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Attendance Management System through Fingerprint

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Abstract: *This work is done to find out the importance's for attendance management system for students or employees within the organization through bio-metric (fingerprint). This research will help any institutions/organizations to signpost attendance of any student/employee in time with data information through finger impression will be a doorway taken as a signature. The challenging part of the system is how to manage database and the database architecture and its business logic.*

Keywords: *Biometric technology, fingerprint, attendance, students, staff member, institute.*

I. AIM

In the growing world of technology and people. Many organization, institutions, and companies are wasting a lot of time and effort in marking the attendance of every individual on a daily bases. This research will tell them the suitable, accessible, reliable, efficient, and affordable attendance system which will cut the effort and cost for them. The most useful and reliable technology for large no. of employee's or students is the biometric technology that uses the ballistic fingerprinting and verification of an individual by analyzing the human finger characteristics that are widely used in various aspects of life for many purposes, most significantly in the study the issue of staff attendance. Conflict in the countless advantages of the fingerprint system and its influence to diverse work sectors across the world, almost all biometric technology users are facing an issue of physical process to find accurate biometric technology which will be more cost-effective in solving attendance and proxy problems in the environment of organization, institution or company. In this research paper, a survey was organized in engineering college name ABESIT, Ghaziabad in the region of Ghaziabad, in order to determine the unique biometric which can be used to better the current manual staff attendance system and student attendance system, currently which is affecting the productivity of the institution. This study was conducted by using duodecimal method for designing questionnaire for the collection of data instrument about different biometric technologies. This survey which involved about 50 students and staff member from the institute based on stratified random sampling technique. At the end of the survey, it was found that fingerprint biometric system is suitable for both staff and students in the institute for marking their attendance on daily biases. It therefore draws the attention on recommending biometric technology for improving productivity and transparency of business process within an organization. The result shows the need of improving the security and technology in the field of biometrics.

A. Research Objective

The primary objective of doing this research is to fault-finding different variety of biometric technology system and study how they were used in past and how can we improve the system, make it useful at present time, particularly the issue of attendance marking in various organizations. As well, the study brings out the assorted factors which are to be considered while implementing a biometric system for a specific purpose.

B. Horizon of the Study

This nature study encloses the choice of answering the question which biometric technology system can be used for taking attendance in the institution situated in Vijay Nagar, Ghaziabad, Uttar Pradesh. In this research, we have included six biometric technologies as a selection of various options like the fingerprint, voice recognition, face recognition, hand geometry, iris recognition and signature verification. The students and staff members, who entered in the self-administer questionnaire, were using pen-paper way of marking and recording students and staff attendance. Moreover, this study has used descriptive research method which later on used a surveying instrument method by asking questions. In the meantime a sampling plan was designed, which was used to select random participants at a time.

II. RESEARCH METHODOLOGY

A. Design

In this the researchers designs/plans about what way should be followed to find an accurate answers to the questions raised while researching. This plan includes clear-thinking about the objective derivative from research questionnaire, nail down the sources from

which the data was gathered, it also identify the constraints that would arises, such as accession to time, location, money and data also discussing ethical issues. This research study engaged the use of quantitative research method which involves the analysis and processes of data before it can be meaningful. Nevertheless, researchers are more facilitative by quantitative techniques such as charts, graph, and statistics which allow them to obtain data and turn them into information.

B. Research Questions

Numerous organizations have to worry about the execution of geometrical technology systems have to figure out the issues of students as well as employee's attendance. In many of the cases, geometrical system desirable for the organization did not served its purpose efficiently and effectively because geometrical technology distinctive such as duplicability, cost-effectiveness, and the call for technology content are not taking into consideration.

Therefore, the favourable research questions well advised:

- 1) Which type of geometrical technology system are they familiar with?
- 2) Does your organization require to follow up chromatogram of attendance of staffs?
- 3) Do you like your organization should use a geometrical attendance system to potentiate employee attendance?
- 4) What version of geometrical technology will you like your organization should use?

C. Sample Population and Size

The amount of data which is needed to be collected can be done by capturing data from a small group instead of an entire population, this can be done by using sampling techniques that capitalize a range of methods to achieve this. The representative group of this research refers to students in the institute. The total number of students are about 1500, plus 200 staff, 6 department's heads, 4 management heads and 12 sub-heads in each department. This study will propose a geometrical technology for all the students, staff and heads in the institution. Due to such large number of individuals sampling the entire group will affect the finishing of this research in time. Therefore, a small group which have been targeted for completion of this research are shown in table 1.

Table 1: Sample Group

Position	Gender		Total
	Male	Female	
Head	4	2	6
Students	28	16	44
Total	32	18	50

According to [16], there are many distinct challenge where sampling is needful, such as when it is not possible for the researcher to survey a large number of individuals; when research have their time constraints while surveying the whole population and the cost required to survey the whole population is not fixed/gathered. Then researchers target a sample population for their study in the various departments of the organization. This sample survey consists of total 6 head of departments, and 44 students in the institute.

D. Problem

Some problems which are identified while using biometric identification or fingerprint identification system. We can get sick by coming in contact with a fingerprint system (biometrics).

- 1) Dead body parts or stolen body parts can be used for identification.
- 2) Biology says twins have same biometric traits like identical fingerprints, irises.... Due to the same clones.
- 3) Features of biometrics system can be easily retrace from templates.
- 4) Mapmaking a fake or duplicate finger is easy.

The powerlessness or helplessness of biometric identification system to enrol children and small Asian women cannot be neglected. But as we are making this system for a particular group of organizations like engineering institution, company this point can be neglected.

III. PROJECT SPECIFICATION

A. Project Description

The aim of this project is set a system which will take daily attendance of students and staff through the fingerprint. This project utilizes and design software architecture for fingerprint.

The system body should be able to compare a scanned fingerprint image with the once stored in the database of known fingerprint images and extract key features from the scanned fingerprint. Through this project we will provide a system which will scan the fingerprints of students and staff with working fingerprint sensor and drivers for windows. Our prospect had been already fulfilled by most of the algorithm developed earlier for window PC.

B. Project Task

This project is mainly divided into format of generalization tasks correspond a series towards the end goal of working fingerprint analysis system.

- 1) We had re-examine techniques for analysing and methods of patten recognition on sets of fingerprints. Several of the important likely techniques/algorithm's had been enforced and first testing carried on the test set of fingerprint images gathered.
- 2) For the main system a biometric attendance system computer code architecture was designed; the chief system needed were determined and a technique of implementing full system was standardized; operational architecture and respective of the functional subsystems were enforced.
- 3) We re-examined the algorithms which were implemented and incorporated with the fingerprint sensing element, and real-time assumption and technical analysis of a fingerprint were demonstrated; refinement in processing speed and implemented.
- 4) A refinement in the analysis of acquired image was progress through image refinement; uniting multiple non-inheritable images to bush an increased hybrid images or more sophisticated mathematical approaches.
- 5) A reform in pattern matching may be attained through assorted pattern recognition approaches; several approaches should be planned and develop an assessment methodology which modify a comparison of reinforced recognition and a decrease in false positives and negatives.

While using techniques of point 4 and point 5 with real-time assumption of fingerprint will surely add remarkable positive stimulus value.

C. Project Planning

Efficient and effective management of a software project count on good and exhaustive programming and preparation of the project. Solutions were defined for the problems raised during the project process. Phases were drawn up for the project. The first phase develops as the project progress and better information.

The preparation phase starts with a classification of the constraints like overall budget, required delivery date, time which will affect the project. This convey out in concurrence with an assessment of project factors such as its size, structure and arrangement of its functions. The development milepost and production are then defined.

The computation then enters a loop. A plan of action for the project is drawn up and the representation defined in the schedule are introduced or acknowledged the authorization to continue by the institute heads.

Later instant usually about 3-4 weeks, work flow was examined and reviewed so that all the differences and disagreement could be noted.

Because the first calculations of project guideline are provisional, the proposed plan needs to be modifies time to time. A detailed structure if biometric attendance system software development plan is described below.

D. Proposed Work

The intention for developing biometric attendance management system is to change the way of taking attendance from pen-paper to fully computerized. The second purpose for processing this software is to automatically generate the report at the end of the day or when the request is made. This software is user friendly because storing and retrieval of data is speedy and preserved expeditiously. In the proposed system a graphical interface will be provided, which lets the user interact with the system very fast and easily.

E. Flow of the System

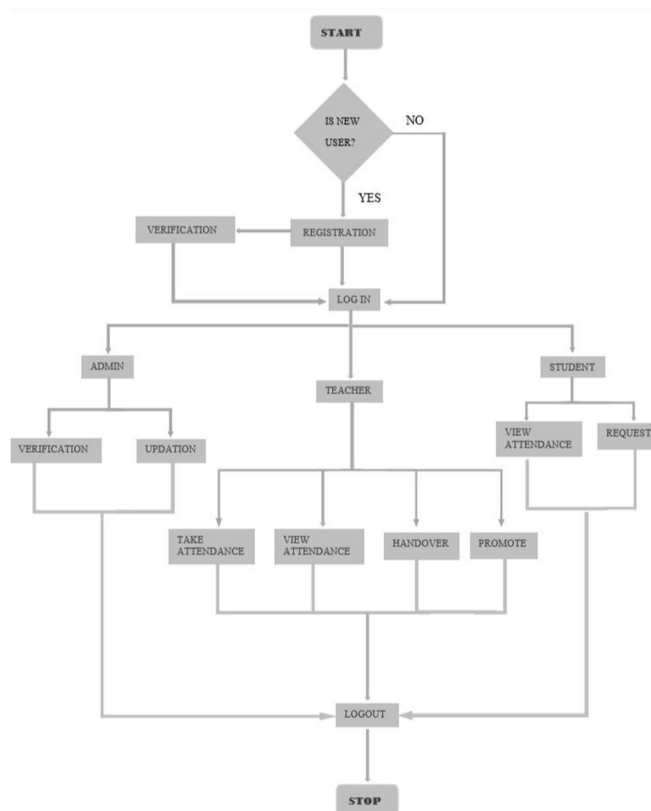


Fig. 3.1: Flow of Student Attendance Management System.

There is separate login section for each admin, teachers, and students. To use the system first of all registration of teachers and students has to be done. After login, admin can do verification of teacher and updating of timetables. The tasks of teachers are to take and view attendance, handover lectures and promote students. The tasks of students are view attendance and make the request to the teacher.

F. Functional Modules

The system is divided into three modules Admin module, Teacher module, and Student module.

- 1) Admin Module: In this module, the admin will first of all login and then he will be able to perform tasks that are verification of the teachers who want to register themselves also he can do regular updating of timetable.
- 2) Teacher Module: This module includes registration of teachers. After registration and verification by the admin, a teacher will be able to log-in and perform operations like taking and viewing attendance, handover the lectures to another teacher and promote students from one semester to another.
- 3) Student Module: This module includes registration of students which is verified by their roll numbers initially fed in database so that no fake person can register. After this login, can be done and then students can view their profile, make changes to it, view their attendance. Also, student can make a request to teacher for attendance in case his attendance is not marked even though he was present.

IV. SYSTEM LAYOUT

Objectives of the Bio-metric attendance system project and identify down the constraints which will impact the project management.

A. Objectives

- 1) Computerize the day-to-day attendance system.
- 2) Attendance by biometric authentication (fingerprint).
- 3) Shield the proxy which is happening in the traditional system.

B. Constraints

- 1) Operating budget
- 2) Fingerprint sensing element + fiber cable Rs.10000
- 3) Spending for the collection of data and information Rs.4000
- 4) The total budget is Rs.14000

C. System Overview

A new system is introduced, which incorporate fingerprint validation into the mapping of attendance management for both, students as well as staff, and workers within the organization. Point in time a user register itself, the fingerprint of the user is captured and the minutiae information is understood and then it is stored in the database as a template for future verification along with its unique user's ID. The goal of the registration module is to acknowledge a user using his/her biometric verification into a database after features extraction. These form an attributes are used to check the identity of the user, generate the process of authentication. The registration process is only communicated by an administrator of the system. When a user put his/her finger on the biometric device, the fingerprint are captured again and it is compared with the one stored in the database at the time of registration to authenticate the user. When the user is authenticated successfully, attendance is marked against the unique user ID allotted in the matching template. For taking images of fingerprint a fingerprint sensor is used, a program is developed that has fingerprint recognition and identification system and a database where the user's information is stored. In the database we stores the fingerprint templates of different user's and their bio-data together with day-to-day attendance of each user. The architecture of the proposed attendance management system is shown in figure 4.1.

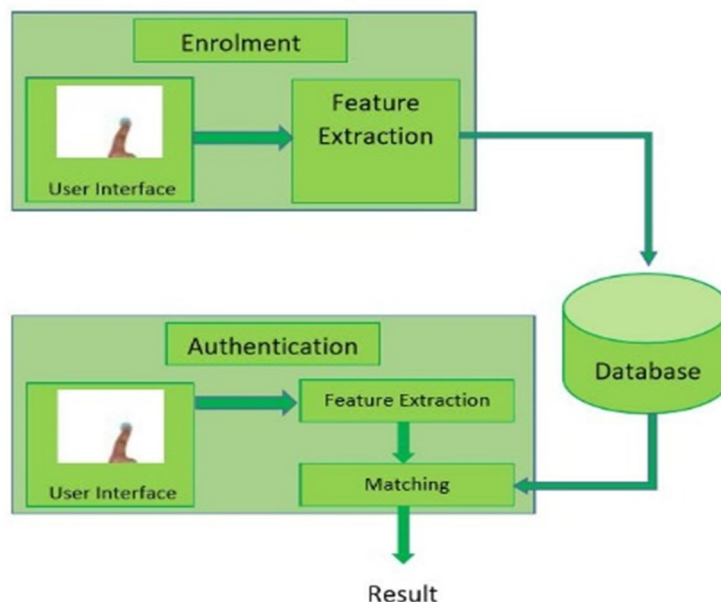


Fig. 4.1 Architecture of fingerprint attendance management system

D. Methods

An inexact work categorization for this project is as follows:

- 1) Interrogate and study the available documents on image improvement and minutiae extraction techniques.
- 2) Enhance sequence of image improvement techniques to support the minutiae activity process.
- 3) Germinate a set of dependable techniques to take out details from fingerprint images.
- 4) Measure the performance of techniques used by fingerprint data set.
- 5) Using active techniques as the point of reference for comparison with the new technique developed.
- 6) Subsequently reliable minutiae detection techniques have been developed and tested, after which a statistical analysis experiment was performed on the fingerprint data set and documented.

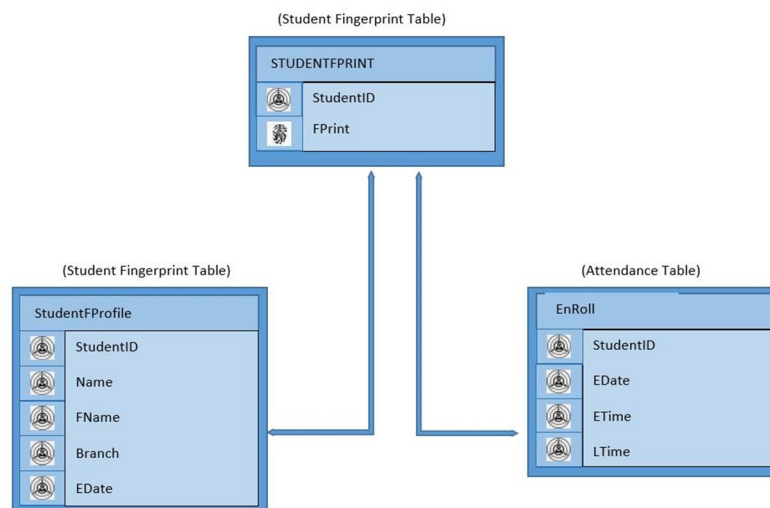


Fig 4.2

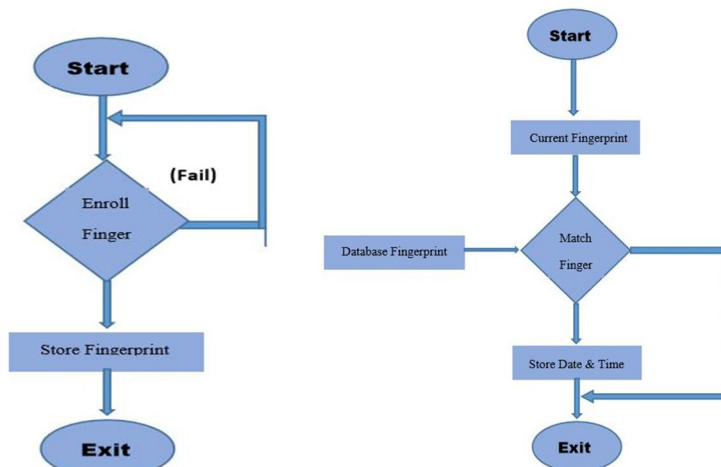


Fig 4.3 Flow Chart of Fingerprint

Fig 4.4 Flow Charts of Fingerprint Matching (Attendance)

E. Project Evaluation

The centre of procedure in this project was making the attendance in the organization through fingerprint, and accompanying action of minutiae. First of all, we had implemented progression of techniques for fingerprint improvement to help the action of minutiae. Many experiments were organized for collection numbers of artificial test images and also actual fingerprint images in order to provide a proportionate assessment of the performance of the implemented algorithm. A more quantitative measure of inspection was provided by the use of synthetic images. The observational outcome had shown that combined with an exact estimation of the orientation and ridge frequency; yet there were cases where the draw out minutiae do not correspond to true minutiae. Therefore, to validate the minutiae in this case an image post-processing stage was implemented. Through this experiment a result from the minutiae authentication algorithm forecast that this extra post-processing stage is efficient in cancelling out various types of incorrect improvement, minutiae extraction fingerprint matched, and categorization. These techniques we implemented for students and staff everyday attendance system. By this employees, students only put his/her finger on the sensor to mark their attendance.

V. RESULTS AND DISCUSSION

A. Geometric technology system the students and staff are well known with

The figure 5.1 correspond to answer the research questions (i). Which type of geometrical technology system are students and staff familiar with? Almost all participants were well-known with fingerprint biometric technology system with 20%. The next most popular biometric technology is hand geometry technology with 8%. The third technology system with which students were familiar is the iris recognition system with 3%, draw close according to the response was voice recognition technology, has 5%. The next

was face recognition technology having 11% and signature technology was chosen by 3% of the participants. It was noted that all the participants were familiar with at least one of the stated biometric technology, none of them chose the option none of the above.

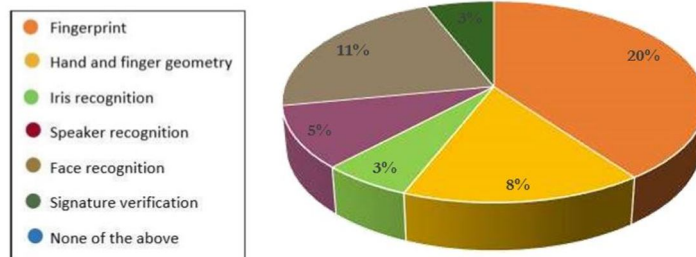


Figure 5.1: Showing the percentages of the biometric technologies with which the participants were well known.

The concept of this research paper we acknowledged that most of the students are familiar with fingerprint technology to a high extent because it is the aged biometric technologies and as best-selling as face recognition today.

B. The necessity for Improving the Current Attendance System

In with reference point to the research question (ii) does your organization require to follow up chromatogram of attendance of staffs? The participants were requested to choose their answers from options disagree, strongly disagree, undecided, agreed and strongly agreed. The response has been shown by the help of a pie chart in figure 5.2. It forecast that high degree of participants had chosen the option strongly agree while only 18% of the sample group had chosen the agree option. No one from the group chose other options available. This research has also been supported by InfoTronics. Inc, Which tell us the advantages of using any geometrical technology in the industry as it neglects the attempts of time fraud and efforts. It also helps the industries to maintain the time records of the employees like the sign in time sign-out time, etc. this system generates automated reports and timesheet.

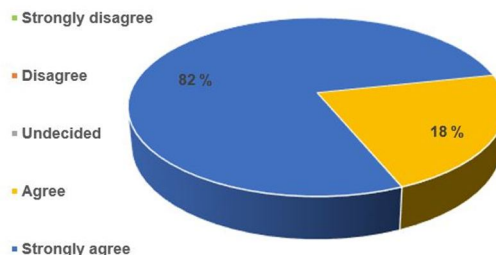


Figure 5.2: Shows the responses by the participants about the need for the enhancement of attendance system.

C. The requirement for a biometric system to be potentiate for students attendance in the institute.

Almost all the participants had chosen strongly agree about the need for the institute for a study in enhancement for recording and monitoring of students and staff attendance which is shown in figure 5.3. 100% participant's choose the options which answers to the research question number (iii).

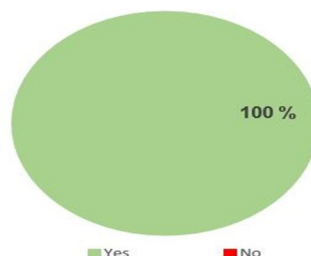


Figure 5.3: options answered by the sample group about whether the institute should use a biometric technology or not.

D. The preferred biometric technology by the institute for students and staff attendance management.

When the question asked from the sample group from the institute about the institute they study really needs a biometric technology for taking attendance of students and staff members. They are given choices of technologies which they wanted to be implemented

in the institution. In figure 5.4 the result of the survey is recorded and it can be seen that fingerprint technology is the most preferred by the participants with 48%. The next preferred technology is iris recognition technology with 17%. At the third position it is hand and finger geometry with 14%. Face recognition technology at 12% and least it was voice recognition technology with only 9%. None of the participants opted for signature verification technology.

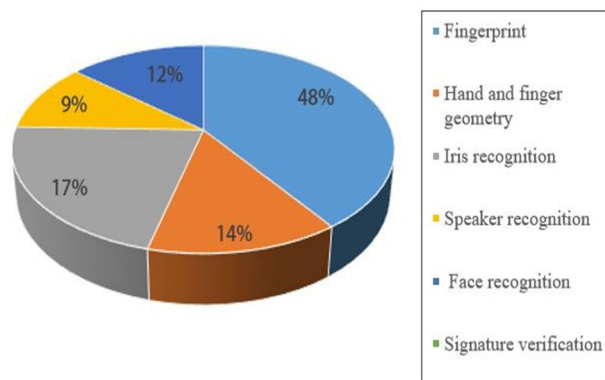


Figure 5.4: It shows the most preferred biometric technology system to be implemented in the institute.

Moreover, the discussion and analysis done after the findings of the survey as most preferred biometric technology system based on qualities or features such as sustainability, acceptability and affordability.

We used a likert scale rating from 1 to 3 where, 1 indicates agree, 2 indicates disagree and 3 indicated participants who are neutral. In this way participants can scale the qualities of each biometric technology system from 1 to 3.

E. Affordability

The figure 5.5 shows the affordability of fingerprint biometric system is highly preferred by the participants with 59.76% which agreed that fingerprint system is the most affordable biometric system. Iris technology with 54.05% agreed on it. At third it was hand and finger geometry selected by 49.35%. The next was voice recognition selected by 46.97% of participants. At last it was face recognition technology with 38.59% of participants.

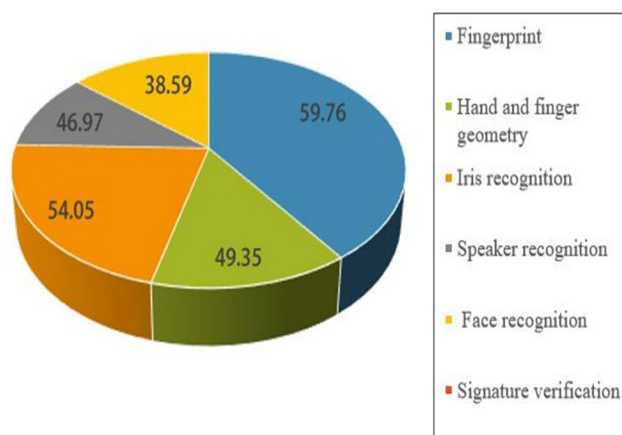


Figure 5.5: The most preferred biometric technology in terms of affordability.

F. Sustainability

Figure 5.6 shows the responses according to the participants to sustainability quality. It was seen that no biometric technology was found to be sustainable by the participants. There is a near about difference in all the technology quality in terms of sustainability. However the most preferred technology is fingerprint technology selected by 52.34% which say it's the most sustainable technology in comparison with others. Hand and finger geometry, iris recognition, and signature verification with 52.05% are the second most preferred system. The least was face recognition and voice recognition system with 47.64% each.

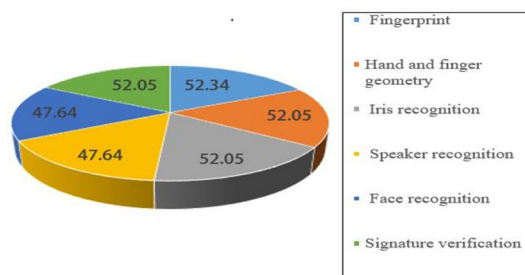


Figure 5.6: sustainability in terms of each technology.

G. Acceptability

Acceptability feature preferences is checked by participants for each technology which is represented in figure 5.7. The first preferred technology is fingerprint system with 60.46%, followed by other systems: voice recognition, signature verification, and hand geometry, each with 53.05%. Face recognition technology with 52.05%. The least preferred was iris recognition technology selected by only 50.65%.

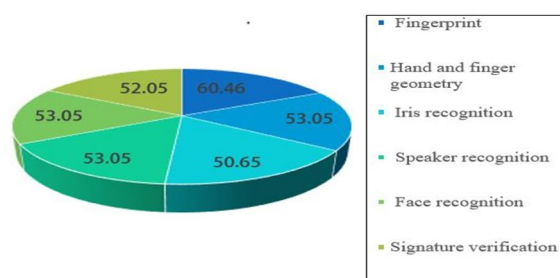


Figure 5.7: Most preferred biometric system in terms of acceptability feature.

VI. CONCLUSION

Our project "Attendance Management System through Fingerprint" is an extensible work for our institute or for any organization, institution and company in this high velocity moving world. At this movement seeing to the research I can say there are many more points of faults which need to be viewed more in depth and a lot more enhancement in flexibility for upcoming technologies in various demanding directions. The technology which we are using is very vast and even Microsoft itself is trying to rule over this technology by researching in this domain. Therefore, we hope that through this research work a new point of interest will be visible in the interest of our successors which can improve it further and can fulfil the requirements of the going market and the needs of the users. Since by using the physiological part of a body (fingers) for verification and authentication can improve the way of taking attendance of the students and staff members in the institution. This satisfies the quality of a sustainable system.

Therefore, biometric technology is for sure a global ICT plan of action that will be used to enhance students and staff attendance system without any proxy attendance. This research and study has come on a decision that fingerprint is the incomparable biometric technology that will solve the problem of proxy and fake attendance of students and staff members in the institution. This will also help us in eliminating buddy punching and will also help us in increasing students and staff productivity. Through this study, more attention should be paid to various factors affecting biometric technology before recommending to any other organization.

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