Study of Theft Detection and Tracking using Raspberry pi and PIR Sensor

Rahane Madhuri
Department of Computer Engineering
S.R.E.S, kopargoan, Maharashtra, India

Pathak Mayuri
Department of Computer Engineering
S.R.E.S, kopargoan, Maharashtra, India

Wadekar Ashabai
Department of Computer Engineering
S.R.E.S, kopargoan, Maharashtra, India

More Rupali
Department of Computer Engineering
S.R.E.S, kopargoan, Maharashtra, India

Malkar Ankita
Department of Computer Engineering
S.R.E.S, kopargoan, Maharashtra, India

Abstract- Study of theft detection and tracking using raspberry pi and PIR sensor using mobile devices that uses mobile technology to provide essential security to our equipment's and detecting the theft. The proposed theft detection integrates camera and PIR sensor , gps tracker on equipment to give the solution through mobile application. Raspberry Pi operates and controls PIR sensor ,camera when motion is detected for remote sensing and surveillance, then capture the image and live video then stores it for future playback, and finally tracing the location of intruder.

Keywords – PIR Sensor, Raspberry -Pi , RPI camera ,Smart Phone ,GSM Dongle ,GPS Tracker.

I. INTRODUCTION

Security over household and farming equipment's always pays a high price which a common man or middle class person cannot afford for such a price. Hence this paper has power to act effectively to provide a security progression over the people in a very low cost and by which he can itself provide a security which could also be said that 'he can be the iron man of his host location'. Anti-Theft Detection provides a greater benefit to any person who can afford a cheap product which could provide anti-theft detection features to any equipment through android device which carrying an App. The Anti-theft detection system works by using the internet as the master and Raspberry pi as hardware tool and the GPS tile tag for tracking, PIR sensor for detecting, and the camera for capturing image/video.

It is now possible to conceive many new networked surveillance applications for diverse domains. It is a rapidly advancing field, as technological advances continue research, design, and building new surveillance serve various practical purposes, whether domestically, commercially, or militarily. Video surveillance is an important research area in the commercial sector as well. Technology has reached a stage where mounting cameras to capture video imagery is economical, but finding available human resources to sit and watch that imagery is relatively expensive. Surveillance cameras are already prevalent in commercial establishments, with camera output being recorded to discs and tapes that are either rewritten on a continuous basis or stored in video archives. But there's a slight problem. Local video surveillance is awful, and it's everywhere. But it would be much beneficial to see about surveillance in the hands of private people there comes Raspberry Pi, bringing the price of networked motion-sensitive surveillance cameras down to be affordable by consumers.

In this Theft detection and tracking system web camera connected to the raspberry pi keeps on capturing what is going on there at the host place and saves it into the server. When the concerned people wants to get an indication to the host section , they launch the App in their mobile then via internet he can view respective information .

II. PROPOSED ALGORITHM

In this paper we are proposing following components for Theft Detection and Tracking

1. Raspberry pi
2. PIR Sensor
3. GPS Tracker

1. Raspberry pi:

The Raspberry Pi is a credit card sized single-board computer developed by The Raspberry Pi Foundation, a UK charity, with the aim of providing low-cost computers and free software to students. Their ultimate goal is to foster computer science education and they hope that this small, affordable chip size computer will be a medium that enables that.

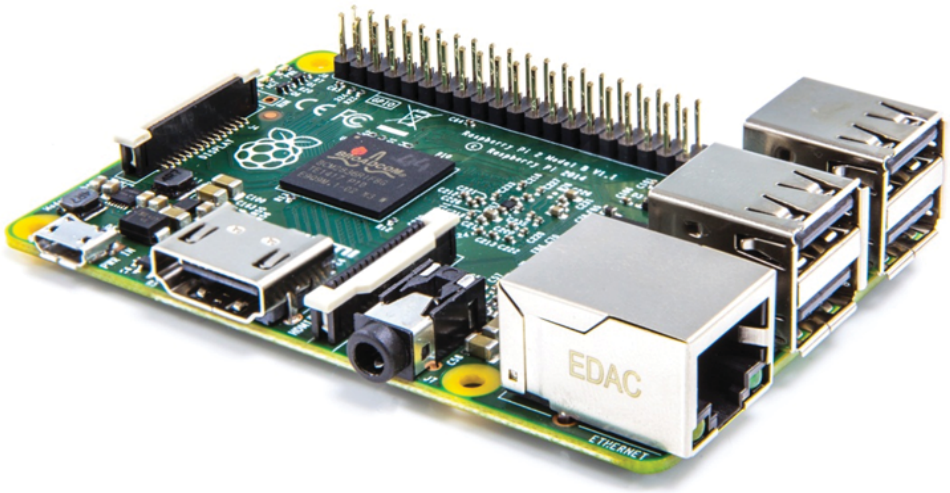

Figure 1: Raspberry Pi B+ Board

The first product is the size of a credit card, and is designed to plug into a TV or HDMI monitor. It comes in two variants, model A and B, with B having more features. The expected price is $25 for model A and $35 for model B. The GPIO pins on each board allow the use of optional expansion boards. Model A has one USB port and no Ethernet controller, and will cost less than the Model B with two USB ports and a 10/100 Ethernet controller. Though the Model A doesn't have an 8P8C (RJ45) Ethernet port, it can connect to a network by using an external user supplied USB Ethernet or Wi-Fi adapter. On the model B the Ethernet port is provided by a built-in USB Ethernet adapter.

Just like modern computers, generic USB keyboard and mouse are compatible with the Raspberry Pi. Multiple USB ports can also be connected by using USB Hub. The Raspberry Pi does not come with a real-time clock, so an OS must use a network time server, or ask the user for time information at boot time to get access to time and date for file time and date stamping. However, a real-time clock (such as the DS1307) with battery backup can be added via the I²C interface.

The small size makes for an easy-to-hide computer that sips power and can be mounted behind the display with an appropriate case. The major requirements of raspberry pi are a bootable SD card with Linux, USB power adapter with support for 700 mA and USB Wi-Fi adapter for internet connectivity.

A. Run And Starting of Raspberry-

Once the SD card is loaded with Raspberry OS, to update the software we use the comments as follows

- sudo apt-get update && sudo apt-get upgrade

- sudo apt-get install motion

To enable motion

- sudo nano /etc/default/motion

B. Camera Setup-

Now you also need to enable camera support, using the raspiconfig program you will have used when you first set up your Raspberry Pi.

Figure 2: RPI Camera

- sudo raspi-config

Use the cursor keys to move to the camera option and select enable. On exiting raspi-config it will ask to reboot. The enable option will ensure that on reboot the correct GPU firmware will be running (with the camera driver and tuning), and the GPU memory split is sufficient to allow the camera to acquire enough memory to run correctly. To test that the system is installed correctly and is in working condition, try the following command:

- Raspstill -v -o test.jpg

C. Internet Connection-

Internet connection required can be either provided by Wi-Fi adapters or USB device called Dongle. Wi-Fi adapters provide wireless connectivity to the local area network (LAN) in the home or office. Typically used to add Wi-Fi to desktop computers, they can also retrofit older laptops that never came with Wi-Fi. The adapter will retrieve the real time video from raspberry pi within the coverage range and provides safety means of video surveillance without any kind of complex wired network. Instead of Wi-Fi, USB Dongle can also be used.

D. Motion Detection-

To configure motion detection, edit /etc/motion/motion.conf. Motion detection is not active while the old video is converted to mp4. To prevent this, stop boxing the h264-video after recording by replacing "MP4Box true" with "MP4Box false" in /etc/raspimjpeg and restart your RPI. Temporarily start/stop and de-installation: If you want to stop the interface temporarily, run

"./RPi_Cam_Browser_Control_Installer.sh stop".

To restart it, run

- ./RPi_Cam_Browser_Control_Installer.sh start

If you want to remove the interface completely, run

- ./RPi_Cam_Browser_Control_Installer.sh remove

Note: It removes all files in /var/www.

E. Update-

If you want to update your existing interface to the newest version, just navigate into the git- and run git pull origin master ./RPi_Cam_Web_Interface_Installer.sh install And ./RPi_Cam_Web_Interface_Installer.sh start. If it doesn't work, restart the RPI or clear the cache of your browser using this you can interface raspberry pi with local web server. But for universal broadcasting, port forwarding is required. Now for port forwarding, you can either use the same Wi-Fi connection or can make use of wireless dongle. In case of Wi-Fi, you need to get the permission of your service provider. If you get the permission, well and good but if you don't, you can make use of wireless dongle. Here the dongle used is Mblaze and the installation steps for it are provided. Now, after the installation of USB modem on your Pi which is easy to create a static IP of raspberry pi globally so that any user can access it on IP of USB modem. Now for each session it has a different dynamic allocation of IP address so every time we need to type a different allocated IP of each session.

2. PIR Sensor-

PIR stands for Passive Infra-Red. All objects whose temperatures are above absolute zero emit infra-red radiation. Infra-red wavelengths are not visible to the human eye, but they can be detected by the electronics inside one of these modules. The sensor is regarded as passive because it doesn't send out any signal in order to detect movement. It adjusts itself to the infra-red signature of the area it's in and then watches for any changes. Any object moving through them will disturb the infra-red signature, and will cause a change to be noticed by the PIR module. In PIR there are the three pins on it; we connect those to the Raspberry Pi GPIO pins. One pin is for +5 volts, one pin is for ground and the other is the sensor pin (the middle pin on our Pi). This sensor pin will receive power whenever motion is detected by the PIR module.

Figure 3: PIR Sensor

3. GPS Tracker:

A GPS tracking unit is a device, normally carried by a moving vehicle or person, that uses the Global Positioning System to determine and track its precise location, and hence that of its carrier, at intervals. The recorded location data can be stored within the tracking unit, or it may be transmitted to a central location data base, or Internet-connected computer, using a cellular (GPRS or SMS), radio, or satellite modem embedded in the unit. This allows the asset's location to be displayed against a map backdrop either in real time or when analysing the track later, using GPS tracking software. Data tracking software is available for smartphones with GPS capability.

III. APPLICATIONS

There are various application domains where the proposed system can be used.

A.Home Automation -

Home automation allows us to control household appliances like light, door, fan, AC etc. It also provides home security and emergency system to be activated. The home automation and security is to help handicapped and old aged people who will enable them to control home appliances and alert them in critical situation. Raspberry helps us to do secure home.

B. In Big Mall-

In a big shopping mall it can be applicable to monitor environment, and secured the products.

C. Vehicle theft detection system -

Vehicle can be secured from stolen and using tracker it able to track the location of vehicle. Also used in a large public places like parking of vehicles. The given system can also be applicable in farming system.

IV. CONCLUSION

This paper deals with the study of theft detection and tracking using raspberry pi and PIR sensor using mobile devices. Thus, smart theft detection system capable of recording/capturing video/image and transmitting to a smart phone. It is advantageous as it offers reliability and privacy. To provide essential security to equipment's and detecting the theft the Raspberry Pi, PIR sensor, Camera and tracker can be used.

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