

“ACCESS MANGEMENT & SECURITY SYSTEM”

(Using Raspberry Pi B2)

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Abstract – Biometric authentication is one of the most popular and accurate technology. Nowadays, it is used in many real-time applications. However, recognizing fingerprints in Linux based embedded computers (raspberry pi) is still a very complex problem. This entire work is done on the Linux based embedded computer called raspberry pi, in which database creation and management using PostgreSQL, web page creation using PHP language, fingerprint reader access, authentication and recognition using python were entirely done on raspberry pi This paper discusses on the standardized authentication model which is capable of extracting the fingerprints of individual and store that in database. Then I use the final fingerprint to match with others in fingerprints present in the database (PostgreSQL) to show the capability of this model.

Keywords – Raspberry Pi, Finger Print Sensor, Keyboard, Mouse, Pre-install OS SD Card (8 or 16 Gb), Display (LED, LCD, Touch pads etc.), TTL Circuit, Connectors, Power supply (Portable Charger).

I. INTRODUCTION

Raspberry Pi is a credit card sized computer. It functions almost as a computer. It has multiple USB ports A/V Jack and Ethernet (RJ-45) jack which makes it work almost same to a computer. Raspberry Pi is equipped with Broadcom BCM 2835 Processor which has 54 GPIO pins out of which 40 are usable. The operating system installed in Raspberry Pi is Raspbian which is a Debian based Operating system optimized for Raspberry Pi hardware. An operating system is the set of basic programs and utilities that makes Raspberry Pi run. Further cost of the biometric can be reduced by the use of a low-cost IoT device, Raspberry Pi. The allure of the Raspberry Pi comes from a combination of the computer's small size and affordable price. Raspberry Pi, a credit-card sized low-cost Linux computer can be used to develop a biometric architecture as it has provision of connecting with cameras, fingerprint scanners etc. via USB ports. It has an Ethernet port for Internet connectivity or can be connected to a Wi-Fi hotspot via USB Wi-Fi adapters. In this paper, Raspberry Pi is used as a low-cost, wireless, remote enrolment node and the biometric authentication can be hosted on the cloud as a Software-as-aService.

The human body has the privilege of having features that are unique and exclusive to each individual. This exclusivity and unique characteristic has led to the field of biometrics and its application in ensuring security in various fields with various embedded controllers and embedded computers. Biometrics have gained popularity and has proved itself to be a reliable mode of ensuring privacy, maintaining security and identifying individuals. It has wide acceptance throughout the globe and now is being used at places like airports, hospitals, schools, colleges, corporate offices etc. Biometrics is the study of identifying a person by their physical traits that are inherent and unique to only the person concerned. Biometric identification includes fingerprint verification, palm geometry, face recognition, iris recognition, etc. The above-mentioned techniques work with different levels of functionality and accuracy. Accuracy and reliability are the two most important parameters when it comes to biometric applications and that too with advanced embedded computers. Fingerprint verification is one of the oldest known biometric techniques known but still is the most widely used because of its simplicity and good levels of accuracy. It's a well-known fact that every human being is born with a different pattern on the fingers and this feature is exploited to identify and differentiate between two different persons that is what the factor which helped to initiate the model.

II. BLOCK DIAGRAM

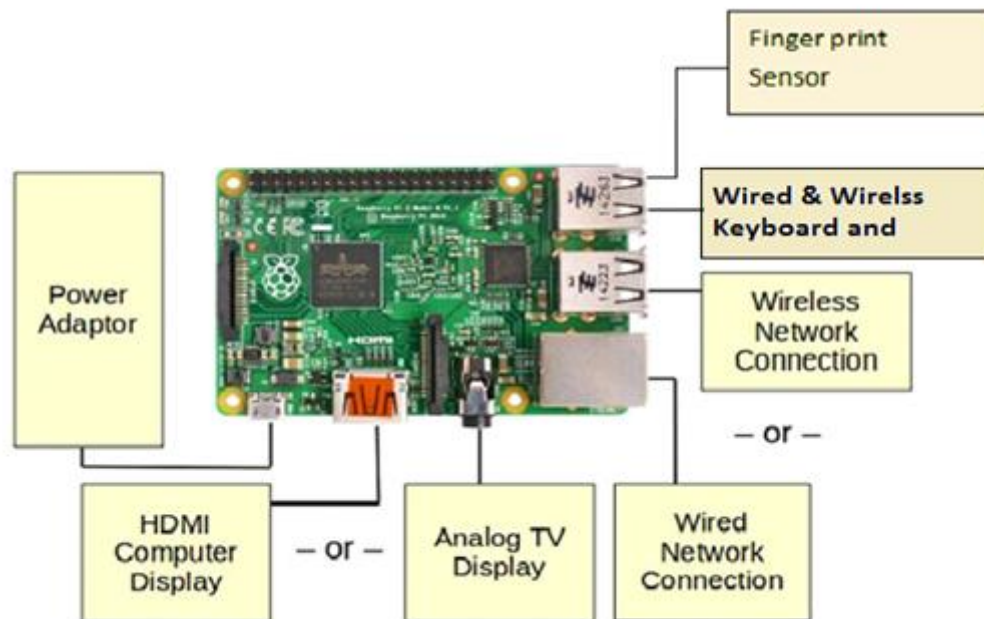


Fig: 1System Block Diagram

III. HARDWARE DESCRIPTION

- A. ETHERNET:** - Ethernet is family of computer Networking Technologies commonly used in local Area Networks (LAN's) & Metro Politan area network (MAN's). It was Commercially Introduced in 1980 and first standardized in 1983 as IEEE.

Ethernet Data transfer rates have been increased from the original 2.94 Megabits per second to the latest 100 gigabits per second

- B. R305 SENSOR:** - R305 Finger print module is a serial finger print scanner which can be directly connected to the Raspberry's COM PORT. R305 Finger print sensor can easily be connected to any controller via MAX 232 IC. This finger print scanner is capable of storing and comparing the finger print and accordingly giving the desired output.

Fingerprint processing includes two parts fingerprint enrolment and fingerprint matching (the matching can be 1:1 or 1: N) when enrolling user needs to enter the finger two times. The system will process two-time finger Images, generated a template of the finger based on processing results and store the template. When matching, user enters the finger through optical sensor and system will generate a template of the fingerprint library. For 1:1 matching system will compare the live finger with specific template designed in the modules for 1: N matching or searching, system will search the whole finger library for matching finger in both circumstances, system will return the matching result, success or failure.

- C. RASPBERRY PI:** - The Raspberry Pi is a series of credit card-sized single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and developing countries.

All models feature a Broadcom system on a chip, which includes an ARM compatible central processing unit (CPU) and an on-chip Graphics processing unit. CPU Speed ranges from 700 MHZ to 1.2 GHZ for the Pi 3 and on board memory range from 256 MB to 1 GB RAM. Secure Digital (SD) Cards are used to store the operating system and program memory in either the SDHC or Micro SDHC sizes. Most Boards have between one and four USB slots, HDMI (High-Definition multimedia interface) and composite Video output, and a 3.5 mm phone jack for audio. Lower level output is provided 8P8C Ethernet port and the Pi 3 has on Board Wi-Fi 802.11n and Bluetooth.

- D. DISPLAY:** - LED, LCD, TOUCHPADS Etc.

IV. SOFTWARE DESCRIPTION

A. How to Install NOOBS on Your Raspberry Pi

NOOBS are a system designed by the Raspberry Pi foundation for installing operating systems onto your Raspberry Pi's SD card. Not only are you able to install an operating system with a single click, but you can install it over a network or even install multiple operating systems on multiple partitions.

For example, if you ever wished you could install both Raspbian and Open ELEC, NOOBS not only make this possible, but easy to switch back and forth between the two.

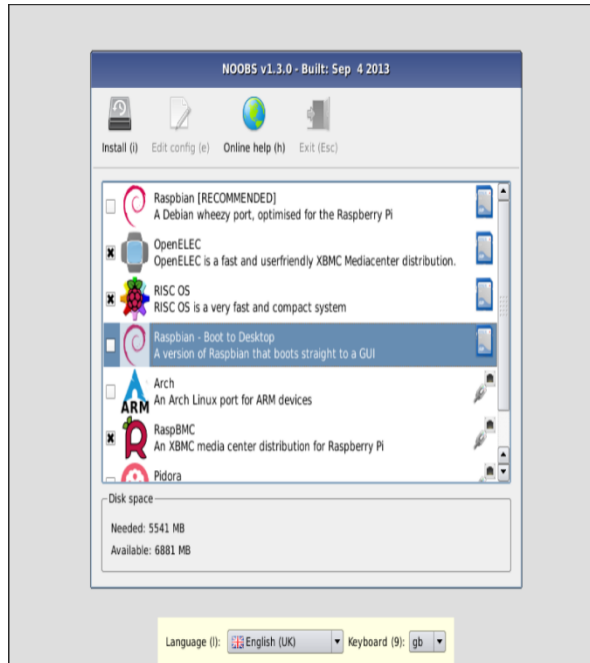


Fig: 2 Installation process step-1

Preinstalled NOOBS SD Cards

You can also purchase an SD/micro SD card with NOOBS preinstalled. This is more expensive than just loading NOOBS onto an SD card yourself, but is an option for convenience

INSTALLING AN OS

Before you plug your Raspberry Pi into the power cable, attach a USB keyboard and mouse so that you can navigate the NOOBS interface. Once you have the keyboard and mouse plugged in, you can turn on the power to your Raspberry Pi and you should be greeted with a screen similar to the following.

Boot Selection

Once you've installed one or more operating systems with NOOBS, rebooting your Raspberry Pi will result in one of two things happening automatically:

If you have a single OS installed, it will boot automatically

If you have more than one OS installed, a boot selector will be displayed Select And install Them.

B. FLOWCHART

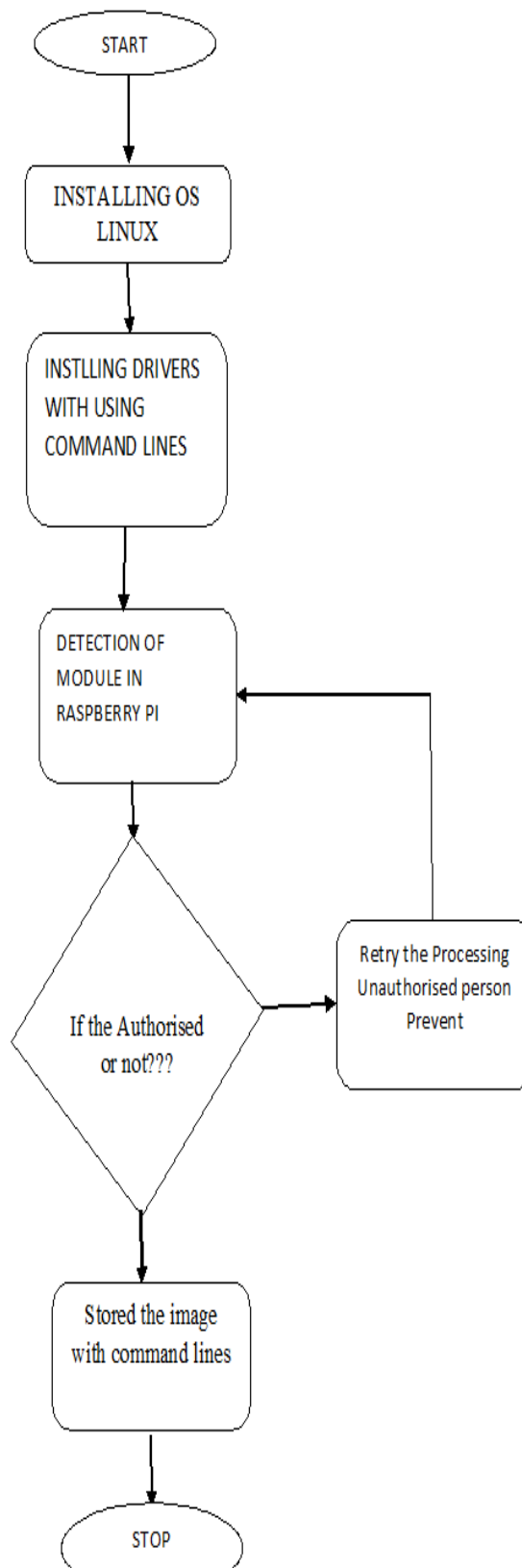


Fig: 3 Flow Diagram

V. RESULTS

Here Shown in Fig. 4 we have to install the Driver on Raspberry Pi with using command lines codes of Linux OS, We run the Programs of Enroll the Fingerprint and Search the fingerprint.

```

pi@raspberrypi: ~/python-codes/fingerprint-r305
File Edit Tabs Help
pi@raspberrypi:~$ pwd
/home/pi
pi@raspberrypi:~$ ls
Desktop  Downloads  Pictures  python-codes  python-R305  Videos
Documents Music      Public    python_games  Templates
pi@raspberrypi:~$ cd python-r305
bash: cd: python-r305: No such file or directory
pi@raspberrypi:~$ ls
Desktop  Downloads  Pictures  python-codes  python-R305  Videos
Documents Music      Public    python_games  Templates
pi@raspberrypi:~$ python-codes
bash: python-codes: command not found
pi@raspberrypi:~$ cd python-codes
pi@raspberrypi:~/python-codes$ ls
box2d  genetic_algorithm  html-multi-table.py  README.md
fingerprint-r305  google  parser
pi@raspberrypi:~/python-codes$ cd fingerprint-r305
pi@raspberrypi:~/python-codes/fingerprint-r305$ ls
enroll.py  README.md  search.py
pi@raspberrypi:~/python-codes/fingerprint-r305$ idle enroll.py

```

Fig: 4 Command-line Codes for Enroll & Search

Here fig.5 is Described the error occurs and we having Remove the Errors and finally run the program of Fingerprint enrolling and search step-by-step.

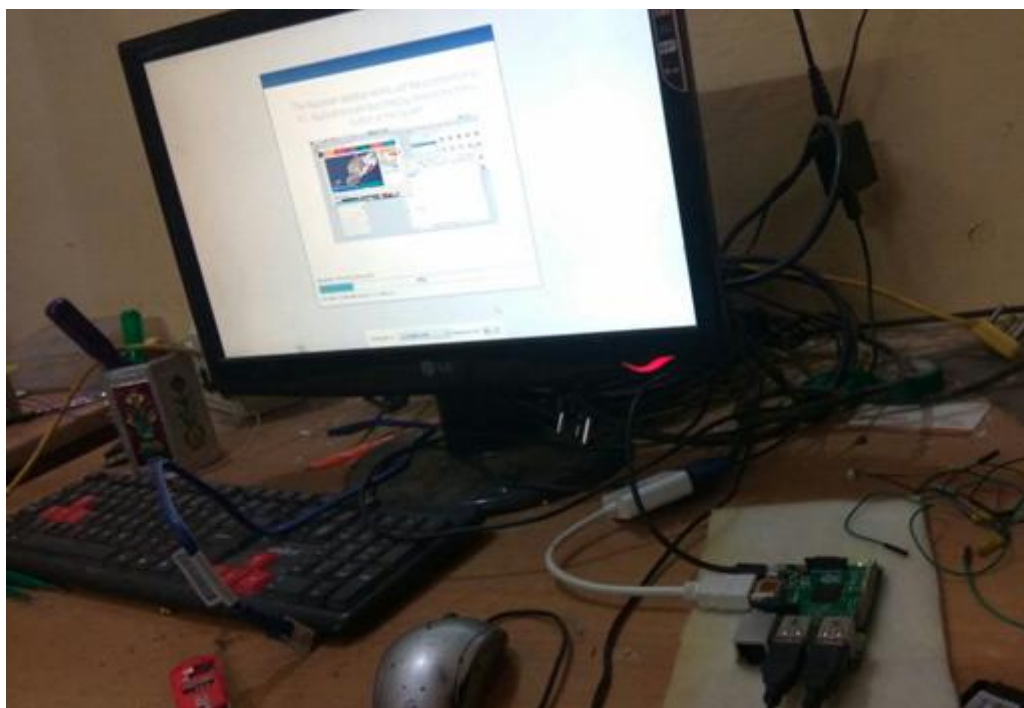


Fig: 5 connection And Result of Raspberry pi With Display

VI. CONCLUSION

This paper introduces the efficient and accurate method of the Access management & Security System Using Raspberry Pi B2. 11,500 user can use the system in one time. The special Security is also Provided in a product, Just like the password System in a python Command with help of Linux System. R305 Fingerprint Sensor Facility is also provided for the Security Purpose. So, that the product can manage 11,500 users and it also provide the security at one time.

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