Web Controlled Surveillance Robotic Car

[1]Likesh [2]Krishna K, [3]Manjunath A G [4]Mithun S, [5]Prajna K B

[1,2,3,4]Final year Student, [5]Assistant Professor,
[1,2,3,4,5]Department of ECE,
[1,2,3,4,5]NMIT, Bangalore, India

Abstract: Video surveillance is the process of monitoring a situation, an area or a person. This generally occurs in a military scenario where surveillance of borderlines and enemy territory is essential to a country's safety. Human surveillance is achieved by deploying personnel near sensitive areas in order to constantly monitor for changes. But humans do have their limitations, and deployment in inaccessible places is not always possible. We have developed a robot which can be used for video surveillance & monitoring which can be controlled through a Webpage. The control mechanism is provided with a video transmission facility. The video transmission is practically achieved through high-speed image transmission. Initially, the robot will be equipped with a camera which will capture the scenes and transfer the images to the server on which the user will be controlling and watching the live feed.

Keywords— Surveillance, Raspberry pi , Robot.

I. INTRODUCTION

We are have built a web-controlled surveillance system using robotic car. This could be a useful and inexpensive security as well as a spy tool. We are using Raspberry Pi, a camera and two DC motor with Robot chassis to build this Robotic car. It has a camera mounted over it, through which we will get live video feed and the interesting part here is that we can control and move this robotic car from a webpage over the internet. We built a webpage in HTML which has Left, Right, Forward, Backward buttons, clicking on which we can move the robot in any direction. This project attempts to address the need for a self-contained home as well as outdoor security system. Currently, security systems require many costly components and a complicated installation process.

Two basic types System can take a lot of time and money. Another drawback is that it is a permanent part of the home. If the owner moves, the security system must stay. The second type of system is a wireless one components for this are also costly. Another point is that the signal strength may not be strong enough to reach every area, leaving portions of the location unmonitored. Also, bad weather can interfere with the signal of these systems. The purpose of the proposed system will be to eliminate the drawbacks of both wired and wireless systems. The proposed system will consist of a single unit, which will monitor the location for various.

II. AIM AND OBJECTIVES

The basic aim behind the proposed concept is to build a standalone device that will be a viable alternative to the conventional surveillance security system. Such a system should be easy to use, reliable, and affordable. The system will operate by using webpage to collect data, which will be sent to a microcontroller which will a control a robot's behavior. The objective of this project is to design a prototype surveillance system that will require minimal installation, while offering more comprehensive monitoring. It will be more complete and user friendly than most of the surveillance systems presently on the market. Home monitoring will be realized by a standalone two robotic unit. This robot will provide monitoring for no less than 8 hours, and interact with its user by transmitting real-time video footage.

III. LITERATURE SURVEY

Kyunghoon kim ; Soonil Bae ; Kwanghak Huh presented "Intelligent surveillance and security robot systems" published on 28 Oct. 2010 IEEE Workshop on Advanced Robotics and its Social Impacts which was held at Seoul, South Korea . This paper presents for this are also costly. Another point is that the signal strength may not be strong enough to reach every area, leaving portions of the location unmonitored. Also, bad weather can interfere with the signal of these systems. The purpose of the proposed system will be to eliminate the drawbacks of a new security solution that integrates vision, intelligent algorithm and robot technology. While conventional security solutions rely on human operator's vigilance on the images provided by cameras, the proposed solution uses machine intelligence to compensate for human factors and robots to provide immediate counter response. [1]

YungeunChoe ; Myung Jin Chung presented "System and Software architecture for autonomous Surveillance robots in urban environments" published in 2012 9th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI) which was held in Daejeon, South Korea. In this paper, they propose a system of the security robot and its software architecture. The proposed system and software architecture will make a robot to perform security missions. [2]

Ki Sang Hwang; KyuJin Park; Do Hyun Kim, presented "Development of a mobile Surveillance robot" Published in 17-20 October 2007 International Conference on Control, Automation and Systems which was held at Seoul, South Korea. In this paper, a simulation based design scheme has been adopted to develop a mobile order to compensate the motion of the vehicle which experiences the rough terrain. [3]

Jung-Hyun Park; Kwee Bo Sim presented "A design of mobile robot based on Network Camera and sound source localization for intelligent surveillance system", Published on 02 December 2008 International Conference on Control, Automation and Systems which was held at Seoul, South Korea. This paper proposes the system which complement the vulnerability. Purpose of this paper is loading network
camera and tracking module of sound source in mobile robot based on embedded Linux for tracking intruder. [4]

R.Karthikeyan ; S Karthik ; Prasanna Vishal TR ; S.Vignesh presented "Snitch:Design and development of a mobile robot for surveillance and reconnaissance" published on 13 August 2015 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS) which was held at Coimbatore, India. This paper describes a novel robot named Snitch capable of climbing walls, scaling horizontal and vertical surfaces while automatically controlling surface transitions, and provides the controlling user with surveillance of its location. [5]

Ashish U. Bokade ; V. R. Ratnaparkhe presented "Video control using smartphone and Raspberry pi" published on 24 November 2016 International Conference on Communication and Signal Processing (ICCSP) which was held at Melmaruvathur, India. This paper proposes a method for controlling a wireless robot for surveillance using an application built on Android platform. [7]

Jae-Seong Han ; Sang-Hoon Ji ; Kyung-Ha Kim ; Sang-Moo Lee ; Byung-Wook Choi presented "Collective robot behavior controller for a security system using open SW platform for a robotic services" published on 19 December 2011 in 11th International Conference on Control, Automation and Systems which was held at Gyeonggi-do, South Korea. In this paper they suggest a method how to organize collective robot behaviors for a self-localization algorithm that allows a recursive state estimation process to be collective in a multi-robot coalition team that is guaranteed connected.[8]

Seohyun Jeon, Minsu Jang, Seunghwan Park, Daeha Lee, Young-Jo Cho, Jaehong Kim presented "Task allocation strategy of heterogeneous multi-robot for indoor surveillance" Published in 2011 8th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI) on 06 February 2012 which was held at Incheon, South Korea. In this paper they addresses the needs to analyze the mission of cooperating increased performance and fault-tolerance in multi-robot more concretely and introduces a strategy for the task allocation problem: off-line and on-line analyses.[10]

Guangming Song ; Kaijian Yin;Yaoxin Zhou;
Xiuzhen Cheng presented"Asurveillance robot with hopping capabilities for home security" published in November 2009 in IEEE Transactions on ConsumerElectronics (Volume: 55 , Issue: 4 , November 2009). This paper presents the development and characterization of a surveillance robot with hopping capabilities for home security.[11]

IV. PROBLEM DEFINITION

Here we are building a Web controlled wireless Surveillance monitoring system using Raspberry Pi mounted on a Robotic car. This could be a useful and inexpensive security and spy tool, which have many configurable options. In this IOT project we are mainly using Raspberry Pi, USB web camera and two DC motor with Robot, chasiss**,** to build this Robotic car.

Scope of project

The Future Implications are very vast of this type of technology.

[1] This technology can also be used with the Home Automation technologies.

[2] It can also be made more advanced such that it can be used within banks, large warehouse, etc.

[3] Surveillance is becoming a need in any public or private area to cope up with increasing number of threats starting from burglary, robbery to terrorist activities.

[4] It can help in monitoring in Airports, Railway Station, Industries, Hospitals, Government offices etc.

V. DESCRIPTION OF PROJECT

Proposed System

This project will make a web control car which has a view via an attached camera. In this project a robotic car to be driven from a webpage in a remote location. The car can be driven remotely while viewing its perspective through a camera mounted on the car. We implemented this project at our university where the wifi network was obtainable across the entire campus. This will allow us to drive the car anywhere that it could connect to the wifi. Realistically you can implement this project and control the car from your webpage anywhere that is within reach-of that wifi signal.

A. HARDWARE REQUIREMENTS

1. Raspberry pi model 3

Raspberry pi is a small credit-card sized computer capable of performing various functionalities such as in surveillance systems, military applications, etc.

2. Raspberry pi Wife module

This make your Internet of Things device cable-free by adding WiFi. Its advantages include low cost, but high-reliability wireless link.

3. Raspberry pi camera module

The Camera Module is a great accessory for the Raspberry Pi, allowing users to take still pictures and record video in full HD.

4. Motor Driver IC L293D

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.

5. Batteries

We are using 4 batteries, each of 1.4V connected in series. Totally we are using 9V, that will make the robotic vehicle to move in desired direction.

B. SOFTWARE REQUIREMENTS

Python (Flask Library)

Raspbian OS (Motion Library) HTML and CSS.

C. METHODOLOGY

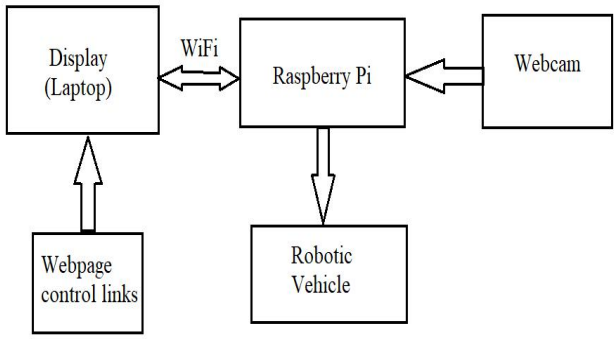

Figure 1: Block Diagram of surveillance system

The Figure [1] consist of the basic model of the system connections and the inter-dependencies of each block on each other. Power supply is given to IC driver L293D and this supply is further given to two dc motors. Camera module and Raspberry Pi is mounted on robotic car for surveillance.

VI. IMPLEMENTATION

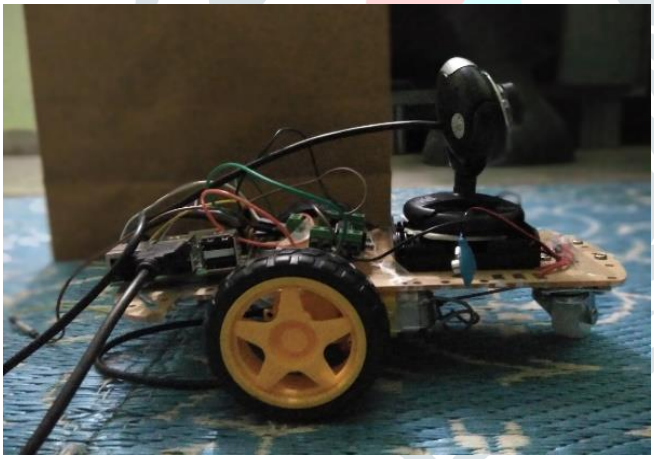

Figure 2: Assembled Model

The above Figure [2] consist of the assembled model of the robotic car connected with camera , battery, motor driver L2938N, Power supply and all other components. This car is controlled by the commands given over phone or PC/ Desktop and the camera captures the live feed which can be used for surveillance purpose.

It has a web camera mounted over it, through which we will get live video feed and the charming part here is that we can control and move this robot from a web program over the web. As it might be controlled using site page, suggests it can similarly be controlled using site page in Mobile. We manufactured a site page in HTML which has Left, Right, Forward, Backward associations, tapping on which we can push the robot toward any way. Here we utilized "Motion"

for getting live Video feed from USB camera and utilized "Flask" for sending directions from site page to Raspberry Pi utilizing python to move the Robot.

Installing and designing ‘Motion’ for getting live streaming: Motion (Surveillance Software) is free, open source movement locator CCTV programming, created for Linux. It distinguishes the movement and begin recording video of it. With 'Movement' introduced in your Raspberry Pi, you can mystically transform your Raspberry Pi into a Security Camera. It is utilized for getting live video feed, setting aside a few minutes pass recordings and taking previews at normal interim. It records and spares the Video at whatever point it recognizes Motion or any unsettling influence in the view region. Live Video feed can be viewed on the internet browser by entering the IP address of Pi alongside the port.

Flask Setup in Raspberry Pi for Controlling Robot through Webpage: Here, we need to make a web server utilizing Flask, which gives an approach to send the directions from website page to Raspberry Pi to control the Robot over the system. Flask enables us to run our python contents through a site page and we can send and get information from Raspberry Pi to internet browser and the other way around. Flask is a miniaturized scale structure for Python.

We have made a website page utilizing HTML language for showing control joins (Left, Right, Forward, and in reverse) to move the Robot from internet browser. We have utilized jQuery content to call the capacities in our Python Program. There are five capacities in Python Code to move the Robot Left, Right, Forward, Backward and to stop it. These capacities will be executed by tapping on the Control Links on page and engines will move contingent upon the connection being clicked.

Here you can see that we have install the IP address, on which the Video is spilling, into the site page by utilizing img src tag. Change the IP address as indicated by your Raspberry Pi however keep the port same.

In the wake of testing the Live Video feed and HTML code, we have to fabricate a robot by utilizing handcrafted or instant robot skeleton, wheels, and nut-screws. At that point place Power bank over it for fueling the Raspberry pi and afterward place the Raspberry Pi and web camera over the power bank. Interface the USB camera with Raspberry Pi.

VII. WORKING

Activity and Working this Surveillance Robot is simple. Make a python document (.py extension) and duplicate the beneath code into it at that point spare it on your Raspberry Pi. At that point put the HTML document in the layouts envelope as clarified previously. Remember to change the IP address in HTML record.

Then run the python code by entering below command :

Python bot.py

At that point open your Raspberry Pi IP address with port 5006 like http://192.168.43.70:5006 . Presently you will see the site page having four robot control connects and live gushing video. Client can control the robot by clicking and holding the connections. On the off chance that client will snap and hold the connections, at that point robot will move as per clicked interface and when will client discharge the connection then robot naturally stop.

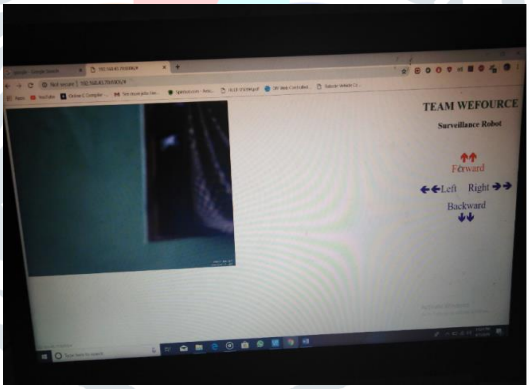

Figure 3: Live streaming on web-browser

The above Figure[3] displays live video captured by the movement of robotic car as shown in figure[2] which is controlled via phone/Desktop. The page on the web browser is provided with four controls forward, backward, right and left for the motion of car respectively.

VIII. CONCLUSION

The surveillance robot we designed to deliver a reasonable level of efficiency and simplicity, providing each user with a streamlined user experience. The surveillance robot is aimed at providing monitoring inclusive of vision, motion.

The surveillance robot can be customized to fuse seamlessly to any warehouse, godown or multi- dwelling units. Based on modular designs and complete scalability, the surveillance robot is designed to be expandable and allow for future control upgrades, thus enhancing the accessibility of the user and providing a efficient way out of the tradition system.

REFERENCES

[1] Kyunghoon kim ; Soonil Bae ; Kwanghak Huh,"Intelligent surveillance and security robot systems", 28 Oct. 2010 IEEE Workshop on Advanced Robotics and its Social Impacts,Seoul, South Korea .

[2] Yungeun Choe ; Myung Jin Chung,"System and Software architecture for autonomous Surveillance robots in urban environments" ,2012 9th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI)Daejeon, South Korea.

[3] Ki Sang Hwang ; Kyu Jin Park ; Do Hyun Kim, "Development of a mobile Surveillance robot"**,** 17-20 October 2007 International Conference on Control, Automation and Systems which was held at Seoul, South Korea.

[4] R.Karthikeyan ; S Karthik ; Prasanna Vishal TR ;S.Vignesh , "Snitch:Design and development of a mobile robot for surveillance and reconnaissance", 13 August 2015 International Conference on Innovations in Information, Embedded and Communication Systems (ICIIECS), Coimbatore, India.

[5] T.M. Sobh ; R. Sanyal ; Bei Wang, "Remote surveillance via web-controlled mobile robots"**,** Proceedings World Automation Congress, 20 June 2004 , Seville , Spain.

[6] Ashish U. Bokade ; V. R. Ratnaparkhe , "Video robot control using smartphone and Raspberry pi", 24 November 2016 International Conference on Communication and Signal Processing (ICCSP), Melmaruvathur, India.

[7] Jae-Seong Han ; Sang-Hoon Ji ; Kyung-Ha Kim ; Sang-Moo Lee ; Byung-Wook Choi, "Collective robot behavior controller for a security system using open SW platform for a robotic services", 19 December 2011, 11th International Conference on Control, Automation and Systems,Gyeonggi-do, South Korea.

[8] Ghanem Osman Elhaj Abdalla ; T. Veeramanikandasamy, "Implementation of spy robot for a surveillance ystem using Internet protocol of Raspberry
Pi",15 January 2017 in 2nd IEEE International Conference on Recent Trends in Electronics, Information & Communication Technology (RTEICT), Bangalore, India.

[9] Seohyun Jeon, Minsu Jang, Seunghwan Park, Daeha Lee, Young-Jo Cho, Jaehong Kim, "Task allocation strategy of heterogeneous multi-robot for indoor surveillance" ,February 2012 in 8th International Conference on Ubiquitous Robots and Ambient Intelligence (URAI),Incheon, South Korea.

[10] GuangmingSong ; Kaijian Yin ; Yaoxin Zhou ; Xiuzhen Cheng, "A surveillance robot with hopping capabilities for home security" ,November 2009 in IEEE Transactions on Consumer Electronics (Volume: 55 , Issue: 4 , November 2009).

[11] S Meghana ; Teja V Nikhil ; Raghuveer Murali ; S Sanjana ; R Vidhya ; Khurram J Mohammad presented "Design and implementation of Surveillance Robot for outdoor security" published on 15 January in 2017 2nd IEEE International Conference on Recent Trends in Electronics , Information & Communication Technology (RTEICT).

[12] Jung-Hyun Park; Kwee Bo Sim presented "A design of mobile robot based on Network Camera and sound source localization for intelligent surveillance system", Published on 02 December 2008 International Conference on Control, Automation and Systems which was held at Seoul, South Kor.