



VIDEO CAPTURING AND FIRE DETECTION USING RASPBERRY PI

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Abstract: This new technology is less expensive and in this paper it is used as a standalone platform for hosting image transmission and device control. The paper aims at developing a system which captures real time images and displays them on browser using TCP/IP protocol. In this project, control of robotic unit is from remote end with the use of Internet and also we are able to get the videos from the robot end for the purpose of surveillance. At the user mobile, we will have videos on the web browser and also we are able to control the robotic movement. In this implementation of robotic system, we control and monitor the robot device from the remote location, When someone enters secured places, using live video streaming we can immediately observe it using web camera connected to the microprocessor keeps on capturing what is going on there at the host place. Also when fire is detect it will provide the status over web.

Keywords: Raspberry Pi, L293d, USB Camera, Fire Sensor.

I. INTRODUCTION

In today's technology, security and monitoring are very important. They are important in any organizations, firms and military purposes. In Military Surveillance of border areas is very difficult. The army is patrolling the border. They are getting help from surveillance cameras but fix mounted camera cover limited areas. The cameras at a fixed position we can't change the camera view in real time. With the popularity and wide use of internet, it becomes

an easy task for anyone to control and monitor from internet. The historical evolution of surveillance system originated from track n surveillance robot controlled via remote controller. Web-Controlled Surveillance Robot is a vehicular robot which can be controlled wirelessly via the internet. It has cameras mounted on it for the purpose of video surveillance. The robotic arm mounted on it makes it a multi-purpose machine. The main application is surveillance across the international borders for monitoring of any illegal or suspicious activities, intrusions or ceasefires violations. In this project we are using Raspberry Pi, which is one of the latest state of the art technologies available in the market. It is a mini computer with a powerful Linux based ARM11 processor and an in-built Raspbian OS, with all the interfaces and memory slot being on the same chip. It is customized for user friendly functionality in a compact and portable environment. The main reason behind selecting Raspberry Pi is its excellent performance with respect to speed as well as user friendliness at a very low cost. The main advantage behind using Raspberry Pi is its portability along with a powerful processor, RAM and interfaces with the outside world all on the same chip. It has innumerable applications which can be realized in very less space and money.

II.SYSTEM ARCHITECTURE

Fig.1 shows Block diagram of the project.

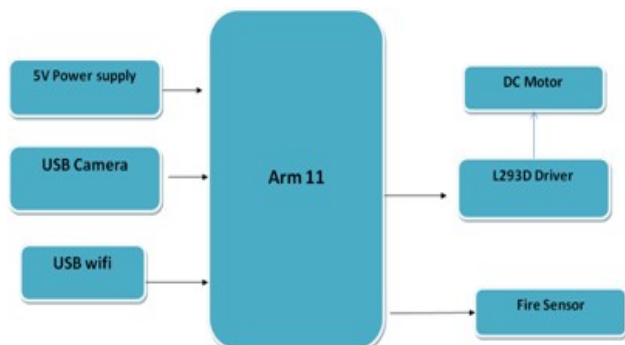


Fig.1. Block diagram of the project.

III.HARDWARE DESCRIPTION

A.Raspberry Pi

The original Raspberry Pi is based on the Broadcom BCM2835 system on a chip (SoC), which includes an ARM1176JZF-S 700 MHz processor, VideoCore IV GPU, and was originally shipped with 256 megabytes of RAM, later upgraded (models B and B+) to 512 MB. The system has Secure Digital (SD) (models A and B) or Micro SD (models A+ and B+) sockets for boot media and persistent storage. In the fig. 2, Raspberry Pi is connected to the USB port. In the PC, Raspbian operating system is installed. Raspberry-pi works only on Raspbian operating system, Linux., 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. Putty configuration and VNC viewer are needed to install Raspbian OS. Putty configuration is SSH and Telnet client. It is an open source software that is available with source code. Virtual network computing is a Graphical desktop sharing system that allows us to remotely control the desktop interface of one computer from another. The Raspberry Pi primarily uses Linux kernel-based operating systems (it is not possible to run Windows on the Raspberry Pi). The ARM11 is based on version 6 of the ARM on which several popular versions of Linux no longer run (in current releases), including Ubuntu. The install manager for Raspberry Pi is NOOBS.



Fig.2.Raspberry Pi Board.

B. L293D Driver

The L293 and L293D are quadruple high-current half-H drivers. The L293 is designed to provide bidirectional drive currents of up to 1 A at voltages from 4.5 V to 36 V. The L293D is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. Both devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo-Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the associated drivers are enabled and their outputs are active and in phase with their inputs. When the enable input is low, those drivers are disabled and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications. On the L293, external high-speed output clamp diodes should be used for inductive transient suppression. A VCC1 terminal, separate from VCC2, is provided for the logic inputs to minimize device power dissipation. The L293 and L293D are characterized for operation from 0 to 70 degree Celsius.

C. USB Camera

Camera plays a vital role in automation purpose. The camera is used for monitoring of a room from a remote place. The camera used is a USB camera. Whenever the user clicks on to video button on loaded webpage, the

corresponding room video will be streamed on to webpage

.For this purpose we use a MJPG streamer. The below fig.3 shows the camera that has been used for monitoring of a room.



Fig.3. USB Camera.

D. Fire Sensor

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire. Responses to a detected flame depend on the installation. The prime function of a fire detector is to detect one or more changes in the protected environment indicative of the development of a fire condition as shown in Fig.4. Usually mounted on ceiling or in air ducts, detectors are activated in the main by smoke or radiation. Fire detectors are identified by their operating principle. The output from the fire sensor is given to an ordinary transistor. Since the microprocessor cannot detect the output coming from the fire sensor, it is given to the base of the transistor. Thus, the collector of the transistor will be given to one of the port pins of the microprocessor. Thus, when the fire occurs, the fire sensor detects the fire and its output alters. Since this output is fed to the base of the transistor, the voltage at the collector of the transistor changes as per the input applied at its base. Thus, this change occurs at the port pin of the microcontroller and therefore, the controller identifies this change and immediately performs the specified task.



Fig.4 Fire sensor.

IV. SOFTWARE REQUIREMENT

A. QT

The software is used to design and developed is QT creator which is used to make efficient GUI application. Qt Creator is a good example of an application that mixes different user interface technologies. In fact, it uses all of the three different approaches described below. Qt Creator uses the traditional Qt Widgets such as menus and dialogs as a basis of the user interface, Qt Quick amongst others for the welcome screen, and Qt WebKit for presenting the Qt reference documentation. Qt Creator includes a project manager that uses a cross platform project file format (.pro). A project file can contain information such as what files are included into the project, custom build steps and settings for running the applications. Qt Creator includes a code editor and integrates Qt Designer for designing and building graphical user interfaces (GUIs) from Qt widgets. The code editor can parse code in C++ and QML languages... It is possible to compose and customize the widgets or dialogs and test those using different styles and resolutions directly in the editor. Widgets and forms created with Qt Designer are integrated with programmed code, using the Qt signals and slots mechanism.

B. Raspbian Operating System

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. The initial build of over 35,000 Raspbian packages, optimized for best

performance on the Raspberry Pi, was completed in June of 2012. However, Raspbian is still under active development with an emphasis on improving the stability and performance of as many Debian packages as possible. Raspbian (recommended)

–Maintained independently of the Foundation; based on ARM hard-float (armhf)-Debian 7 'Wheezy' architecture port, that was designed for a newer ARMv7 processor (or one with Jazelle RCT/ThumbEE, VFPv3 and NEON SIMD extensions built-in) whose binaries would not work on the Raspberry Pi, but Raspbian is compiled for the ARMv6 instruction set of the Raspberry Pi making it work but run more slowly. It provides some available deb software packages, pre-compiled software bundles. A minimum size of 2 GB SD card is required, but a 4 GB SD card or above is recommended. There is a Pi Store for exchanging programs. The Raspbian Server Edition is a stripped version with other software packages bundled as compared to the usual desktop computer oriented Raspbian.



Fig.5. Hardware Assembly

V. RELATED WORK

Developed a surveillance robot based on internet of things(IoT) technology, through which the user can control the robot from web based interface. The system includes advances processor to which a usb camera is connected, for live video streaming of the location. The web interface will contain the push button to operate the robot i.e. to move front, back , right, left and stop conditions. Also a fire sensor is attached to the processor to detect if any fire occurred in the surveillance.

VI. EXPERIMENTAL

RESULTS

Results of this paper is as shown in bellow Figs.5 and 6.

Fig.6. Display over desktop. Advantages:

- Easy to Operate
- Remote Video Surveillance
- Maintenance Free

Disadvantages: Most of the IP cameras require high bandwidth thus involving this as a major drawback. Here also the algorithm and an extra board is used to just control the motors which will be overcome in the proposed method

Limitations:

- Poor latency for low priority nodes
- Unfair access node with a priority can hog the network
- Power Consumption
- Knowledge of operation to customer

II. CONCLUSION

Local network surveillance system provides low cost surveillance system compared to other systems. Raspberry pi core part of such system. Servos are connected to Raspberrypi via switching circuit. It is clear that surveillance system is controlled via controller. Local network is created using Wi- Fi adaptor. Live

streaming is done by MJPEG streamer which takes photograph at some periodic interval and overwrites one over to make it look like real-time video streaming. This system can cover large area for surveillance and low cost solution. But it can be connected via local network only cannot be connected via internet. Also only one location at a time can be surveillance.

VIII. REFERENCES

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