Real Time Security Fingerprint Verification Using Raspberry Pi

K.L.Narasihimha Prasad, Assistant Professor,
Department Of ECE ,Priyadarshini Institute of Technology,Nellore,AP.
Email:prasad9866@gmail.com

Abstract-The main goal of this project is to design and implement a lockers security system based on Finger print technology. This can be organized in bank, offices and homes. In this system only the authenticate person recover the documents or money from the lockers in this security system fingerprint biometric security is used. In this system first person enroll use name and password and mobile number. If user name and password matches then Finger of person will detect and store with id. If the id gets matches.so biometric technology is more advantages than other system. This system can also create a log containing check in and checkout of each user along with basic information.

In this system, only the authorized person can access the valuable things like money, licenses and jewels from locker. Face Recognition is done by using active appearance model algorithm with Bayesian classifier, which is used to identify the persons and verify their identity with the Raspberry Pi processor. RFID (Radio-frequency identification) used together for accessing the locker securely.

I. INTRODUCTION

Now a days bank locker robberies are frequently happening; this means our locker is vulnerable to theft since it has no ultimate protection rather than a lock and key. In the automated world of living, new technologies are evolved day by day and there is a need of peculiar attention on rendering security to lockers. Nowadays larceners are becoming too smart in larceny and opening the lockers brilliantly. To protect our possessions from them is highly challenging task to public. It is a painstaking job for the bank administration to track an account of the locker activity as there is no dedicated employee for tracing the locker activity. To get rid of these issues, bank security system like this one is needed which does not require any special invigilators for 24x7 monitoring of lockers. Lockers are used to safeguard the money, Jewelry, Important documents and licenses.

Locker security system is most important for the safety of money, Jewelry, Important documents and licenses. Currently, most of the banks use two keys to open the lockers. One key is with the customer and another key is with the bank manager. In this case, the bank manager cannot open the locker without the acknowledgement of the customer because those two keys must be inserted at the same time while the opening of the locker. This system is having the following drawbacks. There is a possibility of losing the key which make the system to be insecure and duplication of keys may lead to unauthorized access of the locker. The above problem can be overcome by locker security system using raspberry pi proposed here.

II. PROPOSED SYSTEM

As today fingerprint based system provides high accuracy in terms of security. Also there is a high demand for integration of fingerprint matching techniques for making secure authentication systems. Therefore we have introduced this bank locker system which integrates fingerprint reader in it so as to provide a good level of security. The main goal of fingerprint bank locker with image capture project is to provide security with no manual security flaws. It is easy to use and requires no special training or equipment. This system needs fingerprint authentication while operating the bank locker. The functionality of system is that it will scan the fingerprint and if it matches with registered fingerprint the bank locker opens. The system uses raspberry pi for this purpose. This raspberry pi processes data sent by the fingerprint reader to check if user is registered, unregistered users are not allowed access. This operates the motors to open the locker door on encountering registered valid users. If the fingerprint does not match with register fingerprint of user then buzzer will be ON, the motor will be start. Then the locker door will be not open. So, the system is very beneficial for stopping the bank locker robbery by providing security.

Advantages:
• Fully automatic and very less power consumption
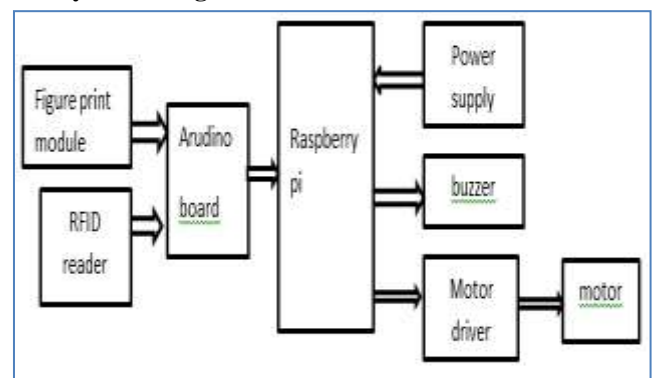• No man power, Registers and log book can be eliminated.

1.1 System Design

Fig. 1.Block diagram of bank security using raspberry pi

It consists

- Raspberry Pi
- Fingerprint Module
- Motor
- Relay Drive
- Buzzer
- Power Supply Unit
- Arduino board
- RFID reader

OS Used:

• Raspbian

Languages Used:

• Python

2.2   Organization Of Rest Of The Report

➢   In chapter 2, the introduction, overview, RAMS, specifications, Accessories of Raspberry pi are explained.

➢   In chapter 3, Features, operating principle, communication protocol, Modulo instruction system, fingerprint processing instructions of fingerprint module are explained.

➢   In chapter 4, Introduction of RFID, RFID reader, RFID frequencies, Uses are explained.

➢   In chapter 5, Introduction, Hardware, Software of Arduino board are explained.

➢   In chapter 6, Introduction, Concept of motor driver are explained.

➢   In chapter 7, Introduction, Design, Working principle of DC motor are explained.

➢   In chapter 8, Power supply is explained.

➢   In chapter 9, Software in this Ardunio coding, Raspberry pi coding are explained.

➢   In chapter 10, Conclusion and future scope of project are explained.

2.3 RASBERRY PI

      The Raspberry Pi is a series of small single-board computers developed in the United Kingdom by the Raspberry Pi Foundation to promote the teaching of basic computer science in schools and in developing countries. The original model became far more popular than anticipated, selling outside of its target market for uses such as robotics. Peripherals (including keyboards, mice and cases) are not included with the Raspberry Pi. Some accessories however have been included in several official and unofficial bundles. According to the Raspberry Pi Foundation, over 5 million Raspberry Pi have been sold before February 2015, making it the best-selling British computer. By 9 September 2016 they had sold 10 million.

      Several generations of Raspberry Pi-3 have been released. The first generation (Raspberry Pi 1 Model B) was released in February 2012. It was followed by a simpler and inexpensive model Model A. In 2014, the foundation released a board with an improved design in Raspberry Pi 1 Model B+. These boards are approximately credit card sized and represent the standard *mainline* form factor. Improved A+ and B+ models were released a year later. A "compute module" was released in April 2014 for embedded applications, and a Raspberry Pi Zero with smaller size and reduced input/output (I/O) and general-purpose input/output (GPIO) capabilities was released in November 2015 for US$5. The Raspberry Pi 3 which added more RAM was released in February 2015.

Fig. 2.Raspberry Pi Zero, a $5 model first introduced in 2015

Raspberry Pi 3 Model B released in February 2016 is bundled with on board Wi Fi, Bluetooth and USB Boot capabilities. As of January 2017, Raspberry Pi 3 Model B is the newest mainline Raspberry Pi. Raspberry Pi boards are priced between US$5–35. As of 28 February 2017, the Raspberry PI Zero was launched, which is identical to the Raspberry PI Zero, but has the Wi-Fi and Bluetooth functionality of the Raspberry PI 3 for US$10. All models feature a Broadcom system on a chip (SoC), which includes an ARM compatible central processing unit (CPU) and an on-chip graphics processing unit (GPU, a Video Core IV). 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 and composite video output, and a 3.5 mm phone jack for audio. Lower level output is provided by a number of GPIO pins which support common protocols like I²C. The B models have an 8P8C Ethernet port and the Pi 3 has on board Wi-Fi 802.11n and Bluetooth. The Foundation provides Raspbian, a Debian-based Linux distribution for download, as well as third party Ubuntu, Windows 10 IOT Core, RISC OS, and specialized media center distributions. It promotes Python and Scratch as the main programming language, with support for many other languages. The default firmware is closed source, while an unofficial open source is available.

2.4 Fingerprint Sensor (R305)

      The fingerprint sensor module with TTL UART interface for direct connections to microcontroller UART or to PC through MAX232 / USB-Serial adapter. The user can store the fingerprint data in the module and can configure it in 1:1 or 1: N mode for identifying the person. The FP module can directly interface with 3v3 or 5v Microcontroller. A level converter (like MAX232) is required for interfacing

with PC serial port. Optical biometric fingerprint reader with great features and can be embedded into a variety of end products, such as: access control, attendance, safety deposit box, car door locks.

• Integrated image collecting and algorithm chip together, All-in-one

• Fingerprint reader can conduct secondary development; can be embedded into a variety of end products

• Low power consumption, low cost, small size, excellent performance

• Professional optical technology, precise module manufacturing techniques

• Good image processing capabilities, can successfully capture image up to resolution 500 dpi

Fig. 3.Fingerprint module

2.5 RFID Reader

RFID systems can be classified by the type of tag and reader. A Passive Reader Active Tag (PRAT) system has a passive reader which only receives radio signals from active tags (battery operated, transmit only). The reception range of a PRAT system reader can be adjusted from 1–2,000 feet (0–600 m)[citation needed], allowing flexibility in applications such as asset protection and super. An Active Reader Passive Tag (ARPT) system has an active reader, which transmits interrogator signals and also receives authentication replies from passive tags. An Active Reader Active Tag (ARAT) system uses active tags awoken with an interrogator signal from the active reader. A variation of this system could also use a Battery-Assisted Passive (BAP) tag which acts like a passive tag but has a small battery to power the tag's return reporting signal. Fixed readers are set up to create a specific interrogation zone which can be tightly controlled. This allows a highly defined reading area for when tags go in and out of the interrogation zone. Mobile readers may be hand-held or mounted on carts or vehicles.

Fig. 4 RFID reader

2.6 Arduino microcontrollers

Arduino microcontrollers are pre-programmed with a boot loader that simplifies uploading of programs to the on-chip flash memory. The default boot loader of the Arduino UNO is the optiboot boot loader. Boards are loaded with program code via a serial connection to another computer. Some serial Arduino boards contain a level shifter circuit to convert between RS-232 logic levels and transistor–transistor logic (TTL) level signals.

Current Arduino boards are programmed via Universal Serial Bus (USB), implemented using USB-to-serial adapter chips such as the FTDI FT232. Some boards, such as later-model Uno boards, substitute the FTDI chip with a separate AVR chip containing USB-to-serial firmware, which is reprogrammable via its own ICSP header. Other variants, such as the Arduino Mini and the unofficial Board arduino, use a detachable USB-to-serial adapter board or cable, Bluetooth or other methods, when used with traditional microcontroller tools instead of the Arduino IDE, standard AVR in-system programming (ISP) programming is used.

Fig. 5. Arduino board

III.PYTHON CODING

Python is a widely used high-level, general-purpose, interpreted, dynamic programming language. Its design philosophy emphasizes code readability, and its syntax allows programmers to express concepts in fewer lines of code than would be possible in languages such as C++ or Java. The language provides constructs intended to enable clear programs on both a small and large scale. Python supports multiple programming paradigms, including object-oriented, imperative and functional programming or procedural styles. It features a dynamic type system and automatic memory management and has a large and comprehensive standard library. Python interpreters are available for installation on many operating systems, allowing Python code execution on a wide variety of systems. Using third-party tools, such as Py2exe or Pyinstaller, Python code can be packaged into stand-alone

executable programs for some of the most popular operating systems, allowing the distribution of Python-based software for use on those environments without requiring the installation of a Python interpreter. CPython, the reference implementation of Python, is free and open-source software and has a community-based development model, as do nearly all of its alternative implementations. CPython is managed by the non-profit Python Software Foundation.

CONCLUSIONS

Bank locker room security is an emerging need throughout the world. The real life model of the prototype can be designed with minimum designing cost and with relatively low operational cost for bank locker rooms where high degree of security is provided. In near future more number of security levels can be added for monitoring as well as control. The security can be used in other highly restricted areas also like private offices, laboratories etc. The ongoing research in the field of IoT and its implementation in full or partial manner will definitely improve the quality of life of human civilization Today IOT is being implemented everywhere which is of human concern like Smart city, smart environment, security and emergencies, smart business process, smart agriculture, domestic and home automation and healthcare. In the near future the system will be augmented with the parameter monitoring security subsystem. This will supplement to get information about home monitoring, fingerprint protection, etc. We can give alarm to nearby resident and the owner of the house in case of theft. This system can be placed in bank lockers, questionnaire room.

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