COMMISSION ON HIGHER EDUCATION
CARAGA REGIONAL OFFICE

CARAGA HIGHER EDUCATION INSTITUTIONS
RESEARCH CONGRESS

ACCEPTANCE LETTER

Congratulations!

Zyrene B. Opalla1, Jasper Jan A. Oriel2 ,
Melody Fe D. Hinayon3 , Jerry I. Teleron4

The Commission on Higher Education-Caraga Region is pleased to inform you that your research paper, *"RFID-Based Student Attendance System using Raspberry Pi"*, has been reviewed and accepted for a face-to-face paper presentation on September 15, 2022 8:00AM – 5:00PM in Butuan City (exact venue to be announced), during the **Caraga Higher Education Institutions Research Congress**.

This has reference to the celebration of ASEAN 2022, with the theme **"ASEAN A.C.T.: Addressing Challenges Together"**.

You are requested to prepare a PowerPoint presentation of not more than 10 minutes, and submit to our secretariat on September 13, 2022 thru k12caraga@ched.gov.ph. For queries regarding the activity please contact or call 0920.876.6879 Ms Weng.

GEORGE M. COLORADO, PhD, CESO III
Director IV

PAPER PRESENTATION GUIDELINES

1. There should only be **ONE** presenter per study
2. ONLY a **maximum of 20 slides** of power point presentation will be allowed preferably,
    - Research Title, Researcher(s)/Author(s) and Year [1 slide]
    - Rationale in brief (keywords) of the study [1 slide]
    - Theoretical and Conceptual Framework [1 slide]
    - Statement of the Problems/Objectives [2 slides]
    - Review of Literature (highlights) [1 slide]
    - Research Methodology (keywords only) [4 slides]
        - Design
        - Locale
        - Instrument/s
        - Respondents/Informants/Participants
        - Sampling Technique
        - Data Gathering Procedure/Experimental Process
        - Statistical Treatment/Data Analysis
    - Results and Discussions (keywords only) [4 slides]
    - Conclusions and Recommendations (keywords only) [4 slides]
    - References [1 slide]
    - Acknowledgment [1 slide]
3. Maintain consistent fonts throughout.
4. The background and font color must be readable at a distance. Limit animations.
5. The presenter is given only a maximum of **10 minutes** to present the study.

*Note: If the presenter has **2** minutes left, the bell will ring ONCE and the presenter should go directly to the methodology section.* If the presenter has **1 minute** left, the presenter should go directly to the Results and Discussions. If time is up, the presenter is requested to stop. Cue cards will also be flashed. *If time is up, the bell will ring vigorously and the presenter is requested to stop.*

6. After each batch of presenters are done with their presentations, **a 10-minute interactive discussion** will follow to accommodate.queries from the panel members and participants.
7. Presenters are expected to be at the venue 30 minutes before the presentation schedule.
8. Attire: BUSINESS/Formal attire (no jeans/slippers allowed).

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COMMISSION ON HIGHER EDUCATION
CARAGA REGIONAL OFFICE

RELEASED
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REGIONAL MEMORANDUM
No. 45, Series of 2022

TO : THE PRESIDENTS / HEADS, PUBLIC AND PRIVATE HIGHER EDUCATION INSTITUTIONS (HEIs)

SUBJECT: CALL FOR PAPERS FOR THE CARAGA HIGHER EDUCATION INSTITUTIONS RESEARCH CONGRESS

DATE : AUGUST 5, 2022

Greetings! We are pleased to announce that the Commission on Higher Education Caraga Region will hold the Caraga Higher Education Institutions Research Congress on **September 15, 2022**- a hybrid conference that shall be a combination of in-person conference and online via Zoom. All higher education officials, faculty researchers, CHED graduate studies scholars, research enthusiasts, and regional partner agencies are invited.

This has reference to the celebration of ASEAN 2022, with the theme **"ASEAN A.C.T.: Addressing Challenges Together"**.

This year, ASEAN's 55th founding anniversary will be celebrated along with the Philippine higher education sector in building efforts to promote and sustain its objective of increasing ASEAN awareness and how ASEAN strives to help its member states address opportunities and challenges. In recognition of the growth and expanding wealth of knowledge, experience, and expertise of our institutions in this field, we will also focus on the impact of internationalization in the Philippine higher education landscape.

The research congress welcomes papers from a wide variety of interdisciplinary and theoretical perspectives, and submissions are organized into the following streams:

theoretical perspectives and submissions are organized into the following streams:

I. Educational Structures
- Educational Policy, Leadership, Management and Administration
- Professional Training, Development, and Concerns in Higher Education
- Educational Research, Development, and Publishing

II. Community, Language, and Culture
- International Education, Sustainability and Society
- Challenging and Preserving Culture, Inter/Multiculturalism, and Language

III. Psychology, Health and Welfare
- Promotion of Health, Prevention and Treatment of Disease
- Counselling, Guidance, and Adjustment in Education in the New Normal
- Women, Children, Elderly and PWD Care and Protection

IV. Engineering, Innovation, and Technology

- Design, Implementation, and Assessment of Innovative Technologies in Education
- Knowledge Creation, Creativity, and Access: Curation, Librarianship, Information, and Archival Science

Submission of Full Paper in Journal Publishable Format is on or before August 24, 2022 to chedcaraga@ched.gov.ph.

All entries will be evaluated blindly by peer review according to Academic Significance, Contribution to Addressing ASEAN challenges, Technical Novelty, and Quality of Information. Authors of papers accepted for oral presentation (in-person) will be notified on or before September 2, 2022. Your paper of original work should be submitted through the following guidelines:

1. Format: Tahoma
2. Font Size: 12, single spaced
3. Sections includes:
    - 3.1 Title of Paper, Author/s Names and Affiliations
    - 3.2 Abstract should be no more than 300 words
        - 3.2.1 Introduction
        - 3.2.2 Objectives of the Study
        - 3.2.3 Methodology
        - 3.2.4 Results and Discussions
        - 3.2.5 Conclusions and Recommendations

FREE REGISTRATION.
**Venue will be announced later*

Your positive response to this invitation will significantly contribute to the success of our endeavor. For more information, you may Dr. Frederick C. Amihan, through mobile number 0907-850-0190.

Thank you very much for your support.

GEORGE M. COLORADO, PhD, CESO III
Director IV

RFID-Based Student Attendance System using Raspberry Pi

Zyrene B. Opalla[1], Jasper Jan A. Oriel[2], Melody Fe D. Hinayon[3], Jerry I. Teleron[4]
Surigao State College of Technology, Philippines
zopalla@ssct.edu.ph, joriel@ssct.edu.ph, mhinayon@ssct.edu.ph, jteleron@ssct.edu.ph

***Abstract*— This study is to design and build an RFID-Based Student Attendance System using Raspberry Pi that will help students and instructors to record precise and accurate data on attendance. The research methodology is the Plan-Do-Check-Act (PDCA) model, which is an interactive problem-solving tool for improving the process and implementing change to produce a functional finished result. The raspberry pi 4, Python, and SQLite Database are being used to create software and perform the operations, and design the Graphic User Interface (GUI) in the system. RFID mainly consists of two important parts, the reader (combination of transceiver and antenna) and the tag (which consists of a unique number). Research shows that the system is efficient and stable, which effectively reduces classroom attendance errors.**

***Index Terms*—Attendance monitoring system, Python language, SQLite Database, RFID technology**

I. INTRODUCTION

An RFID-based student attendance system using raspberry pi is a proposed project that will help students and teachers to record precise and accurate data on attendance. Each student would be provided with an individual RFID tag and the system will store the unique identification number of the students. The students only need to scan their RFID tags on the reader to take attendance for the specific subjects that the subject teacher sets during their period. Hence, it is very time-efficient for both students and teachers. Student attendance is recorded when the encrypted tag ID is scanned and matches the tag ID stored in memory. Otherwise, an error message is displayed. The attendance of students can be viewed on the system and automatically records the attendance to the database.

In the traditional method, attendance is manually recorded by the teachers making it prone to personal error. This system will help the teachers to manage attendance in a more methodical, efficient, and time-saving manner. RFID is an automatic identity and records series technology that guarantees greater correct and well-time records entry. The ability of RFID systems to deliver precise and accurate data about tagged items will improve efficiency and bring other benefits to the school. This project will help teachers to take attendance hassle-free and avoid too much paperwork. It can also help avoid errors in recording and calculations of attendance and also avoid data manipulation. This system will improve student attendance as well as school security.

There are lots of related systems for this project including those systems that use fingerprint verification techniques using extraction of the abnormal point on the ridge of the user's fingerprint. Some also use face recognition with an SMS feature that uses the face of the user to take attendance and send the data to the user's guardian through SMS. Students can visually see their names as they entered class on the screen and they are assured that their presence has been entered into the instructor's record.

Student laziness, indifference to school work, and extracurricular activities that are not related to the goals of the institution can discourage students from attending lectures. This is the main problem in Taganito National High School which leads to students having multiple absences a day. Students tend to attend during the first period and take absences for the next subjects. Some also do cutting classes with the manipulation of friends which sometimes leads to accidents during class hours that add to the school problems. In addition to all these challenges, attendance is manually recorded by the instructor or co-students, making it prone to data manipulation of attendance.

In Taganito National High school, this system is an essential asset for ensuring efficiency and helping improve student attendance as well as school security. This research will provide a mechanism to assist teachers in keeping track of their student attendance and completing their tasks with less effort. It is very efficient for teachers to register students and check attendance records using the VNC viewer installed on their laptop with a wifi connection to access the system and database installed on the Raspberry Pi, and the students could also view their attendance on the LCD. This will also help students to track their attendance records and automatically sends the attendance to the database for the automatic record, greatly assisting in the monitoring of students and ensuring that they enter during class hours.

With the increase in attendance problems in schools, automated attendance is required to ensure students' safety and reduce the problems of the target client. Considering Taganito National High School (STEM-12) uses traditional methods of taking attendance, this system will surely help solve those problems. As a result, RFID-based students attendance system using raspberry pi prototype is proposed to be implemented in the room of STEM-12 in Taganito National High School.

Review of Related Literature

The papers and articles collected in this chapter give readers and researchers a comprehensive understanding of the Project RFID-Based Student Attendance System using Raspberry Pi that has been proposed.

A real-time class attendance monitoring using smart face recognition designed to make both easier to exert by protecting instructors and students from this type of deterrent, creating an Automated Student Attendance Monitoring System (ASAMS). Where automated student participation is used completed on enrolling students, and the students report to their classes specific seats, the framework monitors participation in three various time intervals based on the instructors' requests. [1]

Class attendance management system using face

recognition developed an automated attendance system for use in educational settings institutions, which can produce more accurate results than the manual attendance sheet. The hardware for the system is a Raspberry Pi. The system is written in Python for the face recognition system and PHP for the attendance management system website. Furthermore, it includes a prototype door powered by a Servo motor that opens for the recognized student to pass every time the recognition is successful. The attendance is stored in a MySQL database, and the results can be accessed from any computer web browser with an internet connection.[2]

To developed an electronic attendance and logging system that uses SMS and RFID as students' gate passes is also incorporates an online management interface and a database server for data security and dependability. The study was carried out in Laguna's Lyceum of the Philippines [3].

In RFID based attendance system the Arduino Mega, SD card, Shield, RFID Reader, Wi-Fi module, and LCD Display Shield were all interfaced. The controller evaluates these two pieces of data, and if they match, it takes the attendance, saving time, and notifying the user by indicating on the LCD display that the attendance was taken. The user is not recorded on the LCD display, however, if these two pieces of information do not match. [4].

The RFID technology in real-time attendance register system when compared to the traditional method of attendance system, it provided a more convenient method of attendance marking. The data is more organized when databases are used. This system is also user-friendly because data manipulation and retrieval can be accomplished through the interface, making it a universal system. System of attendance, as a result, can be used in both academic institutions and businesses. [5]

RFID based attendance management system designed an automated attendance management system that can be used at professional gatherings of various sizes (from small-to-medium seminars and workshops to large congresses and technical shows) and types (conferences, exhibitions, training courses, etc.). It is capable of collecting, recording, and processing data on technical gathering participants and their activities, such as attendance at different sessions, visiting different exhibition booths, and so on. [6]

A current study proposes an RFID-based Attendance Management System (AMS) and an information service system for an academic domain by combining RFID technology with programmable logic circuits (such as Arduino) and a web-based application. The proposed system aims to manage student attendance recording and provides tracking capabilities for student absentees. Supporting information services include student grading marks, daily timetable, lecture time and classroom numbers, and other student-related instructions provided by faculty department staff. According to the findings, the proposed attendance and information system is time-effective, reduces documentation efforts, and consumes no power. [7]

The attendance begins with the facial recognition process; divided into two main parts: processing before detection where face detection and alignment take place, and afterward recognition occurs through feature extraction and comparison. The captured image is sent to the PIC controller where it matches the obtained image with the image stored in the database; if the image and ID number match the student is marked as present. ID number is used for security purposes. [8]

Biometrics has an epic range of applications and more inventive ways of using it thus it keeps on emerging. They formulated an attendance that starts by setting up a camera as an input device. During registration, Viola-Jones algorithm was used to detect faces. Moreover, the fisher faces algorithm was utilized for creating templates for the captured faces. During verification, the camera acquired images of faces detected were compared with face templates stored in the database for any match. Attendance information taken is passed via a cellular network to authorized devices. [9]

The RFID based attendance system improved the AlexNet convolutional neural network using deep learning-related ideas, and they used the WebFace data set to improve network training and testing. The error rate in the top five is only 6.73 percent. They took this model and combined it with RFID card reading technology to create a smart classroom attendance system based on face recognition. [10]

To conclude, some previous literature and studies have similar features to the current project, such as the use of a raspberry pi as the system's brain, RFID tags/readers, and attendance systems via software for viewing attendance records. However, some projects have different features; for example, one study offers SMS notification and face recognition, which will not be used for this project. As a result, the researchers decided to bridge the gap between past and present attendance system trends.

Conceptual Framework

The researchers used a waterfall model that describes the entire flow of the study depicted in Figure 1.

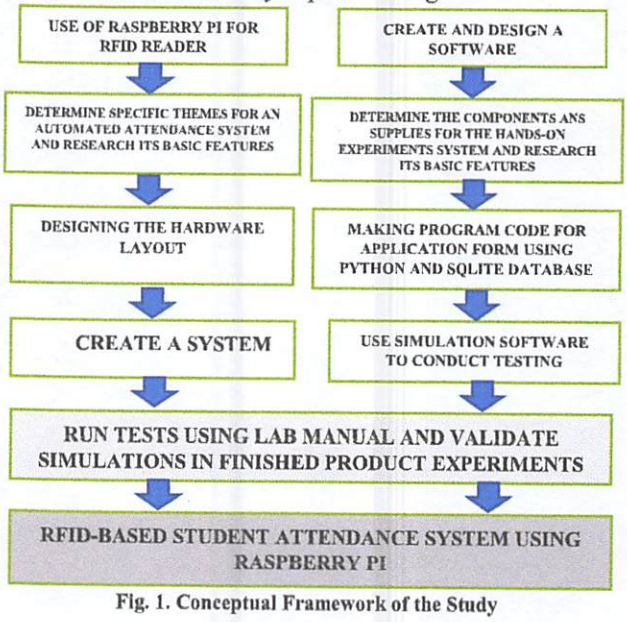


Fig. 1. Conceptual Framework of the Study

Objectives

The general objective of this study is to develop an RFID-Based Student Attendance System.

Specifically, the project aims the following objectives:

1. To design and test the functionality of an Attendance System using RFID and deploy Python framework form application and SQLite for the database to send the received data to the database.
2. To implement the system in Taganito National High School - Senior High (STEM-12)

II. METHODS

Research Design

Researchers used an interactive problem-solving strategy to execute the plan to improve the process and do the changes Check-Act (PDCA) as a solution model. After collecting all the knowledge from different phases of planning, researchers evaluated relevant information and converted them to factual data before assuming they would generate a practical final product.

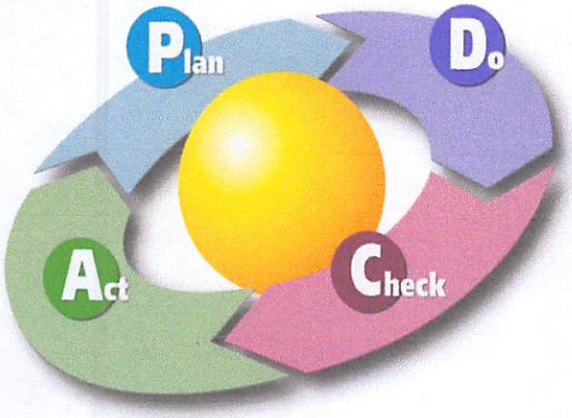


Figure 2. Scheme of the Study

A. Plan

Project Design

The researchers used Raspberry Pi 4, a capable little device that enables people of all ages to explore computing and to learn how to program in languages like Scratch and Python with RFID Reader it is to uses radio waves to send a signal that activates the tag. The students only need to scan their RFID tags on the reader to take attendance.

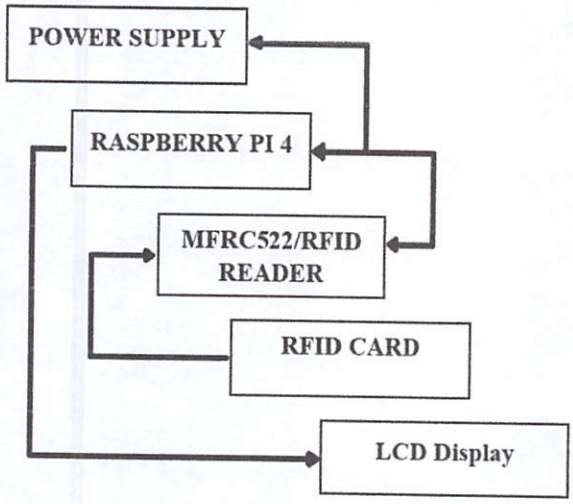


Figure 3. Block Diagram of the Hardware

In this automatic attendance system using the RFID Tags, a verification technique was proposed. The RFID Tag verification was achieved using the extraction of outliers on the ridge of the user tag. The block diagram above shows the flow of the hardware which is the raspberry pi is powered by the power supply and the RFID reader is connected to the raspberry pi. When the RFID card is detected and read by the RFID reader, the data will be forwarded to the raspberry pi, and the data will be forwarded to the LCD display which is connected to the raspberry pi (see fig. 3).

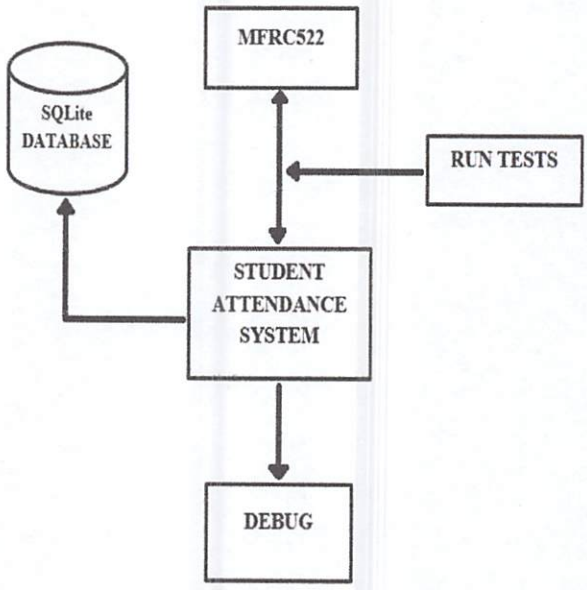


Figure 4. Block Diagram of System Implementation

The block diagram above shows the flow of the system implementation which includes system testing and debugging.

Flow chart

The system begins when the students scan their registered RFID tag/card into the RFID scanner and if it is detected and matches the data stored in the database it will display the output on the LCD with the student name and student ID and then it will automatically record the attendance to the database.

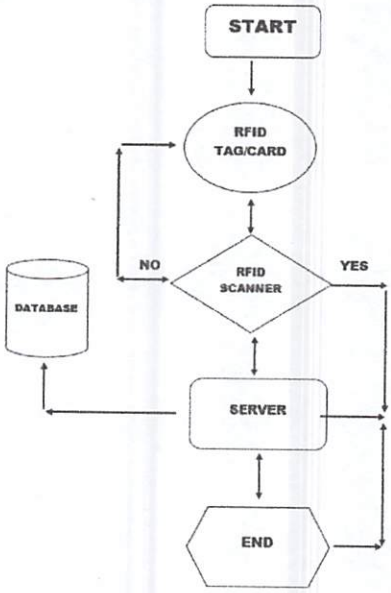


Figure 5. Flowchart of the Software

Validation verifies the authenticity of authorized users by comparing the templates captured by RFID tags with the templates stored in the database on a one-to-one basis (see figure 1). The proposed student attendance system to notify either true or false based on the logical result of Prior one-to-one verification of personal credibility.

The impartiality and affability of the technology infrastructure, especially the PC will be used to collect and collect RFID data. The proposed system provides a solution to the conference attendance problem through data communication handshake hardware and software design coordination between the RFID tag and the RFID reader which is serially interfaced with the computer system.

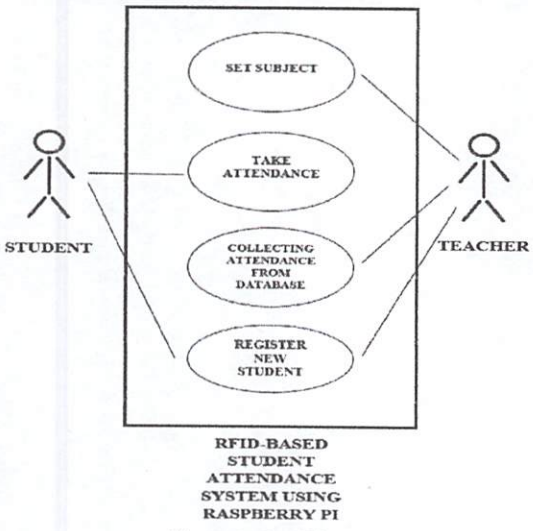


Figure 6. Case Diagram

The case diagram above shows a graphical depiction of the user's possible interactions with the system. The diagram shows two actors which are the student and the teacher. The teacher interacts and acts as the admin that registered a student and sets a subject. While the student interacts with the system by taking attendance.

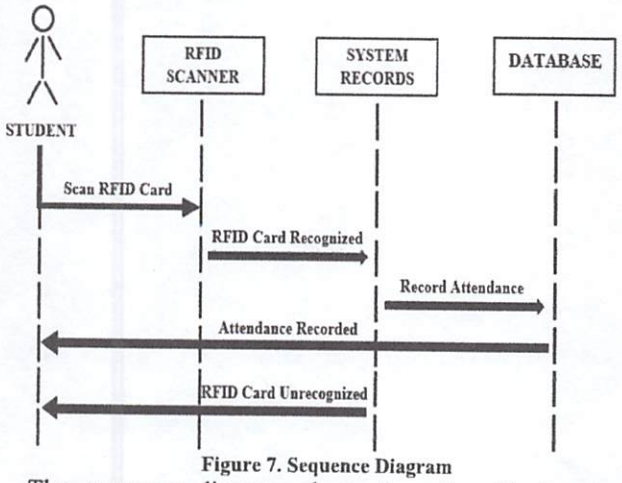


Figure 7. Sequence Diagram

The sequence diagram above (see fig. 6) shows a representation of a timeline that begins at the top and descends gradually to mark the sequence of interactions in the system.

B. Do

The researchers first used the following technologies to develop the RFID-Based Student Attendance System of the project to complete the software and hardware:

1. **Raspberry pi 4**, is a capable little device that enables people of all ages to explore computing and to learn how to program in languages like Scratch and Python. It's capable of doing everything you'd expect a desktop computer to do, from browsing the internet and playing high-definition video, to making spreadsheets, word-processing, and playing games.
2. **Python**, is a computer programming language often used to build websites and software, automate tasks, and conduct data analysis. Python is a general-purpose language, meaning it can be used to create a variety of different programs and isn't specialized for any specific problems.
3. **SQLite**, is a relational database management system contained in a C programming library. It is an open-source SQL database that stores data in a text file on a device.
4. **RFID Reader and Tag**, or Radio Frequency Identification (RFID) refer to a wireless system comprised of two components: tags and readers. The reader is a device that has one or more antennas that emit radio waves and receive signals back from the RFID tag.
5. **VNC Viewer**, or Virtual Network Computing is a graphical desktop-sharing system that uses the Remote Frame Buffer protocol to remotely control another computer. It transmits the keyboard and mouse input from one computer to another, relaying the graphical-screen updates, over a network.

Project Development

Through technology research, the researchers are able to pinpoint the concepts and issues that affect the research study's functionality. The system is being developed with effective planning and study. The bases are made up of all the facts and knowledge discovered via research. The researchers used this to determine which hardware and software were best for the system's operation.

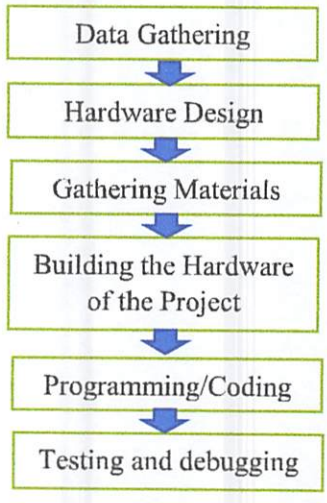


Figure 8. Block Diagram of Stages of Development

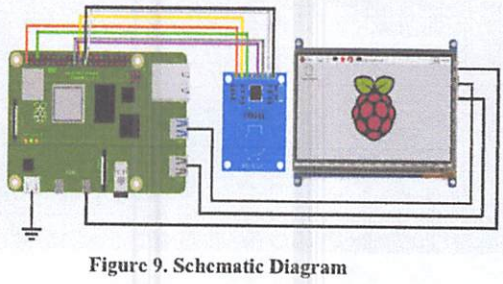


Figure 9. Schematic Diagram

The researchers created a schematic diagram of the system and then wired the necessary components. In creating and coding a software, it must first create the system's Graphical User Interface. Then execute a number of functions in the coding process to the user interface.

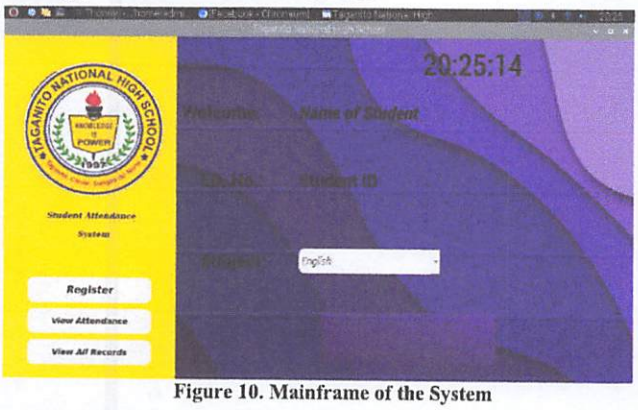


Figure 10. Mainframe of the System

Researchers sought to use the Python programming language primarily for back-end and front-end development. This is due to its efficiency and ease of coding, which makes it easier to maintain and more popular. In frontend development, the researchers design a Graphical User Interface (GUI) of the system to allow a user to interact with electronic devices through graphical buttons and text indicators.

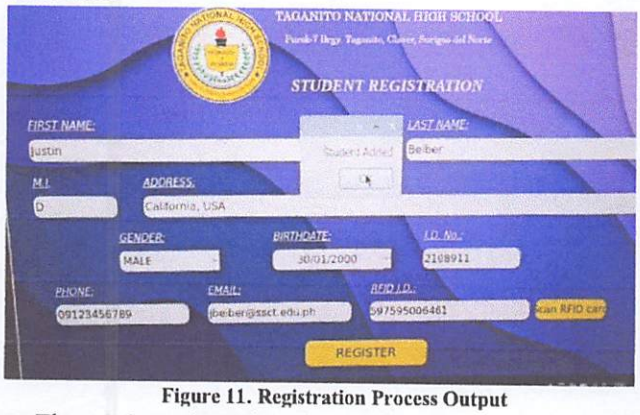


Figure 11. Registration Process Output

The newly registered student information is successfully recorded (see fig. 12).

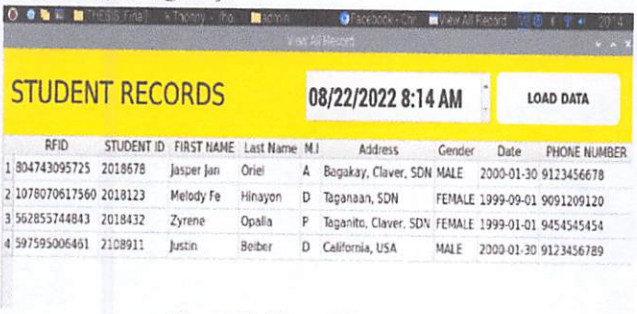


Figure 12. View All Records Output

After making the backend and frontend development, SQLite databases are provided for dependable capacity. It is very versatile and can be broadcast to a large number of servers. We used the Raspberry pi 4 to wire the components.

C. *Check*

After generating the schematic diagram. The researchers debug the software if the data transmitted from the Raspberry Pi 4 to the user interface is correct and test each function if the serial port communicates the software with the microcontroller. Analyze system hardware and software to ensure proper hardware connection.

System Testing

Researchers debug the code to detect errors, identify the cause of the problem, and either resolve the problem or find a solution.

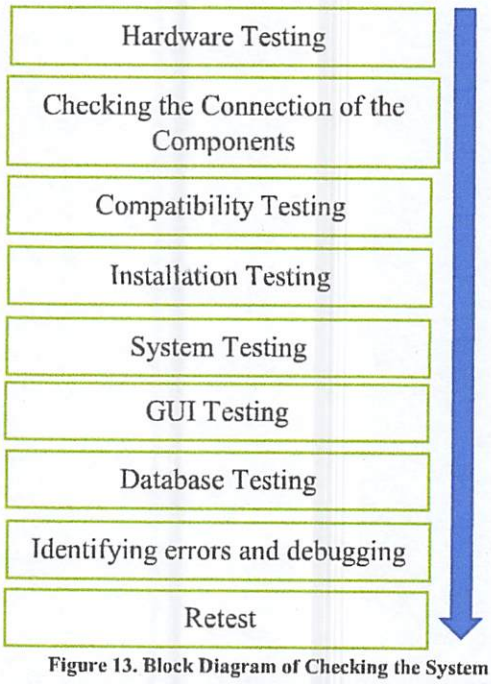


Figure 13. Block Diagram of Checking the System

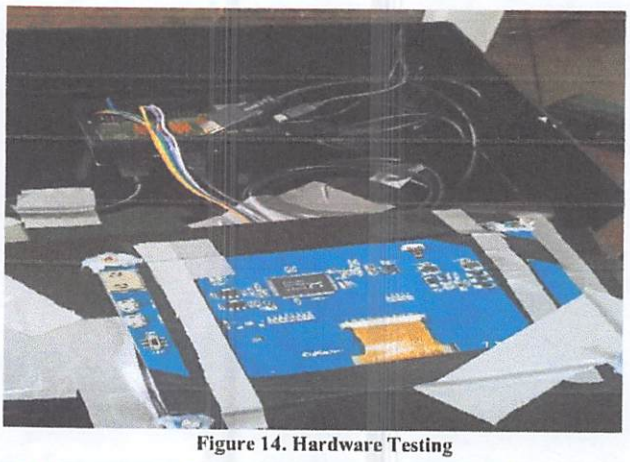


Figure 14. Hardware Testing

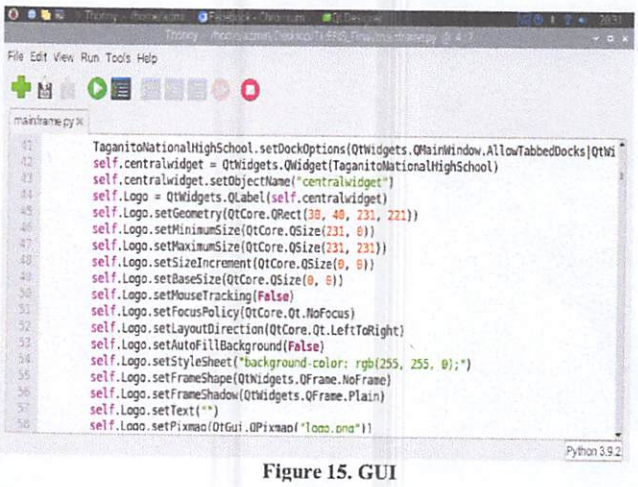


Figure 15. GUI

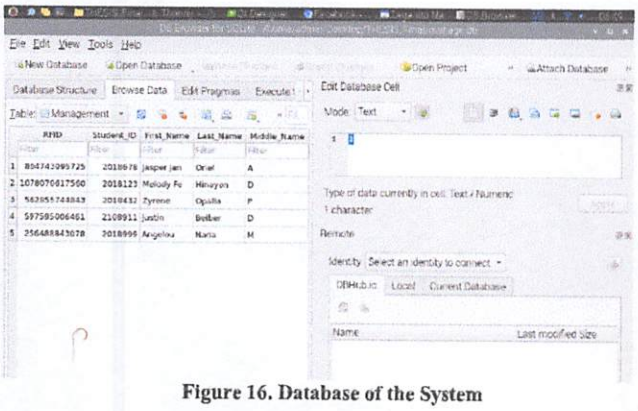


Figure 16. Database of the System

D. Act

Researchers have tested the functionality of the system so that troubleshooting can be completed just before it is installed in the system tree. To complete the system, we carefully connected all the components to the desired location in the actual frame.

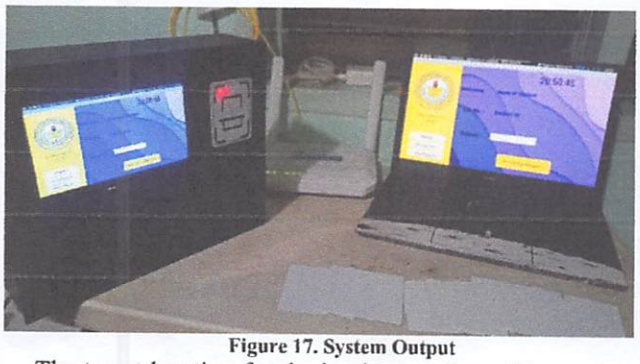


Figure 17. System Output

The target location for the implementation of the project is the Taganito National High School (SHS Building) located in Taganito Claver, Surigao Del Norte. The beneficiary of the project is the SHS STEM-12 students and subject teachers. The researcher took a step to help the target community in terms of new technology for the attendance process.

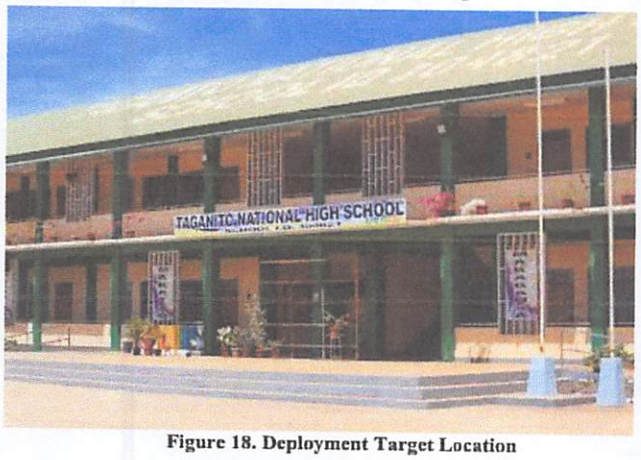


Figure 18. Deployment Target Location

III. RESULTS AND DISCUSSIONS

The researchers came up with a fully functional product that does all of its required tasks. The components are connected carefully to protect breakage from other components, which could produce a system short circuit and damage other components. Then placed in acrylic glass serves as its casing. The researchers stayed on track to test the system's functionality in a basic part of the system so that troubleshooting could be completed quickly before putting it in the system's final configuration.

3.1 Design and Test the Functionality of the System to Register, Record, and Take Attendance

The researchers performed the machine to see if it can register, view records and take attendance.

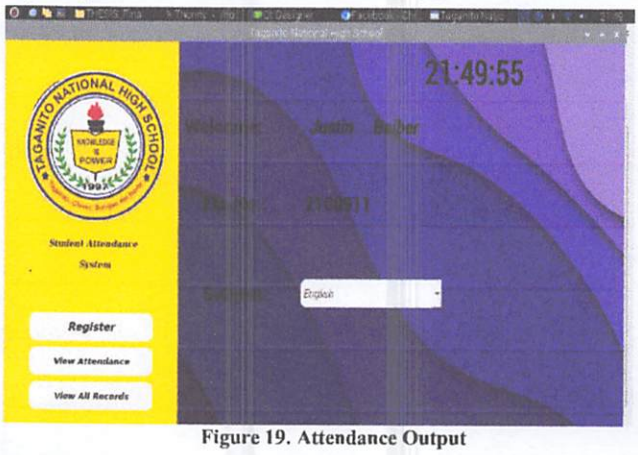
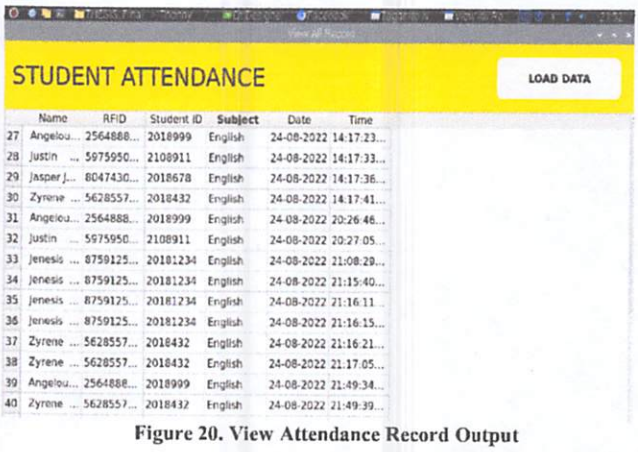


Figure 19. Attendance Output



	Name	RFID	Student ID	Subject	Date	Time
27	Angelou...	2564888...	2018999	English	24-08-2022	14:17:23...
28	Justin ...	5975950...	2108911	English	24-08-2022	14:17:33...
29	Jasper J...	8047430...	2018678	English	24-08-2022	14:17:36...
30	Zyrene ...	5628557...	2018432	English	24-08-2022	14:17:41...
31	Angelou...	2564888...	2018999	English	24-08-2022	20:26:46...
32	Justin ...	5975950...	2108911	English	24-08-2022	20:27:05...
33	Jenesis ...	8759125...	20181234	English	24-08-2022	21:08:29...
34	Jenesis ...	8759125...	20181234	English	24-08-2022	21:15:40...
35	Jenesis ...	8759125...	20181234	English	24-08-2022	21:16:11...
36	Jenesis ...	8759125...	20181234	English	24-08-2022	21:16:15...
37	Zyrene ...	5628557...	2018432	English	24-08-2022	21:16:21...
38	Zyrene ...	5628557...	2018432	English	24-08-2022	21:17:05...
39	Angelou...	2564888...	2018999	English	24-08-2022	21:49:34...
40	Zyrene ...	5628557...	2018432	English	24-08-2022	21:49:39...

Figure 20. View Attendance Record Output

RFID Attendance System Functionality

The researchers did several testing procedures to develop a fully functional end product. Table 1 shows the tabulated result of the first test tackling the speed and accuracy of the RC522 Reader when an RFID tag is scanned through it.

Table 1. RC522 Reader Speed and Accuracy Test Results

No. of Trials	Speed	Accuracy
1	0.6s	100%
2	0.4 s	100%
3	0.4 s	100%
4	0.5 s	100%
5	0.6 s	100%
Average	0.5 s	100%

Based on the results seen in Table 1, the RC522 takes an average of 0.5 seconds to read an RFID tag with 100% accuracy. Table 2 shows the tabulated result of the second test tackling the functionality and output when the entire operation is triggered, from registering a student to saving the records of newly registered students and the attendance record.

Table 2. Testing System Functionality and Output

Categories	Total Processing Time	Functionality	Output
Registration	0.6s	YES	Success
Records	0.6s	YES	Success
Attendance	3s	YES	Success

In the registration category, the system can register a student successfully with a processing time of 0.6 seconds. In the records category, the system successfully recorded the registered information with a processing time of 0.6 seconds. In the attendance category, the system successfully takes and records the attendance using the RFID tags that are scanned by the RFID reader with a processing time of 3 seconds. So far the system is functioning well.

3.2 Implementation of the System

The researchers introduced the fully automated project to the target community which is located at Taganito National High School (STEM-12) Senior High School students.

Figure 21. Taganito SHS Building

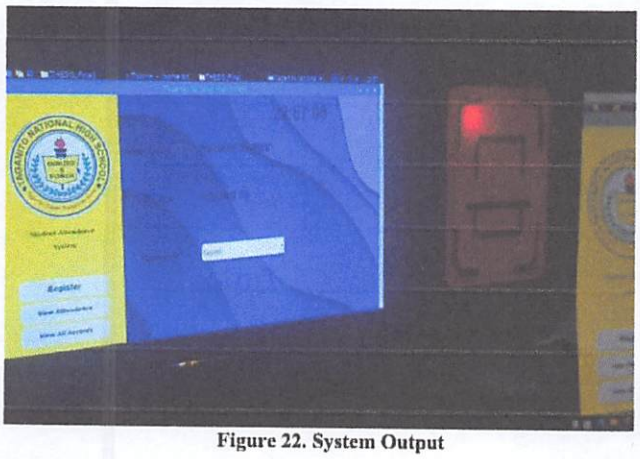


Figure 22. System Output

The researchers first discussed with Stem-12 students together with their subject teacher about the functionality of the system including its use and benefits. Then the researchers taught the teacher about the registration process and give them the chance to experience how to use the system and also three students volunteered to participate in taking attendance using RFID tags/cards.

IV. CONCLUSIONS AND RECOMMENDATIONS

Conclusions

In conclusion, the goal of building an RFID-based student attendance system using raspberry pi has been successfully achieved. In terms of performance and efficiency, this project provided a convenient attendance tagging method compared to traditional attendance systems. Databases helps organize the data better. The system is also user-friendly system and is a universal attendant system because it can edit and retrieve data through the interface. RFID has many applications, as it can be imagine. This article supports the adaptability of RFID to implement a functional, automated student attendance system using raspberry pi that allows students to register attendance using the RFID tags through the RFID reader.

The creation of this project the RFID-Based Student Attendance System using Raspberry Pi has given the students and teachers from STEM-12 of Taganito National High School to facilitate the attendance of students so that the teachers can discuss early. In the implementation of this project the researchers let the teacher and the STEM-12 students on how to use the system and its benefits. The researchers hope that this system will change the guideline for monitoring student attendance in face to face classes and provide a new, accurate, and attractive way to record student attendance at Taganito National High School.

Recommendations

This passive RFID-based student attendance system is an essential limitation as a data acquisition technique with accurate and timely data entry. Therefore limiting this design will be improved in the future by considering the following recommendations:

1. Develop and reduce the weight of prototype designs so that they can be commercialized.
2. Improvements to the system where the system can send announcements via SMS/email so the student will know immediately that her/his attendance has been recorded successfully.
3. Incorporating a facial recognition application will serve to further enhance the biometric security of the system against identity theft by errant students.

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SURIGAO STATE COLLEGE OF TECHNOLOGY

Jerry TELERON <jteleron@ssct.edu.ph>

NOTICE OF ACCEPTANCE: CARAGA HEIs RESEARCH CONGRESS September 15, 2022

2 messages

k12 caraga <k12caraga@ched.gov.ph> Wed, Sep 7, 2022 at 10:55 AM
To: Jerry TELERON <jteleron@ssct.edu.ph>, joriel@ssct.edu.ph, mhinayon@ssct.edu.ph
Cc: Frederick Amihan <famihan@ched.gov.ph>, Noeme Rose Mani <nrmani@ched.gov.ph>

For: **Zyrene B. Opalla1**, Jasper Jan A. Oriel2 , Melody Fe D. Hinayon3 , Jerry I. Teleron4

Congratulations!

Please find herewith the notice of acceptance.

Kindly reply with your contact number and a formal picture (in jpeg or png format) to confirm your attendance. Thank you.

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