International Journal of Recent Technology and Engineering (IJRTE)
ISSN: 2277-3878 (Online), Volume-9 Issue-5, January 2021

Enhanced Attendance Monitoring System using Biometric Fingerprint Recognition

Ronald B. Rivera

Abstract*: In this study, an enhanced attendance monitoring system using biometric fingerprint recognition in tracking and monitoring employees' attendances for Callang National High School, District 04, San Manuel, Isabela was introduced. For most organizations, handling people is a daunting job in which it is very important to maintain an accurate record of attendance. Taking and maintaining the attendance of employee manually on a regular basis is a big activity that requires time. For this reason an effective system was designed. The system was designed and developed primarily to improve the monitoring of employees attendances and leave management through the use of biometric technology. It records the data of the employees, handles leave management, tracks employee attendance and encourages participation through fingerprint recognition. The system is equipped with a dashboard monitoring system that can be viewed by school heads to track the list of employees, early birds (employees who arrived early), on-leave staff, on-official business and a statistical graph of the monthly attendance rate of employees. Moreover, the system provides an auto-generated DTR for employees which saved time compared to the manual process. The innovation greatly affects the improvement of employees' attendance through its automated attendance monitoring, leave management and report generated by the system. The impact of EAMS to the employees was identified through first quarter attendance report of SY 2028-2019 which served as a bases of comparison with the attendance rate of SY 2019-2020 when the system was implemented. The outcome shows that through the usage of the system, employees' attendance has improved.

Keywords: Biometric System, Attendance Monitoring System, Fingerprint Recognition, Employees Attendance

I. INTRODUCTION

Managing people is a difficult task for most of the organizations, and maintaining the attendance record is an important factor in people management. Manually taking the attendance and maintaining it for a long time adds to the difficulty of this task as well as wastes a lot of time [1]. Most of the attendance systems use paper based methods for taking and calculating attendance and this manual method requires paper sheets and a lot of stationery material [2]. To address these issues an automatic attendance system which automates the whole process of taking attendance should be implemented. Biometrics techniques are widely used in various areas like building security, forensic science, ATM, criminal identification and passport control [3]. The fingerprint recognition is widely used for many other purposes and it is widely popular technique [4]. The Fingerprint is the feature pattern of one finger or an impression of friction ridges found on inner surface of finger as shown in figure 1(a). Everyone in this world has his own fingerprint with the permanent uniqueness. A fingerprint is made up of ridges and furrows, which shows good similarities like parallelism and average width [5]. Fingerprint attendance system comprises at least one fingerprint scanner and a computer server. First templates of fingerprint related data are stored on the server, and similar templates are stored on the scanner. When a fingerprint is scanned, the fingerprint data is transmitted to the server, where a comparison is made. The server directs the scanner to display an indication whether or not a match was found [7].

The EAMS (Employees Attendance Monitoring System) utilizes a fingerprint biometric device where employees cast their daily attendances. It is capable of capturing attendances, records credit units, leave applications and official business records. It also facilitates automatic generation of DTR (Daily Time Record) and FORM 6 (Leave Form).The system is a great help in monitoring employees of CNHS because of its automation. Time consciousness will be practiced where every employee is expected to log/sign-in their daily attendance regularly which can be a key part of creating a school climate in which consistent teacher attendance is the norm

II. MATERIALS AND METHODOLOGY

2.1 Data Gathering

To determine the key features that will be added to the study the researchers asked the concerned staffs (ADAS and Teachers) or end users for features and add-ons to be included in the system. Moreover, the researchers also gathered the teachers attendance information based from the logbook of SY 2018-2019 and randomly selected 15 employees which served as a basis in identifying the impact of study in Improving the employees' attendance rate.

2.2 Prototyping

To develop a working interface of the program, prototyping and actual programming was done. The researchers used Visual Basic .Net as the front-end programming language, and MySQL as its back-end.

2.3 Alpha Testing

It was done by the researchers to test bugs and other technical errors that may occur during system development.

Manuscript received on August 24, 2020.
Revised Manuscript received on January 28, 2021.
Manuscript published on January 30, 2021.
***** Correspondence Author
Ronald B. Rivera*, Bachelor of Science in Information Technology, Isabela State University Angadanan Campus, Centro 03, Angadanan, Isabela , Philippines. Email: ronald.b.rivera@isu.edu.ph

2.4 Beta Testing

It was done to test and deploy the system with the users (Teacher and Non-Teaching Staff and the Proponent of the Study).

2.5 System Implementation

This was done to determine the effectiveness of the developed program. The following procedures cover the implementation The employees' registration was done where employees' information and fingerprint templates are stored.

2.5.1. Employees Registration. The employees' registration was done where employees' information and fingerprint templates are captured which will be the basis of their attendance casting.

2.5.2. Casting of Attendances. Employees used their registered fingerprint to cast their attendances. Employees' attendances are reflected directly to their DTRs.

2.5.3. Leave Management. Employees leave credits and leave applications are stored as basis of leave w/ pay and leave w/o pay.

2.5.4. Printing and DTR (Daily Time Record). This was done to provide the employees their auto-generated DTR where their logs and leave applications are reflected.

Figure 1: Employees Registration

Figure 2: Casting Employees attendance

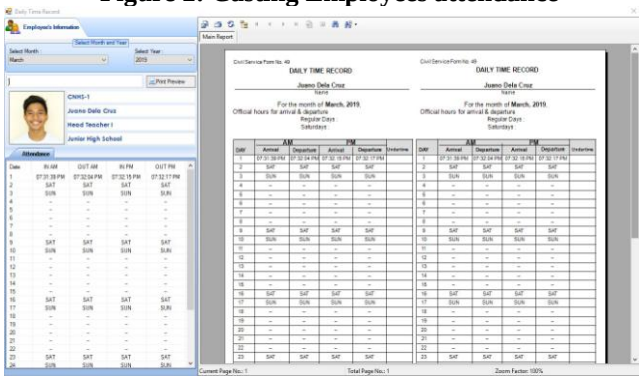

Figure 3: Printing of DTR (Daily Time Record)

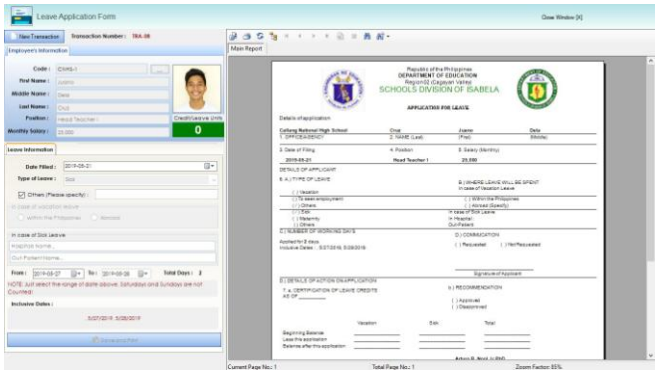

Figure 4: Leave Application

2.6 System Evaluation

This was done to determine the extent of impact of the system in improving the attendance rate of the employees. The researcher gathered the first quarter attendance report of SY 2028-2019 and randomly selected 15 employees which served as a bases of comparison with the attendance of SY 2019-2020 when the system was implemented. The average rate of late attendance from the attendance report of SY 2018-2019 was compared to the average rate of attendance generated by the system.

III. RESULTS AND DISCUSSION

3.1 Comparative Analysis

The implementation of the developed program (Employees Attendance Monitoring System) automatically facilitates employees' registration, generation of employees' DTR and leave form and monitoring of employees' attendance. The employees' have less time consumption in preparing their attendances through the auto-generated DTR's/ Moreover, awareness among the employees attendance are assured through its real-time dashboard monitoring which can be viewed by the school-head.

LOGBOOK DATA - FIRST QUARTER SY 2018-2019						
EMPLOYEE NO	NUMBER OF LATE					
	JUNE	% Late	JULY	% Late	AUGUST	% Late
1	1	3.33	3	10	3	10
2	0	0	4	13.33	10	33.33
3	4	13.33	1	3.33	8	26.67
4	4	13.33	6	20	14	46.67
5	10	33.33	11	36.67	10	33.33
6	11	36.67	9	30	17	56.67
7	0	0	1	3.33	4	13.33
8	0	0	7	23.33	0	0
9	2	6.67	8	26.67	13	43.33
10	0	0	3	10	4	13.33
11	0	0	10	33.33	7	23.33
12	2	6.67	2	6.67	3	10
13	1	3.33	4	13.33	17	56.67
14	10	33.33	16	53.33	21	70
15	5	16.67	8	26.67	18	60
TOTAL	**50**	**166.66**	**93**	**309.99**	**149**	**496.66**
MONTHLY PERCENTAGE LATE	11.11		20.67		33.11	
AVERAGE LATE ATTENDANCE					21.63	

Table. 1. Employees' average late attendance during the first quarter of the SY 2018-2019.

The table 1 shows the computed late attendance percentage of employees for the first quarter of SY 2019-2020.

EAMS ATTENDANCE REPORT – FIRST QUARTER SY 2019-2020						
NO	NUMBER OF TARDINESS					
	JUNE	% Late	JULY	% Late	AUGUST	% Late
1	4	13.33	1	3.33	3	10
2	0	0	4	13.33	3	10
3	4	13.33	1	3.33	8	26.67
4	2	6.67	1	3.33	5	16.67
5	5	16.67	4	13.33	5	16.67
6	3	10	3	10	4	13.33
7	0	0	0	0	2	6.67
8	0	0	7	23.33	0	0
9	2	6.67	5	16.67	5	16.67
10	0	0	3	10	4	13.33
11	0	0	5	16.67	5	16.67
12	2	6.67	2	6.67	3	10
13	3	10	2	6.67	5	16.67
14	4	13.33	3	10	5	16.67
15	2	6.67	1	3.33	6	20
TOTAL	31	103.34	42	139.99	63	210.02
MONTHLY PERCENTAGE LATE	6.89		9.33		14	
AVERAGE LATE ATTENDANCE					10.07	

Table. 2. Employees' average late attendance during the first quarter of the SY 2019-2020.

The table 2 shows the computed late attendance percentage of employees for the first quarter of SY 2019-2020

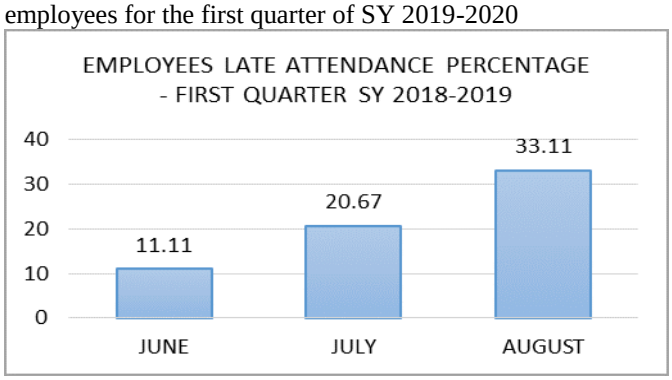

Fig. 6. Employees' average late attendance during the first quarter of the SY 2018-2019.

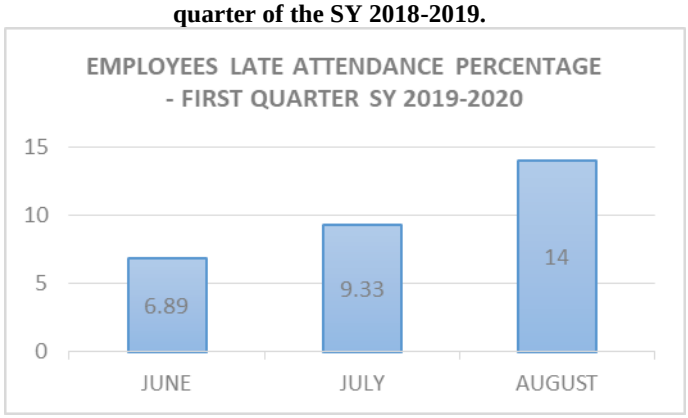

Fig. 6. Employees' average late attendance during the first quarter of the SY 2019-2020.

The graph in the figure 6 shows Employees' late attendance record percentage during the first quarter of the SY 2019-2020.

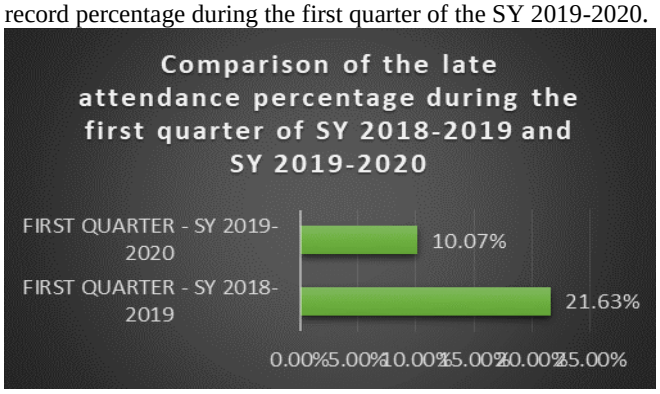

Fig. 7. Comparison of the late attendance percentage during the first quarter of SY 2018-2019 and SY 2019-2020.

The graph in the figure 3 shows the comparison of employees' attendance during the first quarter period of both SY 2018-2019 and SY 2019-2020. The result shows that there was an improvement in employees' attendances through the use of the developed program. Employees' late percentage was decreased by 11.56 % which signifies that the program can be considered as one of the effective tools for the improvement of employees' attendance. Meanwhile, there were still extraneous that affect the on-time attendance of employees, it is highly recommended that aside from the automated monitoring system, The school head should also consider issues regarding transportation and the distance between the employees residence and the school.

3.2 Development of the Program Interface

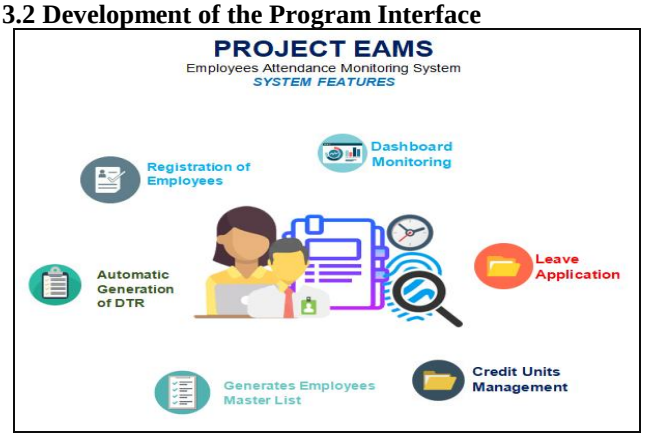

Fig. 8. The Framework

Fig. 9. Employees Registration Window

The register employees' information allows the user to register basic information of employees together with its 4 fingerprint samples to be used to cast his/her daily attendance.

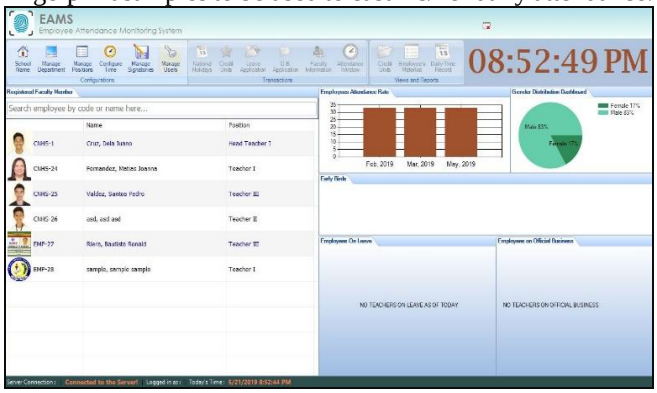

Fig. 10. Dashboard Monitoring Window

The main window allows the user to view attendance statistical dashboard together with the pie graph distribution of male and female teachers. It also allows the user to view early birds / employees who arrives early in school and a monitoring board for employees on leave and on official business.

Fig. 11. Leave Application Window

The leave application form allows an employee to electronically apply for his / her leave. The user will just search an employee and identify his leave type. Once the employee clicks save and print transaction button, the system provides a pre-formatted FORM 6 or leave form that can be printed and downloaded.

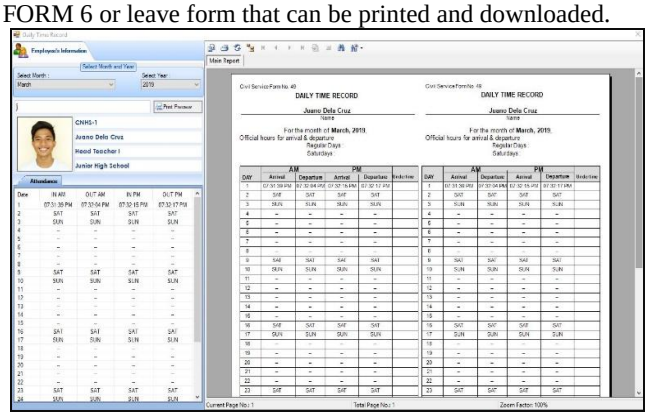

Fig. 12. Individual Monthly Attendance Window / DTR Window

The DTR window allows the user to print employees DTR by selecting the month, year and the employee. A DTR containing logs of employees will be displayed and can be printed.

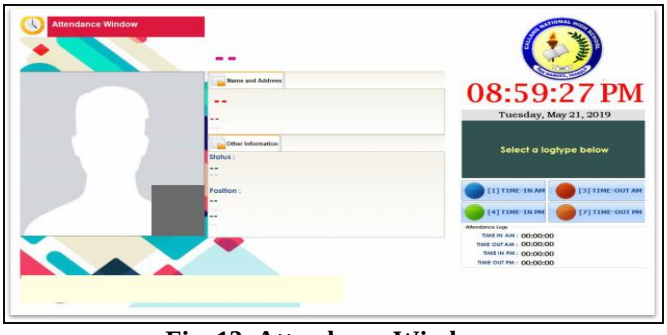

Fig. 13. Attendance Window

The attendance window allows employees to cast attendances. The employee will choose first on what attendance log will he be casting. After selecting the log type, the employee can now plot his registered fingerprint to the biometric device for recognition and recording of attendance logs.

IV. CONCLUSION

It can be concluded that the enhanced attendance monitoring system using fingerprint biometric recognition is effective to replace a manual system that is inefficient. Results have shown that this system can be applied in academic institutions to produce better results in attendance management. This system would save time, reduce the amount of work that the administration needs to do and replace stationery content with electronic equipment. However, a system with anticipated performance has still some rooms for improvement.

ACKNOWLEDGMENT

The author wish to thank Callang National High School for the support of this study

REFERENCES

1. Taxila, P. (2009). Development of academic attendance monitoring system using fingerprint identification. *IJCSNS*, *9*(5), 164.
2. Adewole, K. S., Abdulsalam, S. O., Babatunde, R. S., Shittu, T. M., & Oloyede, M. O. (2014). Development of fingerprint biometric attendance system for non-academic staff in a tertiary institution. *Development*, *5*(2), 62-70. Available: https://core.ac.uk/download/pdf/234644765.pdf
3. Jain, A. K., Ross, A., & Prabhakar, S. (2004). An introduction to biometric recognition. *IEEE Transactions on circuits and systems for video technology*, *14*(1), 4-20.
4. Ramotowski, R. (Ed.). (2012). Lee and Gaensslen's advances in fingerprint technology. CRC press.
5. Saraswat, C., & Kumar, A. (2010). An efficient automatic attendance system using fingerprint verification technique. International Journal on Computer Science and Engineering, 2(02), 264-269.
6. Cayen, J. D. (2010). *U.S. Patent No. 7,826,645*. Washington, DC: U.S. Patent and Trademark Office. Available:https://patentimages.storage.googleapis.com/65/50/8a/29507abd10cf11/US7826645.pdf

AUTHORS PROFILE

Ronald B. Rivera, finished his MIT degree at Isabela State University – Cauayan campus in 2017. He obtained his Bachelor of Science in Information Technology at the Isabela State University – Echague Campus, San Fabian Echague, Isabela. He started his teaching profession at the La Salette of Cabatuan, Cabatuan Isabela as a computer teacher, he has been a Basic Education Curriculum Teacher for 8 years, has been designated as one of the brigade innovators in the SY 2019-2020 at Callang National High School. He has been tapped by various agencies to perform job relevant to his field of specialization. At present, he is a college instructor at Isabela State University – Angadanan Campus.