

“PROPOSED AUTOMATED STUDENTS ATTENDANCE MANAGEMENT SYSTEM USING RASPBERRY PI AND NFC”

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ABSTRACT: As we know the tradition approach of attendance, takes quite long to take attendance and pronounce each and everyone's name properly of a bulk of students. And in the changing world we must have to update our attendance system in a smarter way with speed and efficiency to reduce the time required to take attendance in our traditional way. Here, we are presenting an automated attendance management system using Raspberry Pi and NFC which is a smarter and more efficient way .with the help of such system the attendance management system in school/colleges/universities and hence reducing the time required for attendance in class. This system is applicable to not only students but also teachers, employees, workers.

Keywords: Automated Attendance, Raspberry Pi, Facial Recognition, NFC.

1. INTRODUCTION

Attendance is the necessary think in today's days to maintain in the discipline in school and colleges. Automated Students Attendance Management system using Raspberry-Pi and NFC is a modern easy and cheap way to take attendance and provide the result accurately. For making this amazing and modern Attendance management system we required NFC tag (Raspberry Pi), Student id_tag (NFC tag) and RFID .NFC is the technology which is been with us since a couple of years back and carries a lot of advantages .The NFC which is use in today's each phone is basically based on wireless communication interface and also the NFC tags are available which is used for storing and identify particular identity , RFID (Radio Frequency Identifier) is based on the magnetic field induction which is used for communication between two electronic devices here RFID is used to identify a particular NFC tag. A Raspberry Pi is a low cost, business card size computer with his ARM processor, able to play 1080p video with Videocore 4 GPU, 512MB of RAM , a SDcard slot, USB slots with a 10/100 Ethernet port. This attendance system can be used by school, college, offices, university, by using NFC in Linux OS based Raspberry Pi device. The student just has to tab his NFC tag to RFID reader which is placed along with the Raspberry Pi and after identifying the Face recognition is done. After this, the system will generate the report of the student and calculate the number of students attends that class and this also avoid the problem of illegal marking of attendance. In this way the system works. The Hardware requirements are Raspberry Pi, NFC tag, RFID reader, camera module. The overall cost of this system will not be more than a 5,000 INR. The total execution is done by hardware and software of this system. The main advantage of this type of this system is this system totally avoid the illegal attendance problem, it saves a lot of time that is waste in the lecture and hence a smarter way in the smarter world full of technologies.

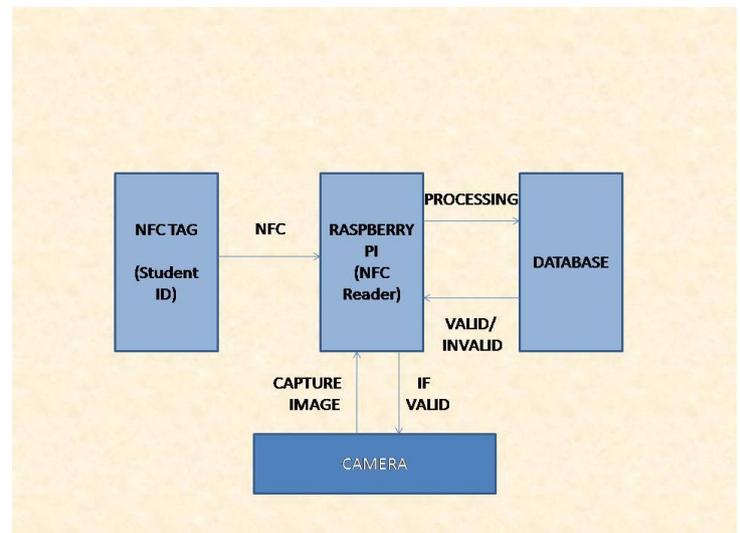


Figure 1: The Sequence Diagram

2. RELATED WORK

As we know most of the university and college's attendance of students is important for checking and managing student attendance. Some colleges use paper sheet for student attendance and after that fill all this information manually on college server. A designed proposed by "Marianne Kinnula and the team", in 2010 was based on NFC tags of students, NFC reader. Students need to tap their NFC cards to their teacher's Mobile phone which would be acting as an NFC reader. As soon as the tag comes in contact with that reader the attendance would be marked at the back-end. This leads to the waste of time in their lecture time. Nearly 5-10 min is being wasted in a lecture of an hour [2]. A system proposed in 2012 by "Mohammad Umair Yaquub" in which students have to tap their NFC enable phone with teacher phone before the lecture and after this the lecture teacher upload attendance on the server [3]. "Unnati A. Patel" designed a system in 2013 in which she uses RFID technology for the attendance of students in classroom. [4] In 2014, "Dhiraj.R.Wani, Tushar.J.Khubani, and their guide Prof.Naresh Thoutam" designed a system in which automated attendance management system is done with

'Raspberry Pi' and 'NFC' with facial recognition. If NFC tag and facial recognition result is accessed then the attendance is reported otherwise not [5]. A paper proposed by "Jomon Joseph, K.P.Zacharia" in which they use face recognition for the validation purpose especially in case of the students attendance. Today's attendance system is monotonic and time consuming. Face Recognition is used to observe the facing characteristics of a person to identify that person. It stores the all recognized data into the database of the system and is very useful and it reduces the time and also it detects the face of a person from 2 foot or more away from the camera position. [6]. In 2014, Ajinkya Patil, Mrudang Shukla proposed a paper in which they implemented a classroom attendance management system based on face recognition by image processing. Face detection differentiates between faces from non-faces like objects and is therefore essential for accurate attendance. In this the face of student can be detected individually or with group of students [7]. In December 2013, "Vishal more", "Surbhi Nayak" proposed an attendance monitoring system that replaces the system which is proposed in 2010 by "Mari Ervasti", "Marianne Kinnula", "Minna Isomursu" by making some advanced changes in the time span. All the data is stored in the database and the final report can be generated [8]. Few years back an Attendance monitoring system is proposed by "Jakub Dvorak" in which he used Raspberry Pi and NFC. User initially has to perform some actions regarding students. Then after that he is asked to tap the tag on the NFC reader. All this is stored in the database MySQL, which can be retrieved later [9]. "G.Senthilkumar, K.Gopalakrishnan, and V. Sathish Kumar" they designed an embedded image capturing system using the latest Raspberry Pi system with the camera module in the year 2014. In this proposed an image capturing technique in an embedded system supported Raspberry Pi board [10].

3. METHODOLOGY

3.1 Components

3.1.1 NFC/RFID: Near Field Communication which is also popular as NFC is a short range wireless technology and it is the subset of RFID family. Near Field Communication is one of the most significant technologies in the field of personal communication. NFC is based on High frequency- Radio Frequency Identification (HF-RFID) technology that uses magnetic field induction to do communication between electronic devices in its active area. Both operate at 13.56 MHz. Operating distance of NFC technology is typically 10 cm and data exchange rate is typically 424 kb/s.

3.1.2 Raspberry Pi: The Raspberry Pi is the low cost credit card size computer with a RAM of 512MB and a memory card slot, memory card is used for booting purpose and Linux OS is used. Slots of USB and Ethernet is provided with a 40pin GPIO used to interface with RFID reader and a camera module can be

attached to Raspberry Pi for face recognition. It also contains a memory card slot and standard mobile charger slot.



Figure 2: The Raspberry Pi

3.1.3 Open CV: The Open Source Computer Vision which is popular as Open CV, It is the transmission of data in the form of still or video camera to obtain the desired goals. It is used for Motion analysis and object tracking, image analysis, object recognition, structural analysis. There are different algorithms such as fisher algorithm, ADABOOST these are the algorithms to which we are going to work. It has the libraries such as IPL (Image Processing Libraries). In open CV we can perform Framework for working with different databases like Action recognition, Gesture recognition, Object recognition and text recognition.

3.2 Working

The method to implement this type of system is simple. All we have to do is to make the hardware implementation correctly and the NFC tag is provided to every student which is a unique id for every single student. So whenever the user taps his NFC tag on the RFID reader, due to the magnetic field induction between RFID and that NFC tag the tag is read and if the card belongs to that particular department then the validation is successful or else that card is not validated or not registered. If the card validation is successful then the face recognition of that user is done with camera module which is connected to Raspberry Pi. If the NFC tag recognition is valid and the face recognition is valid then attendance is recorded. The admin can change student's information, generate reports of particular period and can change the database if required. If the result is invalid then the illegal use of NFC tag is being made or user must register properly. The NFC tag and Face recognition data is already stored in the database and the Raspberry Pi is connected to the server to access that database. The most important advantage of this type of system is cost effectiveness and in this way the automated attendance management system replaces the manual and traditional approach of attendance and maintaining the record of attendance.

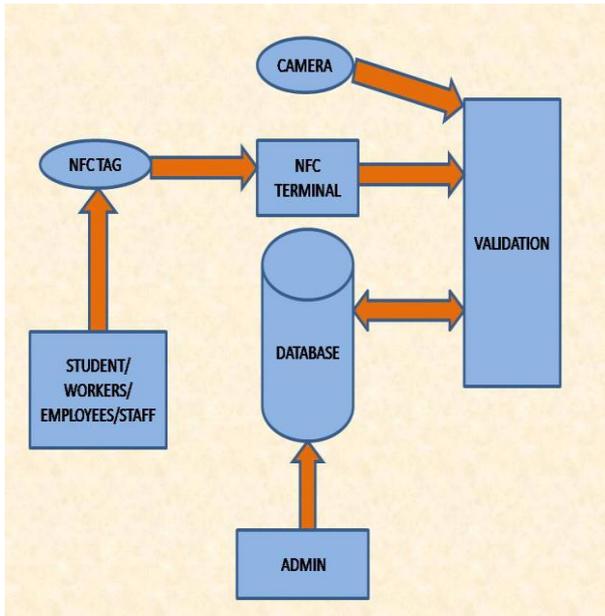


Figure 3: The actual implementation

4. FUTURE SCOPE

As time is the most valuable thing, by implementing this technique we can save a valuable time which is being wasted until now in a lecture of an hour nearly 5-10 min is wasted. This system is quite cost effective and even provides a smarter way for taking attendance. The main advantage is it saves time, avoid illegal attendance system. This system may be used for the security purpose means only the authorized or registered person can access some particular high security area by their tag and face authorization is valid or not can be decided. So we must have to replace our tradition way by a smarter and automated way in the smarter world.

5. CONCLUSION

Attendance management system using Raspberry Pi and NFC is automated and monitored without any wastage of time i.e. the time used for roll calls and pronouncing each student's name properly can be eliminated... It provides implementation of new technology in schools, colleges, etc where attendance is necessary to achieve an overall attendance of an individual student automatically without any calculations from attendance sheet. It is the most highly secured authentication system because of NFC tag and facial recognition. No illegal attendance by other individuals because of this face authorization. Hence, this system must be implemented in each field or department where attendance plays an important role. This is latest and the smartest technology in the world of automation.

6. REFERENCES

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