

IOT BASED STUDENT ATTENDANCE SYSTEM

P. Ravi Shankar¹ | G. Lalitha² | A. Satya Sravani³ | N. Alekhya⁴ | BH. Vamsi⁵

¹Assistant Professor, ^{2,3,4,5}UG Students, Department of Electronics and Communication Engineering, VSM college of Engineering, Ramachandrapuram, Andhra Pradesh, India

Abstract -

The project aims to develop an IoT based attendance system which gives an information about student's entry and exist timings for both the college management and the parents. We used the Raspberry Pi Pico as the main microcontroller, Buzzer, WIFI Module combined with cloud database and an IoT interface. The system includes a biometric fingerprint reader to verify the identity of the user and a small LCD display to show the attendance status of student.

The attendance information is stored and updated in ThinkSpeak cloud storage and can be accessed and analyzed through a Excel Spreadsheet. The Raspberry Pi Pico acts as the main processing unit of the system, where it collects and verifies the data from the fingerprint reader for this, we use Thonny IDE Software. The attendance information, which can be accessed from any location through the Weblink.

KEYWORDS: Raspberry Pi Pico, Fingerprint Module, LCD Display, WIFI Module, Buzzer.

I. INTRODUCTION

An IoT-based student attendance system is a modern approach to attendance management that uses the Internet of Things (IoT) technology to automate the process of taking attendance in schools, colleges, and universities. The system is designed to be efficient, reliable, and secure, providing accurate attendance data in real-time to help educators make informed decisions.

The system typically consists of several components, including a Raspberry Pi Pico, a fingerprint module, an LCD display, a WiFi module, and a buzzer. The fingerprint module is used to identify students, while the LCD display and buzzer provide feedback to students and educators about attendance status. The WiFi module is used to connect the system to the internet, allowing attendance data to be sent to a cloud-based server where it can be stored and accessed in real-time.

The benefits of an IoT-based student attendance system include improved efficiency, accuracy, and reliability of attendance management, reduced administrative workload, and increased security. Additionally, the system can be customized to meet the unique needs of different educational institutions, making it a flexible and adaptable solution.

II. LITERATURE SURVEY

1. "IoT-Based Smart Attendance System Using Fingerprint Recognition" by Syed

Muhammad Abdullah, Aisha Usman, and Muhammad Faisal Khan. This research paper discusses an IoT-based attendance system using fingerprint recognition for higher education institutions. They used a Raspberry Pi and a fingerprint module to collect attendance data and stored it in a cloud server. The data was analyzed to generate reports using Excel.

2. "Design and Implementation of an Automated Attendance System Using Fingerprint Biometrics" by Oluwaseun

B. Ajayi and Tolulope A. Fowora. This paper presents a design and implementation of an automated attendance system using fingerprint biometrics for tertiary institutions. The system is based on Raspberry Pi and uses a fingerprint scanner to capture attendance data. The system generates daily, weekly, and monthly reports in Excel format.

3. "IoT-Based Attendance System for Classrooms" by B. Lavanya and M. Sivakumar. This research paper presents an IoT-based attendance system for classrooms using Raspberry Pi and a fingerprint sensor. The attendance data is stored in a database and can be exported to an Excel file. The

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When a student enters the classroom, the RFID reader detects the RFID tag and sends the ID to the attendance system. The attendance system then matches the ID of the student with the attendance data, and if there is a match, the attendance is marked as present.



Fig.1.1 RFID

2. FACE RECOGNITION SYSTEM

A FRS (Facial Recognition System) based student attendance system is an IoT- based system that uses FRS technology to accurately and efficiently record student attendance.

The system includes an FRS camera that is placed at the entrance of the classroom. When a student enters the classroom, the FRS camera captures the facial image of the student and sends it to the attendance system for recognition.



Fig.1.2 Face Recognition System

The attendance system matches the facial image of the student with the attendance

data, and if there is a match, the attendance is marked as present. The attendance data is then stored in a database that can be accessed by teachers and administrators for record-keeping and analysis.

IV. PROPOSED SYSTEM

We proposed an IOT based Student Attendance System using Raspberry Pi Pico which overcomes Excited device drawbacks and gives student attendance as entry and exit timings information to the parents and the college management.

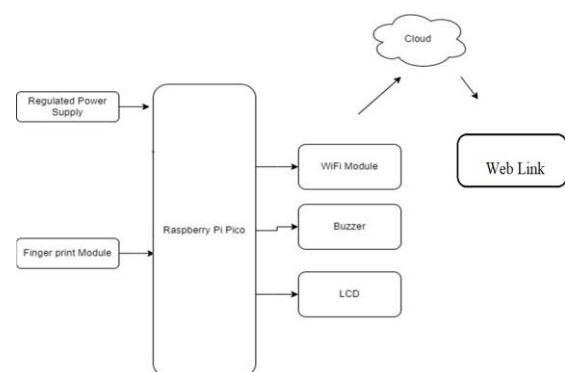


Fig.4.1 Block Diagram

V. SOFTWARE

Thonny is an Integrated Development Environment (IDE) for the Python programming language that is designed to make the process of learning and teaching programming easier and more efficient. The name "Thonny" is derived from Python's mascot, a friendly-looking snake named Monty. Thonny IDE has several features that make it ideal for beginners, including a simple and intuitive user interface, code highlighting and indentation, code completion, debugging, and

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step-by-step execution of code. It also includes a built-in Python shell that allows users to run code directly in the IDE and see the results immediately.

One of the main benefits of Thonny IDE is its focus on education. The IDE is designed to be user-friendly and approachable, with clear explanations and tutorials on how to use each feature. This makes it a popular choice for teaching programming in schools and universities, as well as for self-learners who are just starting out with Python.

Overall, Thonny IDE is a powerful and user-friendly development environment that is particularly well-suited for beginners who want to learn Python programming.

VI. METHODOLOGY

The methodology for developing an IoT-based student attendance system involves several steps, which are outlined below:

1. **System Analysis:** In this phase, the requirements and specifications of the system are defined. This includes identifying the features and functions of the system, as well as the hardware and software components required to implement the system.
2. **Design:** In this phase, the system architecture is designed, including the data flow, database schema, and system components. The user interface is also designed in this phase.
3. **Implementation:** In this phase, the system is implemented using the chosen

hardware and software components. The code for the system is written and tested, and any bugs or errors are resolved.

4. **Testing:** In this phase, the system is tested to ensure that it meets the requirements and specifications defined in the first phase. This includes functional testing, integration testing, and user acceptance testing.
5. **Deployment:** In this phase, the system is deployed to the production environment, and any necessary training and support is provided to the users.
6. **Maintenance:** In this final phase, the system is maintained and updated as needed to ensure that it continues to meet the requirements of the users.

Throughout the development process, it is important to follow best practices for software development, including using version control, documenting the code and system design, and following a rigorous testing process.

VII. ADVANTAGES

- Accuracy
- Time Saving
- Real Time Monitoring
- Accessibility
- Cost Effective
- Integration with other Systems

APPLICATIONS

- Schools and Universities
- Online Learning Platforms
- Corporate Training Programs
- Workshops and Conferences

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- Events and Festivals

VIII. EXPERIMENTAL RESULTS

IX. CONCLUSION

In an IoT-based student attendance system using Raspberry Pi Pico, LCD display, WiFi module, buzzer, fingerprint module, and

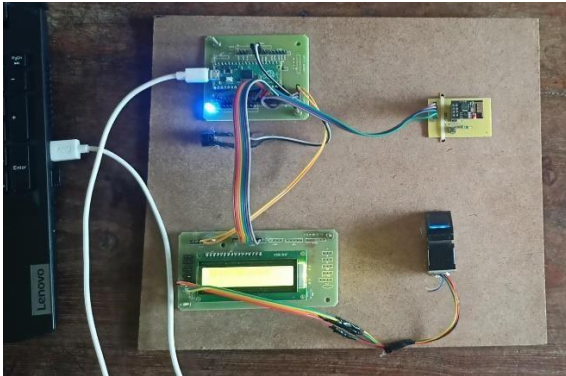


Fig.8.1 Final Project



Fig.8.2 Input

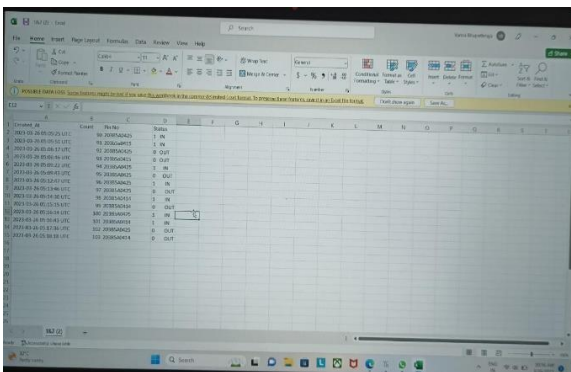


Fig.8.3 Output

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Excel spreadsheet is a comprehensive digital solution that offers numerous benefits for attendance tracking in educational institutions. The system provides accurate and reliable attendance records by using biometric technology to capture attendance data in real-time. The data is then transmitted to a cloud-based server, where it is processed and generated into an organized Excel spreadsheet format. This format enables authorized personnel such as teachers and administrators to access and manage attendance records conveniently and efficiently.

The use of Raspberry Pi Pico, LCD display, WiFi module, buzzer, and fingerprint module provides a user-friendly and intuitive interface for students and teachers to interact with the system. The LCD display and buzzer provide immediate feedback on attendance status, while the fingerprint module ensures that attendance data is accurate and secure.

X. FUTURE SCOPE

The fingerprint-based attendance management system was implemented in the future work may consist of creating the database of students which contains the academic details of the students. We can send the academic details of the students periodically to the parent's mobile along with the attendance report.

The future scope of IoT-based student attendance system is very promising as technology continues to advance, and the need

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for accurate and efficient attendance tracking remains essential in educational institutions

REFERENCE

Here are some references for IoT-based student attendance systems using Raspberry Pi Pico, Fingerprint Module, LCD Display, WIFI Module, Buzzer, and output through Excel spreadsheet:

1. K. Al-Khafaji, A. Al-Khafaji, and H. Al-Sabti, "IoT-Based Automatic Student Attendance System," 2018 International Conference on Computer, Control, Electrical and Electronics Engineering (ICCCEEE), 2018. Link:

<https://ieeexplore.ieee.org/document/8620968>

2. S. S. H. R. Alshahrani, M. A. Alshehri, and A. M. Alzahrani, "IoT Based Attendance System Using Fingerprint Recognition," 2019 4th International Conference on Computing Sciences (ICCS), 2019. Link:

<https://ieeexplore.ieee.org/document/8927075>

[27075](#)

3. D. D. Pham, H. T. Tran, and D. Q. Nguyen, "IoT-based Smart Attendance System Using Raspberry Pi," 2020 IEEE RIVF International Conference on Computing and Communication Technologies (RIVF), 2020. Link:

<https://ieeexplore.ieee.org/document/9094144>

[94144](#)

4. T. M. Thanh, H. T. Pham, and V. T. Truong, "IoT-Based Attendance System with Raspberry Pi and Fingerprint Recognition," 2020 3rd International Conference on Computer Communication and the Internet (ICCCI), 2020. Link:

<https://ieeexplore.ieee.org/document/9202831>

[02831](#)

5. K. M. Saravanan, K. C. Kalyan, and B.

P. Priyadarshini, "IoT-Based Smart Attendance System Using Raspberry Pi and Fingerprint Module," 2020 11th International Conference on Computing, Communication and Networking Technologies (ICCCNT), 2020. Link:

<https://ieeexplore.ieee.org/document/9225372>

[25372](#)