

Internet of Things Based Employee Presence System Model Using the Agile Method

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ABSTRACT

PT Syntax Corporation Indonesia operates in the F&B sector and requires a computerized employee attendance information system to provide precise, fast, and accurate information. The attendance process and recap calculations are still performed manually, which is time-consuming. With a computerized system, this research aims to analyze an Internet of Things–based employee presence system model using Agile methods. The method used to design and analyze the system’s advantages and disadvantages is the Agile methodology. The development flow is as follows: (1) Definition of Requirements, (2) Design, (3) Coding, (4) Testing, and (5) Operation and Maintenance. The results of this study indicate that the information system can minimize employee fraud in manipulating attendance and make it easier for institutions or companies to obtain detailed employee attendance and departure information. The implementation of an Internet of Things (IoT)–based employee presence system is an effort to facilitate employees in recording attendance and generating employee attendance reports. Based on tests and surveys on the use of an Internet of Things (IoT)–based presence system, it achieved an average usability of 79.16%, efficiency of 83.78%, and portability of 74.33%. The use of an Internet of Things (IoT)–based employee attendance system can simplify the attendance process, record employee attendance data, and reduce the risk of losing paper-based attendance records. This system can also improve the overall effectiveness and efficiency of attendance management through automation.

Keyword: employees; agile; internet of things.

INTRODUCTION

In the current technological era, companies or organizations must keep up with changes in information system technology (Widiati et al., 2015). The role of attendance information systems is to increase effectiveness and facilitate employee attendance (Cahya, 2020). The attendance information system in a company is expected to be a solution for organizational needs (Huda, 2025). An information system is an interconnected unit that gathers (collects and retrieves) information, processes it, stores it, and distributes it to support decision-making and control within an organization (Etika Profesi, 2018).

PT. Syntax Corporation Indonesia is a company engaged in education consulting services and the food and beverage (F&B) business. Generally, the system currently in operation is still carried out manually. The employee attendance information system currently in use is still manual in the form of handwritten records (Kabir, 2021; Kurniawan & Alviana, 2019). Calculating attendance recaps is also done manually, requiring accuracy and considerable time, and the data is not computerized. Therefore, a computerized system is needed to provide more accurate information to employees and company owners in a flexible, fast, and accurate manner (Aji et al., 2020).

In line with the rapid development of increasingly advanced information and communication technology, the use of information technology in the workplace has also proliferated. Technology can be used to help overcome problems in the work environment. One of its applications is providing real-time employee attendance information to company owners. A technology that can be used to provide real-time reports to company owners is an Internet of Things (IoT)-based employee presence system (Aji et al., 2020). Subsequent research was conducted by Robby Tan, Djoni Setiawan Kartawihardja, and Ivan Christian, designing and implementing an employee presence system in a computer laboratory utilizing RFID technology (Tan et al., 2017).

Further research states that the implementation of an Android-based online presence system can be accessed immediately through a server owned by the office and is equipped with a security system. It is developed using HTML, PHP, and the Google Maps API programming interface to monitor marketing positions (Khoir et al., 2018). According to (Oktaviani, 2018), a microcontroller is an integrated circuit (IC) that contains a Central Processing Unit (CPU), Read-Only Memory (ROM), Random Access Memory (RAM), and Input/Output (I/O). With the presence of the CPU, the microcontroller can carry out processing tasks based on the program embedded within it. Microcontrollers are widely used in automated electronic equipment, such as fax machines and other devices. They can also be considered small, low-power computers, allowing them to operate using battery power (Nurnaningsih, 2018).

Radio Frequency Identification (RFID) is a general term used to describe a system that transmits the identity (typically in the form of a unique serial number) of a person or object wirelessly using radio waves (Sonjaya, n.d.). RFID systems consist of several main components, including input (tag), reader, and data storage (database) (Purnomo & Heru Supriyono, 2017).

According to (Zenari et al., 2020), the Real-Time Clock (RTC) in this system functions as a timekeeping device so that time data does not reset when the system loses power. RTC modules are used in personal computers, embedded systems, and servers and are present in electronic devices that require accurate timekeeping. The RTC can continue functioning even when the main system power is off by using a backup battery.

This research aims to create an employee attendance system based on the Internet of Things (IoT) and to use the Agile method as an iterative development approach. In this system, employee attendance data is collected through IoT devices connected to an internet network, enabling attendance information to be gathered and processed automatically in real time.

Testing activities are carried out using a black-box testing approach to ensure that the application functions properly and produces outputs according to the specified inputs. This testing aims to achieve the desired results based on the system design (Hidayat et al., 2023).

METHOD

In this study, the authors used a descriptive method, which describes a situation or problem that is currently occurring based on facts and data obtained and collected at the time of the research. Data collection techniques used in this study are

a. Observation

Data collection by direct observation of the research object, by recording essential matters related to the report's title to obtain complete and accurate data.

b. Interview

Data collection using direct communication and interviews with related parties such as the author conducted interviews with PT's Informatics Engineering administration staff. Syntax Corporation Indonesia.

c. Study of literature

Collect data by reading books and articles about ESP32 ESP32-Based Attendance Applications, RFID, PHP, MYSQL, and other supporting devices.

The analysis technique used in this study is a quantitative analysis using the Likert Scale method, the Likert Scale then the variables to be measured are translated into variable indicators. Then these indicators are used as a starting point for compiling instrument items in the form of statements or questions. The development process starts from specification analysis to changes to existing software rather than creating new software.

The concept of Agile Software Development was coined by Kent Beck and 16 of his colleagues, stating that agile software development is a way of building software by doing it and helping others build it simultaneously (Rianto et al., 2022). The Agile Software Development method is a software development approach that focuses on teamwork, response to change, and delivery of quality products on an ongoing basis. This software development philosophy is oriented to iterative and incremental processes and produces high-quality code. The development process involves the customer directly (Mahendra & Yanto, 2018).

Several software development models include agile software development methods, namely 1) Extreme Programming, 2) Adaptive Software Development, 3) Dynamic Systems Development Method, 4) Scrum Model, and 5) Agile Modeling. In this study, the model to be used is the Scrum model. The scrum model is a fast (agile) software development method (Lutfiani et al., 2020). Scrum principles conform with the principles found in rapid tool development methods that guide software development activities, such as requirements fulfilment, analysis, design, and delivery. The series of activities in the scrum model consist of 1) Backlog Activities, 2) Sprints Activities, 3) Scrum Meeting Activities, and 4) Demos (Fahlevi & Riyanto, 2022).

RESULTS AND DISCUSSION

Based on the research results, several objectives that form the basis of the research are the analysis and implementation of an Internet Of Think (IOT) based employee attendance system using agile methods. This system is easy to use on the attendance system processing side and for employees by accessing the present application. From the results of the analysis of the implementation of the employee attendance system, the aim is to provide accurate, fast and accurate employee and owner attendance information in managing employee attendance at PT. Syntax Corporation Indonesia.

Research Stage

The application of the agile method consists of several stages, namely analysis, design, coding, and testing.

a. Analysis

The analysis focuses on exploring the wishes of the management of PT. Syntax Corporation Indonesia is the right solution through interviews, a basic understanding of the applied applications and obtaining ideas about the project being made.

Table 1. Problems and Solutions

Problems faced	Solution to problem
How to design an employee attendance system that can make it easier for company owners to absent employees.	Designing an IOT-based employee attendance tool with RFID so owners can easily monitor employees and no longer need manual attendance.
How can the attendance process with this prototype be more effective than the conventional method?	Using this prototype design should be more effective because the process for employee attendance is very efficient and saves time because the owner does not have to wait for employees to take attendance and write it down manually.

Design

1. Current flowchart

Current System Flow Chart on a CV. Yana Sport is still running manually by signing a presence on the paper provided.

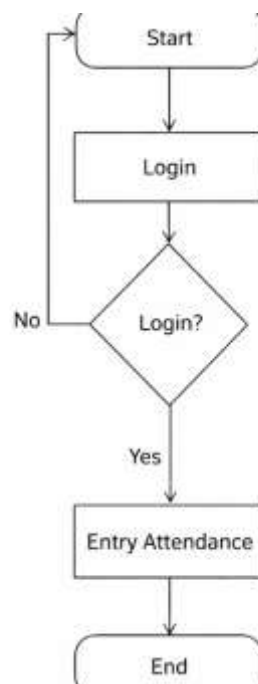


Figure 1. Current flowchart

2. proposed flowchart

The proposed flowchart on the CV. Yana Sport, all attendance recording is done automatically by attaching the card to the attendance device assembly, which is appropriately systemized.

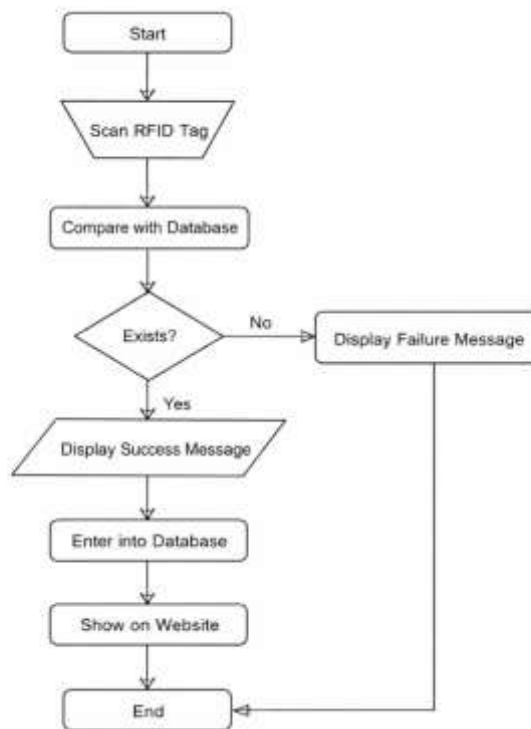


Figure 2. The proposed flowchart

3. The Proposed Use Case Diagram

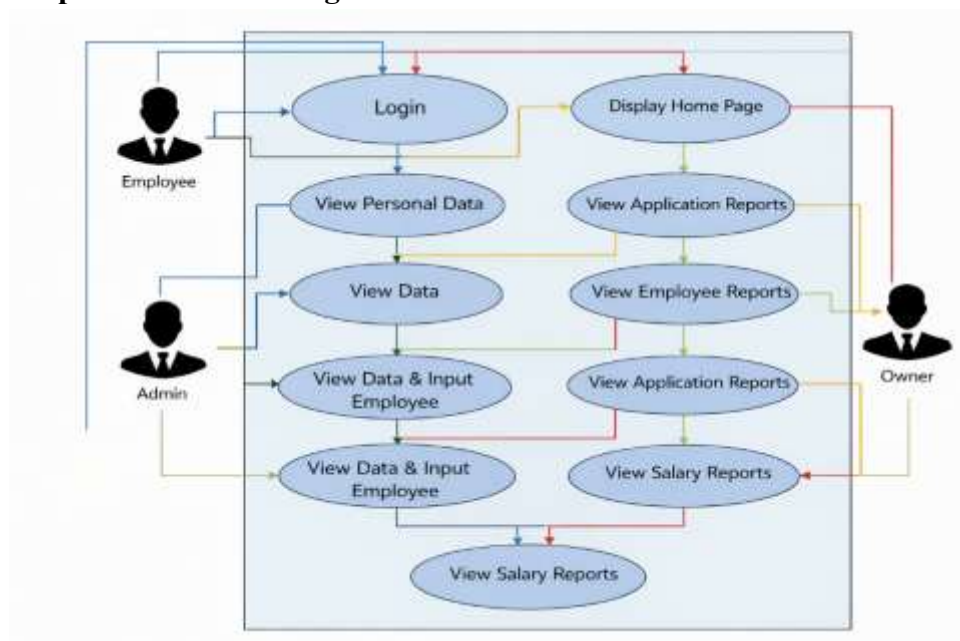


Figure 3. The Proposed Use Case Diagram

Based on the Use Case Diagram above, there are:

1 (one) system for processing employee payroll data.

3 (three) actors who carry out activities namely Admin, Employees and Owners.

8 (eight) Use Cases that can be carried out by actors.

The scenario procedure of the proposed use case diagram is as follows:

1. Login Procedure

a. Use case : Show Login

b. Actor : Employee, Admin, Owner

c. Scenario :

i. The actor opens the Employee presence information system application

ii. The system displays the Login page

iii. Actor logs in

2. Procedure for Displaying Home

a. Use case : Show Login

b. Actor : Employee, Admin, Owner

c. Scenario :

i. The actor logs in.

ii. The system displays the home page

iii. The actor performs an activity or exits the application.

3. Procedure Displays employee personal data

a. Use case : Displays employee personal data

b. Actor : Employee,

c. Scenario :

i. The actor logs in.

ii. The system displays the home page

iii. The actor chooses to display personal data on employees

4. Procedure Displays employee reports

a. Use case : Displays employee reports

b. Actor : Admin, Owner

c. Scenario :

i. The actor logs in.

ii. The system displays the home page

iii. The actor selects the report menu.

iv. The system displays the employee report menu

v. Actors view employee report data

5. Procedure Displays employee data and input

a. Use case : Displays employee data and input.

b. Actor : Admin,

c. Scenario :

i. The actor logs in.

ii. The system displays the home page

iii. The actor displays the employee data and input menu

- iv. Actors fill in data
- 6. Procedure Displaying payroll reports
 - a. Use case : Display payroll reports
 - b. Actor : Admin, Manager
 - c. Scenario :
 - i. The actor logs in.
 - ii. The system displays the home page
 - iii. The actor selects the report menu
 - iv. The system displays the payroll data menu
 - v. The actor selects the payroll data menu
 - vi. The system displays the payroll data page.
 - vii. Actors view payroll data

4. Class Diagrams

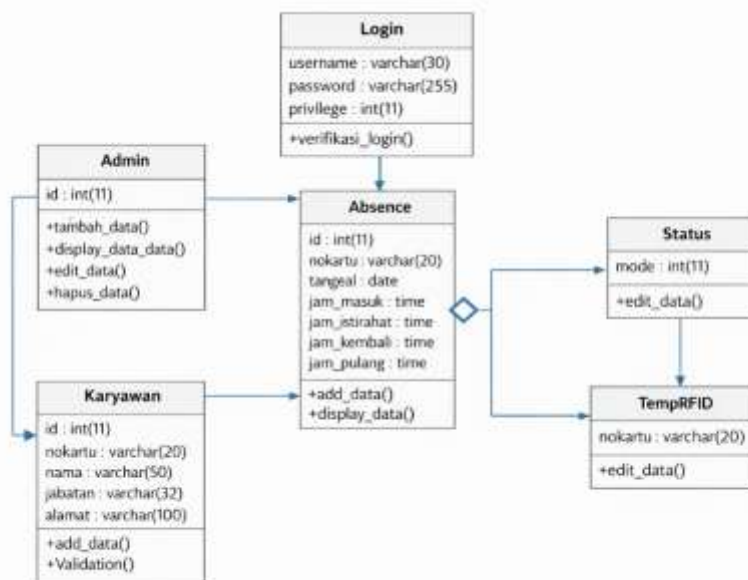


Figure 4. Class Diagrams

a. Database Specifications

Database specification is a database design that is considered normal. The database design describes the storage media used, primary key, record length, etc. The database specifications used in the system to be built are as follows:

a. Attendance

Table of Attendance (Presence) is a table to accommodate all employee attendance data.

b. Employee

c. Status

The Status table is a table for changing attendance mode, mode 1 = entry, mode 2 = break time, mode 3 = return from break and mode 4 = go home

d. Tmprfid

The Tmprfid table is a table for storing or reading the RFID card number which will be displayed on the website temporarily.

e. User

The User table is a table that contains owner or admin data information that is used to access the employee presence information system.

5. Home Design



Figure 5. Home Design

This design is in the form of a start page when the user executes the web application. The RFID tag is attached to the RFID scanner so the data will be automatically registered and if it has been registered then the employee can log in, if he has not registered then contact the admin department.

6. Employee Data Design

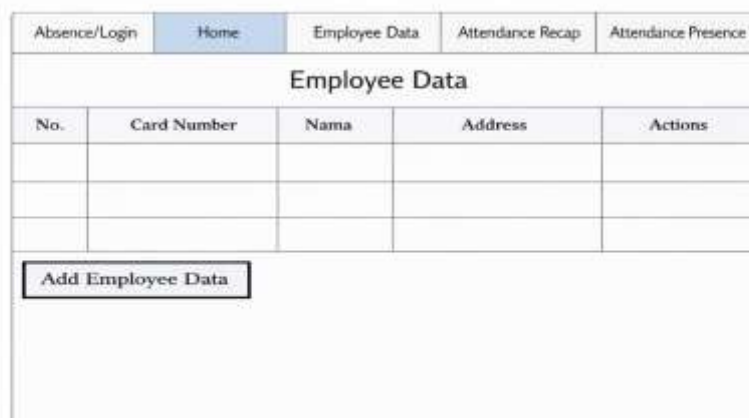


Figure 6. Employee Data Design

In the initial display of employee data, there are several buttons and their respective functions. For the "Add employee data" button to add new employee data.

7. Employee Presence Form Design

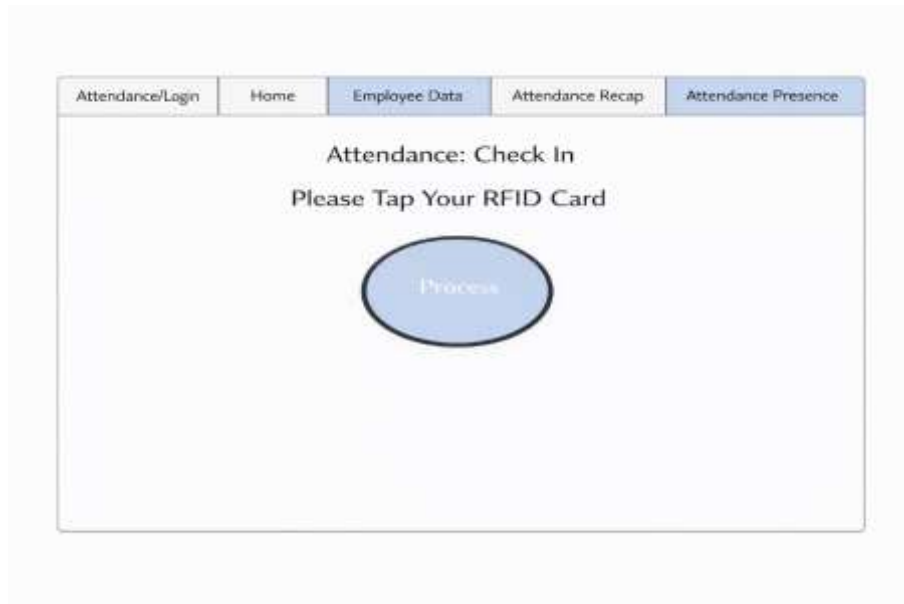


Figure 7. Employee Presence Form Design

After the process of filling in employee data has been completed, the data is immediately stored in the database, then for attendance it is done by the admin first after that the employee begins to fill in the attendance that has been determined. To activate Admin presence and Employee attendance, you can scan available cards

Home page

1. Home page



Figure 8. Home

This design is in the form of a start page when the user executes the web application. The RFID tag is attached to the RFID scanner so the data will be automatically registered and if it has been registered then the employee can log in, if he has not registered then contact the admin department.

2. Employee data



Figure 9. Employee Data

When filling in employee data input there is a "Save" button used to add new employee data

3. Employee Presence Form



Figure 10. Employee Presence Form

4. Presence Tool



Figure 11. Presence Tool Assembly

System Testing

1. System Feasibility Test

Testing the system's feasibility determines the user's reaction to the formed application. This test was tried using a questionnaire (questionnaire) method (Hadi et al., 2022). The instrument used in this study was a questionnaire that submitted several assessment criteria to respondents based on predetermined indicators. Using a Likert scale on criteria items, each alternative answer contains a different value.

Table 2. Presence System Test

Aspect	Percentage
Usability	79.16%
Efficiency	83.78%
Portability	74.33%

2. BlackBox

Table 3. Black Boxes

Testing	Test result	Information
Login	Login successfully and display the Main Page	Valid
Home page	The system will display the Home page	Valid
Employee data	The system will display the employee data page	Valid
Add Employee Data	displays the added employee data page	Valid
Edit Employee Data	displays the employee data edit page	Valid
Presence Display	displays the Card Attendance page	Valid
Login Presence View	displays Notification Time Card Check-in "Welcome...."	Valid
Rest Presence Display	displays Notification of Time Card Attendance break "Happy Rest..."	Valid
Presence View Returns	displays Time Card Notification hour after the break "Welcome back..."	Valid
Home Presence View	displays Notification of Time Card Attendance home "Goodbye..."	Valid
Presence report display	Display attendance reports by time	Valid
Export MS. excel	Successfully exported attendance report data	Valid

Support (Support) or maintenance (Maintenance)

1. Tool maintenance

By checking that each component is installed correctly and the power voltage required by the tool

2. Databases

By backing up data every week/month.

The results of the analysis of identifying needs in the employee attendance process after using an Internet of Think (IOT) based attendance system are as follows:

- 1) With the employee presence feature, it makes it easier for employees to attend by attaching a card to an RFID device and knowing the time of attendance – until they go home in detail.
- 2) Facilitate employees making/recording attendance reports by exporting data to the specified time.
- 3) The system feasibility test obtained good results, namely: Usability (Usability) of 79.16%, Efficiency (Efficiency) of 83.78% and Portability of 74.33%

CONCLUSION

An Internet of Things (IoT)-based employee attendance system improves the process of recording and managing employee presence by making attendance more convenient, automating report generation, and reducing the risk of lost paper-based records. The system

also enhances operational effectiveness for company owners through real-time data access and streamlined monitoring. Based on testing and user surveys, the system demonstrates good performance, with usability at 79.16%, efficiency at 83.78%, and portability at 74.33%, indicating that it is generally effective and acceptable for practical use. For future research, it is recommended to further improve system portability and integration with mobile platforms, as well as enhance security features and scalability to support broader organizational needs.

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