Review Paper on Wi-Fi Surveillance Robot using Raspberry pi

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Abstract- This review paper deals with the Smart surveillance monitoring system using different techniques. This techniques increases the usage of mobile technology to provide an essential security to industry, our homes and other control application. Internet technology provides a good way for us to develop an integrated computing network environment for the application of different robotic systems. The concept of internet based robots is new technology and it does not have the limitations of the range of operation. At the same time, the need to observe more and more people, places, and attached with a desire to pull out of things more useful information from the video data, the spread of using embedded systems is motivating the new demands capabilities and capacity. In such cases, we may use the proposed robotic system whose working based on Raspberry pi, which will go into those areas and provide us with the information in the form of live videos of that locations. When someone enters such highly secured places, the camera mounted on the robot will keep on capturing the videos from the surroundings to keep a record of the details of the incident happened and this is readily available to the user and only the authenticated users can see the recorded details. It can also find the number of persons located with the help of the Infrared sensor. This review paper gives a peculiar approach towards surveillance system.

Keywords: USB cameras, Raspberry Pi, Relay, 3G dongle, Smart phone, Security etc

1. INTRODUCTION

Wireless communication is very important concept and it plays an important role in various applications like industrial automation, home automation etc fields. Today the application of wireless communication in automation field is increasing rapidly. In some applications human beings have been replaced by unmanned devices that will acquire data and relay the data back to the base. A single person can monitor and even interact with the ongoing work from a single base station. Wireless based surveillance robot is a prime concern in our day-to-day life [9]. The approach to Wireless Network for various applications standardized nowadays.

Intelligent and low-cost automation of industrial and home application processes are crucial in order to improve process efficiencies, deliver quality products, and ensure timeliness and accuracy of systems. Wireless is predicted to be one of the fastest growing technologies in the area of process automation sector. The embedded web server network consists of advanced processor ARM11-Raspberry Pi[5]. It is having RISC architecture. 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. 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 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[8]. When the surveillance is considered, home automation or the weather monitoring ,the raspberry pi has proved its importance for application in the field as the paper deals with this it can be seen further [3][9].

2. LITERATURE REVIEW

The Raspberry pi was created in February2012 by the Raspberry pi Foundation, Originally 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 &

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capabilities[4]. 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), 4 USB ports, and an expanded GPIO for more input/ output flexibility[6]. 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.

3. SYSTEM OVERVIEW
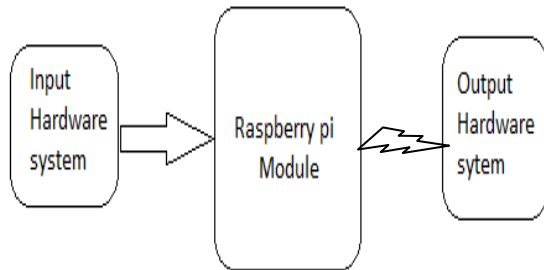
Fig.1: Block diagram of Raspberry pi

The block diagram shows the basic working of the Wi-Fi based raspberry pi in which the block describes the working. As the diagram shows the first block that the hardware input which will give the processing now as the applications are considered that can be sensors which will sense, can be camera which will take the pictures that can be flow sensor and can be any home automation sensors.

Now the main thing comes that is Raspberry pi is a micro-controller kit with in-built ARM11 board provided with internet/Ethernet connectivity, dual USB connector, 512MB memory and works on Linux operating system [5]. The main use of raspberry pi is to convert conventional television to smart TV.

Fig.2: Raspberry Pi B+ model

The board provides both the audio and video output as well the onboard storage of the micro-controller kit supports SD, MMC, SDIO card slot. This has its basic use in this data transmission in which it actually act as the server. After processing the data it transmits the data through the Wi-Fi module to the internet. This processing is totally dependent on the software used in the raspberry pi which uses the python language and can access the internet and process the data.

Output system gives the output which is taken from the server through internet in the form of digital data. The sensed data is transmitted through the Wi Fi module which is connected to the Raspberry pi the output can be the images captured by the camera or can handle the motor and can handle home appliances [9].

Now, we are compare the two platforms one is Raspberry pi and another is Arduino we use the most for home automation and Industrial Automation etc projects. They both have their advantages and disadvantages.

Connectivity of Raspberry pi seems to have an advantage because it has a built in Ethernet Connection, at least for the most common boards. And we can easily add Wi-Fi connectivity by plug i a Wi-Fi dongle on one of the USB port. But the Arduino can also be easily connected to the web by using shields. Ethernet shield which is very well documented on web and it is used for a simple home and Industrial Automation Project [3]. Also, a recently a GSM shield was released, which opens the door to even more exciting application with the Arduino platform. So for the connectivity both the platforms are good [7].

Computing Power In terms of computing power, the situation seems to be clear as well. Most of the Arduino boards are equipped with an 8-bit microcontroller from ATMEL [2], usually the ATmega328 which runs at 16 MHz Of course it can compete with the 700 MHz BCM2835 chip which power the Raspberry pi. Even one of the latest board from Arduino, the Arduino Due, can't complete with the pi with it's 84 MHz SAM3x8E chip. So if it is computing power we are looking for, there is a one

clear winner the Raspberry pi platform.

There were various smart systems have been proposed where the control is via Bluetooth [1], internet etc. Bluetooth capabilities are good and most of current laptop/desktops, tablets, notebooks and cell phones have built-in adaptor that will indirectly reduce the cost of the system. But it limits the control to within the Bluetooth range of the environment while most other systems are not so feasible to be implemented as low cost solution. In Wi-Fi based home automation system is presented. It uses a PC

(with built in Wi-Fi card) based web server that manages the connected home devices. The system supports a wide range of home automation devices like fans, lights, other home appliances.[1] A similar architecture is proposed in where the actions are coordinated by the home agent running on a PC. Other papers such as also presented internet controlled systems consisting of a web server, database and a web page of websites for interconnecting and handling the devices.

Table 1: Comparison of Various platforms

FEATURES	PIC	AVR	ARDUINO	BEAGLEBONE	UDOO	RASPBERRY PI B+ MODEL	RASPBERRY PI 2 MODEL
RAM	14 KB	1KB-256KB	Upto 512KB	512MB	1GB	512MB	Upto 1GB
EXTERNAL MEMORY	NA	NA	NA	64GB	64GB	2-64GB	2-64GB
OS	NA	NA	NA	Linux Angstrom	Ubuntu, Android, Arch Linux	Linux	Raspbian
USB HOST	NA	NA	NA	1	2	4	4
NETWORK	NA	NA	NA	10/100/1000 Mbps	10/100 Mbps	10/100 Mbps	10/100 Mbps
AUDIO OUTPUT	NA	NA	NA	Analog	HDMI, Audio Jack	HDMI, 3.5 Audio Jack	HDMI, 3.5 Audio Jack
CLOCK SPEED	32MHz	32MHz	84MHz	700MHz	528MHz	700MHz	900MHz
VIDEO OUTPUT	NA	NA	NA	NA	HDMI	HDMI Components	HDMI Components
POWER	2.0-5.5 V	5V	7-12V	5V	6-15V	5V	5V
LANGUAGES	C++	C++	C++	Any for Linux OS	Embedded C	Python	Python
RELEASE YEAR	-	-	-	2012	-	2014	2015

A sensor is an electronic device that transfers a physical phenomenon into an electrical signal. Sensors are the sensory system of a robot, like the five sensors that humans have: Touch, Sound, Sight, Smell, and Taste. Sensors also measure environmental data like touch, distance, light, sound, strain, rotation, magnetism, smell, temperature, inclination, pressure, or altitude. For this project PIR and IR sensors are used for live motion detection and for obstacle detection respectively.

The SMS Based automation system presents style and model implementation of a basic home automation system based on SMS technology. The automation system consists of 2 main components; the GSM electronic equipment, which is that the communication interface between the house automation system and therefore the user. GSM electronic equipment uses SMS technology to exchange information, and signaling between users and residential automation system. The second module is the microcontroller, that is that the core of the house automation system, and acts because the bridge between the GSM network (the user) and sensors and actuators of home automation system. Sensors and actuators are directly connected to hardware small controller through appropriate interface.

4. CONCLUSION:

In this review paper, we have presented a real-time surveillance robot using different system for human-computer interaction with the surveillance robot in context. Also this paper contains detailed information for controlling a robotic vehicle guided via internet. All this techniques can be used any conditions and areas where it is difficult for the security forces to reach it can monitor the areas. This techniques having their own applications in that field.

The surveillance robot was designed with AVR microcontroller using embedded platform. It monitors and secures a place from the adversaries which can be done by surveillance robot all the times with great accuracy and high precision. An IP camera is used which continuously monitors the place and sends the information to the control station.

If we has doing a small home automation & industrial automation etc and we want cheap and easy solution, we can go probably with Arduino. But if we want to build a larger project and want to any typical computer to be involved we would like to suggest Raspberry pi board to act as the "brain" of our Project.

It is concluded that smart surveillance system using Raspberry pi capable of recording/capturing video/image and transmitting to a smart phone. It is advantageous as it offers reliability and privacy on both sides [9]. It is authenticated and encrypted on the receiver side, hence it offers only the person concerned to view the details. Necessary action can be taken   in short span of time in the case of emergency conditions such as elderly person falling sick, military areas, smart homes, offices, industries etc.

5. FUTURE SCOPE:

Now that the Raspberry pi 2 has been released with more power into the same small frame than the previous version (Raspberry pi), the vision applications are larger and more complex than before. Like almost everyone else, makers and hackers now use Pi 2 board with a camera for wide range of applications. The many original projects being developed to shoot outdoor Infrared photos, Automatic video capturing, security surveillance applications and more [5].

The Raspberry Pi 2 packs a lot of power into the same small frame that the Raspberry Pi has always had. Compared to the Raspberry Pi Model B+ Broadcom BCM2835 ARMv6 system on chip processor, the Pi 2 model B has new quad core BCM2836 ARMv7 processor, powering a single board computer running at 900MHz.

The time delay which occurs in the execution of commands has to be reduced and thus we can have real time access to the robot. With reduced time delay we can have faster operation and quick response to any illegal activities in the monitored area. This Raspberry Pi 2 provides the real time video [8]. In future we will pay more attention to reduce the storage capacity of the SD card it is wiser to take images when it matches the pre-defined template using open programs and compress those images and send those images to the web page through GPRS shield which helps in sending MMS through Wi-Fi.

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