Secure Identity Attendance System Using Raspberry Pi – A Review

V.Kaviyarasi, M.Padmapriya

M.E. Scholar, Dept. of Embedded System Technologies, Gnanamani College of Technology, Pachal, Namakkal, India

Assistant Professor, Dept. of EEE, Gnanamani College of Technology, Pachal, Namakkal, India

ABSTRACT: Biometric authentication is one of the most popular and accurate technology. Now days, it is used in many real time applications. However, recognizing finger prints 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, fingerprint reader access, authentication and recognition using python were entirely done on raspberry pi. In this rsearch, Raspberry Pi is utilized for building an economic biometric system. Raspberry Pi (RPi) is a compact micro-computer with boundless abilities similar to PC. In this study, Rpi was utilized as remote enrollment node. Cloud computing and Raspberry Pi have given a new dimension to research into Internet-of-Things (IoT) applications. By utilizing biometric technology, a novel system of IoT based biometrics was proposed. The encrypted biometric information is stored on the cloud and the authentication is created through Biometric service as host on cloud.

I. INTRODUCTION

Attendance is a concept that exists in different places like institutions, organizations, hospitals, etc. during the start and end of the day to mark a person's presence. Since the past, the traditional way of taking attendance in a class includes a pen, attendance book or registers and a person. Thus the drawbacks arise as it consumes time, needs manual work and the most important, information or the attendance can be manipulated. Also, there are chances of students not responding to their attendance and later claiming for the attendance. The new procedure of taking attendance using fingerprint is easier and therefore overcomes all the above mentioned drawbacks [1-2]. This paper presents a fingerprint based biometric system that records the attendance automatically. This system consists of a Raspberry pi- the heart of the project and fingerprint sensor which is used to detect the person's identification. For example, in educational institutions, the student needs to place their finger on the fingerprint sensor to obtain their attendance. The fingerprint captured is recorded in a flash memory and then each time it is checked whether the obtained fingerprint matches with the record in the flash memory after which the student gets the attendance [3-4].

By making use of this system, we overcome the issues such as proxy so no student can give attendance for their friends who are absent. The software platform used is Raspberry-pi (Linux OS), Python programming language. The attendance management system can be improved by adding the features that indicate if the employee or student is late. Some of the future enhancements for this are to extend the current flash memory to store the complete details of the student. The system can be enhanced to track the arrival and exit time of the student or employee for additional monitoring [5]. Further cost of the biometric can be reduced by the use of a low-cost IoT device, Raspberry Pi [7]. 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 Software-as-a- Service. The blend of Raspberry Pi and the cloud has led to the era of an emerging trend. The Internet of Things allows objects to be sensed and controlled remotely across existing network infrastructure, creating opportunities for more direct integration between the physical world and computer-based systems, and causing in improved proficiency, precision

and economic assistance. The advantages of incorporating IoT are low-cost, low space, low power and portability of the entire system of implementation. The Internet of Things will redefine identity management using biometrics to unlock bank apps, email accounts but also cars, homes and personal health databases. IoT will drive device and user relationship requirements in 20 percent of new identity and access management (IAM) implementations by year-end 2016, according to Gartner [8]. Gartner said, "Traditional authentication and authorization for user identities will continue to include devices and services, but will also incorporate expanded machine-tomachine (M2M) communications requirements into expanding digital business moments".

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 has 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 include 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. LITERATURE SURVEY

Sonam Shukla, Pradeep Mishra suggested increasing the Accuracy of an Existing Fingerprint Recognition System Using Adaptive Technique, in this approach developer mainly focusing on Integrated Automated Fingerprint Identification Service (IAFIS) of the most famous police agencies. [1] They extracted fingerprint pattern is characterized by a set of ridgelines that often flow in parallel, but intersect and terminate at some points. The uniqueness of a fingerprint is determined by the local ridge characteristics and their relationships. Main drawback of this model is this approach is not so apt for real time applications but the accuracy of system is highly adaptable. Most automatic systems for fingerprint comparison are based on minutiae matching. Le Hoang Thai and Ha Nhat Tam in 2010 suggested Fingerprint recognition using standardized fingerprint model, now a days, fingerprint recognition is one of the most Important biometric technologies based on fingerprint distinctiveness,[2] in this approach they focused on improving the quality of fingerprint images. In fingerprint recognition process, the important step which affects on system accuracy is matching between template and query fingerprint This approach functions based on the uniqueness of each person and it integrating the biometric device to transmit the information obtained in this approach they are using fingerprint extraction and matching algorithm and they maintaining the database to authenticate the person who approaching for the access through the On line web page created in the local server.

One of the main aims of this research is to empower biometrics as an authentication method for security purposes like authenticating for cloud services, unlocking a door, accessing a particular service etc. taking into account the privacy and security challenges that face biometrics when used for remote applications. The security and usability problems [9] of password-based authentication, which is the most commonly used authentication method for secure access, have been reviewed. Many theoretical studies in the literatures show that password-based authentication suffers from a wide-range of attacks including brute force, dictionary, sniffing, shoulder surfing, phishing, and key-logger attacks. In addition, human elements add additional security weaknesses to the password-based authentication. For example, users are likely to write down their passwords, use the same password across-multiple systems, use the same password over a long period of time, and share their passwords with their co-workers, family members, or friends.

Sasse et al. [10] experimentally investigate the main causes of password problems such as memorability issues and technical/organizational requirements (e.g., forced change of password). This study concludes that Human Computer Interaction (HCI) techniques can be used to address password problems. Similarly, Yan et al. [11] empirically study passwords memorability and security. In [12] among the biometrics of face, finger, hand, voice, eye, DNA and signature, the face biometric ranks first in the compatibility evaluation of a machine readable travel document (MRTD) system on the basis of six criteria: enrolment, renewal, machine assisted identity verification requirements, redundancy, public perception, and storage requirements and performance. In [13] authors projected an image capturing technique in an embedded system based on Raspberry Pi boards. Most of the recognition systems are centered on a PC, the portability of which is limited by its weight, size and the high power consumption.

 In [14], implementation of feature extraction of fingerprint and footprint in Raspberry pi has been conversed. Numerous image processing techniques are implemented on RPi using open source OpenCV library into a Linux platform. A cloudbased biometric architecture is proposed [15] on Raspberry Pi which has aid in developing a low-cost, scalable and portable biometric system. Peter Peer and Jernej Bule [6] have proposed a face recognition system on cloud, This paper tries to elaborate on the issues such as the most common challenges and obstacles encountered, when moving the technology to a cloud platform, standards and recommendations pertaining to both cloud-based services as well as biometrics, and existing solutions. In [16] authors

Dr. Vinayak Bharadi and Mr. Godson D'silva has proposed an architecture for implementing online signature recognition system on a public cloud like Windows Azure. The literature reveals some works that leverage cloud data storage for storing biometric data. Griaule Biometrics [17] introduces a biometric information management system in the cloud, which leverages cloud storage to store biometric data on the cloud. Griaule's biometric information management system protects biometric data using AES encryption while stored and Secure Socket Layer while in transfer. Raspberry Pi's performances [18] are compared with some current IoT platforms on a general level by computing power, size and overall costs of the solutions.

Based on performed scrutiny, it can be stated that Udoo has the best performances among considered IoT hardware platforms, but at the same time its price is quite high. On the other side the detail analyses of Raspberry Pi have shown that as ultra-cheap-yet-serviceable computer board, with support for a great number of input and output peripherals, and network communication is the perfect platform for interfacing with many different devices and using in wide range of applications. Connecting it with WiFi and providing access to the Internet it is probable to set it up for a remote communication, what the Raspberry Pi makes very suitable for applications in IoT concept. Thus, the benefit of Raspberry Pi lies in its flexibility and unending possibility of its usage aiding the end-users to program it according their needs and budgets [19-22].

III. BLOCK DIAGRAM

Raspberry pi is a small size computer which can be used with more applications. The processor at the heart of the Raspberry Pi system is a Broadcom BCM2835 system-on-chip (SoC) multimedia processor. This means that the vast majority of the system's components, including its central and graphics processing units along with the audio and communications hardware, are built onto that single component hidden beneath the 256 MB memory chip at the centre of the board. The ARM-based BCM2835 is the secret of how the Raspberry Pi is able to operate on just the 5V 1A power supply provided by the onboard micro-USB port. It's also the reason why you won't find any heat-sinks on the device: the chip's low power draw directly translates into very little waste heat, even during complicated processing tasks.
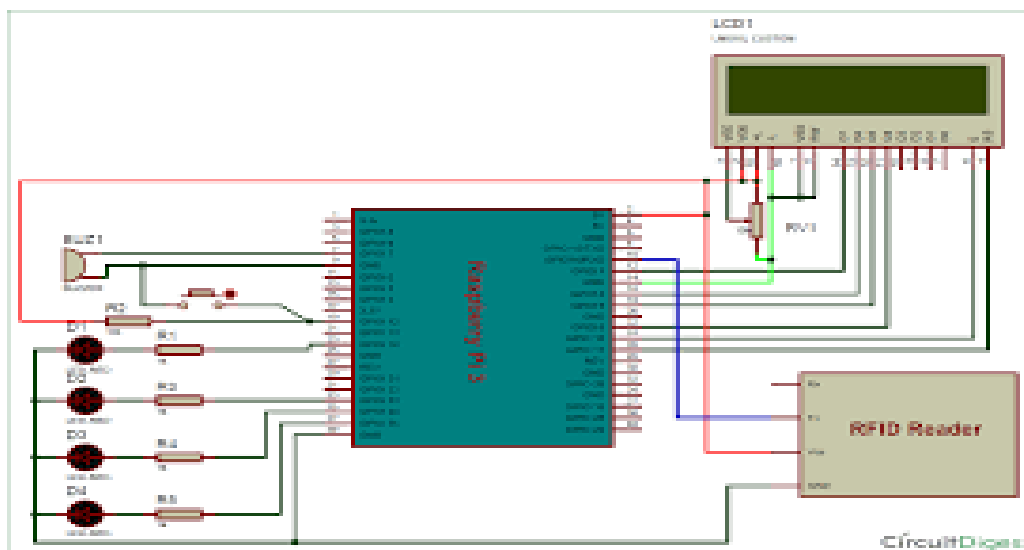
FIG 1: CIRCUIT DESIGN

If you're using the Raspberry Pi's HDMI port, audio is simple: when properly configured, the HDMI port carries both the video signal and a digital audio signal. This means that you can connect a single cable to your display device to enjoy both sound and pictures.

To prepare a blank SD card for use with the Raspberry Pi, you'll need to flash an operating system onto the card. While this is slightly more complicated than simply dragging and dropping files onto the card, it shouldn't take more than a few minutes to complete.

To prepare a blank SD card for use with the Raspberry Pi, you'll need to flash an operating system onto the card. While this is slightly more complicated than simply dragging and dropping files onto the card, it shouldn't take more than a few minutes to complete. Although no current models of the Raspberry Pi include Wi-Fi networking hardware onboard, it's possible to add wireless Connectivity with a simple USB Wi-Fi adapter. However, you will need to configure the adapter before you can use it to get your Pi online.

Here the raspberry pi is connected with the Raspberry pi camera, personal computer and GSM. The multi tasking raspberry pi use with an MATLAB platform for the image processing to find the attendance system. So that the final result of the attendance will be sent to the particular mail id and to a authorized person mobile no. The SD card is used to store the database of the class students. Similar images of same student of nearly ten will be stored in the database. In order to get exact image as a output. This will be done for every student in the class.

IV. CONCLUSION

This paper introduces the efficient and accurate method of attendance in the classroom environment that can replace the old manual method. This method is secure enough, reliable and available for installing the system in the classroom. It can be constructed using a camera and computer. There is a need to use some techniques that can recognized the faces in veil to improve the system performance.

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