



Inventing A 2-Way Communication Link To Notify Static Power Parameters

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Abstract: In practical meter reading system, traditional meters does not provide more information about the same. There should be provision for power supply unstable / outage occurs to utility consumer's information to utility company for clearing the fault as quick as possible. In this paper we discuss about Wireless ARM Based Automatic Meter Reading with control system (WAMRCS). This System is used with 32 bit ARM microprocessor for reading power consumption & communicates this data to the utility server for power data processing. GPRS networks are used for communication with utility server in two – way communication link. Power data is used for various purposes such as bill management, for measurement of static power parameters etc. Control systems contains relay circuit, used for disconnection power supply when consumer fails to pay electricity bill in due time. Communication media like GPRS, Internet are easily available everywhere. GPRS is widely used due to its advantages such as always on-line, high speed transmission & charged fee according to the amount of data transmitted. The developing tool of the program design of central monitoring station is Visual Basic 6.0, and the software includes the controlling interface and initialization program of monitoring center, the program of accepting and sending short messages, data processing and preserving program.

Keywords: Automatic Meter Reading, ARM Based System, GPRS, Relay Control.

I. INTRODUCTION

In traditional meter reading system in which utility usages are written on paper by workers, there is lot of chances of human errors. These will cost more to the utility company. Also there are chances that of unavailability of consumers during utility worker's visit for meter reading. In such cases, billing process will be pending & utility workers again require visiting to consumer. Going to each & every consumer's house & generating the bills is very laborite's task & require lot of time. It becomes very much difficult in natural calamities especially in rainy season. Problem associates with traditional meter reading have been increased day by day, due to various reasons such as rapid growth in population, tedious location, environmental conditions etc. But with new developments in microcontroller, there are many improvements in automating various industrial aspects for reducing manual efforts. Moreover it is also difficult for utility workers to find out unauthorized connections or malpractices carried out by consumers manually. This all will result in loss of revenue generation for utility company. There are another type of customers also, for which not only continuous electricity is matter but also about quality of power is also matter. In practical meter reading system, traditional meters does not provide more information about the same. There should be provision for power supply unstable / outage occurs to utility consumer's information to utility company for clearing the fault as quick as possible. Also the development in the field of wireless technology along with microcontroller leads to

unwrap the solution to many problems. The wireless media made the exchange of information fast, secured & more accurate. These wireless media, along with microcontroller or microprocessor leads to digital implementation which causes rapid utilization of devices such as computers & telecommunication devices. Communication media like GPRS, Internet are easily available everywhere. GPRS is widely used due to it's advantages such as always on-line, high speed transmission & charged fee according to the amount of data transmitted. After considering all this GPRS advantages, It is also can be used for sending power parameters on automatic system of reading digital meter. These computed power parameters are then sent to Utility company server through wireless communication method such as GPRS. Also data or signal from utility company server is received through wireless communication module to ARM based embedded system. (AES). Considering all above pro & cons of traditional & automatic metering system ,this study proposes a wireless ARM- based automatic meter reading & control system (WAMRCS).It uses Current & Power Transformer to read current & Voltage parameters of incoming electrical signal. After this, signal conditioning unit along with ARM-based embedded system (AES) is used to compute the power parameters.

II. METHODOLOGY

The analog quantity of voltage as well as current on the primary side of transformer is proportionally transformed on the secondary via power

Transformer (PT) & Current Transformer (CT). Burden resistor is used along with CT for setting the desired voltage at the CT's Secondary Side. The main problem of measuring analog quantities such as voltage & current is solved by using Power transformer (PT) & Current Transformer (CT). Along with Power Transformer (PT), Voltage divider is used to drop the voltage to limits of ARM operating voltage range. Finally filter is used to avoid any emf in DC signal, before passing this to ADC of ARM Controller. Relay Control Unit (RCU), this Unit consists of Proactive relay, breaker control circuit & breaker. It is an interrupting device used for fault interruption & load switching. Figure 1 WAMRCS System Architecture Relay Control Unit is used to shutting off the electric power supply when the signal from AES because due date is over. Electricity will resume automatically with the help of protective relay wired in series with breaker control circuit, so the breaker could be controlled. Depending upon the information received from remote stations, ARM processor can control the relay module to shut off or resume the electric power supply. This relay is driven by ARM processor. ARM-Based Embedded System (AES), this is heart of the system. Conventional power measure instruments are not able to give required information about power quality. So in order to calculate Root Mean Square value of voltage and current, power factor, real power, reactive power and apparent power, it is appropriate to use microprocessor to design digital reading meter. There are various microprocessor based digital power meters available in laboratory & in market. These are basically bulky in size & having limited capabilities. Compare with this, ARM-based system occupies small space. It also supports most popular communication protocols. As far as ARM based system is concerned, it is widely used in variety of network equipments, such as mobile phone and PDA, and become popular and cheaper. It's also having on chip 10 bit ADC of successive approximation type. In this each analog input has a separate register to avoid interrupt handling & it is having global start command for both converters. This study adopts LPC2148 ARM Processor for AES System. ARM based embedded system is having simple in operation compare to their counterparts. So software program development can be done in popular C Language. Wireless Communication Module (WCM), the Wireless Communication Module (WCM) in WAMRCS is the system is mainly composed of different subsystem such as - central monitoring station and GSM network. Central monitoring station consists of GSM modem. Utility Control Center (UCC), utility Control center (UCC) is the central server used for information processing & data exchange between various AES systems through wireless

communication module (WCM). UCC is located in Utility company. It is having Personal Computer (PC) used as a control server along with required programs & storage media (generally Hard drive). UCC will read & collect power parameters from AES via communication network. The wireless remote communication between ARM Based Embedded System (AES) station and Utility Control Center (UCC) is done by the GSM network. A GSM module assembles a GSM modem with standard communication interfaces like RS-232 (Serial Port), USB etc., so that it can be easily interfaced with a computer or a microcontroller based system. The power supply circuit is also built in such module that can be activated by using a suitable adapter. The GSM Module used in project uses GSM network which offers GPRS data communications along with GSM services & mobile internet access. It also be integrated via standard RS-232 interfaces.

III. IMPLEMENTATION

The most important of those is the serial communication between the central monitoring center servers and GSM wireless communications module SIM900. Visual Basic 6.0 provides a serial communication control MSComm which can facilitate the realization of serial communication. The developing tool of the program design of central monitoring station is Visual Basic 6.0, and the software includes the controlling interface and initialization program of monitoring center, the program of accepting and sending short messages, data processing and preserving program. The functions of AES software are measurements acquisition, relay control, tamper detection, AES setup, power parameters computation and database management. The AES software runs under the Real Time Operation system. The software design tasks of the central monitoring station include sending instructions to remote monitoring stations (in the form of short message), accepting the monitoring data from the remote monitoring stations (in the form of short message), store and deal with database. Adopting VB to design the software of central monitoring station has many advantages. Developer can use C-language to program software and build it as executable file on personal computer beforehand. His executable file will be loaded into microprocessor of embedded system through RS-232 from PC and runs under RTX operating system. For example, it has a good man machine interface, it can provide serial communication control MSComm which can facilitate realization of serial communication the programming method is very and the operation is simple, connecting to database and its management are very easy. On the aspect of WAMRCS software, the embedded system uses RTX as operating system core.

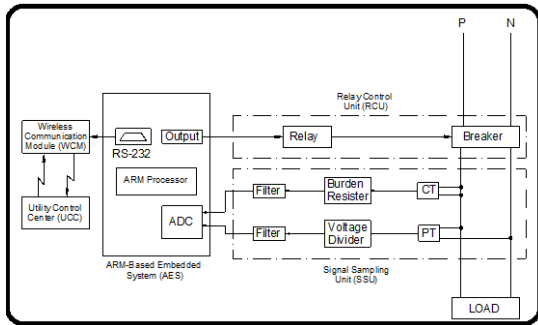


Fig.1. Block diagram of the proposed system

IV. CONCLUSION

There are various microprocessor based digital power meters are available in laboratory & in market. These are basically bulky in size & having limited capabilities. Compare with this, ARM-based system occupies small space. By using this embedded system along with GSM module, provide automation for electrical distribution system. Along with this, it provides better accuracy in meter reading, better control over distribution & management. Same system can be expanded for multipurpose like water & natural gas. Also many users can share same system.

V. REFERENCES

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