

Production Process Monitoring System for RFID-Based SMEs and the Internet of Things

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Abstract

Micro, Small, and Medium Enterprises (UMKM) illustrates business being run either by private, home households, as well as business entities size small. this venture's own role is important in the growth and industry of a country. In these global economic times, In this case, MSMEs are demanded to carry out replacement To use upgrade energy it's competitive. One aspect that means what you want to ensure energy MSME competitiveness is technology information (IT). Adana Sugar Ants " is one of the UMKM which is located in Penggung Hamlet, RT.70/RW.21, Hargorejo , Kokap , Kulon Progo , Yogyakarta. Problems faced by SMEs Adana Sugar Ants are many get quota excess orders for certain events like celebration day large and delivery of goods throughout Indonesia, namely the checking process goods still production done manually with record in the book so that needs a long time and thoroughness by personnel. The objective of the study This is designing tools that simplify the checking process of goods production. So that from study This produces A Production Process Monitoring System for RFID-Based SMEs and the Internet of Things.

Keywords : System, Monitoring, UMKM , Internet of Things, RFID

1. INTRODUCTION

Micro, Small, and Medium Enterprises (SMEs) describe businesses that are run by individuals, households, or small business entities. This business has an important role in the development and industry of a country. Nearly 90% of the total businesses in the world represent the contribution of MSMEs (Rahmana 2009).

In the current global economic era, MSMEs are required to make changes in order to increase their competitiveness. One important aspect that wants to ensure the competitiveness of SMEs is information technology (IT). The use of IT can enhance business transformation through the speed, accuracy, and efficiency of exchanging large amounts of data. Most importantly in terms of the production monitoring process (Rahmana 2009).

"Adana Sugar Ants" is one of the SMEs that has problems. The problem comes when these MSMEs get excess order quotas for certain events such as holiday celebrations and delivery of goods to all regions of Indonesia, namely the process of checking production goods which is still done manually by recording it in a book so it requires a long time and accuracy. by personnel. Based on these problems, we need a technology that is able to identify production goods effectively, accurately, and efficiently.

Based on this description, the author will create a tool to facilitate the process of checking production goods, namely "Production Process Monitoring System for MSMEs based on RFID and the Internet of Things" at "Adana Gula Semut" which is located at Penggung Hamlet, RT.70/RW. 21, Hargorejo, Kokap, Kulon Progo, Yogyakarta.

2. RESEARCH METHODS

In accordance with the title compiled by the author, namely about the Production Process Monitoring System in RFID-Based SMEs and the Internet of Things at Adana Gula Semut Penggung Hamlet RT.70 or RW.21, Hargorejo, Kokap, Kulon Progo, which is based on Google Spreadsheet, then in this research it will design and build a sensor that can assist manufacturers in monitoring ongoing production in real-time. This tool can display the results of production that are already running, then the data that has been read by the RFID will be processed into Google Spreadsheet.

2.1. Flow chart

As described in the flowchart if the system starts with initialization, it applies tool configuration and RFID material. Initialization is attempted using the contribution of the MFRC522 library to apply the configuration of the RFID content. after that, the reader will apply the check to the tag included in the interrogation. after that, the reader will check whether the tag can be detected or not. If no tag has been successfully identified by the reader, the reader will repeat checking the tag. However, if there is a tag that is successfully identified then the tag sends its Unique ID to the reader and the reader will share that information with the device to be displayed on NodeMCU and completed activities. The flowchart image can be seen in Figure 1 below.

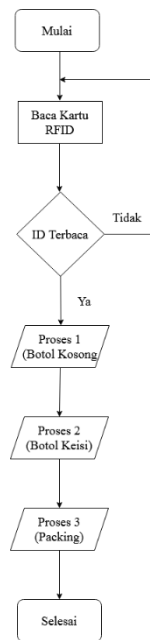


Figure 1. Flowchart

2.2. System Design

System design It means design physique for A process flow on A area production using the application of RFID. System design Can see in Figure 2.

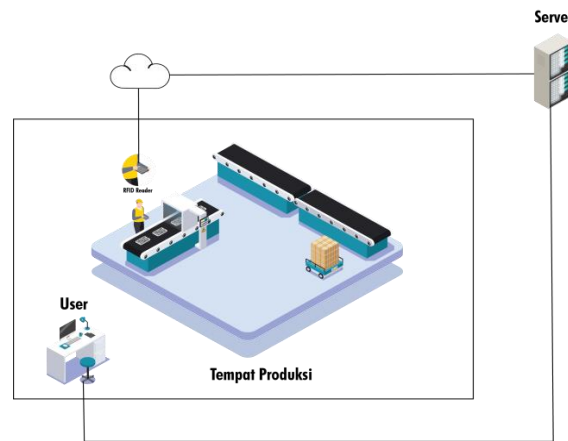


Figure 2. System Design

2.3. Design Hardware

This hardware design will describe the combination of components used in the manufacture of telemonitoring devices. The illustration of the component circuit can be seen in Figure 3 below.

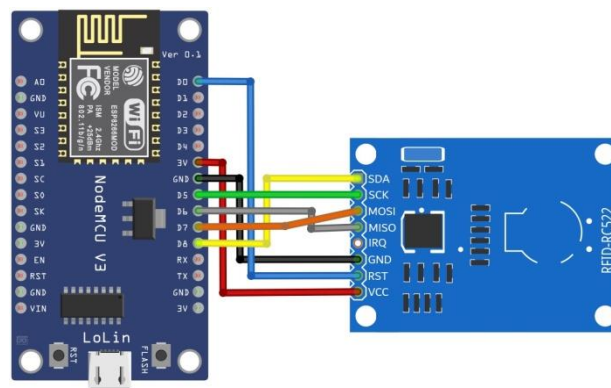


Figure 3. Hardware Design

2.4. Interface Design

Interface system design describes the shape of the system. The interface will be implemented later. The design of an implementation system for monitoring the MSME production process at Adana Sugar Ants based on Google Spreadsheet can be seen in Figure 4 below:

Proses Produksi Minuman Adana Gula Semut					
No	Nama	Rasa	Jenis	Kode	Proses
1	Chocmut	Coklat	Minuman	AB01	Botol Kosong
2	Chocmut	Coklat	Minuman	AB01	Botol Keisi
3	Chocmut	Coklat	Minuman	AB01	Packing
4					
5					
6					

Figure 4. Application Display Design.

3. RESULTS AND DISCUSSION

The chapter discusses the results of the system that has been made. This test is attempted to identify whether the system can run as it should or not using the predetermined test area and is carried out according to the design and the programming. The information generated from this test, design, and manufacturing process monitoring system utilizing RFID connected to a NodeMCU-based spreadsheet.

3.1. Tool Prototypes



Figure 5. Tool Prototype

Following This appearance MSME monitoring system in Adana Gula Ant can be seen in Figures 6 and 7 :

```

terbaru_banget2 | Arduino 1.8.19
File Edit Sketch Tools Help

terbaru_banget2

#include <Arduino.h>
#include <ESP8266WiFi.h>
#include <SPI.h>
#include <RF24.h>
#include <HTI19SRedirect.h>

#include <Wire.h>

const char *scriptId = "AKKzycvwh8CBSRFPDq6ImE4q4ns640Velt-baf_of_q03Wk5tB6Uze88_q7betChjkkRp_41A";
const char *ssid = "Room 21";
const char *password = "pelukduludong";

String payload_base = "{\"command\": \"insert_row\", \"sheet_name\": \"Sheet1\", \"values\": ";
String payload = "";
const char *host = "script.google.com";
const int httpsPort = 443;
const char *fingerprist = "";
    
```

Figure 6. Arduino IDE

	A	B	C	D	E	F	G
1	Date	Time	Nama	Rasa	Jenis	Kode	Proses
2	20/10/2022	5:23:04	Chocmut	Coklat	Minuman	AB01	Botol Kosong
3	20/10/2022	5:22:52	Choco	Anggur	Minuman	AB02	Botol Kosong
4	20/10/2022	5:22:27	Chocmut	Coklat	Minuman	AB01	Botol Keisi
5	20/10/2022	5:22:17	Chocmut	Original	Minuman	AB03	Botol Kosong
6	20/10/2022	5:19:55	Choco	Anggur	Minuman	AB02	Botol Keisi
7	20/10/2022	5:19:27	Chocmut	Original	Minuman	AB03	Botol Keisi
8	20/10/2022	5:19:18	Chocmut	Coklat	Minuman	AB01	Packing
9	20/10/2022	5:18:57	Choco	Anggur	Minuman	AB02	Packing

Figure 7. Google Sheets

3.2. Testing in place of SMEs

This testing phase is carried out directly at the UMKM, along with pictures and descriptions can be seen below



Figure 8. Labeled Bottle

In the description of Figure 8 above, a drink bottle that has a sticker tag attached that is ready to be scanned using an RFID reader.



Figure 9. The bottle is scanned before filling

In the description of Figure 9 above, it can be explained that the empty bottle has been given an RFID tag sticker and is ready for the scanning process.



Figure 10. The bottle is scanned after filling

In the description of Figure 10 above is a bottle that has gone through the process of filling the drink and goes straight to the next process.



Figure 11. Scan Finishing Process

The description of Figure 11 above is the finishing process after going through the previous processes which are ready for packing

3.3. System Testing on Google Sheets

Test data on monitoring the production process using RFID connected with Google Sheets. The result of testing the Suite monitoring system using the connected RFID Google Spreadsheet can see in Table 4. below this :

<https://journal.upy.ac.id/index.php/ASTRO/index>
 Table 4. Google Spreadsheet test results

Date	Time	Name	Flavor	Type	Code	Process
20/10/2022	5:23:04	Chocmut	Chocolate	Drink	AB01	Empty Bottle
20/10/2022	5:22:52	Choco	Wine	Drink	AB02	Empty Bottle
20/10/2022	5:22:27	Chocmut	Chocolate	Drink	AB01	Keisi bottle
20/10/2022	5:22:17	Chocmut	Original	Drink	AB03	Empty Bottle
20/10/2022	5:19:55	Choco	Wine	Drink	AB02	Keisi bottle
20/10/2022	5:19:27	Chocmut	Original	Drink	AB03	Keisi bottle
20/10/2022	5:19:18	Chocmut	Chocolate	Drink	AB01	Packing
20/10/2022	5:18:57	Choco	Wine	Drink	AB02	Packing

3.4. Sensor Distance Testing with Tag Stickers

Trial _ distance reading sensor RC 522 wearing Tried Tag Sticker wearing rule. Measurement distance RFID RC522 wearing RFID Tag aims To use know RC522 RFID range capable Read RFID Tags capable note in the following table 5 this.

Table 5. Testing Distance Reader with Mifare 13.56

No	ID tags	Distance(cm)	Results
1	Mifare 13.56	0cm	sis detected _
2	Mifare 13.56	0.5cm	sis detected _
3	Mifare 13.56	1cm	sis detected _
4	Mifare 13.56	1.5cm	sis detected _
5	Mifare 13.56	2cm	sis detected _
6	Mifare 13.56	2.5cm	sis detected _
7	Mifare 13.56	3cm	sis detected _

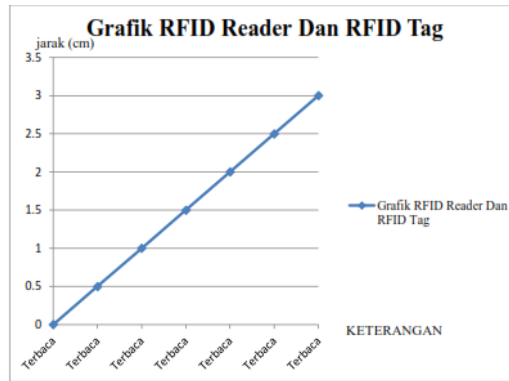


Figure 12. Graph of RFID Reader with RFID Tag

4. CONCLUSION

From the results already researched obtained conclusion is as follows:

- 1) this tool can work well and Sticker RFID can be legible on RC522.
- 2) Nodemcu 8266 can connect with Google Sheets with Good without existence -an inhibition.
- 3) Conveyor Belts can work smoothly and get used To make it easy to work within MSMEs

5. SUGGESTION

Based on studies and reviews, the following is that's all Lot's recommendations which are expected able as input and materials considerations :

- 1) The size of the antenna used must be bigger, at least use distance to reach a minimum reading of 1 meter.
- 2) Use of RFID reader wears hand Enough influence wave electromagnetic so that reading must closer.

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