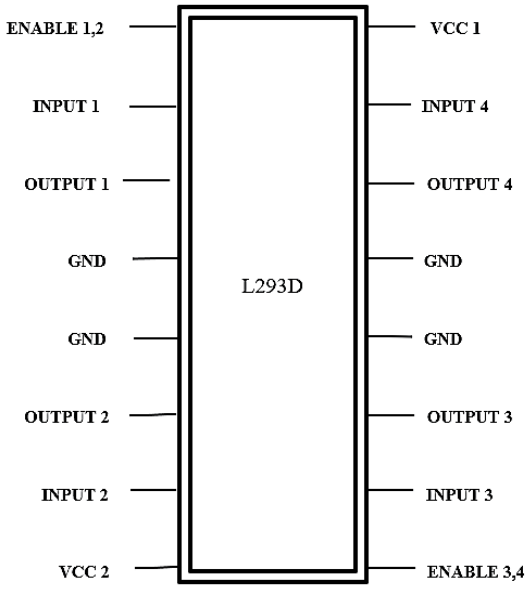

Fig.6. pin diagram L293D

L293D engine driver IC contains two H-connect circuit inside it, which may likewise utilize Darlington semiconductor a few times for flow intensification.

By understanding this H-connect circuit, in the event that 1, when rationale '1' apply to semiconductor T1 and T4, engine turns over pivoting clockwise way because of circuit total and current courses through it as demonstrated by blue sign.

On the off chance that 2, we apply rationale '1' to semiconductor T2 and T3, so engine turns over pivoting in enemy of clockwise course because of circuit total and heading of current moves through it is appeared by green sign.

As referenced that rationale '1' apply to T1 and T4 or T2 and T3 is only for effortlessness cause this semiconductor is hard wired inside IC so deal with pin-out and apply rationale to IC's pin straightforwardly and completed your work.

IV. SOFTWARE USED

4.1 Raspberry pi Software

It is a free open source working framework and it has a place with the Unix working frameworks. Linux implies the actual bit which is the Main Part of the working framework and handles the

correspondence between the user and hardware. It utilizes typical Linux is utilized to allude to the entire Linux circulation. Linux appropriation is an assortment of programming dependent on the Linux Kernel. It comprises of the GNU-venture's segments and applications. Since Linux is an open source project, anybody can change and circulate it. That is the fundamental explanation like where there are numerous varieties of Linux.

4.2 Python

Python is some undeniable level, deciphered, object-situated scripting language. It utilizes English catchphrases much of the time whereas different dialects use accentuation, it has some linguistic developments than different dialects.

Standard Library of python

1.Pandas
2.Numpy
3.Sklearn
4.Seaborn
5.Matplotlip
6.Importing datasets
7.OpenCV

Image processing is the way toward controlling pixel information to make it appropriate for PC vision applications or to make it reasonable to introduce it to people. For instance, changing brightness or contrast is a picture handling task which make the picture outwardly satisfying for people or reasonable for additional preparing for a specific PC vision application.

OpenCV is Open Computer Vision Library. It was from the start delivered in 1999 by Intel. With more updates, it has been changed starting now and into the foreseeable future to zero in on the continuous PC vision. This library has been created under programming languages like C and C+. It will in general be adequately run on working frameworks Windows and Linux. This library can be effectively interface with programing languages like Python, MATLAB, Ruby and others as well. Close by NumPy and Python picture preparing (shape &color identification) can be performed quiet.

Initially, a sample image in which preparing is to be applied is to be read. It's done using a pre-characterized.

Python function: CV2.imread (). The example picture bought to be accessible in current folder or the full location of the picture is to be referenced as a argument. For reading a picture, we can utilize functions like imread_color, imread_grayscale, mread_unchanged

V. RESULTS

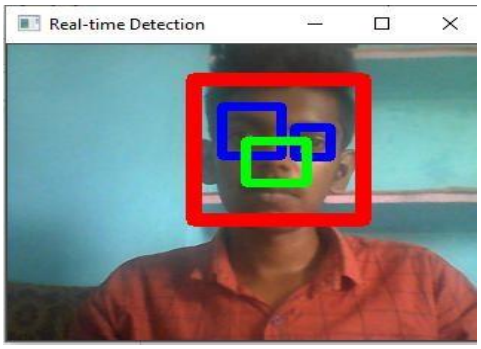

Fig.7. Morning Vision of camera

As shown in the figure 5 the red line will detect the face by giving this equation the python itself .

1.face_detect=cv2.CascadeClassifier('haarcasade_frontalface_alt.xml')

By using the haarcascade frontal face and will get the binary code of the code and directly detect the face of the computer vision of the camera and it will capture the image.

2.if face_detect.empty():raise IOError('Unable to haarcascade_frontalface_alt.xml file')

This code will load the image of the red line front face of the camera. The blue line indicates the nose of the image by giving a code and will run in the python it will capture the image of the eyes.

3.eyes_detect=cv2.CascadeClassifier('haarcascade_eye.xml')

4.if eyes_detect.empty():raise IOError('Unable to load haarcascade_eye.xml file')

Where it will load the image of the eyes.

The green line indicates the nose of the image by giving an code and will run in the python it will capture the image of the nose

5.noise_detect=cv2.CascadeClassifier('haarcascade_mcs_nose.xml')

6.if noise_detect.empty():raise IOError('Unable to load haarcascade_mcs_nose.xml file')

It will load the image of the face of a nose.

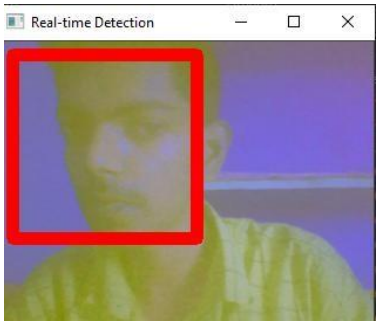

Fig.8. Night vision of camera

As shown in in the fig 6 the image captured in the night where it captures the image and directly

send to the user and the images of the people will get a image.

6.gray=cv2.cvtColor(resize_frame,cv2.COLOR_BGR2LAB)

By giving this code in the image it will get black and white of the image and we can change it into morning vision or night vision of the camera by giving a color code of it.

As shown in the figure red line is capturing the image of the people and it will capture the image.

7.resize_frame=cv2.resize(capturing,None, fx=0.5,fy=0.5,interpolation=cv2.INTER_AREA)

By giving this line it will resize the frame of the people and giving the rectangle frame of the people to detect.

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Fig.9. Captured Image

This is the clear-cut image as shown in the image without any lines to capturing and saved to the folder. All captured images have been saved to the folder.

As shown in the fig 7 the python code when executed then the output will be given on the camera and it will capture the image of the human and detect the image and any suspicious is going on it will detect and directly send it to the user. Where it will capture the image cv2.imshow("Real-time Detection", gray) It will detect the real time detection of the robot.

VI. CONCLUSION

As per this project, the entire territory surveillance is finished the night vision camera and furthermore programmed framework when the sound is distinguished robot will follow the specific way and go to that space and catch the region and catch the picture and send it to the user using IOT. This undertaking complete behind is a programmed brilliant path for night vision watching.

REFERENCES

[1]. "Mobile Detection Assessment and Response System (MDARS)", Everett, H. & Gage, D.W, 1999

[2]. "Some 6481 results of the test operation of a security service system with autonomous guard robot", Y. Shimosasa, J. Kanemoto, K. Hakamada, H. Horii, T. Ariki, Y. Sugawara, F. Kojio, A. Kimura, S. Yuta,2000.

[3]. "Team Mobile Robots Based Intelligent Security System", S. Chia, J. Guo, B. Li and K. Su,, 2013.

[4]. L. Chung, "Remote Teleoperated and Autonomous Mobile Security Robot Development in Ship Environment", Mathematical Problems in Engineering, vol. 2013, Article ID 902013, 2013.

[5]. J. Garcia, A. Alsuwaylih and S. Tosunoglu, patrolling "Security Autonomous Robot", in Florida Conference on Recent ad vances in Robotics, 14-15 May 2015.

[6]. advances in Robotics, 14-15 May 2015.

[7]. N.Hemavathy, Arun.K, Karthick.R, Srikanth.A.P, Venkatesh.S "Night vision patrolling robot with sound sensor using computer vision technology".

[8]. Alexander Lopez,Renato Paredes,Francisco Cuellar "Robotman: A Security Robot for Human-Robot Interaction".

[9]. Ahsanul Hoque, Shekh Nuruzzaman, "Arduino based Battlefield Assistive Robot".

[10]. Dr Akash Saxenaa , Gaurav Kumar Das b and Avinash Sain "Mining Criminal Dataset Using Gradient Boosting Algorithm".

[11]. O.Ramstrom and H. Christensen, "A method for following unmarked roads," in Intelligent Vehicles Symposium, 2005.Proceedings. IEEE. IEEE, 2005, pp. 650–655

[12]. Q. J.M. A´ lvarez and A.M. Lopez, "Road detection based on illuminant invariance,"Intelligent Transportation Systems, IEEE Transactions on, no. 99, pp. 1–10, 2010.

[13]. Kaumalee Bogahawatte and Shalinda Adikari, "Intelligent Criminal Identifiaction System", Proceedings of 8th IEEE International Conference on Computer Science and Education, pp.633-638, 2013.

[14]. M.Sreedevi, A.Harsha Vardhan Reddy, Ch.Venkata Sai Krishna Reddy, "Review on Crime Analysis and Prediction Using Data Mining Techniques", International Journal of Innovative Research in Science, Engineering and Technology, Vol. 7, Issue 4, April 2018.

[15]. J.Gowthami,K.Aishwariya, P.Divya, M.Kavin Kumar, A.Elangovan, "Data Provenance for Multi-Hop Internet of Things", International

Journal of Engineering Research & Technology, 2019.
[16]. H. Benjamin Fredrick David and A. Suruliandi "Survey on crime analysis and prediction using data mining".
[17]. Tahzib Mashrik, Hasib Zunair, Maofic Farhan Karin "Design and Implementation of Security Patrol Robot using Android Application.
[18]. K. Gopalakrishnan, S. Thiruvenkatasamy, E. Prabhakar and R. Aarthi "Night Vision Patrolling Rover Navigation System for Women's Safety Using Machine Learning"

Irfan Ahmad Pindoo, et. al. "Night Vision Patrolling Robot for Security Patrolling Using Raspberry Pi." *International Journal of Engineering Research and Applications (IJERA)*, vol.11 (5), 2021, pp 01-07.