

Wireless Video Surveillance

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Abstract

This project is about a remote monitor surveillance using Raspberry Pi architecture fixed over a vehicle. Here we use a vehicle to control and move it around the places where we cannot reach or see. The main function of this device is to show us what is happening in some particular place by live streaming through the device and check what is happening there. The video stream is locally as well as remotely visualized. Raspberry Pi has these all interfaces using communication ports like GPIO, Ethernet and USB. Thus, the system is an efficient camera based security system. The project is designed for video surveillance for live streaming which is controlled by the application. The cameras automatically initiate recording and the Raspberry pi device alerts the owner of the possible intrusion having a smart phone.

INTRODUCTION

An embedded web server creates an easy way for monitoring & controlling any device which is at remote place. For designing the system, we require remote pc along with the internet facility at the remote locations. If we don't have internet connectivity, still we can use the unit using Wi-Fi. We implement a system which is portable, low cost & having less maintenance. The reporting of this real-time data corresponding to the process plants is therefore be of great use for future analysis. As the growth rate of crime has been increased

in past years, as a result, everyone is concerned about their safety and security. Due to this reason, people started to consider the significance of surveillance systems. The majority of the people are doing Internet Protocol (IP) based installations rather than analog because of IP-based installations are from anywhere. In order to make the IP-based systems affordable for the people having a low budget, we need to develop a system which is cost effective and portable. This paper describes the system which acts as a robot. This robot uses raspberry pi model B for making this real-time surveillance possible by providing the installing and processing high resource software's which makes it possible to live streaming & controlling the robot. As the internet of things is the concept, newly introduced in the field of electronics. The concept is about handling the things with the use of internet and the best model for these applications is raspberry pi. When the surveillance is considered, raspberry pi serve his purpose as it is good at connectivity simply plugging Wi-Fi dongle into one of its port. Robotics is an art of designing, applying by using robot in human endeavors. A robot is a machine which is designed to perform a particular task based on the programming done by the user. It can perform multi task at a time. Nowadays most of the industries are

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automated. Robots are being used in variety of industrial applications for various activities like pick and place, painting, assembling of subsystems and in hazardous places for material handling etc. Robots are becoming more and more advanced as technology increment in the areas of CPU speed, sensors, memories etc. And there is ever demanding applications even in defense. With the rapid growth of the Internet, more and more advanced devices or sensors have been embedded into it for performing the desired work, distributed computer systems, surveillance cameras, telescopes and manipulators. Although the implementation of Internet robotics or web-based robotics is relatively new and still in its early stage, it has gathered the huge interest of many researchers in the world.

LITERATURE SURVEY

The International Telecommunication Union's (ITU) statistics on mobile subscriptions indicates five billion mobile subscriptions for 2010, with a 17% penetration of smart phones in 2009. For mobile users, smart phones have created a unique opportunity for mobile multimedia services. Now a day's most of smart phones are equipped with both hardware (that supports real-time video processing) and ad-hoc wireless communication between peers and this allows real-time video streaming over multiple wireless hops between peer devices. Phones within communication range or area of each other automatically establish a wireless link creating a client mesh network (ad-hoc network of devices). Such streaming can be used in a variety of applications such as social network Joint fieldwork (providing video distribution for teams distributed in a small region, e.g. teams of repairmen, and search and rescue teams in adversity areas), and support for health impaired team including the elderly. With Smartphone adoption on the rise, opportunity for marketers is calling, the mobile industry is on a fast-track, with immense expansion in mobile promotion, advertising and paid-content for users. But what is really most important, that development is the increase in quality devices and fast, reasonable data. While Smartphone tenure was once just a business tool, more consumers than ever are using smart phones in their daily lives

METHODOLOGY

In this project, present a wireless multi-hop video streaming application for the Android based mobile devices (including Android based tablet PCs). With help of this application, users can stream live video using their android phones camera, and share this video with people nearby using a wireless mesh network without any charge. Routing protocols can be installed to make easy the multi-hop communication to go beyond a single hop. We proposed a system to build a real-time live streaming and monitoring system using Raspberry pi with installed Wi-Fi connectivity. In monitoring phase, the pi will record the video of the location in real-time. Capturing video is done through commands given through the computer to the raspberry pi. This command will be communicated to the pi using Wi-Fi. The pi camera is being used which will give a very good quality of the picture in video.

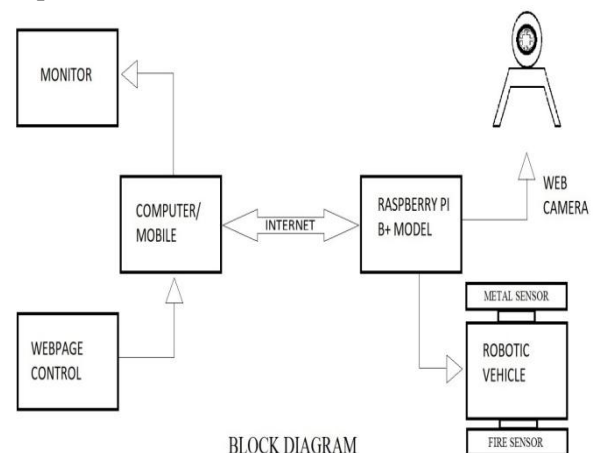
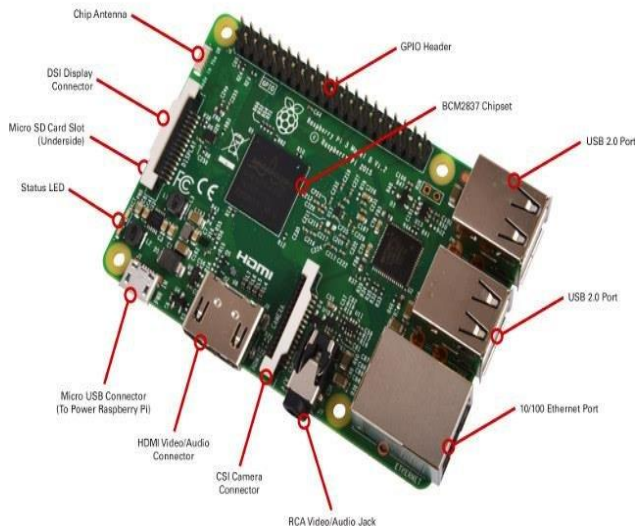


Fig.1: Block diagram of video surveillance

HARDWARE IMPLEMENTATION

Raspberry pi

The Raspberry Pi Compute Module 3 (CM3) are DDR2 – mechanically, compatible System on Modules (SOMs) containing processor memory, Flash and supporting power circuitry. These modules allow a designer to leverage the Raspberry Pi hardware and software stack in their own custom systems and form factors. In addition, these modules have extra IO interfaces over and above what is available on the Raspberry Pi model A/B boards opening up more options for the designer.



- Quad Core 1.2GHz Broadcom BCM2837 64bit CPU
- 1GB RAM
- BCM43143 Wi-Fi and Bluetooth Low Energy (BLE) on board
- 40-pin Extended GPIO
- 4x USB 2 ports
- 4 Pole stereo output and composite video port
- Full size HDMI
- CSI camera port for connecting a Raspberry Pi camera
- DSI display port for connecting a Raspberry Pi touch screen display
- Micro SD port for loading your operating system and storing data
- GPIO stands for General Purpose Input-Output, what this means in layman terms is that the pins can be used as either inputs, which receive data, or outputs, which react to data. An input might include a button or a sensor, an output could be an LED or a buzzer.

This means that we can create exciting physical computing projects which react and interact with the real world instead of just learning to program text on the screen!

Robotic vehicle

Robotic vehicles are machines that move “autonomously” on the ground, in the air robotic vehicles are capable of traveling where people cannot go, or where the hazards of human presence are great.

DC Motors

PWN DC Motor control PWM, or pulse width modulation is a technique which allows us to adjust the average value of the voltage that’s going to the electronic device by turning on and off the power at a fast rate. The average voltage depends on the duty cycle, or the amount of time the signal is ON versus the amount of time the signal is OFF in a single period of time.

Device driver

The L298N is a dual H-Bridge motor driver which allows speed and direction control of two DC motors at the same time. The module can drive DC motors that have voltages between 5 and 35V, with a peak current up to 2A.

Fire sensor

LM393 760nm - 1100nm IR Infrared Flame Sensor Module Board for Arduino

This module is sensitive to the flame, but also can detect ordinary light. Usually used as a flame alarm. On board, digital output interface can be directly connected with the microcontroller IO.

Metal sensor

A Metal detector is an electronic instrument which detects the presence of metal nearby. Metal detectors are useful for finding metal inclusions hidden within objects, or metal objects buried underground.

SOFTWARE IMPLEMENTATION

LINUX:

Linux or GNU/Linux is a free and open source software operating system for computers. The operating system is a collection of the basic instructions that tell the electronic parts of the computer what to do and how to work. Free and open source software (FOSS) means that everyone has the freedom to use it, see how it works, and changes it.

Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that

make your Raspberry Pi run. However, Raspbian provides more than a pure OS: it comes with over 35,000 packages, pre-compiled software bundled in a nice format for easy installation on your Raspberry Pi.

Hyper Text Markup Language (HTML) is the standard markup language for creating web pages and web applications. With Cascading Style Sheets (CSS), and JavaScript, it forms a triad of cornerstone technologies for the World Wide Web. Web browsers receive HTML documents from a web server or from local storage and render them into multimedia web pages. HTML describes the structure of a web page semantically and originally included cues for the appearance of the document.

WORKING PRINCIPLE

- This project is used for video surveillance through the web cam at which we can control the movement of the application.
- We can move the robot in the forward, backward, left and right.
- In this through the application we can detect the metal and fire by the sensors.
- The device driver which is connected to the raspberry pi through GPIO pins and controls the movement of the vehicle which makes the constant current and voltage.
- The 12v battery is connected to the device driver for the movement of the vehicle at which 5v is not sufficient for to control the motors.
- The metal and fire sensors are connected to the raspberry pi at which it detects when ever the robot is in position where we cant go, it goes to that place capture and detects it.
- In the we require the HDMI cable at which we can see the video through it.
- Based on the IP address it is connected through the Wi-Fi at which the IP address can be open in the web browser and it should be connected to the same Wi-Fi.

ADVANTAGES AND DISADVANTAGES

Advantages

1. In CCTV systems there should be a dedicated PC for the module which is eliminated here.
2. A PC can be Hacked, and the files can be erased while this system overcomes those problems.
3. In this system, authentication is required on the user side in order to view the streamed video in the browser.
4. Very less expensive when compared to the other existing systems.
5. In this system, a wide area can be captured.
6. The camera motion can be controlled by the user.

Disadvantages

1. It does not have a Hard Disk associated with it for permanent storage pf files, we have to connect one externally or have to use SD card for the purpose.
2. The RAM is a POP package on top of the SoC, so it's not removable or swappable.
3. There is no Real time clock associated with the board. Adding an RTC is expensive. You can add one yourself using the GPIO pins

APPLICATIONS

- Modular Robotic Approach in Surgical Applications – Wireless Robotic Modules and a Reconfigurable Master Device for Endoluminal Surgery
- Novel Assistive Robot for Self-Feeding.
- Robot Handling Fabrics Towards Sewing Using Computational Intelligence Methods.
- Robotic Systems for Radiation Therapy.
- Reconfigurable Automation of Carton Packaging with Robotic Technology.
- Tracking Control in an Upper Arm Exoskeleton with Differential Flatness.
- Real-Time Robotic Hand Control Using Hand Gesture

RESULTS



Fig.2: Raspbian OS booting process



Fig.3: Running application

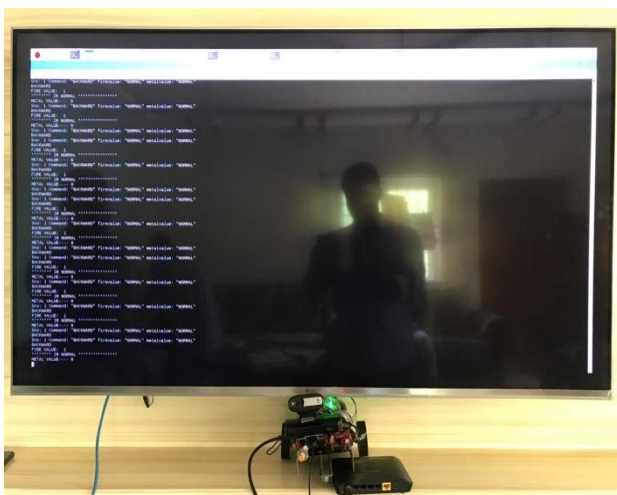


Fig.4: Verification of output from Hardware setup

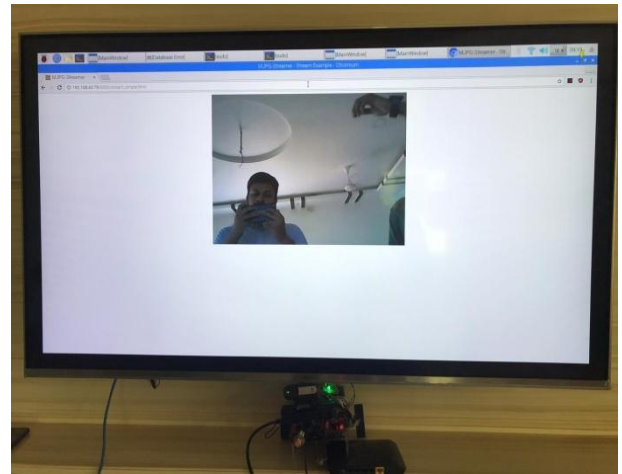


Fig.5: Live streaming

SMART VIDEO SURVEILLANCE ROBOT

stop

Press & Speak

METAL SENSOR	FIRE STATUS
DETECTED	DETECTED

Fig.6: Mobile application

CONCLUSION

It is concluded that smart surveillance system using Raspberry pi capable of recording/capturing video/image and transmitting to a smart phone. Also, this paper contains detailed information for controlling a robotic vehicle guided via internet. All these techniques can be used in any conditions and areas where it is difficult for the security forces to reach. It can monitor the areas and secures a place from the adversaries which can be done by surveillance robot all the times with great accuracy and high precision.

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