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Web-based canteen payment system with RFID technology

Lia Lissa'idah*, Mochamad Alfian Rosid, Arif Senja Fitriani

Universitas Muhammadiyah Sidoarjo, Sidoarjo, Indonesia

¹lialissaidah@umsida.ac.id, ²alfanrosid@umsida.ac.id, ³arifsjenja@umsida.ac.id

Abstract. The development of Modern Technology is very fast, along with the existence of paper money as a global exchange instrument used as a means of payment began to be replaced by magnetic card cards. The process of payment at the Bilingual Krian Canteen Krian Still Less Efficient, causing quite long queues that cause feelings of uncomfortable, complicated change change makes the transaction process becomes longer and change money in the form of unequal amount of candy. To overcome the problem required a system that is expected to solve the problem, where the RFID card can be used as a means of payment to replace cash. General system design includes design flowchart, context diagram, data flow diagram, relationships between tables and design output or system design and detailed design includes database design. The system created aims to design a Payment system. It consists of several components namely RFID card and reader. The test results of this system when RFID closer to the reader then the system will display data in accordance with the data received from the RFID and can make a transaction. The read distance of each RFID to the reader after 5 times is 6 cm. On the barrier or object determines the success of data readings detected or not. This RFID payment system is potentially good enough to be applied in the Canteen environment.

1. Introduction

The development of modern technology is very fast, along with the existence of paper money as a global medium of exchange used as a means of payment began to be replaced by magnetic card cards. This can be seen from the Use of Automated Teller Cards (ATM) as a transaction tool. By using this ATM, users do not need to make payments in cash.

But these magnetic cards have several disadvantages such as being vulnerable to magnetic fields and easily broken because they are made of thin material. Because of that, the use of magnetic cards is now slowly being abandoned due to the weaknesses mentioned above, then replaced by Radio-frequency Identification (RFID) cards, which is an alternative payment or use tool, such as the Contactless e-money system. Smartcard with RFID technology[1][2].

The payment process in the canteen of MA Bilingual Krian Masih Bukan Efisien, which causes a long queue and uncomfortable feeling. When buying food, the relatively long transaction time has become a classic problem or an old problem and so is the case with the MA Bilingual canteen, especially during recess times or during lunch hours which are always crowded. Therefore we need a system that is able to solve the problem, where RFID cards can be used as a means of payment to replace cash because RFID cards have the capacity to be able to store more information than other cards.[3].



The availability of adequate facilities and infrastructure with the existence of this payment system will have an impact on the level of satisfaction of the academic community [4]. The system that was built in addition to using RFID technology we also use twitter bootstrap in building a user interface, The developers can quickly design a system or website by utilizing Twitter Bootstrap with its front-end framework because it has provided templates for CSS and Javascript functions supporting the creation of system[5], the application design work faster because there is no need to think about css syntaxes and produce responsive, light and simple templates [6]

2. Radio Frequency Identification

Radio Frequency Identification or usually in short RFID is a technology that uses auto ID (Automatic Identification) methods. Auto ID itself is a method of retrieving data by using object identification automatically without human involvement. Auto ID works automatically so that it can improve efficiency in reducing errors in entering data.

3. RFID Tag

Based on the power supply, RFID tags are classified as active and passive tags. The active tag uses one battery and can be read (Write) and written (Write). By using an internal battery the active tag can transmit information at a greater distance and the reader itself only requires a small amount of power to read the tag. Passive tags can only be read or Read and do not have an internal battery like an active tag. The power source used to activate passive tags comes from an RFID reader.



Figure 1 Active tag



Figure 2 Passive tag

4. RFID Reader

RFID reader is a link between application software and an antenna that radiates radio waves into RFID tags and the radio waves will be transmitted by the antenna propagating to the surrounding space. The result is eating the data can be moved wirelessly to RFID tags that are adjacent to the antenna. ID-12 is a reader that specifically detects RFID tags with a frequency of 125kHz.



Figure 3 RFID Reader

5. Experimental Method

In this study used several stages including:

5.1 Data collection

At the data collection stage begins with observations on the school canteen, then conducts interviews with the canteen manager. Literature is also needed to support the system development process

5.2 System development

At the stage of system development begins with the identification of problems and the solutions offered then define the format of the software to be developed, which includes planning system requirements and outline the system design that will be made. If the system design is deemed appropriate then it can proceed to the next stage, then enter the Making, Testing and Evaluation Prototype stage, using the prototype and the last prototype development[7][8].

6. Results and Discussion

6.1 System designs

In Figure 4 is a context diagram that describes the work process of a system of activities that take place in the payment system.

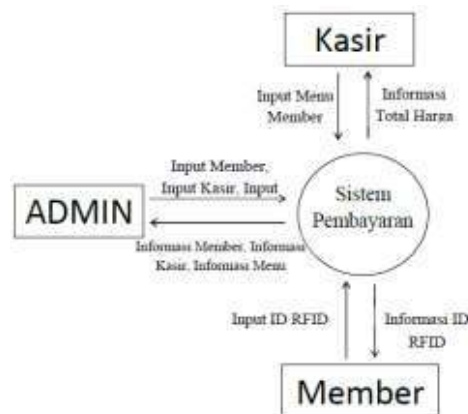


Figure 4. Context diagram of the canteen payment system

While Figure 5 shows the relationship between tables in the canteen payment system, it takes 6 tables in making the system.

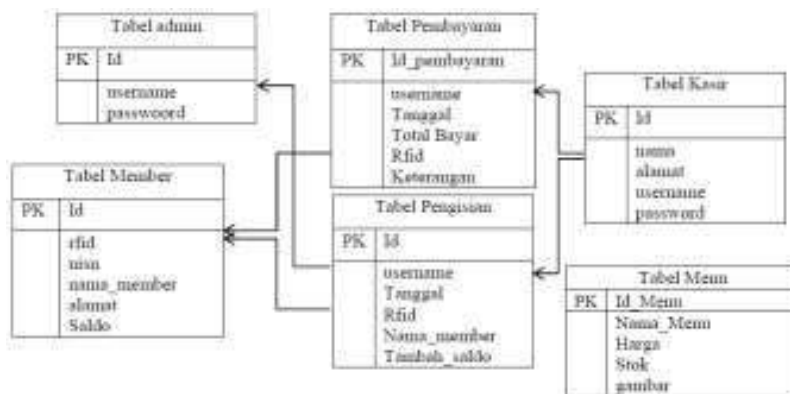


Figure 5. relations between canteen payment system tables

6.2 Implementation of the cashier page

At the stage of program implementation here, the interface created at the design stage is implemented into a web page form that is built using software. The form of the web page resulting from the implementation can be presented in the following figure 6:



Figure 6. Implementation of a canteen payment system

In figure 6a is the login page of the canteen payment system, to fill the RFID balance can be through the balance content page shown in figure 6b. the balance filling report can be seen in figure 6c, when there is a payment transaction the cashier uses the payment page shown in figure 6d. We are aware that the system works well and can be applied to wider applications[9].

7. Testing

System testing is intended to test all the elements of the software made whether it is as expected. Software testing in this study is carried out by the member or user, while the test method used is the balck box test. Black box testing is testing the fundamental aspects of the system without regard to the structure of the software's internal logic. This method is used to find out whether the software is functioning properly[10]. Black box testing is a method of designing test data based on software specifications made. Table 1 shows the results of testing with the black box method:

Table 1. Results of system testing

Test Class	Test Item	Result	Explanation
Data filling test	Fill in the data menu	V	[v] can run well [x] can't run properly
	Fill in the checkout data	V	
	Filling member data	V	
	Fill out the purchase	V	
	Fill out payment confirmation	V	
	Fill in the balance filling data	V	
Process verification	Save process	V	
	Process added	V	
	Delete process	V	
	Edit process	V	

8. Conclusion

Based on the results of testing and analysis of the web-based canteen payment system, it can be concluded that:

1. From the results of testing time differences in the use of RFID-based payment systems and money, the use of RFID-based payment systems has a relatively short time in the payment process, which means that RFID-based payment systems have succeeded in shortening payment times.
2. This system makes it easy for customers or members to make payments, customers do not need to bring money in buying food just need to carry an RFID card.
3. Helps save money and indirectly helps regulate member / student expenses.
4. The ability to read RFID to the reader or reader has a certain distance that is less than 6 cm card from the reader and certain thickness also like paper at a thickness of 10 mm and plastic at 1 mm thickness can be read while if the card is inserted into the wallet the reader cannot read the RFID.

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