PROTOTYPE ARCHITECTURE OF RFID TECHNOLOGY AS A VERIFICATION DEVICE ON THE WEB-BASED APPLICATION OF SPARE PART ORDERING SYSTEM STUDI-IN PT SINERGI UTAMA BANDUNG

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ABSTRACT

PT. Sinergi Utama Bandung is one of the companies engaged in the Maintenance, Service and Development. PT. Sinergi Utama do the work by a team of Workshop consisting of the Technician Leader as a recipient of the Work Order from the Director of the company, the responsible Technician do the job in accordance with Work Order under the supervision of the Technician Leader, Warehouse Staff as being solely responsible for the stock of spare parts as well as the flow of incoming spare parts out. Ministry in PT. Sinergi Utama insufficient in information system of spare parts are not available, where information on the availability of spare parts needed to complete the work can be obtained. Information systems stock of spare parts is very used to help the work being done by the technicians. And RFID technology applied to support making the report available spare part stock in the warehouse. Based on functional testing and user testing, this spare part ordering system information system supported by RFID technology allows the head technician, and Warehouse staff in monitoring and reporting the flow in and out of spare part. As for the technician helps in terms of filing the spare part needed to complete his work.

Keywords : spare part, RFID, stock, information systems, Technician, Warehouse Staff

1. PRELIMINARY

Spare Part (Parts) is a component of the instrument and electrical control equipment which is reserved for the repair or replacement of damaged parts of the machine. Spare parts are the main factors that determine the course of the electronic control system in an engine. So that these parts have a significant role in a series of production processes of a company. PT. Sinergi Utama Bandung is one a company engaged in the sale of services Maintenance, Service and Development. Services PT. Sinergi Utama Bandung conducted by a team workshop, which consists of Technician Leader as the recipient of the work order of the Director of the Company, technician responsible for carrying out the work in accordance with the work order under the supervision of Technician Leader, Warehouse Staff as fully responsible for the stock of spare parts and the plot out spare part. Services at PT. Sinergi Utama less than the maximum when the system information about spare parts are not available, in which information regarding the availability of spare parts needed to complete the work can be obtained.

Filing system of ongoing spare parts still rely on paper as the main medium. This causes the technician is difficult to know the availability of the required spare part, due to the availability of spare parts are only available in the Warehouse Staff. Availability of spare parts and not even this piled neatly arranged in the warehouse. Warehouse Staff often complain that the process of finding spare parts often repeated checks on the same spare parts. It is often complained of by the

technicians due to slow in completing the work.

In the filing system of ongoing spare parts technician must write its needs and submit it to the Technician Leader for approval, after which it went into Warehouse Staff Technician to obtain spare parts needed. This filing system requires several checks by the Technician Leader in coordination with Warehouse Staff. So frequent delays in the completion of work by Technicians caused by the slow coordination of Technician Leader and Warehouse Staff.

The slowness is due to the coordination of the documents that are still in the form of paper piled up so it was difficult to find a list of spare parts available stock in the warehouse. Coordination between the Technician Leader with Warehouse Staff is also often constrained by several documents groove and out of spare parts were missing.

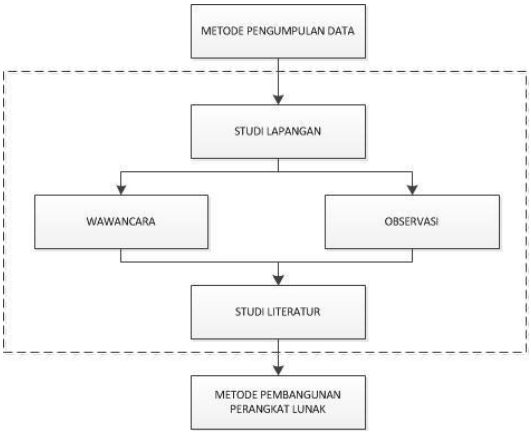
Based on the background described above, then the problem in this research are:

1. The filing system spare parts that exist today have not been computed so that Warehouse Staff is difficult to locate the position and the number of spare parts available.
2. To apply for the required spare part needs Technicians must write and submit it to the Technician Leader for approval, after which it went into Warehouse Staff Technician to obtain spare parts needed.
3. Preparation of reports stock of spare parts and spare part discharge inflows still refer to the notes in the form of paper so frequent errors due to the loss of some records

Based on the problems described above, the purpose of this research is to build and implement RFID for applications Parts Ordering System at PT. Sinergi Utama,, The purpose of this study is:

1.Technicians facilitate in filing the required spare part
2.Application of Radio Frequency Identification (RFID) as a search tool spare part.
3. Facilitate the manufacture of spare parts inventory report and the flow in and out of the spare part by Warehouse Staff.

The method outlined in Figure 1.1 Research to be conducted in this study.



Picture 1,1, Flow research

2. LITERATURE REVIEW

2.1 Company History

PT. Sinergi Utama is a private company that has a long experience in the field of repair, maintenance and Control Instrument & Electrical Equipment in the Industry. The company has been conducting its business since it was founded in 2002. The company was established in the city on March 30, 2002 based on the Deed Notari No. 10 Notary Rasman, SH, and has approval from the Minister of Justice and Human Rights of the Republic of Indonesia by decree No. C-08 166 HT.01.01.TH.2002 on May 13, 2002. Based on the decision, the company set out as a Limited company, which became PT. Sinergi Utama.

At this time PT. Sinergi Utama are committed to improving the company's performance through the application of technology management and the restructuring of the Company's overall dumulai of the company logo, vision and mission, organizational structure, human resources, information systems up to management. The company's commitment is built with the aim of improving customer satisfaction significantly to produce quality work and on time.

PT. Sinergi Utama established to serve and help in dealing with problems of repair and maintenance Control Instrument & Electrical Equipment in the Industry. As for the employees who are members of this company are the people who are knowledgeable and experienced in the field long before the company was incorporated. The company is engaged in the repair and maintenance of Control Instrument &

Electrical Equipment in the Industry. Adapaun scope of work in the field of repair and maintenance Control Instrument & Electrical Equipment in the Industry as follows:

1. Maintenance
2. Repairing
3. Redesign
4. Assessment & Inspection

PT. Sinergi Utama in quality control as a reference for the work provided by the customer and has a modern supporting equipment to support all the work.

2.2. Parts Ordering System

Spare Part (Parts) is a component of the instrument and electrical control equipment which is reserved for the repair or replacement of damaged parts of the machine. Spare parts are the main factors that determine the course of the electronic control system in an engine. Ordering (reservation) is the process works, how to order or book. Booking is one of the activities in a company. The ordering helps determine the amount of the warehouse inventory. System when seen from the characteristics of a system composed of the parts are linked and operate together to achieve some suggestion or intent. means a system made up of elements that can be known sebaagai complementary because it has a purpose, goals, and objectives.

2.3. RFID

RFID (Radio Frequency Identification) is a technology that can help the company to handle the data. Many companies are slow to warm up the idea of using RFID to improve the effectiveness and efficiency of business processes, applications and data multiplies the cost savings. RFID is one of the innovation system that provides storage and transmission of data entry is easy, safe and fast. It is used in many places such as stores, hospitals, companies parmacy, logistics service and others. Where the real time data should be used (Brown, 2007, Miles et al., 2008). [1]

2.4. RFID systems

Generally, RFID (Radio Frequency Identification) is divided into 4 parts of the system [2], namely:

a. RFID tags
b. Antenna
c. RFID reader
d. Software application

2.5. How RFID Works

RFID systems work in general, fit a tag on the object. RFID tags inside there is a transponder that has a digital memory so that it can provide a unique electronic code. Equipment has a tag reader antenna with a transceiver and decoder, generates a signal to activate RFID tags, so that it can send and receive from the tag. When an RFID tag passes through the electromagnetic zone tag reader equipment, the RFID tag detects the activation signal from the tag reader equipment, and transmit the return signal in accordance with stored in the memory tag in response. Equipment tag reader then translates the data transmitted by the RFID tag according to the needs. [3]

Picture 2.1. How RFID Works

2.6. Internet of Things (IOT)

Currently the Internet of Things (IOT) get a lot of attention from researchers since become a promising technology human life smarter with the concept of the ability to communicate between objects, machinery and any co-exist with humans. IOT represents a system which comprises an object in the real world as well as the sensors are mounted or combined with these objects, connect to the Internet or through a wired or wireless network structure. [4]

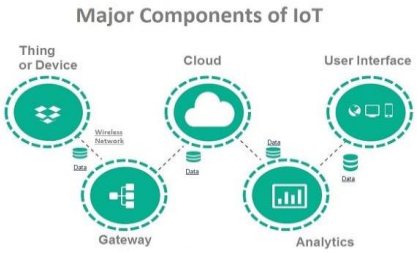
Figure 2.2. How RFID Works

2.7. Main Components IOT

Each technology has a definite must-have standaritas system, and the system is always associated with the components, if one component is missing the system will not run with the maximum, as well as also by the IOT. [5]

Components that should be owned by IOT are:

1. Things.
2. Gateway.
3. Cloud.
4. Analytics.
5. User interface.



Picture 2.3. Main Components IOT

2.8. analysis System

The analysis is part of a system of separation of components of a complete system into certain parts are intended to identify and evaluate the problems, opportunities, problems such as barriers that occur and the expected needs so that it can be proposed improvements to the system for the better.

2.9. Problem analysis

Analysis of the problem is the stage of elaboration of the problems that exist before the application is built and aims to assist the development of applications Parts Ordering System (SPOS) is. Analysis of existing problems include the following:

a. Spare parts ordering system that exists today has not been computed, so that the documents in the form of paper stock to accumulate and are not structured properly.
b. The technician must write the needs of spare parts and sends it to the Technician Leader to get peretujuan, after approval by the technician must return to the Leader to take the approved list after the new technician can go to the Warehouse Staff to obtain spare parts needed
c. Manufacture of spare parts inventory reports and inflows in the discharge of spare parts still refer to the notes in the form of paper so frequent errors due to the loss of some records.

2.10. Analysis System Running

This analysis is done so that the software is built not out of the scope of spare parts ordering system that will be built. Based on the research that has been done, there are procedures that are running, the spare parts ordering procedures, and procedures for making spare part.

2.11. Flow Distribution Spare Parts

a. Warehouse Staff buy spare parts from the supplier (Supplier).
b. Warehouse Staff create a list of spare parts that have been purchased
c. Technicians make a submission list of spare parts
d. Technicians submitted a list of spare parts were submitted to the Head Technician
e. After the submission of the list of spare parts approved by the Technician Leader and Technicians carry a list of filing parts to Warehouse Staff
f. Warehouse Staff provides spare parts filed by the technician in accordance with the submission of a list of spare parts

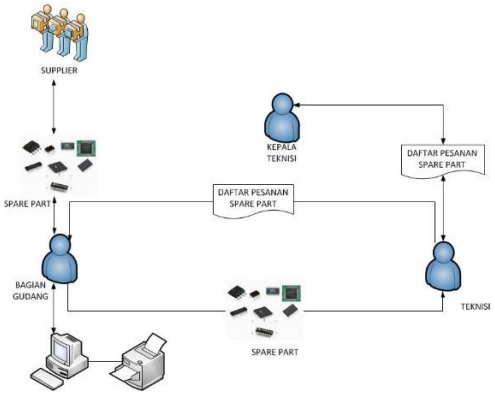


Figure 2.4. Flow Distribution Spare Parts

2.12. Analysis of the Proposed System

analysis sistem proposed by problems that have been described above, the researchers proposed a system that will be built are:

a. Warehouse Staff buy spare parts from the supplier (Supplier).
b. Warehouse Staff provides RFID tags on every spare part that has been purchased.
c. Technicians make the required spare part orders through the Application Parts Ordering System.
d. Kepala Technicians check the spare part orders submitted if it is appropriate Work Order.
e. After the list of spare part orders approved by the Technician Leader and Technicians carry name Tag (RFID tags) to Warehouse Staff.
f. Warehouse Staff paste Name Tag to the RFID Reader.

g. Application Parts Ordering System will display the required order.
h. Warehouse Staff prepare a spare part.
i. Warehouse Staff inspect parts using RFID Reader that products are not mixed up.
j. Warehouse Staff Returns Name Tag and provide the required spare part.
k. Application Parts Ordering System automatically reduces the amount of stock of spare parts that have been taken

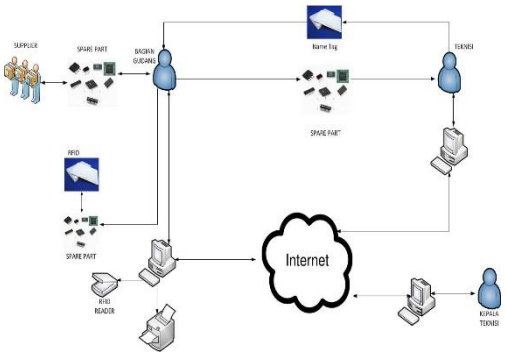


Figure 2.5. Flow Distribution Parts Proposed

2.13. The Business Rules Progress

Business rules contained in the PT. Sinergi Utama effect in every business process with the parties involved in the process of ordering spare parts. The business rules that apply are as follows:

a. Warehouse Staff purchases spare parts from multiple suppliers (Supplier).
b. Warehouse Staff create a list of spare parts purchased from suppliers (suppliers).
c. Warehouse Staff store spare parts in place that has been provided.
d. Warehouse Staff distributes spare parts to Teknsi already ordered and received approval from the Technician Leader.
e. Warehouse Staff reports every spare part that has been distributed.

2.14. System Architecture

The system's physical architecture to be built consisting of users, namely Technicians, Technician Leader, Warehouse Staff, suppliers, RFID Tag, RFID Reader, Detection Equipment and spare parts Spare Parts Ordering System applications. Can be seen in Figure 2.5. following

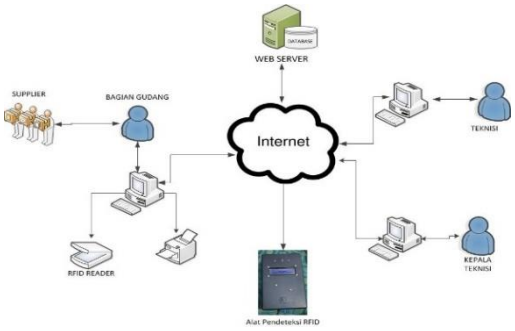


Figure 2.6. System Architecture

a. Technicians make a reservation of spare parts after getting the Work Order of the Technician Leader.
b. Technician Leader Perform validation of the order.
c. Technicians come Warehouse Staff to take the spare part to carry RFID tags to be scanned.
d. Once RFID is scanned it would appear that the computer technician orders Warehouse Staff.
e. Once the order is received Technicians then the amount of stock items in the database automatically reduced.
f. Warehouse Staff Print Report groove out of the spare part.

2.15. Network analysis

Network analysis in this study can be seen in Figure 2.6.

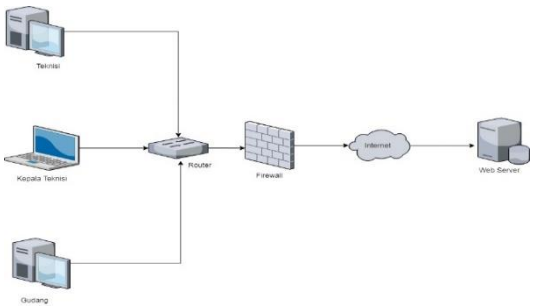


Figure 2.7. Network analysis

a. Technician's Computer function for ordering spare parts dibutuhan Technician to complete the job
b. Technician Leader's Computerorders serves to confirm Technician
c. Warehouse Staff's Computer serves to verify the order has been confirmed by the Technician Leader and report the flow in and out of spare parts

d. Router responsible for managing the data traffic between the computer and connect to the Internet network.
e. firewall serves to protect the company's digital assets from attacks by hackers or data thieves
f. web Server responsible for storing all the data contained in this application

2.16. Functional analysis

As functional needs analysis for a description of the process that will be implemented in the system and explain the necessary requirements in building Parts Ordering System at PT. Sinergi Utama, the system is required to have a functional system requirements are:

a. The system can help ordering Spare parts needed by technicians to complete the job easier and saves time.
b. The system can generate reports inflows in the discharge of spare parts more accurately and efficiently so that Warehouse Staff can work more effectively.

2.17. Use Case Diagram

Use Case Diagram is the highest part of fungsionalitias owned system that will describe how a person or actor will use and exploit the system. Use case diagrams in this application can be seen in Figure 2.8.

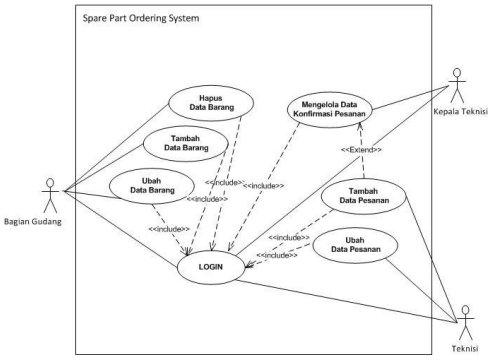


Figure 2.8. Diagram usecase

a. definitions Actor

Below is a description of the defining actors in the application of spare parts ordering system in PT. Sinergi Utama

No.	Actor	Description
1	Warehouse Staff	Warehouse Staff is the person in charge and have access rights to perform operations on the data management application Spare Parts Ordering System
2	Head of technician	Technician Leader is a person whose job is to order confirmation management operations
3	technicians	Technician is the person in charge and can perform order management operations

2.18. Designing Spare Part Detector

Develovment spare part detector is the overall picture of how the tool is to be built in terms of hardware implementation to support Spare parts ordering system has been made.

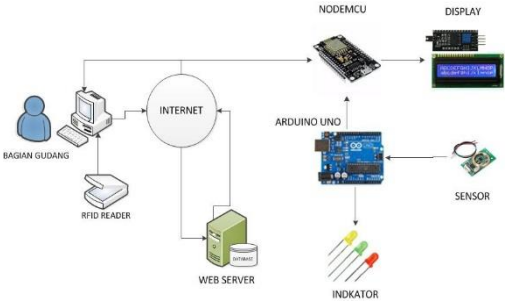


Figure 2.9. Tools workflow scheme

2.19. Hardware Implementation

Tools are made can be seen in Figure 2.10. Spare Part Detector Equipment

Figure 2.10. Spare Part Detector Equipment

2.20. Components Used

The components used in the manufacture of these tools are as follows:

No.	Name	Information
1	NODEMCU	Recipients of data from WEB
2	Arduino Uno	RFID Data Processing
3	UART 125KHz RFID Reader	RFID sensor
4	Display 16x2	Displaying Data Items
5	Led 5mm	Indicator

2.21. Interface Implementation

1. Login Interface

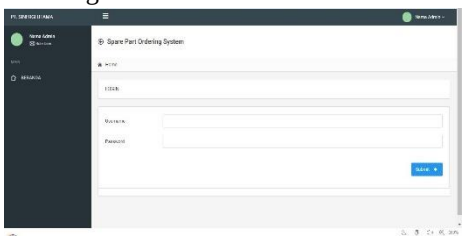


Figure 2.11. Login Interface

2. Warehouse Staff Interface

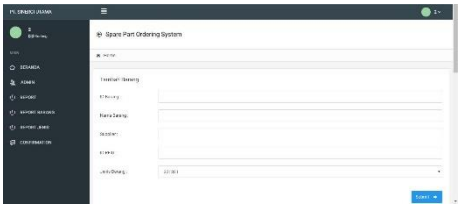


Figure 2.12. Warehouse Staff Interface

3. Technician Interface

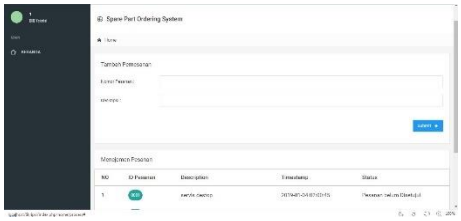


Figure 2.13. Technician Interface

4. Technician Leader Interface

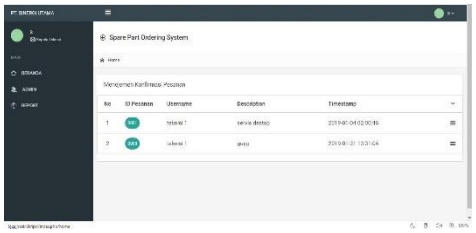


Figure 2.14. Technician Leader Interface

5. Spare part retrieval interface

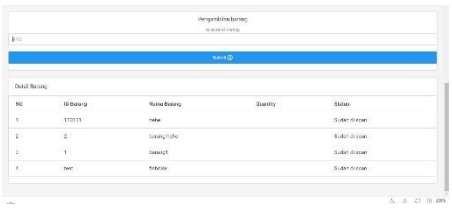


Figure 2.15. Spare Part retrieval interface

2.22. Black Box Testing

1. Testing Data Delivery of spare part

Application Testing Results				
Tested Component	**Screenshots**	**scenario Testing**	**Expected results**	**Test result**
Data Delivery Spare part		Sending data items from the application to the device	Tool displays the name of the spare part	(✓)Be accepted ( )Rejected

2. Spare Part Data Verification Testing

Application Testing Results Case Data Properly				
Tested Component	**Screenshots**	**scenario Testing**	**Expected results**	**Test result**
Spare Part Data Verification		RFID Card Scanning items on the search appliance spare part	Tool Displays "Spare part Matches" on the screen	(✓)Be accepted ( )Rejected

2.23. Conclusion Testing Black Boxes

Based on black box testing has been done before, it can be deduced that:

1. Application of this spare part ordering system has managed to send data to the spare parts spare parts Detection Tool.
2. Detection appliance spare parts have been successfully matched the data sent from the application of this spare part ordering system with the spare part sought.

3. CLOSING

3.1. Conclusion

Based on the results of the implementation and testing that has been created it can be concluded as follows:

1. Applications spare parts ordering system has been successfully storing data online spare part on a web server that can be

known by technicians when they wanted to submit a list of spare parts needed.
2. Application of this spare part ordering system to assist the Technician Leader and Warehouse Staff in monitoring the stock of spare parts available in the warehouse.
3. Application of this spare part ordering system has managed to create a report incoming and outgoing flow of spare parts automatically in PDF form that can not be manipulated by any party.
4. Application of this spare part ordering system has managed to send data to the spare parts spare parts Detection Tool.
5. Detection appliance spare parts have been successfully matched the data sent from the application of this spare part ordering system with the spare part sought.

3.2. Suggestion

The suggestions can be given to the construction of a system that has been created for further system development can be explained as follows:

1. Extra features of the filing of a spare part is not available in the warehouse either by Technicians or Technician Leader.
2. The addition of a notification feature on the application so that all users know if there are updates to the data.
3. Spare time reading on the detector will be improved in order to speed up the search time.

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