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Camera Based Surveillance System Using Raspberry pi 3

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ABSTRACT:

For making aware of the new environment one should go there and analyze what is happening, but life is precious so robots are used instead. The main theme of this paper is to develop a Raspberry Pi based robot which can be controlled remotely via internet. The proposed robotic unit is used for video surveillance of remote place as well as re- motely control of the unit using Wi-Fi as medium. The robot has been primarily built over Raspberry Pi which controls data transmission between the server and the robot. Raspberry pi serve the purpose of server as well as the microprocessor for the system. An embedded web server creates an easy way for monitoring controlling any device which is at remote place. Video is captured through the webcam placed on the robotic unit and lively transmitted to the remote end. Controls are provided on the console page where one can see the live streaming as well as can control the movement of robotic unit and controls the motion of the motors via motor controller L293D. This paper gives an approach towards video surveillance and control using advanced processor like raspberry pi.

Literature Survey:

The Raspberry pi was created in February 2012 by the Raspberry pi Foundation, Origin- ally setup to promote and teach basic computer science in schools and colleges around the UK. They initially released two devices the Model A, the Model B, this computer ranged in specification capabilities. The Raspberry Pi has been the object of great deal of nerdy affection since it is initial release in 2012. In February 2012 they had been reported to have sold 4.5 million boards, soon after this success they released the Model A+ and Model B+ which provided more GPIO's and used less power to run. The upgraded Raspberry pi Model B+ packs additional RAM (a total of 512 MB), USB ports, and an expanded GPIO for more input/ output flexibility. The B+ launched in July 2014, and can be had for the same price as the earlier Model B. Raspberry pi is known for its versatility and inexpensiveness with respect to display modules. As time passes public utilizes the Raspberry Pi 1 Model B+ as the central module and extract the results.

Problem Statement:

Determining crime, monitors scenarios and activities, it is difficult now a days and detecting thefts instantly it is a big problem. In Traditional surveillance, large number of video cameras is deployed and the live video is transmitted through wires.

1.2 System Design A Raspberry Pi is modest, Master card estimated PC board which when connected to a showcase unit and connection of a console and a mouse, can finish the elements of any standard PC. Like a PC, it has RAM, Hard Drive (SD Card), Audio and Video ports, USB port. HDMI port, an Ethernet port. Raspberry Pi is Linux based and the Operating System is put away on the SD card. So as to introduce the Operating framework onto the SD card, the crude picture must be downloaded from the Raspberry Pi's site. When it is downloaded, the SD card must be arranged utilizing the product SD For matter. When it is designed, the product Balen a Etcher must be utilized to compose the picture onto the SD card. The SD card would then be able to be embedded into the Raspberry Pi and booted up utilizing a LCD show or a Laptop/PC. The Pi contains its own Wi-Fi association and an Ethernet port. The technique to make the security observation framework begins by downloading the correct Operating System within the SD card. When the framework is booted up the USB camera must be empowered under Raspberry pi designs. The boot technique for Graphical User Interface must be chosen. When these setups are made the framework should reboot. After to type consists of a web camera, voltage regulator circuitry with L293D motor driver and raspberry pi. The real time video and control are displayed in the web page which can be viewed from anywhere in the world using internet or within the Wi-Fi range and one can control it using those control provided. Step 1: Setting up the raspberry pi and installation of operating system from raspberry pi.org. Here we used raspbian OS. Step 2: Install the required packages in the pi using suitable commands in terminal window and connect the webcam to the pi, after this you will get MJPG streamer folder. Step 3: Now design the control page that provides a way to control our robot this page is designed with HTML and PHP and write the controlling of the robot code based on the L293D IC logic we have used. Step 4: Connect a Wi-Fi dongle to connect raspberry Pi with Wi-Fi router. After connecting Wi-Fi dongle to PI, open Wi Configuration application this application is pre-installed in raspbian OS connect your PI with your Wi-Fi router. When it is connected with Wi-Fi router, IP Address can be found using if configure command. Step 5: Once we got the IP address we can use it for controlling purpose. Step 6: Now build the Robotic unit, we can use DC Motor based simple robot. To control your motors we need L293D IC. Here we used L293D ICs for controlling two motors. Step 7: Connection of power Supply. Here we used 12v rechargeable battery for driving the motors. But as per specifications Pi will work on 5 V, So we use IC 7805 for this and also an external portable battery

bank can be used directly. We connect battery terminals directly to motor driver IC. Step 8: Pi gets turn on as soon as you connect 5V supply; you can see green LED blinking while startup process. After some time open browser in your Laptop reboot, the framework must have its every single important bundle introduced to ensure Motion works appropriately for that it is important to refresh and redesign. The USB camera can be utilized as a standard camera just as a movement identifying camera. It is fundamental to realize that after any changes that are made to the design document the framework ought to be rebooted prototype consists of a web camera, voltage regulator circuitry with L293D motor driver and raspberry pi. The real time video and control are displayed in the web page which can be viewed from anywhere in the world using internet or within the Wi-Fi range and one can control it using those control provided. Step 1: Setting up the raspberry pi and installation of operating system from raspberry pi.org. Here we used raspbian OS. Step 2: Install the required packages in the pi using suitable commands in terminal window and connect the webcam to the pi, after this you will get MJPG streamer folder. Step 3: Now design the control page that provides a way to control our robot this page is designed with HTML and PHP and write the controlling of the robot code based on the L293D IC logic we have used. Step 4: Connect a Wi-Fi dongle to connect raspberry Pi with Wi-Fi router. After connecting Wi-Fi dongle to PI, open Wi Configuration application this application is pre-installed in raspbian OS connect your PI with your Wi-Fi router. When it is connected with Wi-Fi router, IP Address can be found using if configure command. Step 5: Once we got the IP address we can use it for controlling purpose. Step6: Now build the Robotic unit, we can use DC Motor based simple robot. To control your motors we need L293D IC. Here we used L293D ICs for controlling two motors. Step 7: Connection of power Supply. Here we used 12v rechargeable battery for driving the motors. But as per specifications Pi will work on 5 V, So we use IC 7805 for this and also an external portable battery bank can be used directly. We connect battery terminals directly to motor driver IC. Step 8: Pi gets turn on as soon as you connect 5V supply; you can see green LED blinking while startup process. After some time open browser in your Laptop

Problem Identification:

Camera Based Surveillance System Using Raspberry Pi is mainly beneficial for determining crime, it monitors scenarios and activities, helpful for gathering evidences and detecting thefts instantly. The system is built to monitor home, offices and detect theft as soon as it takes place. System uses Raspberry Pi with a camera based circuit. System constantly monitors camera for motion. The camera input is constantly fed to the pi processor. The camera input is constantly processed by Raspberry Pi processor for any motion. If any motion is detected, the system goes into alert mode. System now sounds alarm as well as captures images of the motion happening. These images are saved for later viewing reference. Thus the system is an efficient camera based security system. It can be further enhanced by adding a gsm modem to send an alert sms or alert over IOT for remote alarm.

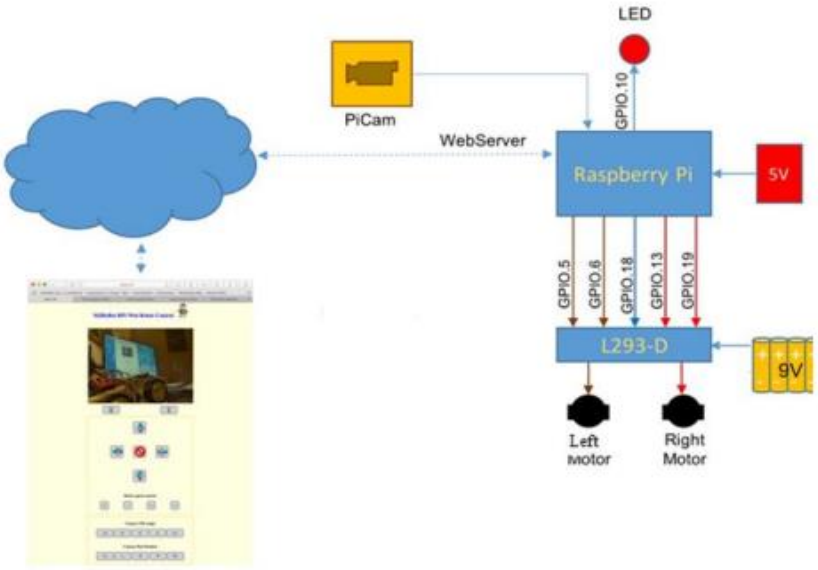
In this paper we use internet to establish communication between the user and a robotic vehicle. This is a reliable connection and a continuous video vehicle. Due to the use of internet, there is no limitation on range or distance between the user and the robotic vehicle. Robots have found an increasing demand in a wide range of applications in our life. Their use in defense has increased by the day. In today's world, robots find use in various places be it to detonate buried bombs or in industrial applications or even robotic components used in children's toys. The complexity of computer software depends on how difficult the robot's tasks. • Overcome the drawbacks of the existing application. • Alternative to traditional maintenance and control process of streetlights

Objectives:

The following are some more objectives of Camera Based Surveillance System Using Raspberry Pi 3: • The angle and direction of camera is fixed. • The initial surveillance robots are developed with infrared technology and controlled with specially designed remote. After that the Radio Frequency controlled robots • Laptop with the use of Wi-Fi as well as Internet and also we can get the live streaming of video from the robot for the purpose of surveillance. • One can control the robot from remote end say mobile • web browser of the remote device from where we are operating the device also we are able to control the robotic movement. DC motors are being used for the movement of robotic wheels and stepper motor is used for camera movement. • The system is built to monitor home, offices and detect theft as soon as it takes place. System uses Raspberry Pi with a camera based circuit. System constantly monitors camera for motion. • Camera Based Surveillance System Using Raspberry Pi is mainly beneficial for determining crime.

The block diagram shows the basic working of the Wi-Fi based raspberry pi in which the block describes the working. The proposed system consist of two units mainly a robotic unit and a remotely control unit. The robotic unit is consisting of the webcam, Wi-Fi dongle and the heart of the paper, raspberry pi along with the PCB containing motor driven IC and voltage regulator circuitry. The controlling unit consists of a PC within the Wi-Fi range. HTML page is designed having options of controlling the dc motors and stepper motors. It shows the live video streaming of the environment. At the robotic unit, Raspberry pi is used for the control of DC motors and stepper motors. Raspberry Pi requires 5 volt supply with minimum of 1500-2000MA current. This raspberry pi is powered through micro USB cable. ARM11requires 3.3 volt of supply which it takes with the help of linear regulator. 5 volt is required for the USB ports.

Block Diagram:



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Circuit Diagram:

The below diagram shows the complete circuit diagram of the system. In this system have used a Raspberry pi is used as a minicomputer and acts as a brain of the system. Raspberry pi is used to control and monitor the robotic unit. Raspberry Pi has a strong processing capacity because of using the ARM11 architecture and

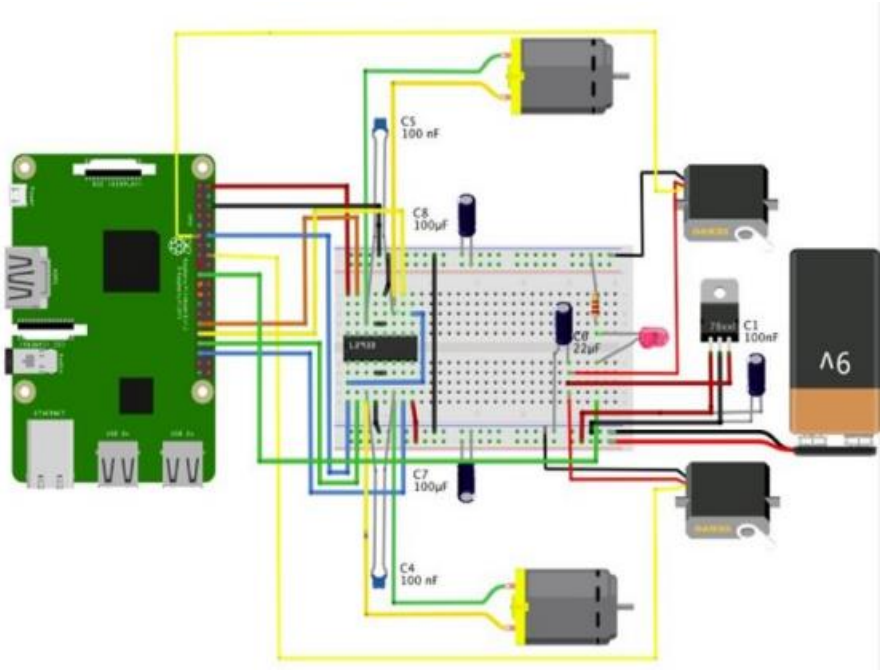


Fig 2: Circuit Diagram

Linux-based system there are simple and easy-used open source peripheral driver libraries. A webcam is connected to one of its USB ports. A Wi-Fi dongle is provided so as raspberry can communicate over Wi-Fi. Internet can be provided to the raspberry through this. All the interfacing peripheral devices are connected with the raspberry pi microcontroller. The webcam is also interfaced with the microcontroller which is used to capture the video streaming of the room or the area where the system is implemented. This webcam re- cords the video and sends it over the internet through a Wi-Fi modem interfaced with the raspberry pi in this system. In this system we have used a servo motor which is to tilt the camera for the video capturing. In this system we have used two DC motors for the movement of the robot. These motors are connected with the raspberry pi micro controller as shown in the above circuit diagram of the system. These DC motors are driven by a driver IC used in this system. This driver IC is interfaced with the raspberry pi micro controller. Here we have used L293-D motor driver IC to drive the motors.

Testing and Verification:

The motion is detected through the PIR sensor and the camera captures images and videos. After that the buzzer was sending sound message to indicate receiving massage. The raspberry pi is save images and videos in its storage unit, then the image is going to be displayed on the laptop or the monitor at same time sent to the user's email

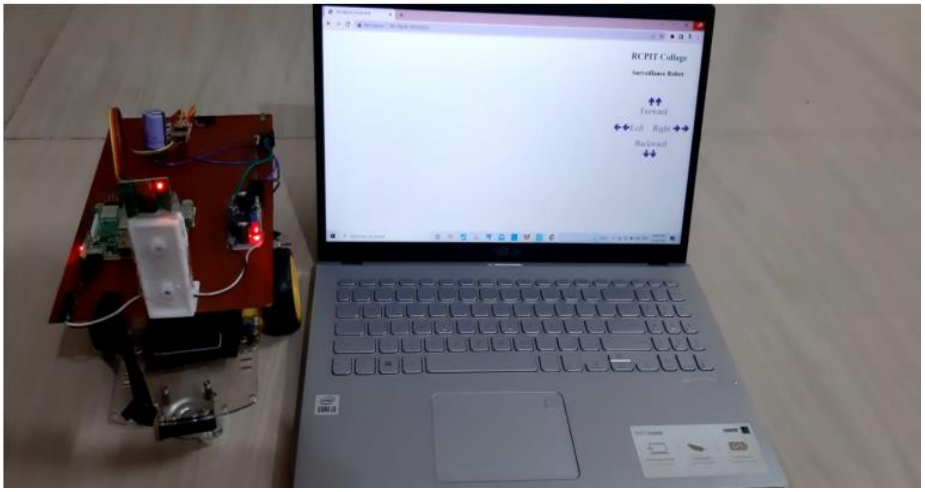


Fig 3: When is in normal position



Fig 4: Final Setup with pi camera



Fig 5: Final setup with PCB

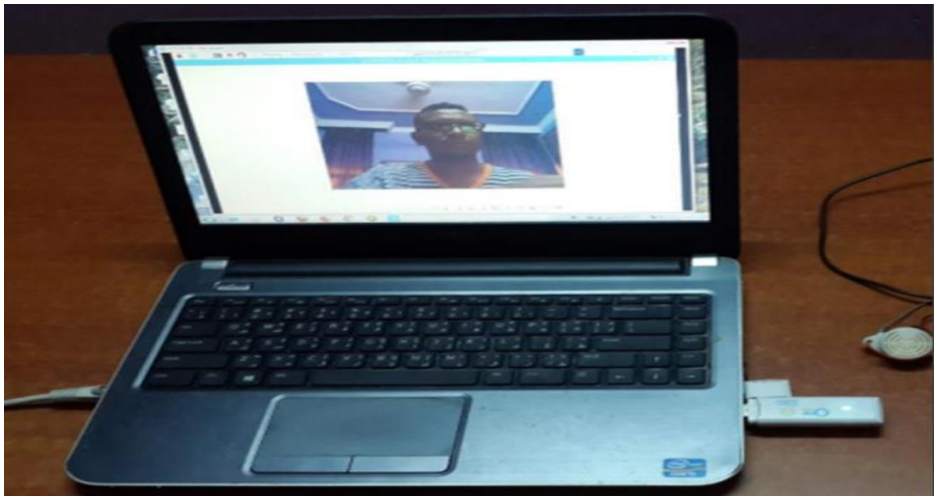


Fig 6: Visual snap

Conclusion:

Using this robotic system a remote area can be monitored easily from remote end. One can easily monitor as well as control the activity of the robotic unit. This system conditions and areas where it is difficult for the security forces to reach it can monitor the areas. As the communication is done with the help of internet so limitation of range of operation does not arise and thus we can monitor any remote areas. If this robot is within the Wi-Fi range there is no need of internet too. We control the robot using the Wi-Fi as a medium. The smart surveillance framework has been structured so that it can satisfy the requirements of the client for a specific surveillance territory. It has endless applications and can be utilized in various conditions and situations

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