An Efficient Image Processing based Security Technique using Raspberry Pi

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ABSTRACT

Image processing is one of the latest and prominent fields of computing and plays a very important role in security also like Steganography. IOT is the latest and emerging technology and need for the modern life. The paper is about the mixture of the above technologies to make a very dynamic security approach that addresses number of issues. In my approach I am using Raspberry Pi with camera to capture images and send these images to another Raspberry Pi in encrypted format.

Keyword: IOT, Raspberry Pi

I. INTRODUCTION

Image processing is a method to perform some operations on an image, in order to get an enhanced image or to extract some useful information from it. It is a type of signal processing in which input is an image and output may be image or characteristics/features associated with that image. Nowadays, image processing and IOT are among rapidly growing technologies. The term "Things" in IOT refers to various IOT devices having unique identities and has capabilities to perform remote sensing, actuating and live monitoring of certain sorts of data. IOT devices are also enabled to have live exchange of data with other connected devices and applications either directly or indirectly, or collect data from other devices and process the data and send the data to various servers. Security is prime concern in modern computing like security of applications. My research is based on Raspberry Pi a computer with the size of a credit card, which was designed to promote the training on computer programming skills and the understanding of computer hardware in schools. Due to its size and accessibility in price, it was adopted by users for projects that required more than a primary microcontroller. Raspberry pi has computer capabilities with a free operating system called Raspbian which is a version of Debi an and is optimized for the hardware components of the system. The system is capable of running wireless home speakers, a media centre for TVs, and personal web servers. It is a low-cost portable miniature computer which can play high-definition video. The following figure shows a functional block schematic of Raspberry Pi.
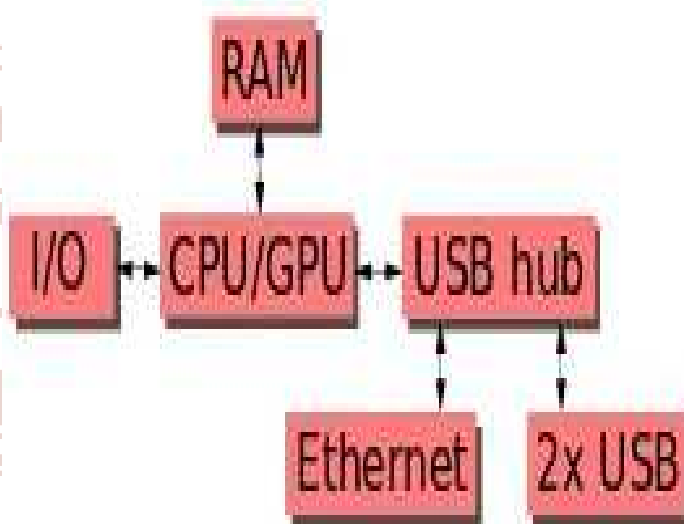
II. PROBLEM DEFINITION

The security is the prime concern and implementing security essentials through image processing is a challenging and most acceptable approach. My research is based on image cloning means getting desired results after comparing two images. In simple words a very efficient Raspberry Pi based security mechanism that will be based on image processing concept.

III. OBJECTIVES

The main objectives are described as below:

1. To implement a cost effective security system.
2. Can be a very flexible and efficient Steganography based tool.
3. Can be a very flexible image based data backup option.

IV. PROPOSED WORK

The aim is to make a smart image processing based system that can used for number of circumstances like surveillance system for remote security monitoring, data security in terms of encrypting and decrypting using images, Data backup, IOT based home automation etc. in my approach two Raspberry Pi devices can connected over internet/network. Camera will be fitted on one Raspberry Pi to capture images manually but if we need to capture images automatically based on motion detection, the deployment of PIR Sensor is necessary. The USB Camera captures the images and sends it to the USB port of the Raspberry Pi. After capturing images the images will be transmitted to second Raspberry Pi in encrypted format. The main motive behind using second Raspberry Pi is only to get the perfect and original results if somehow the image is altered in first Raspberry Pi means a simple data backup option for future use.

V. METHODOLOGY

Hardware Synchronization
Camera Attachment

In this step camera is fixed on Raspberry Pi as shown below:

Connecting Raspberry Pi Devices

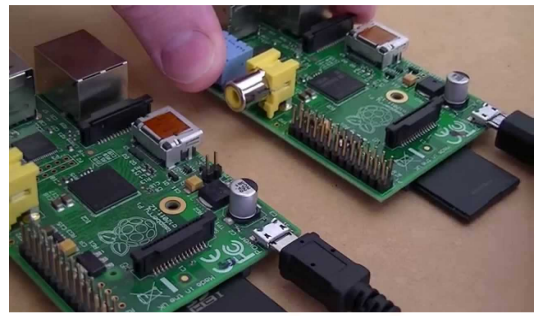The two Raspberry Pi devices can be connected over the internet/network as shown below:

Image Capture

Image capturing is the main step in my research. In this step the camera fitted one Raspberry Pi capture the images but if we need to capture images on motion detection, the deployment of PIR sensor is a mandatory case.

Raspberry Pi Configuration

The configuration of Raspberry Pi means settings of different options on computer to make device ready for use. The configuration of Raspberry Pi is described as shown in the following figure.
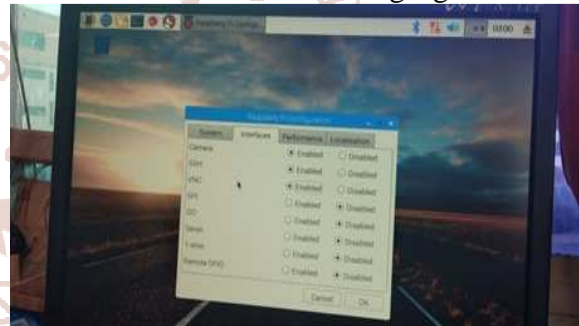
Displaying image:

In this step the screen is configured with another Raspberry Pi which displays the clone of captured image in an encrypted format as shown below:

VI. CONCLUSION:

Image processing and IOT are the latest and emerging technologies with great impact on modern life. Data security is a very vast domain and implementing data security using image processing is a challenging task. The whole research is based on cost effective and very dynamic security approach using Raspberry Pi concept. Images will be captured through camera fitted on one Raspberry Pi and the copy of the same image will be transmitted to another Raspberry Pi in encrypted format. To get the desired and perfect results the two images will be compared. In simple words a very dynamic steganography based tool for achieving modern security.

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