USB Device Driver Development of Image Processing Using Raspberry Pi 4 via Thingspeak

Priyadharshini S.[1], Dr.S.Natarajan[2] & Dr.S.Kavitha[3]

[1,2,3]*Department of Electronics and Communication Engineering,*
[1,2]*Veltech Rangarajan Dr.Sagunthala R&D Institute of Science and Technology, Tamilnadu, India.*
[3]*Nandha Engineering College, Tamilnadu, India.*

Abstract:
Contemporarily, Face recognition is a common part for a home security system. Image gets captured using Raspberry pi 4 is processed to identify the image. In this paper, face detection system for home security system that is based on webcam with python programming was implemented. IOT based methodology or automation system was designed with the help of raspberry pi 4 together with Thingspeak. Thingspeak was made to be used at the user end.

Keywords: *Raspberry pi4, Internet of Things, Hardware/Software components.*

I. INTRODUCTION

Contraption of USB driver in Raspberry pi 4modules, IoT have been creating worldwide physical objects to be consistently correlation of the information. Home Automation uses a number of domineering frameworks for controlling home security system. Face recognition can be obtained with web camera, it get monitor at the user end by Thingspeak.

II. METHODOLOGY

This System categorized in different stages to capture, comparison, and matching. The Raspberry pi 4 board is connected with various accessories. It connects the SDcard, Keyboard, camera module and power supply.

III. DESIGN AND IMPLEMENTATION

The development and design aspect in independent modules and considered.

Procedure

1. Power on.

2. Initialize the USB connected with web camera module.

3. Camera starts capturing the images in front of it at the rate of one second.

4. Captured images are connected with predefined image database.

5. If the image matches, automatically door gets opened which is sensed by Thingspeak, when images does not match, it get alerted through Thingspeak as "*Unauthorized Entry*".

Image detection

Fig.1.Raspberry pi 4 with webcam
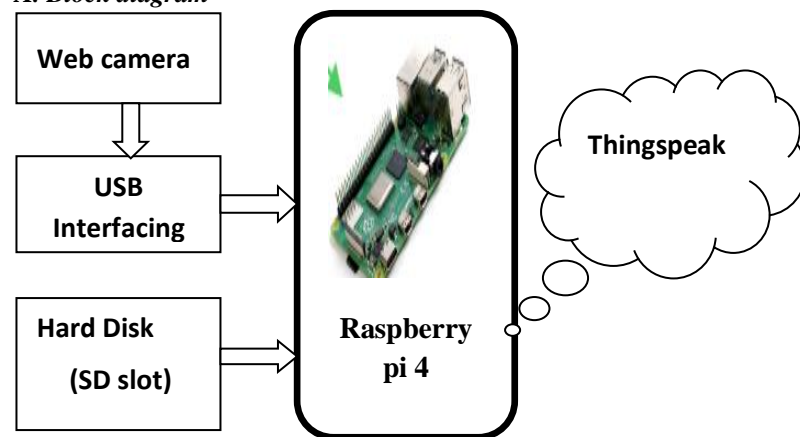
A. Block diagram

Fig.2. Block diagram

a) Raspberry pi 4

The electric interconnection of the CM4 using dual 100-pin higher density connectors are instigated by enhanced physical form factor owing to reduced footprint by considering all connectors. This interfaces one supplementary HDMI, PCIE and Ethernet. The representative qualities of Raspberry pi 4 are of Quad core cortex, Broadcom BCM2711, etc., together with small footprints of 55*40*4.7mm^{3}modules [1]-[3].
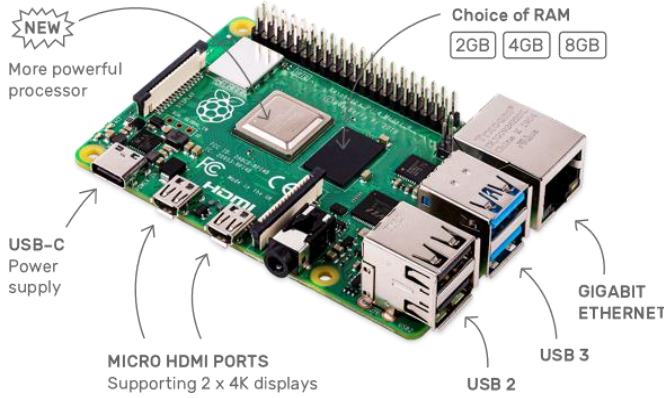

Fig.3.Raspberry pi 4

b) USB

Over raspberry pi 4, USB Hub chip was linked with SOC by employing PCIE bus.USB ports enable these attachments of peripherals such as webcam. This port of USB host inner to the raspberry pi 4 is normally ON-THE-GO(OTG) host as the application processor powering the raspberry pi, BCM 2835 which is typically aimed for being applicable at the mobile markets.USB ports of 2.0 and 3.0, USB 2.0 devices were linked through inner hubs that link with upstream PCIE

link over a unique USB2.0,bandwidth of 480 bits and USB 3.0 devices were solely constrained towards overall bandwidth that exist over PCIE link.
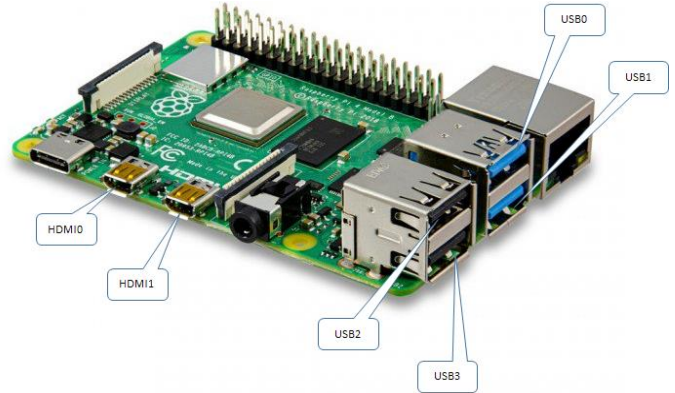

Fig.4.USB Ports

c) Web camera

In this paper, a webcam was utilized so as to cover the front portion of the user by fixing it at the door's entrance. Generally, when a person is entering the home, webcam captures a picture that is subsequently transmitted over Thingspeak [4]. The interesting feature here is that, the software in the Webcam typically permits the users in video recording and video streaming over Internet. With the constraint that, video streaming consumes higher bandwidth, thereby this streaming process employs compressed formats.

d) Thingspeak

It is an open IoT platform monitoring our data online. Internet connection and sensing of data can be measured, triggers were predicted and altered accordingly to automatically react in certain scenarios
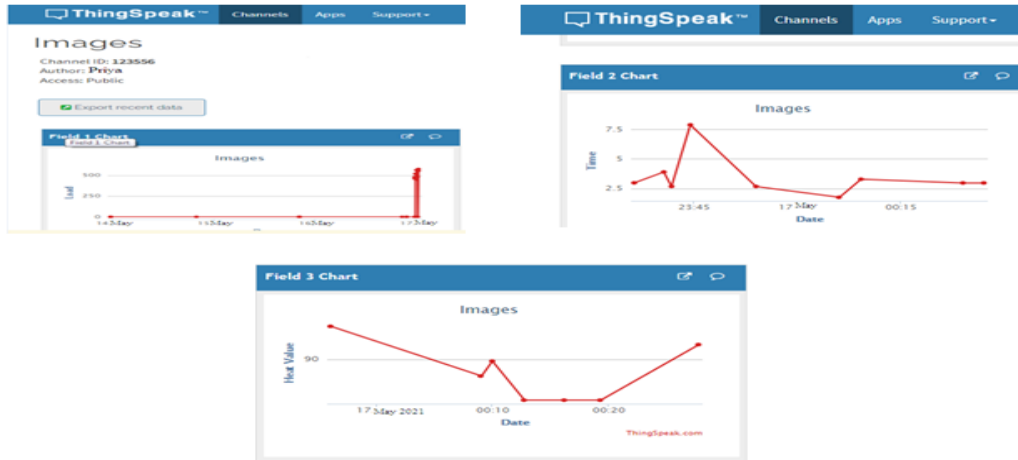
IV. OUTPUT

A. Image at webcam
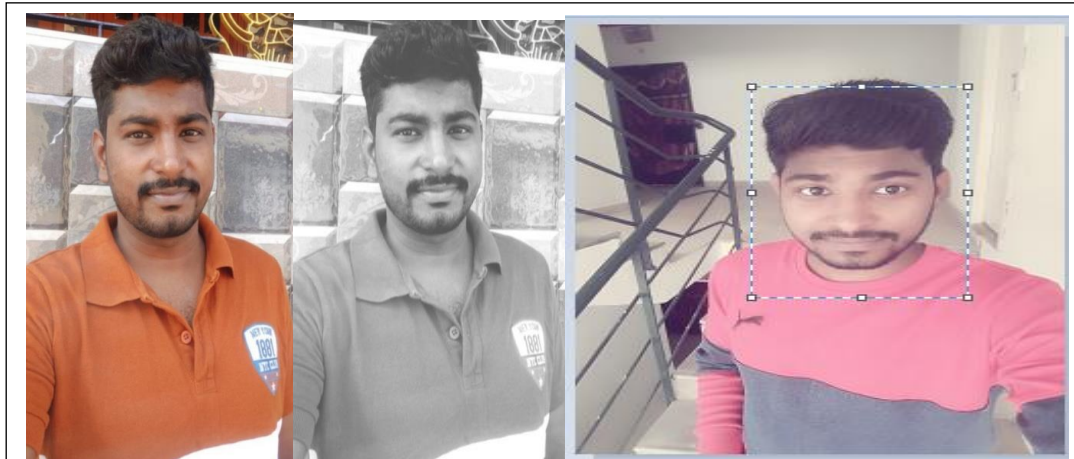
Fig.5: (a) Colour into grayscale   (b) Recognized face

B. Thingspeak graphical output:

Fig.6 Output of Thingspeak

V. CONCLUSION

The purpose of this system is providing security for home. The impetus to protect the house from theft, by using this system, flay security that provides our house from unauthorized person's entry. By usage of face recognition data by the camera module, it a real time face recognition system with smart door system. Every process is possible only with the help of raspberry pi4, webcam and IoT.

References

[1] V.K., Harshal, S. Mane. Human face detection & recognition using raspberry-pi. Int. J. of Adv. Engg., Manag.& Sci., (2017) 198-205.

[2] V.D. Shrutika, U.A. Kshirsagar. (2017) Face detection & face recognition using raspberry pi. Int. J. of Adv. Res. in Comp. and Comm. Engg., 6(4) (2017) 70-73.

[3] Janhavi K., SayaliP., Samrudhi. (2016) Face recognition in non-uniform motion using raspberry pi. Int. Res. J. of Engg. &Tech., 3(5) (2016) 534-537.

[4] Omkar B., Anurag B., Face recognition based attendance monitoring system using raspberry-pi and open CV, Int. Res. J. of Engg. &Tech., 6(1) (2019) 713-716.