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DESIGN AND BUILD A PROTOTYPE INTERNET OF THINGS BASED ON COOKING OIL DISTRIBUTION AT PT. LION SUPER INDO JATIBENING

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Abstract

The scarcity of cooking oil is the main factor for PT LION Superindo Jatibening to make provisions for limiting the purchase of cooking oil. Of course, some people use this to commit fraud in purchasing, namely, buying cooking oil beyond the predetermined limit by repurchasing it after a few hours from the previous purchase. Of course, some use this to cheat on purchasing cooking oil over the predetermined limits of repurchase within a few hours of previous purchases. Thus, the governmental tribunician is disproportionate to other customers, so many are not getting cooking oil. RFID technology (radio identification) to make automated systems as authentication media and security systems. The system is a card reading that contains the user or item data. This technology assists in limiting purchases to greater efficiency, safety, and protection of people against the repurchasing of cooking oil. Fry oil distribution systems use IoT devices by applying PHP programming language based on websites that can be accessed and integrated with MySQL databases as data storage. For IoT devices, the main device uses NodeMCU esp8266 as a microcontroller and rc522 RFID reader as a module to read RFID cards configured using microcontroller software.

Keywords: Internet Of Things, RFID, NodeMCU ESP8266, Oil Distribution

Abstrak

Kelangkaan minyak goreng menjadi factor utama PT LION Superindo Jatibening untuk membuat ketentuan batasan pembelian minyak goreng. Hal ini tentunya dimanfaatkan oleh beberapa oknum untuk melakukan kecurangan dalam pembelian, yaitu melakukan pembelian minyak goreng melebihi batasan yang sudah ditentukan dengan cara melakukan pembelian ulang setelah beberapa jam dari pembelian sebelumnya. Oleh sebab iu, pendristribusian menjadi tidak merata kepada customer lainnya sehingga banyak yang tidak mendapatkan minyak goreng. Teknologi RFID (Radio Frequency Identification) banyak digunakan dalam pembuatan system otomatis sebagai media otentikasi dan sebagai sistem keamanan. Sistem tersebut berupa pembacaan kartu yang berisikan data barang atau data pengguna. Teknologi ini menjadi suatu sarana yang dapat membantu dalam membatasi pembelian agar lebih efisien, aman, dan terhindar dari okum yang melakukan pembelian minyak goreng secara berulang. Sistem pendistribusian minyak goreng menggunkan perangkat IoT yaitu dengan menerapkan bahasa pemrograman PHP berbasis website yang bisa diakses dan terintegrasi dengan database My SQL sebagai penyimpanan data. Untuk perangkat IoT, perangkat utamanya menggunakan NodeMcu ESP8266 sebagai Mikrokontroler dan RC522 RFID Reader sebagai modul untuk membaca kartu RFID yang kemudian akan dikonfigurasi menggunakan software mikrokontroler

Kata kunci: Internet Of Things, RFID, NodeMCU ESP8266, Distribusi Minyak

INTRODUCTION

The scarcity of cooking oil in modern retail shopping centers is caused by distributors' obstruction of supply and specific individuals' actions (Wahyudi, 2022). It makes it difficult for people to get cooking oil in modern retail shopping centers. Several factors are also associated with the scarcity of this cooking oil (Ilmu et al., 2022), including the rising oil price (Rosmiati et al., 2022). The price of oil on the world market has increased from $1100 to $1340 per drum. Domestic producers choose to sell it abroad rather than domestically.

It causes a change in household consumption patterns because people are worried about the transmission of the virus, which makes people reduce their activities outside the home. As of January 19, 2022, at 00.00 local time, a new policy from the Minister of Trade was enacted, the price of packaged cooking oil is Rp. 14,000.00/liter. However, this policy is ineffective because traders in traditional markets and stalls have not received precise information about the mechanism for replacing subsidies. It causes prices outside retail stores to still apply according to the wholesale value, thus causing people to experience panic buying conditions. Thus, as of February 1, 2022, Permendag Number 6 of 2022 concerning the Highest Retail Price (HET) of Palm Cooking Oil is applied. For bulk cooking oil, HET is applied at IDR 11,500 / litre, packaged cooking oil is IDR 13,500 / litre, and premium packaged cooking oil becomes IDR 14,000 / litre (Nasution, 2022).

The Indonesian Consumers Foundation (YLKI) stated that the release of subsidized cooking oil at IDR 14,000 / litre should be followed by a policy of limiting purchases, in line with the rampant wholesale or panic buying actions carried out by consumers. In retail, Superindo Jatibening has implemented a method of limiting oil purchases to reduce the panic buying figure. Superindo Jatibening applies a maximum purchase per customer per day, as much as two litres, but many cheat by buying past the purchased quota. It has led to a new factor in the scarcity of cooking oil in modern retail today.

The technology developing today is one of the supporting aspects of all. Technological developments include developing control systems on attendance systems, parking cards, door security access systems etc. (Lusiana Utari et al., 2022).

The distribution channel is one of the marketing mix elements that holds a vital role in marketing activities. Sometimes these channels are called trading or marketing channels (Setiyarti & Wardhana, 2018).

The selection of a distribution channel strategy becomes a problem the company faces. The company must determine whether to distribute its products centrally in only a few regions or spread throughout the region (Subagyo, 2016).

Distribution strategy is concerned with determining the distribution channels used by the company to deliver its goods and services until they arrive in the hands of consumers (Hernanta, 2017). Radio-Frequency Identification (RFID) is a technology that uses radio waves to automatically identify an object or human being both remotely and nearly (Yoanda, 2017). Security systems using RFID technology can only be accessed using one e-KTP (Afandi, 2021). Digital transaction systems using this RFID turned out to be more profitable than conventional transaction systems in terms of effectiveness and safety. This one RFID card can make it easier for humans to access digital data transactions (Christanto & Candra, 2017).

The research that will be used as literature is a prototype of a rice ATM using an Arduino-based E-KTP. The Raskin program is a program from the government to reduce the burden on Indonesian people's spending. However, the distribution of rice itself often takes a very long time, causes long queues, and is not time efficient. The distribution of Raskin rice is also often uneven, with many economically well-off residents joining the queue to collect Raskin rice. Based on this, this study discusses the rice ATM system using an Arduino-based e-KTP using an Arduino microcontroller, photoelectric sensor, loadcell, Rfid, and servo motor. Rice withdrawals at ATMs can only be made once daily in 1 card, effectively reducing fraudulent practices.

This ATM-Rice Prototype tool system can be made using an RFID tag as the main object of taking rice, a servo motor as a driver for opening and closing, Arduino as a system program controller, a load cell sensor to determine the maximum amount of rice-taking, LCD OLED to determine the contents of rice stock ready. From the test results obtained from 2 trials, this tool can remove rice by scanning the RFID tag card. This experiment found that the system's success was good on the prototype of the rice ATM (Ramadani et al., 2021).

This tool cannot be used for various other types of items and also cannot be used using an ID card. Many sensitive items are susceptible to fraud. For example such as cosmetic items, cosmetic items have high prices and are prone to theft. Using an RFID card is also vulnerable to data falsification because we only enter the ID card number without being able to check whether the ID card belongs to

the customer because there are so many cases of identity fraud because our data leaks and many are traded on the internet black market. Further development and research are needed regarding the system mechanism and other features, supporting various types of goods in one microcontroller module, and adding features and sensors that can read E-KTP so that the use of the tool becomes efficient.

This cooking oil distribution system using RFID and based on the internet of things was created to set a cooking oil purchase quota limit, with an RFID card containing customer data and cooking oil purchase quota data that can help cashiers and security to see how much cooking oil is purchased so that customers cannot purchase cooking oil beyond the limits set by PT. Lion Superindo Jatibening. The use of the cooking oil distribution system using RFID and based on the Internet of Things is expected to reduce the level of fraud committed by specific individuals, and the distribution of cooking oil can be done evenly to every customer who shops at PT. Lion Superindo Jatibening.

RESEARCH METHOD

Type of method

In collecting data and information, the authors conducted several studies, namely:

1. Observation

The author uses the Observation method at PT. Lion Super Indo Jatibening by observing and collecting data about data on oil purchases.

2. Literature Study

The author uses the library method by reading various books, journals, and literature to be a reference and study Informatics.

A. Block Diagram

Here is a block diagram used to quickly identify problem points or focus of attention, to determine success parameters, and to understand which processes or activities are causing a decrease or driving a rise in performance.

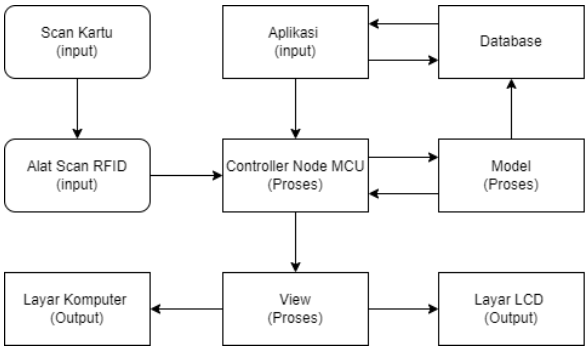

Figure 1. Block Diagram

In figure 1 Block Diagram, the explanation of the block diagram is as follows:

1. Input

The input component is the input component that will be processed. The following components are used:

a. E-KTP (RFID Card)

RFID TAG is a device attached to or in the object that the RFID READER will identify. RFID tags can be installed or embedded in a product, animal, or even human for identification using radio waves. The RFID tag consists of a silicon microchip and an antenna. (Ferdiansyah & Susanto, 2020).

b. RFID *Reader*

RFID Reader is a tool to read the card to be scanned and then identified by the system that we created.

c. Website Application

A website application designed to find out how much cooking oil is purchased on a scanned RFID card.

d. Power Supply 12 volt

An adapter is an electronic circuit that converts a high AC (alternating current) voltage into a lower DC (direct current) voltage. In addition, some adapters only provide a certain amount of voltage and are intended for specific electronic circuits. (Anifam, 2021).

2. Process

Process components produce output delivered by input and based on an embedded program language command. The following is an explanation of the process components:

a. Mikrokontroller

Moreover, the microcontroller aims to respond to the input's specific output and is based on the programming language or the coding provided. The microcontroller is an electrical delivery technology whose presence will significantly help the electronics and control systems world. A more efficient design and many integrated system circuits or logic gates make it easier for them to design

efficient and portable electronic circuit systems. (Siswanto et al., 2018)

b. *Model View Controller*

It uses the MVC (Model View Controller) concept, which allows separation between application-logic and presentation layers, making it easier for future repairs or maintenance, and it minimizes repetitive code writing in many libraries. (Richardo & Setiyawati, 2021)

3. Output

Output is the output displayed on media such as a 16x2 LCD or a computer screen. The output will display according to the process of the program flow we made in the code.

B. *FlowChart*

Here is the workflow of the flowchart that has been created.

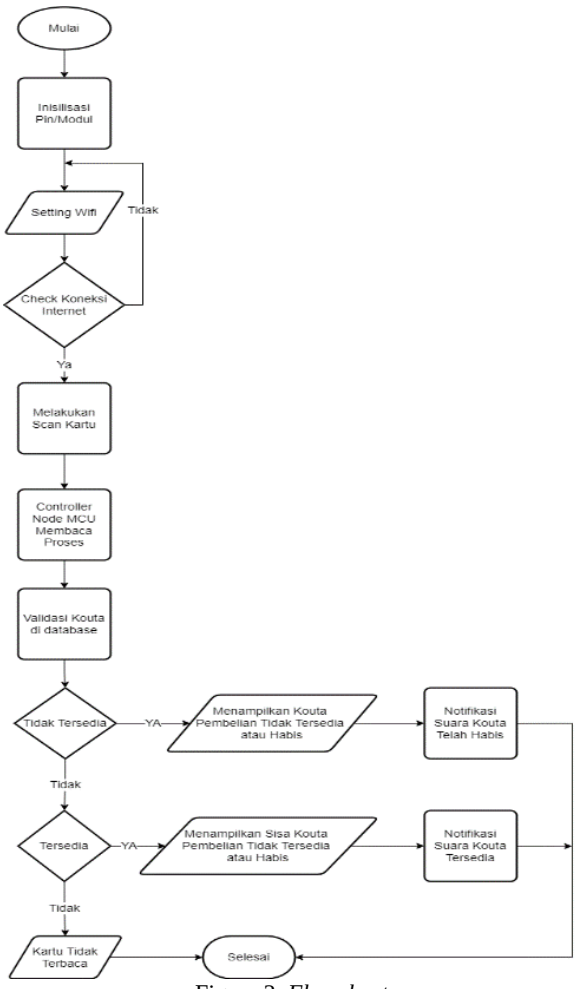

Figure 2. *Flowchart*

In figure 3 Flowchart, the flowchart explanation includes that the ESP 8266 MCU Node is provided with a 12-volt voltage supply, then make sure it is connected to the available wifi. They have then given the input of the RFID card scan. The RFID Reader reads the card scan, and the MCU NODE performs the input reading process. Then ask the database if the quota condition has been exhausted. It will display a message sorry that the quota has run out on the LCD screen, the computer screen, and the buzzer sensor is on. If the quota condition is available, displaying the quota message output is available on the LCD and computer screens. Then continue the buying process. If the card's condition is not read, then the output sounds the sensor buzzer.

C. Tool Scheme

The following is a schematic explaining the process of input into output produced to LCD screens and computer screens.

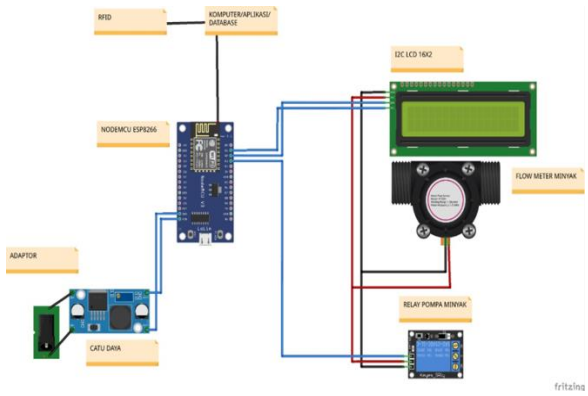

Figure 3. Tool Scheme

In figure 2, Tool Scheme, the device's schematic consists of inputs, processes, and outputs. The input consists of a voltage supply obtained from a 12-volt adapter. Then the RFID Reader reads the input from the RFID card. Then Node MCU ESP 8266 is a microcontroller that processes input into output generated to the LCD screen and computer screen.

RESULT AND DISCUSSION

The results of the input experiment obtained when testing the ESP 8266 MCU Node and the web application to display the output according to the system are as follows:

1. Ensure the RFID Reader is turned on and the Node MCU ESP 8266 is connected to wifi.

Here is a picture of the preparation of all devices that must be ensured to be active and working.

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Figure 4. Tool Scheme Implementation

Figure 4 Tool Scheme Implementation is the process of ensuring all devices are on and working.

e. Then log in to the website application

Here's what the login page looks like.

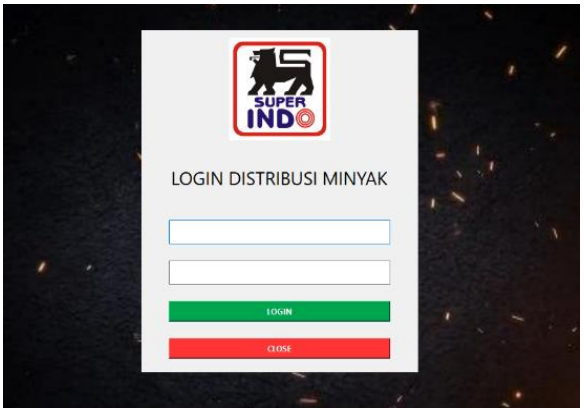

Figure 5. Login Page

In figure 5 Login Page, this page admin inputs the id and password to log in.

f. Home Page

Here's a look at the main page that has been created.

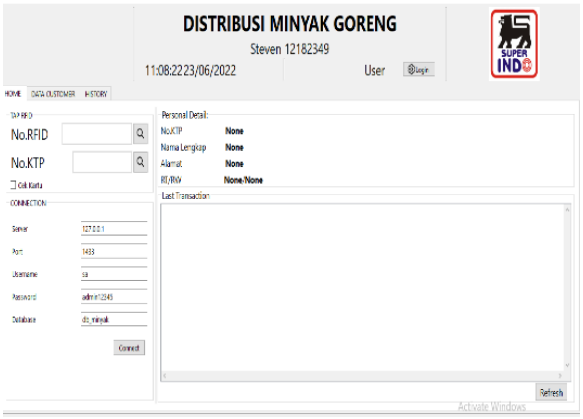

Figure 6. Home Page

In figure 6 Home Page, the home page will appear after successfully logging in, which functions to display the results of the RFID card scan on the RFID Reader. When the RFID card has been scanned, the Node MCU ESP 8266 processes the system and then displays the scan results in the form of RFID No., KTP No. Then the home page also displays the details of each card, such as full name, address, RT/RW, and last transaction.

g. Customer Data Page

In figure 4, Customer Data Page, the Customer data page adds customer data if it wants to register and get an RFID number according to registration. In addition to adding, it can also change data if there is a change in data on the customer.

Figure 7. Customer Data Page

h. Purchase History Page

Here is the purchase history page that has been created.

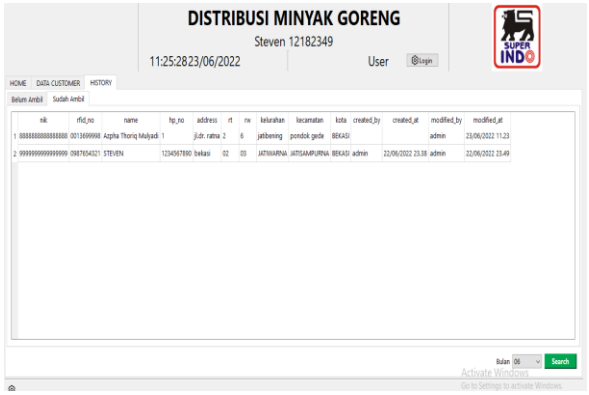

Figure 8. Purchase History Page

Figure 8 Purchase History Page serves as a daily purchase history. If the quota for each card is still available, it is permissible to purchase oil and save it on the purchase history page. Moreover, the purchase history will display the name of the customer and the name of the admin who made the transaction to find out the history of the transaction.

Table 1. Testing Process

In table 1, Testing Process, in this table contains all test results.

Testing Process		
No	*Use Case*	Test results
1	Use case Test: Login Description: Verifying against admins who are in the hands of Test Cases Username: Admin-1 Password: admin123! Captcha: Input according to the results Expected results : - If the login is successful, it will go to the admin page - If the login is not successful, a notification will appear with a message of failed login username or an incorrect password	Succeed Succeed
2	Use Case Test: Access No RFID Description: View RFID Number data Test Cases Scan RFID Card Expected results : - Displaying RFID Scan Data - If it does not display the RFID scan data, there is an error connection problem to the database	Succeed Succeed
3	Use case Test: Manage Customer Data Description: Perform Manage data by adding customer data, changing customer data, and viewing customer transactions. Test Cases NIK : 3175001122331001 Customer Name : Customer-1	Succeed Succeed

Testing Process		
No	*Use Case*	Test results
	Phone Number: 08785564451 Kouta : 6 times/month Expected results : - Admin Adds data of customers who want to buy oil, admin can also change customer data if there is an update on changing phone numbers or others, and admins can see oil purchase transactions made appearing on the computer screen - The customer data page does not display if the customer's name is not registered and displays a voice message if the purchased quota is available or has run out/month	

CONCLUSIONS AND SUGGESTIONS

Conclusions

Based on the research results described, the authors get the following conclusions. This study built a prototype cooking-oil distribution system with the Internet of Things (IoT) using NodeMCU components ESP8266, RFID Reader, I2C, and LM 2596. C++ is used for all coding, with several libraries serving as controllers for various device parts. The application's primary function is client administration. The final prototype can authenticate users or workers for use.. The results of the cooking-oil distribution management prototype that has been formed, the user feels that the prototype is by the expectations and needs.

Suggestions

The author realizes that the results of this study have many shortcomings. Overall, the author has several salient points that need to be conveyed as suggestions for personal writers and readers in order to improve the future results of this research and can be considered in further developments similar to or related to this research in the hope of enhancing performance, development system, and security of this IoT device. Some of these points include further development needed regarding system mechanisms and other features; further, development is needed to support various types of goods in one microcontroller module, and further research is needed to be able to add features and sensors that can read E-KTP so that the use of the tool becomes efficient.

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