



Analysis of Prepaid Electricity Monitoring System with SMS Notification

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ABSTRACT

Today the electric meter consists of two types, namely postpaid electricity meter and prepaid electricity meter. Postpaid electricity meters are often misused by the public by not making timely payments. So to cope with that created a product of prepaid electricity meter system. In prepaid electricity system PLN today can minimize the problem of delinquent bill payments, but on the side of the community sometimes they often cannot control about their kwh (killo watt hour) balance when not at home or when they are busy until the electricity suddenly runs out. This is because there is no direct notification system to gsm handphone owner. With the sms notification via microcontroller this will be able to solve the problem about the notice about the balance kwh electricity directly to consumers wherever and whenever.

Keywords: *Prepaid Electricity, Monitoring System, SMS Notification, Microcontroller, PLN.*

1. INTRODUCTION

Electricity is a basic human need; it can be seen from the pattern of human life that is always dependent on electricity. Let's say when the lights off will be pitch dark and people will look confused in the dark. All household appliances or offices have now been made in a modern way and to run it must use electricity.[1]

Electricity is not provided free of charge. Formerly the way of payment of electricity only postpaid or in other words use electricity first then at the end of the month will come out the bill.[2] Currently electricity meter payments have started not using postpaid but replaced with prepayment ie pay in advance if you want to use electricity. The buyer will get an electrical token to be loaded on his electric meter for electricity to be delivered at home.[3]

The community has their own busyness, some work from morning to evening. There are also those who work from morning to night both in housing and in the village. It sometimes makes the owner of the electricity meter forget

how many pulses of electricity belongs to him. There is also a toll-out pulse that causes their home electricity to die. Owners did not have time to monitor, when there is an alarm that sounds if the pulse is in the number 10 which indicates the pulse will run out and the electricity will go out.[3]

Monitoring system is a solution of current prepaid electricity problem.[4] At this time system pemberidak existing in PLN electricity meter only limited only alarm, so needed a monitoring system with notification sms. This system will work with the base of the microcontroller as a sensor, so the meter owner is easier to know that the pulse is low or low.[5]

SMS notification becomes a solution of the problem. With the sms notification system monitoring will be easily integrated with the customer. So customers no longer need to worry about the balance of the remaining balance, because it has been notified via sms..[6]

With the monitoring system through sms notification, prepaid electricity subscribers will easily know about the remaining balance of their electricity, so customers can know the rest of their electricity meter wherever and whenever without any worries. Finally customer satisfaction can be realized properly with an effective and efficient system,

2. SYSTEM DESIGN ANALYSIS

In the design analysis of pre-paid electricity monitoring system with sms notification is divided into several components[7] :

- Planning: preparation of ideas or ideas about microcontroller, PLN, meter and GSM.
- Design: designing the flowchart, the workings and determine the needs of the device.
- Code: Setting the microcontroller in accordance with the design that has been made.
- Testing: test the program

- Implementation: the application of the device to the pre-paid power meter.

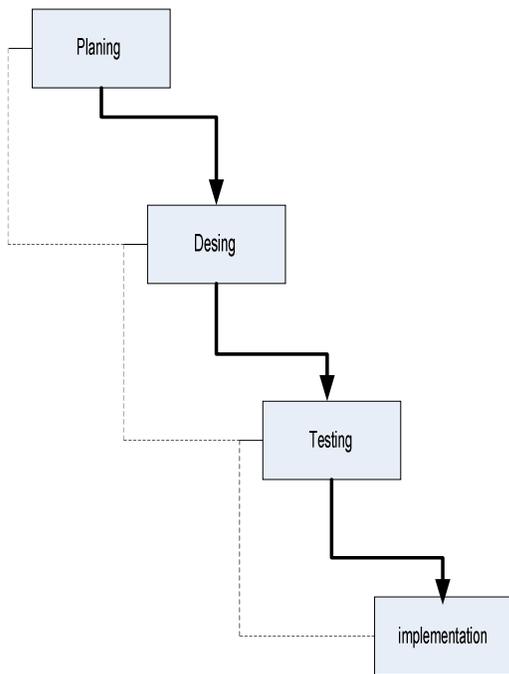


Fig. 1. System Design

In the discussion of this system will only be discussed in the analysis phase where only two components will be discussed are: planning and design. At this stage of planning will be done two activities which in the planning stage will involve two compacts actuators and sensors[8]. At this stage of planning is very important because at this stage is the key of the basic foundation of a system to be applied. So that the placement of the actuator and sensor components becomes important in the role of this system[8].

2.1 Actuator

A prepaid electrical monitoring system design using sms notification is required a mechanical equipment that serves to control the system made[9]. In this actuator will serve as a tool that becomes one unity that will work structurally with the control of the microcontroller. In other words the actuator becomes a mechanical part of a system of equipment that will work on a prepaid electricity system[10]. In the design of this system there will be some mechanical tools that are collected in the table list below:

Table 1: Actuator of Prepaid Electricity Monitoring System Using SMS Notification

Sms	Used for communication between owner and power meter
Signal	Used for delivery media from the power meter to the owner's mobile phone
GSM	Used for connecting media to get the phone signal
Handphone	Used for sms between owner and power meter
Owner	Used for executor to purchase token pulses

2.2 Sensor

In this system required a sensor as the basic of the work of a system. This sensor serves as a data analyzer which will then be forwarded to the microcontroller. In this microcontroller is the center of every system performance to be started.[11] Therefore the role of microcontroller here is very vital because as the brain of this system work, because the microcontroller is also the center of the execution of the command monitoring system in the form of sms notification to consumers.[12] Sms notification delivered to the customer will be useful where the consumer is not at home then, consumers can know about the balance of their last pulse if the balance is already minimum balance.[13]

Table 2: Sensor of Prepaid Electricity Monitoring System Using SMS Notification

Electric meter	Checked media
Censor (AI)	<ul style="list-style-type: none"> - Media that always checks the number of electrical pulses - Media that notifies the owner that the electrical pulse will be exhausted - Media that fills the electrical token from account to the power meter - Media checking the contents of the account
Display	Media that always displays the number of pulses power meter

3. SYSTEM ARCHITECTURE ANALYSIS

3.1 Hardware Design

The design of hardware to be created is the initial scheme of a design that will be done in the design of a tool. In the previous discussion has been discussed about the components of the actuator and also the sensor.[14]
 In this scheme the prepaid electric meter will be connected to the power supply so that the power supply will be directly connected to the microcontroller where microcontroller also get data from the sensor, then from this result the microcontroller will give instruction in the form of monitoring system to the consumer handphone in the form of sms notification.[3]

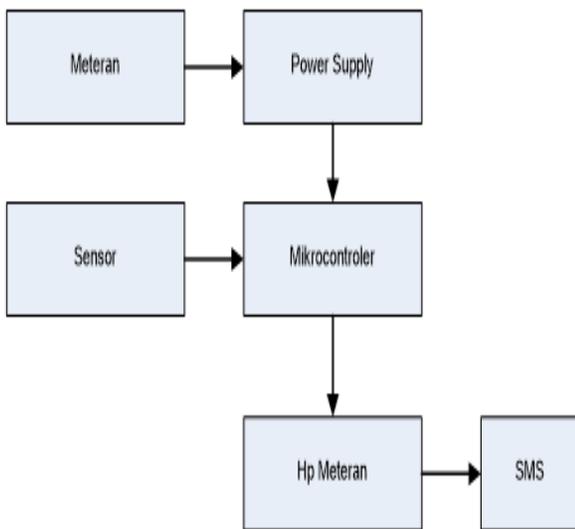


Fig. 2. Hardware Design

3.2 Developing

a. Data Flow Diagram

Data flow diagram describes the current of the performance of a data to be obtained from a system, so that from this DFD can be known working system of the data stream will be designed in accordance with the design later. For that required a good DFD system in designing a system that will be developed, especially on a system that deals with managing data into an information.[15]

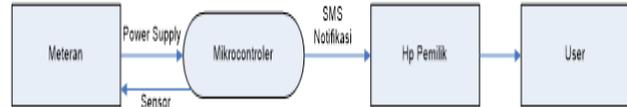


Fig. 3. Data Flow Diagram Prepaid Electricity

3.3 Flowchart Siystem

The design of a system created can not be separated from the flowchart, because the flowchart is a picture or framework of the journey of a system that will be made later[16], so that the failure or failure of a system must be in accordance with the design flowchart made.[17]

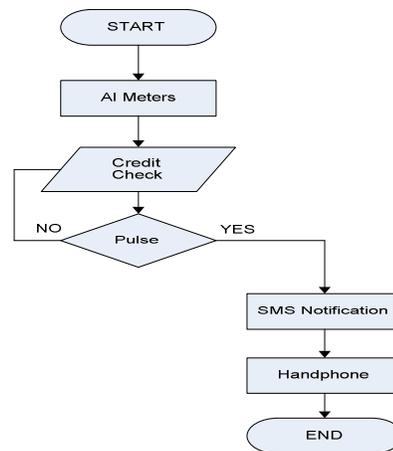


Fig. 4. Flowchart Prepaid Electricity

c. Block Diagram

At this stage is a scheme of designing the results of the analysis of the electricity monitoring system paid with sms notification, whereas in this scheme is a scheme of design a prototype that will be developed in the future. From this block diagram will be known working system of the system made this, so the block diagram is the final design of the pre-paid electricity monitoring system with sms notification.[18]

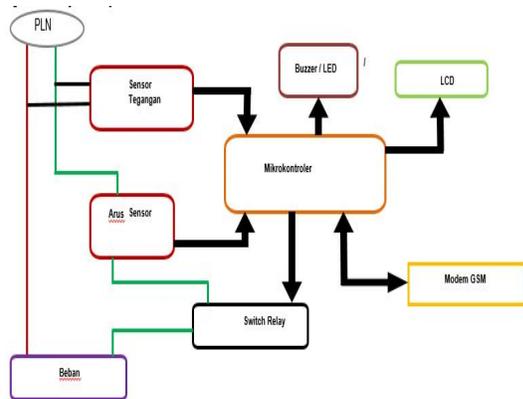


Fig. 5. Block Diagram Prepaid Electricity

4. CONCLUSION

Prepaid electricity monitoring system at this time is needed especially in prepaid electricity consumer. With the existence of intelligent electric meter or can also called automatic power pulse is expected to help the community in housing and settlement to more easily in checking electrical token pulse and efficient time for charging token electrical pulses. So that prepaid electricity consumers can check their balance balances quickly, so that consumers can easily take decisions in terms of charging the next balance. Nevertheless there are some things that must be considered for the progress of this system for that is:

- Required implementation of this system pengembangan this forward so that consumers can easily feel the benefits of this system.
- In the case of development is expected to be integrated with the existing system so that not only sms notifications, but can be directly connected to the charging pulse through m-banking.

REFERENCES

[1] Z. Hussain, S. Memon, S. Zardari, R. Shah, and Z. Bhutto, "Systematic Analysis of Smart Meter Technologies and Their Implantation Challenges in Pakistan," *Sci-Int.Com*, vol. 28, no. 4, pp. 113–120, 2016.

[2] N. Janahti and Isharijadi, "Analisis Penerimaan Pembayaran Listrik Paska Bayar Dan Prabayar Terhadap Pendapatan PT. PLN di NGAWI," pp. 41–47, 2011.

[3] A. Panchani and H. Doshi, "International Journal of Advance Engineering and Research," *Int. J. Adv. Eng. Res. Dev.*, vol. 2, no. 2, pp. 61–67, 2017.

[4] A. H. Mohamad Hanif Md Saad, Mohd Zaki Sarnon, Rabiah Adawiyah Shahad, Muhammad Faiz Mohd

Shukri, "Pump Operation Monitoring and Notification (PuMa) via Telegram Social Messaging Application," vol. 1, no. 3, pp. 57–60, 2015.

[5] D. Tristanto and H. P. Uranus, "Microcontroller based environmental control for swiftlet nesting with SMS notification," *Proc. 2011 Int. Conf. Electr. Eng. Informatics, ICEEI 2011*, no. July, 2011.

[6] H. Kale, G. Rane, S. Shende, and S. Shinde, "Short Message Service Offline Notification System through Bulk SMS for Android Application," *Int. J. Comput. Sci. Eng.*, vol. 2, no. 12, pp. 101–103, 2014.

[7] N. S. Mahmoud, R. M. A. Lashin, and L. K. Abdulaziz, "Bridge Of Relations in the Information System, Case Study ; Radiation Protection and Materials," vol. 9, no. 10, pp. 240–245, 2017.

[8] A. Guerrouat, "A Test Purpose-Driven Testing Method," vol. 9, no. 11, pp. 258–263, 2017.

[9] Y.-J. Liu, S.-I. Chen, Y.-R. Chang, and Y.-D. Lee, "Development of a Modelling and Simulation Method for Residential Electricity Consumption Analysis in a Community Microgrid System," *Appl. Sci.*, vol. 7, no. 7, p. 733, 2017.

[10] Y. Zhou, "A Model-Assisted Reduced-Order ESO Based Cascade Controller for Sensorless Control of Independent Gear-Shifting Actuators," *Appl. Sci.*, vol. 7, no. 12, p. 1283, 2017.

[11] K. Holeczek, E. Starke, A. Winkler, M. Dannemann, and N. Modler, "Numerical and Experimental Characterization of Fiber-Reinforced Thermoplastic Composite Structures with Embedded Piezoelectric Sensor-Actuator Arrays for Ultrasonic Applications," *Appl. Sci.*, vol. 6, no. 3, p. 55, 2016.

[12] M. Quintana-Suárez, D. Sánchez-Rodríguez, I. Alonso-González, and J. Alonso-Hernández, "A Low Cost Wireless Acoustic Sensor for Ambient Assisted Living Systems," *Appl. Sci.*, vol. 7, no. 9, p. 877, 2017.

[13] R. G. L. E. D, "SENT SMS: School Event Notification Through SMS," vol. 4, no. 4, pp. 61–68, 2016.

[14] N. Umelo, A. Amadi, F. Obodoeze, and C. Onyibe, "A Multi-purpose Hardware Efficient Temperature Regulator with LCD Display," vol. 9, no. 10, pp. 254–257, 2017.

[15] F. Wei, S. Roy, and X. Ou, "Amandroid: A Precise and General Inter-component Data Flow Analysis Framework for Security Vetting of Android Apps," *Ccs*, pp. 1329–1341, 2014.

[16] D. Hooshyar, R. B. Ahmad, M. Yousefi, F. D. Yusop, and S. J. Horng, "A flowchart-based intelligent tutoring system for improving problem-solving skills of novice programmers," *J. Comput. Assist. Learn.*, vol. 31, no. 4, pp. 345–361, 2015.

[17] D. Hooshyar et al., "A flowchart-based multi-agent system for assisting novice programmers with problem solving activities," *Malaysian J. Comput. Sci.*, vol. 28, no. 2, pp. 132–151, 2015.

[18] A. Dâmaso, N. Rosa, and P. Maciel, "Reliability of Wireless Sensor Networks," *Sensors*, vol. 14, no. 9, pp. 15760–15785, 2014.