

AUTOMATED WATER METER READING

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Abstract— Automated Water Meter Reading deals with the collection of water units consumed by the customer. The objective of this project is to overcome the disadvantages of current meter technology and make the billing process faster. This advancement helps in eliminating the traditional billing system and eliminates the manual reading of meters where human resource is required to collect the meter reading periodically. Automated Water Meter Reading uses Radio Frequency to transmit the data collected at the consumer site to the administrator. Customer can make payment based on the invoice sent by administrator.

Index Terms—Automated water meter reading, Radio frequency transceiver, Bill generation, Email.

I. INTRODUCTION

In this project we are building an automatic meter reading, which is a technology of automatically collecting consumption of water. The rotating motion of water turbines will provide quantity of water consumed and then with Radio Frequency transceiver the reading is sent to the Radio Frequency transceiver at the administrator's site. The administrator contains details of water consumption by various users in the database. The administrator after a specific duration of time or based on bill cycle date will send the users an alert message to inform about the amount to be paid for the units of water consumed. The user has facility to pay the amount online. The need of this kind of the system that it provides the ease of payment to user and also the problems with the inaccurate billing technique is eliminated.

Another advantage is the economic feasibility. As we know water meter is a device that measures the amount of water resource supplied to consumer by a residence, business or industry. Automatic Meter Reading is a system that allows meters to be checked without the need to send a meter reader out. This can be effectively achieved using off-site metering, that is a micro controller is placed at the junction point where all the connections originate and which are used to send radio frequency signals.

Automatic meter reading is the method of automatically collecting consumption, diagnostic, and status data from water metering device and transferring that data to a central database for billing and analyzing. This advance mainly saves utility providers the expense of periodic trips to each physical location to read a meter. Another advantage is billing can be based on near real time consumption rather than on estimates based on previous or predicted consumption. This timely information coupled with analysis, can help both utility providers and customers better control the water consumption. In this system, water flow sensor sends a pulse data continuously for every few rotation of water turbine to the microcontroller. Microcontroller will send that information to the Radio Frequency transceiver unit which transmits that information to the transceiver unit at administrator side. Then the data is fetched from it and appended to the user for which data was obtained. Administrator issues signal to connect to the customer for a new customer or when the due amount is paid. Administrator issues signal to disconnect the customer when the bill amount is not paid. These signals are received by the Radio Frequency transceiver unit on customer side which sends the signal to the microcontroller which then directs the relay unit which closes or opens the valve for water supply based on the signal obtained.

RF based meter reading usually eliminates the need for the meter reader to enter the property or home, or to locate meter. The utility saves money by increased speed of reading, has lower

liability from entering private property, and has less chance of missing reads because of being locked out from meter access.

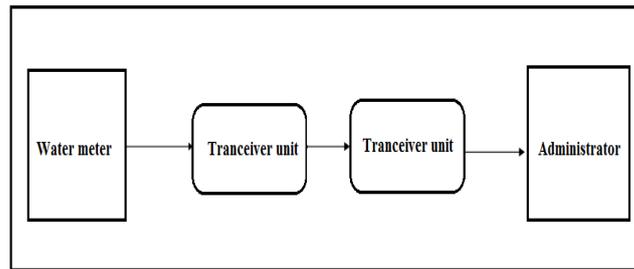


Fig 1 Overview Diagram

II. EXISTING SYSTEM

In the present scenario water meters are deployed in all houses and the reading is taken at the end of the month and a bill generated and given to users. Here the problem is that the accuracy in reading of the units consumed is very erroneous. This happens due to various factors such as :

- We don't get an accurate reading of the consumption in units at the end of the month due to improper functioning of hardware in some parts and hence there is also no easy way to make repairs timely.

- The payment of the users is not in timely manner and hence the whole system is not properly organized. Even if the user wants to pay there is not facility to payment method which can be achieved quickly.

- The officials who collect the reading of the meter visit irregularly.

If faulty bill is provided to the consumers then just to make the changes the consumers should make frequent trips to the water board. This leads to wastage of time money and other resources.

When water meter units collector visits the house for collecting the units he generates the bill and if door is locked then he will keep the bill on the door latch and due to winds it may be lost and the consumer will not have any information about that and next month he will have to pay the due amount also.

III. PROPOSED SYSTEM

In this system, water flow sensor sends a pulse data continuously for every few rotation of water turbine to the microcontroller. Microcontroller will send that information to the Radio Frequency transceiver unit which transmits that information to the transceiver unit at administrator side. Then the data is fetched from it and appended to the user for which data was obtained. Administrator issues signal to connect to the customer for a new customer or when the due amount is paid. Administrator issues signal to disconnect the customer when the bill amount is not paid. These signals are received by the Radio Frequency transceiver unit on customer side which sends the signal to the microcontroller which then directs the relay unit which closes or opens the valve for water supply based on the signal obtained.

- The benefits of smart metering are clear and proven.
- Accurate meter reading, no more estimates
- Eliminating the need of the human resource
- Improved billing
- Less expenditure
- Transparency of "cost to read" metering

IV. LITERATURE SURVEY

In the survey we did, we found out that in the existing systems of automated meter reading the methods were not as efficient and reliable to the methods that we have incorporated in our project.

In New Development In Energy Meter Reading System paper published by Manisha V Shinde and Pradip W Kulkarni of NBN Sinhgad School Of Engineering Pune a new approach to automate the energy meter reading system with the use of camera is proposed. In this paper, the camera is placed in front of energy meter of each house to capture image. This image is used to transfer data to server wirelessly where it will be processed to get digits separate out & to calculate the bill for the month. To transfer this photo data from consumer's meter to the central station, various communication technologies wired or wireless have been proposed, but as we know the wired communication has many problems, so the approach is to go for wireless including mobile here ZigBee is used as a communication media. The captured image undergoes preprocessing in the MatLab at the server side to get digits separate out & used for billing process. Here the need for image processing makes the system complex and not so cost-effective.

The paper published in the International Journal of Advanced Research in Computer Science and Software Engineering titled Design and Implementation of Automatic Meter Reading System Using GSM, ZIGBEE through GPRS by S.Arun a Research Scholar of CMJ University in Shillong and Dr Sidappa Naidu the Principal of Veltech Multitech Engineering College, Chennai which presents method to implement a wireless automatic meter reading system making use of GSM and Zigbee network. The use of GSM as the medium for WAMRS provides a cost-effective, wireless, it sends provider of utility usage, power quality. In this paper it suggests a method to utilize telecommunication systems for automated transmission of data to facilitate bill generation at the server end and also to the customer via SMS, Email.

In the paper published in IEEE Communication and Surveys titled Influence of the Transmission Medium Quality on the Automatic Meter Reading System Capacity by Dubravko Sabolic who is Student Member of IEEE an analysis of the failure in transmission of data to be sent to the utility provider is done in case of the use of automatic meter reading system. Here as the PLC medium causes most of the transmission errors occur due to the lower quality compared to radio, so the latter is used as an efficient transmission medium.

In the paper Implementation of AMR using RF module by A.ali, N.A. Razali, NH SAAD, N.Vitee. It aims at collecting the consumption data from customers' utility meters using radio frequency module.

V. SYSTEM DESIGN

The overview diagram represents the six modules used in the Automated Water Meter unit. In the customer profile module the user provides the required details to the administrator, administrator saves the details. When any modifications are required, user sends data to administrator and then it is saved in the database. If the user requests for disconnecting the water supply connection then admin does disconnection by issuing signal to do so and then deletes the user profile in database. In the hardware design module the automated water meter reader at the customer side consists of water flow sensor which detects flow of water by rotating motion and sends that data to the microcontroller. Microcontroller will send that information to the Radio Frequency transceiver unit which sends that information to the transceiver unit at administrator side. Then the data is fetched from it and appended to the user for which data was obtained. Administrator issues signal to connect to the customer for a new customer or when the due amount is paid. Administrator issues signal to disconnect the customer when the bill amount is not paid. These signals are received by the Radio Frequency transceiver unit on customer side which sends the signal to the microcontroller which then directs the relay unit which closes or opens the valve for water supply based on the signal obtained.

In the hardware communication module communication the Radio Frequency transceiver unit at the customer side sends the information about the water consumption to the radio frequency transceiver unit at the administrator side. The administrator checks if the previous bill's are not paid by the particular customer then admin issues a signal to disconnect the connection by sending it to transceiver at his side. Finally, transfer of the signal is done between RF transceivers at customer and admin side to disconnect the water connection. If the connection needs to be reestablished then admin issues signal to connect and sends it to transceiver at his side and then the signal is sent to the radio frequency transceiver unit on customer side.

In the bill generation module administrator calculates the bill amount by taking into account the per unit charge based on connection type whether it is industrial, commercial or for domestic purpose. The status of the bill paid by the customer is checked in the database. If the user has not paid the bill which is indicated by the status then the total bill amount is the sum of the bill amount for the current month and fine charged for the number of days not paid and the previous bill amount. The invoice is generated which has information about due date and total amount to be paid.

In the bill payment module user views the bill and pays the amount. The user can view the bill which was sent by administrator through alert message. The user is directed to make payment to the window where payment can be made. When the user finally makes payment and if the transaction is successful then administrator directs the database to modify the payment status for the particular and then previous units of consumption are reset in the database. In alert and notification module the admin alerts the user after the bill generation to pay the bill. The user makes payment and if it is successful admin sends a notification message to indicate the payment was successful. This module acts as an interface to bill generation and bill payment module. Finally, all the modules are integrated to form the proposed system as shown in fig.2.

VI. HARDWARE DESIGN

In the block diagram we can see that the power is supplied to the hardware from the mains, but we won't require that much voltage so we use a Regulating Power Supply that is a step down transformer. From the step down transformer power is supplied to all the working hardware components. There is a solenoid coil which allows/restricts the flow of water based on the signal received by the microcontroller. If the valve blocks the flow of water then the water flow sensor won't sense the flow and it won't send any signal to the microcontroller regarding the water consumption. If there is any water consumption then that is sent to the microcontroller which in turn sends the signal to the transceiver at the customer side which transmits the same to the transceiver at the administrator's side. Admin collects the consumption information and generates the bill. If customer doesn't pay the bill even after few months then he admin will send a signal to the transceiver at the administrator's side and it will communicate the same to the customer's side and block the flow of water. Here for demo purpose we are using a water pump because we need pressure of water in the water flow sensor to give the water consumption. This is shown in fig 3.

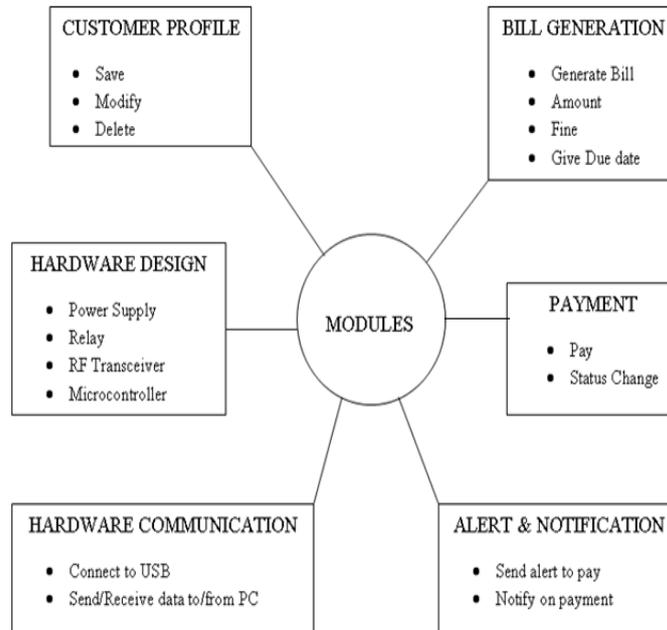


Fig 2 Modules

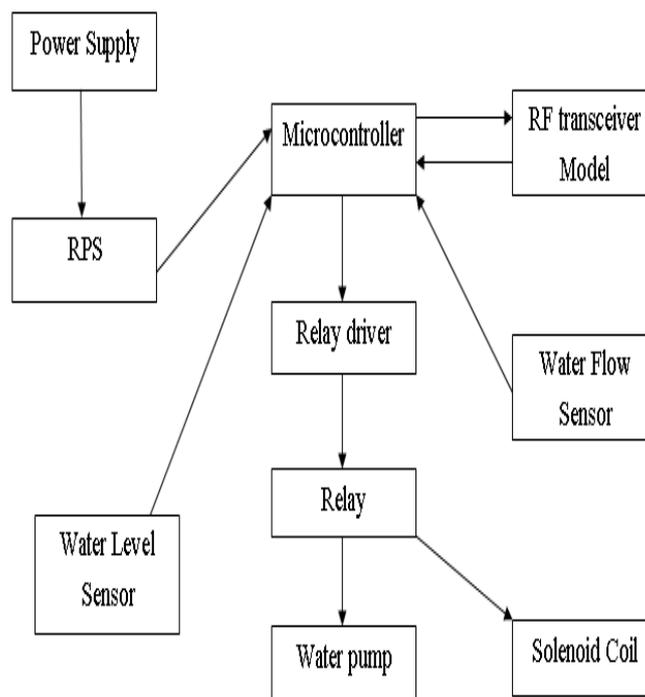


Fig 3 Hardware layout

VII. CONCLUSION

RF based meter reading usually eliminates the need for the meter reader to enter the property or home, or to locate meter. The utility saves money by increased speed of reading, has lower liability from entering private property, and has less chance of missing reads because of being locked out from meter access. In this system, the medium of storage cloud, gives additional advantage as it can be accessed by any user anywhere with the necessary permissions.

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