On the Basis of Frequency Distribution Algorithm: Implementing a Smart Attendance System in the Field of Corporate Management

Sobre la base del algoritmo de distribución de frecuencias Implementación de un sistema de asistencia inteligente en el campo de la gestión corporativa

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ABSTRACT

An automatic process that gives the complete solution for attendance and time management is knows as smart attendance management system. On the basis of several events like on duty, overtime, holiday working, shift, permission and late the attendance management system keep the record of attendance of all the employees. Because of non-intrusiveness and strong anti-interference the Radio-Frequency Identification (RFID) provide the solutions. In this paper we study the smart attendance system based on frequency distribution algorithm.

Keywords: Smart attendance, automatic, radio frequencey, identification.

RESUMEN

Un proceso automático que brinda la solución completa para la asistencia y la gestión del tiempo se conoce como sistema inteligente de gestión de asistencia. Sobre la base de varios eventos como en servicio, horas extras, trabajo de vacaciones, turnos, permisos y retrasos, el sistema de gestión de asistencia mantiene el registro de asistencia de todos los empleados. Debido a la no intrusión y la fuerte anti interferencia, la identificación por radiofrecuencia (RFID) proporciona las soluciones. En este artículo estudiamos el sistema de asistencia inteligente basado en el algoritmo de distribución de frecuencia.

Palabras clave: Asistencia inteligente, automática, radiofrecuencia, identificación.

RESUMO

Um processo automático que fornece a solução completa para gerenciamento de presença e tempo é conhecido como sistema inteligente de gerenciamento de presença. Com base em vários eventos, como serviço, horas extras, trabalho de férias, turno, permissão e atraso, o sistema de gerenciamento de presença mantém o registro de presença de todos os funcionários. Devido à não intrusividade e à forte interferência, a identificação por radiofrequência (RFID) fornece as soluções. Neste artigo, estudamos o sistema de presença inteligente com base no algoritmo de distribuição de frequência.

Palavras-chave: Atendimento inteligente, automático, radiofrequência, identificação.

I. INTRODUCTION

In every organization like private or public sector, an educational institutions the attendance management system is an important factor (Miao et al., 2019). It is software that keeps the record of employees and students in the organization for increasing the performance of the system. In a company and in an education institute managing the record of employee or the record of students is a challenging task. In the manual computation the probability of errors increased and it is a very time consuming process. To keep the record of both employees and students and to track the activities of the students in the class for attendance management system web based application a web application is required (Susilowati et al., 2018).
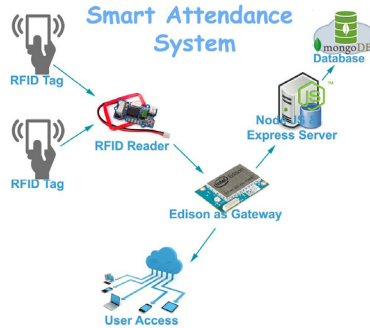

Figure 1: Smart Atatendance System

For better recognition with the same features to extract the fingerprint K-means clustering method is used in this method it extract a frequency distribution histogram. The attendance systems that are based on RFID are working on the principle of living biological characteristics when it is compare with traditional attendance system the false rate of identification is also very less. Much system developed to measure the performance of the system. The smart attendance system used recognition system and the attendance is done by recognition either through fingerprint or face. This type of attendance system generally used in private sectors. For these purpose the records of all the employees should be inserted so the match will be find when it go for attendance (Werner & Schill, 2009).
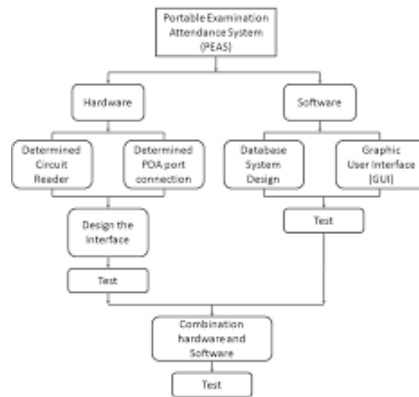

Figure 2: RFID Based Portable Attandace Sysytem

Technology/characteristic	Face recognition	Fingerprint
Ergonomic aspect	Non-invasive	Invasive
Cost	Medium cost and Multi-purpose	Medium costa Single purpose
Reliability	Very high	High
Social acceptability	High	Very High
Accuracy	High	Very high
Spoofing (Creating a fake biometric)	Very difficult	Very easy
Behavior analysis	Possible (dynamic)	Impossible

Table 1: Biometric identification Technologies Comparison (Mohammed et al., 2018)

II. APPLICATIONS OF ATTENDANCE SYSTEM

Some applications of smart attendance system is given below:

1. Interaction between human and computer. Included computer based reality training program, audio visual gaming, proactive computing,

2. Observation of audio and video. Include certain alert for crime stopping, unsure pursuing, suspect circumstantial patterned, marker incident predictor investigation, shoplift etc.

3. Smart card with face ID. Include driver's-license, voter's registration user authentication, passports, national ID etc.

4. Secure and safety. Include application safety, extremist attentive folder encrypts, medicals archives, device logon, database security, TV parental control, internet and intranet safe keeping interchange systems etc.

5. Other applications. Applications like presence monitoring used for keep growing the lesser the enormous presentations and is estimated to broadly developed. These applications frequently used face recognition systems.

III. RFID(RADIO-FREQUENCY IDENTIFICATION) SYSTEM

By using radio waves and RFID tag it can recognize distant information through RFID technology. There is a reader and a server used for collecting the data. An integrated circuit and an antenna are comprised in a tag. By using the attached card the tag can identify the data. On the basis of frequency the RFID system has the ability to identify over distance, and it take less time to identify the data. With data processing it has outstanding performance and long term use (Belhumeur et al., 1997). The comparison of RFID system with existing system is shown in table 1 on the basis of accuracy and speed of data recognition (Yang et al., 2015).

	Barcode	IC Card	RFID
Recognition	Contactless	Contact	Contactless
Distance	less than 50cm	Insert type	less than 100m
Speed	4sec	1sec	10~100ms
Accuracy	96%	99.9%	
Transmission	impossible	impossible	possible
Effective life	short	10,000	100,000
Data processing	less than 100byte	16~64kb	64kb
Economy	cheap	expensive	medium
Security	impossible	possible	possible

Table 2: Comparison with other Technology (Kim & Cheong, 2013)

IV. FACIAL RECOGNITION SYSTEM

For getting the identify of a particular person the face recognition process used image of face by comparing the image with already stored data in the system that are based on face recognition (Tolba et al., 2006; Subban et al., 1993).

- Face recognition system include:
- Recognition through location of lips, node, eyes or shape
- On the face image it detect regular surface features like expression on face
- It select the amount of suitable features like feature value.
- A collection of good factor of discrimination can recognize (Maseleno et al., 2016)
- With scalability and accuracy a high system can combined
- For determining the accuracy of recognizing the face can include various factors at this time (Werner & Schill, 2009).

V. WI-FI POSITIONING SYSTEM

The areas where it needed the services like emergency evacuation directions, indicating current position and indoor mobile route guidance in the smart device by using Wi-Fi in the interior of the building through map it can identify the location of the user. This wi fi positioning system can used by a system based on fingerprint and applied received signal strength of the wireless LAN measurements (Mandal, et al., 2013). Based on Time-of-Arrival it measure the wireless LAN transceiver signal propagation (Fu, 2018).

Figure 3: Fingerprinting Method for Positioning (Kim & Cheong, 2013)

VI. PROBLEMS OF RFID-BASED ELECTRONIC ATTENDANCE SYSTEM

RFID based electronic attendance system that are not depend on face recognition have some problems. They are described as follows:

- For checking the attendance there is need to double check the process
- In the attendance system of students when class is over again it checks the attendance and compare with the attendance which was taking when class is started. It is very time consuming process. It is called the phenomenon of bottleneck.
- If a student or employee do not contain its identity card that it many show absent.
- When the time of class or office is change it can be inconvenient
- If an employee or student comes just after starting the class or office it may consider as late.
- Without an RFID reader the attendance cannot check
- If someone using any other's ID card it can consider that employee or student as present (Rizal et al., 2017).

VII. HUMAN DETECTION BASED ON RFID

Due to non-intrusiveness and strong capability of anti-interference in the field of sensing RFID is becoming more and more popular. To detect the human or target motion phase changes of passive RFID tags are exploited in previous methods. With RSSI positioning system based RFID is first defined by LANDMARCŒ (Ni et al., 2004), this system has the problem of severe multipath. For tacking moving objects Yang et al. (2015) introduced a system that can work behind closed doors and walls. Through walls to track device-free human motion a sensing technique that is based on RFID is presented, it is called RF-HMS (Wang et al., 2018). Xiao et al. (2018) proposed that instead of using per-tag localization pattern by attaching two RFID tags to one object a tracking scheme and comprehensive localization scheme can used. To track mobile RFID tags with a high precision according to constructs a virtual antenna array and phase values a differential augmented hologram is build. It is introduced by Togoram (Yang et al., 2014).

VIII. FREQUENCY DISTRIBUTION ALGORITHM

Due to unique environment of offices and university the previous smart attendance system used only one technology, in that system it can occur minor problems. For the problem happening in technical complexity implementation and physical limitations it uses two factor authentication processes (Maseleno et al., 2019).

System operators that are proposed by authentication algorithm placed in the order given below:

- Manager: a manger of admin declares for checking the attendance. It set the valid time for checking and to confirm the attendance click on start button
- Smart phone of manger: the Wi-Fi AP list send to scanned, to the server of system management it send the expiration time

- Employee: for confirming the attendance of employee click the ok button
- Server of system management (Siswanto et al., 2015)

In most of the organization the face recognition attendance system are used now in these days. A face recognition based attendance system is show in figure 4. Over all process is presented in the flow chart. By matching the image of face with existing database the face can be detect and then it consider as present employee.
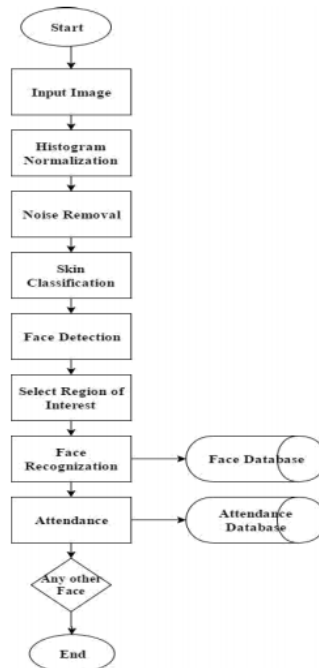

Figure 4: Flow chart of face detection attendance system

IX.   PROCESS OF IMPLEMENTING

For developing a system that is based on face recognition from the system algorithm given subsequent stages are comprised

- Acquisition of image
- Normalization of histogram
- Filtering of noise
- Skin classification
- Tracking of face
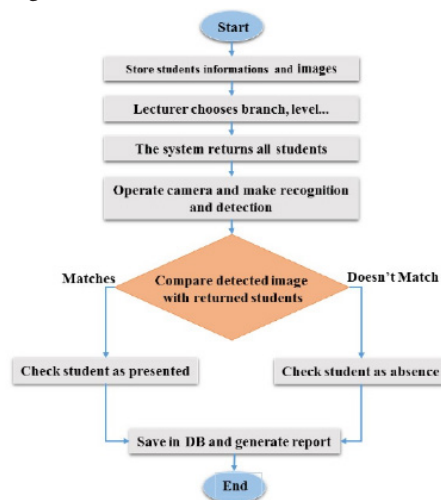- Identification if face
- Attendance monitoring

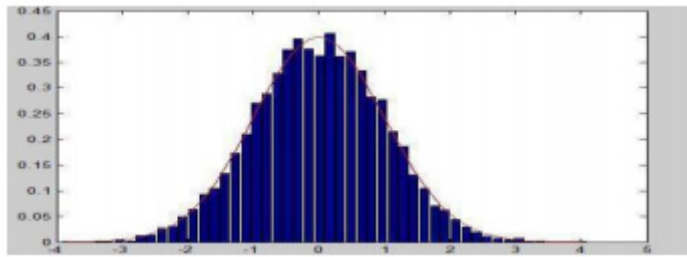Figure 5: Proposed System Authentication Algorithm (Siswanto et al., 2015)

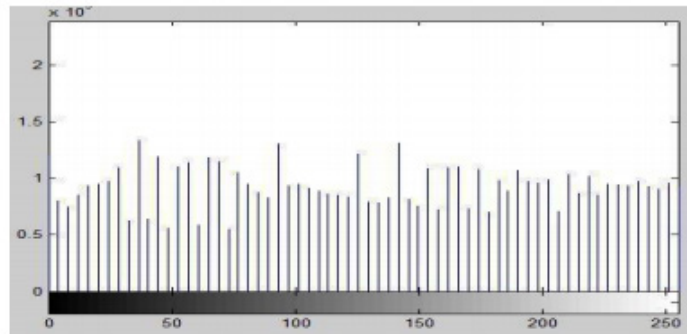Figure 6: image input for Histogram (Mehul et al., 2013)

Figure 7: histogram for equilzed image (Mehul et al., 2013)

X. CONCLUSION

A programmed procedure that gives the total answer for participation and time the board is knows as smart attendance management system. Based on a few occasions like on obligation, additional time, occasion working, move, authorization and late the participation the executive's framework keep the record of participation of the considerable number of representatives. Due to non-nosiness and solid enemy of obstruction the Radio-Frequency Identification (RFID) give the arrangement. In this paper we study the savvy participation framework dependent on frequency distribution algorithm.

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