A Review Paper on Automatic Energy Meter Reading System

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Abstract— The available systems area units are mostly associate electronic energy meters that area unit presently in use is limited in extent to measure up to kwh units. The meter readers records the meter units in kwh unit monthly, on foot which required to be managed by a meter perusing companies. For processing the these companies must link every measured usage of electricity knowledge to the people and so confirm the quantity owed by suggests that electrcity used by users. The different researchers proposed many systems for AMR on this basis. There area units are generally based on wires AMR devices like Power Line Commubications , phone Line Networks and wireless AMR systems like E-metering systems.The style of these devices for far range transferof data that primarily depend on GPRS(General Packet for Mobile Service), however this method can't be imposed therefore simply as a result of the consistent use of GPRS remained as a fantasy to someone. A GSM (Global System for Mobile Commuications) depend on Energy meter with immediate request provision is brought in is resaonable, however still the matter of missing SMS can reduce the definitiveness and working abilities. A subsidiary dependable and client friendly system by making internet portal for numerous access victimisation the Visual studio.NET frame work which can record and keep the information expeditiously notwithstanding there's SMS losses. These channels may be a terribly helpful suggests that of exchanging information as causing knowledge as SMS seems to be awfully effective tool, thanks to its sensible space analysis abilites and there correctness.The face internet portal is friendly for users and any worker with minimal data of computers can perform operations on this package. Staff will browse the meters by phsically in their offices.

Keywords— Power Line Communication; General packet radio service. Global System for Mobile Commuications.

I. INTRODUCTION

At present, most of the homes in Bharat have the standard electromechanical induction watt-hour meter and therefore the asking technique isn't machine-controlled. At the tip of every month an individual from the meter reading company goes to each place of residence and takes the reading of meter manually. These electronic meter readings area unit used for calculating electricity bill and

this electricity bill sent to client residence by post. Client goes to electricity office(department) for paying their electricity bill quantity.However during this technique we tend to area unit needed nice range of people for meter readings. The mechanism of causing the electricity bills to client area unit terribly punishing and incommodious. However a brand new technology is known as Automatic Energy Meter Reading System is discussesd.AMR annihilate all the disadvantages of typical meter reading systems. These System could be a subtle method that permits corporations to gather the meter reading while not going to the positioning.AMR embrace varied technology for knowledge assortment like Zig-bee technology, RF Methods,Power line communications and networks of GSM,
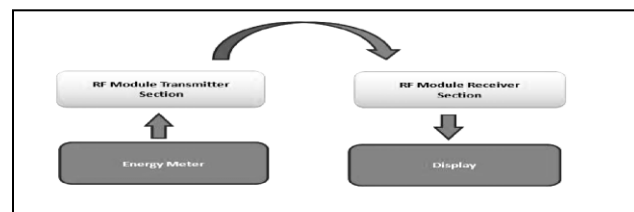
Fig 1.Block diagram of Energy Meter reading system

however networks of GSM is finest among these technologies.
The Energy meter knowledge acquisition system with wireless communication is bestowed during this paper. The planned technique is predicated on wireless communication with use of a RF Transceiver and GSM module. the ability consumption is measured with digital energy meter in terms of units and so the ability measuring readings area unit transmitted with use of RF transmitter from energy meter to the middle node that contains a RF receiver and GSM module as knowledge Forwarder. The GSM module can forward the info to the tip utility workplace. therefore the whole planned technique can add 2 sort of communications. initial short distance wireless communication with use of RF Transceiver from energy meter to the middle node. Second are going to be for long distance wireless communication from center node to the tip utility workplace with use of GSM module. All the hardware and package primarily based details area unit delineate within the paper. The system has several important blessings like, wireless communication, low power consumption devices, Accuracy, massive coverage space.The power consumption knowledge area unit received at the tip wherever they're hold on and used for future references and client asking system. The forepart internet portal is more efficient for users and any worker with minimal data of computers can work on this package.

II. BRIEF HISTORY

The AMR was initial planned in 1962 by AT&T, however this experiment wasn't in. when in experiments, AT&T proposed to make AMR services which will be phone system-based at $2 per meter. The value was fourfold quite the monthly price of an individual to scan the meter-50 cents. therefore the technology was thought of financially impracticable. In 1985 the new era of AMR began, The all-out implementation of AMR on gas and water energy meters were primarily planned by Hackensack Water Company.
In 1986, a 450,000-point radio-based AMR system was started by Minnegasco. In 1987, Philadelphia electrical Company, got struck with an oversized range of meters that were not accessible, put in many of distribution line carrier AMR meters to unravel the drawback.Therefore,AMR is turning into a lot of viable day by day. Advances in solid-state natural philosophy, micro chip parts and less price planar-mounted technology assembly techniques are the impulse to supply trustworthy efficient product adequate of accommodating the economic and people edges that legitimize uses of AMR systems on an oversized, if not all-out, basis.
The basic driver for the automation of energy meter reading isn't most to cut back labor prices, however to get knowledge that's otherwise impossible. several meters, particularly water meters, square measure settled in areas that need a rendezvous with the house owner. Electricity and gas are more valuable

commodities than water, and also the have to be compelled to supply actual readings rather than calculable readings will drive a serviceableness to think about the automation. whereas earlier drive by and walk-by were consisted by systems of AMR for houses.
AMR system are those systems that uses a technique of communication to mechanically take the reading of meters and different appropriate knowledge from serviceable gas meters, while its not necessary to physically going to the residences to check the meters.This technology has catapulted meter knowledge to center stage of the utility business set up.

III. BENEFITS OF AUTOMATIC ENERGY METER READING SYSTEM

This technology is incredibly helpful in several applications. By victimisation this technology, we will get plenty of advantages. Some edges of this area unit as follow-
A.   Advantages for Electrical Companies:-
☐   Smart machine-controlled processes rather than manual labour work.
☐   It optimizes maintenance and investments as the machines send accurate info.
☐   Rates and asking dates are customizable.
☐   The investigations of electricity bills are higly streamlined.
☐   The change in state of energy meters can be detected.
☐   Accurate measure of transmission losses.
☐   The performance of network becomes more efficient and price potency.
B.   Advantages for the clients(users):-
☐   The consumption of electricty info is precised.
☐   Absolute and correct asking.
☐   The info of outage is given automatically and system recover more quickly.
☐   Good and quick client services.

IV. SYSTEM DESIGN

A.Proposed System:
The planned System will be divided into main four sections.
- Meter Reading System
- Wireless Communication for brief vary
- Wireless Communication for Long vary
- Data assortment and Storage

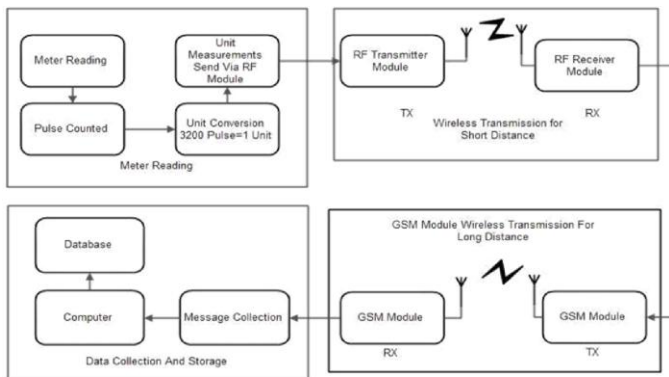A Review Paper on Automatic Energy Meter Reading System

Fig.2. Block Diagram of Proposed System

These four sections combined will provides a higher resolution for sensible metering application. the most plan behind keeping the middle node is to reduce the hardware used for the installation on each meter. The RF transceiver used is CC2500 of terribly low value and reliable for brief vary communication. CC2500 is put in on each energy meters and people finish nodes are going to be causing information statistics to a middle unbroken another CC2500 receiver that is termed center node. currently from the middle node a GSM module is connected to the CC2500 RF Transceiver. this can forward the meter reading information to the opposite finish with long distance.

Thus solely RF transceivers ar put in on each energy meters rather than GSM modules as delineated within the projected system. this may lower the price of overall system. The microcontroller utilized in the projected system is of extremist low power consumptionss. the middle node between the various finish nodes are going to be functioning on battery offer in most of the cases in order that is most vital that the middle node needs minimum quantity of power.

A. *Power Measurement*

The power measuring of the energy meter is completed with the 5V operated AD7751 Energy meter IC and three.6V operated

MSP430G2553[25] microcontroller in terms of pulse tally as shown within the diagram of Fig.2.The whole setup was tested with 100W bulb and also the results are shown within the later sections.

Fig 3. Prototype setup Data Transmission between CC2500 and MSP430G

B. *knowledge Transmission for brief distance with CC2500 RF Transceiver*

The 3.6V power operated RF Transceiver CC2500 used is of terribly low value and with sensible accuracy and enough coverage space for the info transmission between the energy meters to the middle node connected with ultra-low power operated MSP430G2553 microcontroller.

C. Center node (CC2500 with SIM300 primarily based GSM module

On reception of the meter reading packet at the middle node the twenty pin out of eight pins connected to microcontroller CC2500 can receive in reception mode and extract the meter address and reading knowledge from the packet. consistent with the meter address the reading are going to be forwarded through the SMS with the employment of GSM module. With the employment of UART of

MSP430G2553 the GSM module is given AT command for causation the message that contains the meter reading. With simple use and wide unfold network of GSM network, it offers excellent result for long vary communication

CONCLUSION

In this work Associate in Nursing automatic energy metering device is delineate that permits the mental image of power consumption of electrical devices sort of a TV or washer in real time. this system allows residents to possess a direct summary regarding the particular and short term history power consumption. Future work can embrace developments towards automatic and device of devices. an additional approach can be that when daily accumulated information is distributed from the home to the energy supplier. this offers the energy supplier the chance to raised calculate the required

FUTURE SCOPE

- Accurate meter reading, no additional estimates.
- Security will be improved and tamper detection for instrumentality.
- Management of energy through profile information graph
- Improved procurement power though more accurate data - "de-risking" price
- Transparency of "cost to read" metering.

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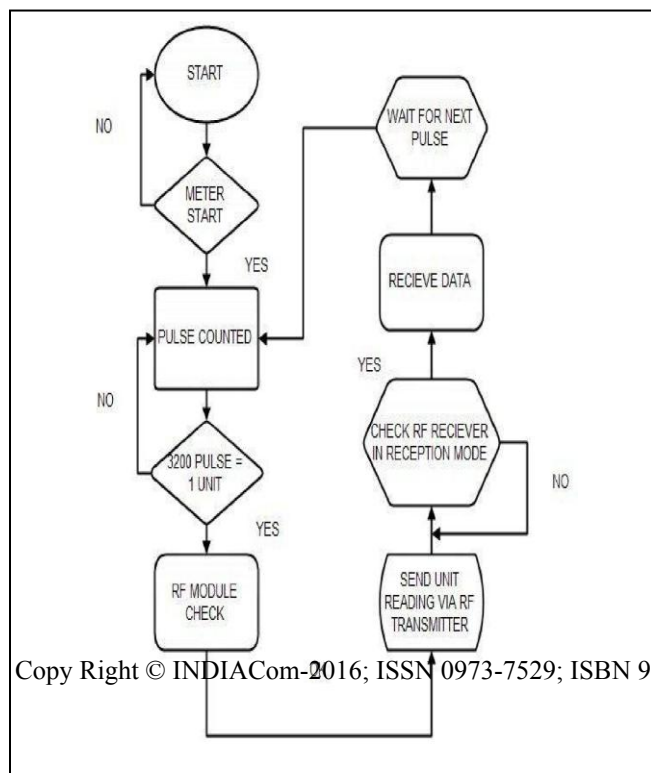
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