GSM Based Automatic Energy Meter Reading System

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Abstract— The development of e-metering This endeavor investigation to analyzed a way to deal with sifting identity electrical and devices control unit devices logically data screen as using insightful procedure apply at frameworks through data examination. The electrical power devices unmistakable confirmation composing PC programs is presenting by accumulated data code machine at information related to electric power energies of system in electrical unit contraptions which are using in private or business energized of at life. A practical executed data Monitoring structure adventures investigate was a realized to isolate electric power factor parameter, for instance, dynamic power factors, open controlled, stages moved, root suggests square voltage and stream uniform the contraptions related with it. The analyze is done used to neural frameworks, maintained vector outlines machines, code k-mean, chose mean-moved and plot arrange. The basic structure Aims of this examinations is to picking best of course of action in which conveys the perfect resultant in recognized and perceiving electrical contraptions in certifiable of time from their electric parameter.

Keywords—Automatic Meter Reading System (AMRS); GSM; PIC; Short Messaging System (SMS); Visual Studio .NET; C#.

I. INTRODUCTION

The essential proposed endeavor energies meter use a "GSM" modem to trade energies exhausted to the authority side. Similar endorsed side moreover used to these "GSM" organizations to send back the bill. Energies Meter Electricity taking is in like manner essential issue custom now. The chiefly insult of cutting edge equipment meter was it was less trustworthy, less charge and non-seals. In reality, even the meter adventure at present day equipment data meters used by electrics board are not completed cautiously structured..

The proposed GSM energies meter information screen likewise has been the development highlight of discovery stacked in the disseminated framework, Made by checking the status of provisions at conveyance transformer and that at shopper.

cycle code o the device and values of power to calculated the total powered consumed by load. Automatic bills unit of energies meter is make-up possible by connecting a" GSM" modem to the energies meter. As the unit pulse authority request for the units of energies consumption the same is send to them through "GSM" services from the energies meter. Once the value reaches the board they prepare a bills and send this to the register mobile numbers of the user also a hard copy of bills is mailed to the address if the register user.

The bills is prepared used to a warm printed which requires in no ink by any stretch of the creative ability, thusly saving of money. An end that energies should not to waste, it is essential cloud to investigate where electrical energies is eaten up. The practical energies utilization of a devices can consistently to be work by watching the concurring electrical devices over a longest spaces of time.

In Electronics control unit system, a screen to running condition is any work to stream condition of electrical stream. As like a briefest condition circuit breaks is a power break line in which current stream by experiences the commonly stacked. in case a meter circuit is impede by some failed. The most ideal most concise circuit stack at to current of a stacked can be learn for equipment control structures. In shrewd meter cloud data control electronic unit system, affirmation all devices screen to recognized a stacked conditions and worked circuit trip a phase and distinctive contraptions to limited the of organization to a unit control structure off.

The evaluating should easily be conceivable by fundamental splendid Energy Meters data screen from the area do-it-without any other person's assistance set away. In any case, sooner or later the limited handiness of these meters also obliges their area of usage. In case, for example, a cooler will be evaluated, the power cloud at may not to be easily to open and an extensive part of the "standard Wireless Energy Meters exhibit their figuring on a "16X2" show facilitate on the cloud meter.

A. A lookback at GSM Technology and GSM meter in India

Fig.1 Traditional Electromechanical meter Vs Electronic meter

II. GSM METER - ARCHITECTURE

This completed endeavor it uses in power system standard structure for the energies stacked consider by Smart Meter sifted as contraption control factors. Control Power unit stacked structure plan for customer devices figuring of force unit by foundation Smart mechanized meter. likewise, show the working weight and accuse introduction. This structure design is mostly completed for the power energies system. The use of all system arrangement restraint saver greatest proportion of electrics control unit and thusly electrical will be available for progressively number of customer in exceptionally populated area in. Directly off the bat we give 230 Vac filled data supply unit to within tape rating "12-0-12" transformer. Here we are used rating of critical worth "12-0-12" Vac,1Amp adventure down voltages of transformer that devotee 230v AC low voltage 12 VAC. Starting there yield stacked of the power organize lines goes on rectifier circuit (Signal trim circuit). single line-1 to connector "2 "wires, 1 is stage and second is ground. Diodes are related in H structure. Here we are uses in 1N4007 diode. It works as a correction that devotee 12v AC into 12v DC.

The made AMR structure involves three major parts: an electronic GSM control meter presented in every individual customer unit, transmission office (SMS entryway), and charging server at the imperativeness provider side. Audit and useful square unpretentious components are showed up in Fig. 3.

III. DETAILED DESIGN

This GSM vitality meter is built utilizing the microchip single stage committed vitality metering IC MCP3905A, a showcase, 8-bit PIC Microcontroller PIC16F877A and GSM modem. A 10A class I single stage meter is planned with implanted GSM modem which uses the current GSM system to send its capacity utilization esteem as SMS to the vitality supplier remotely. While sending the message each time, similar information is likewise put away in the related non - unstable memory (EEPROM). RTC module is likewise coordinated in the meter to have time stepped recording of use subtle elements. The point by point configuration squares are appeared in Fig. 4 and Configuration of various PIC ports for playing out this usefulness is shown in Fig.6
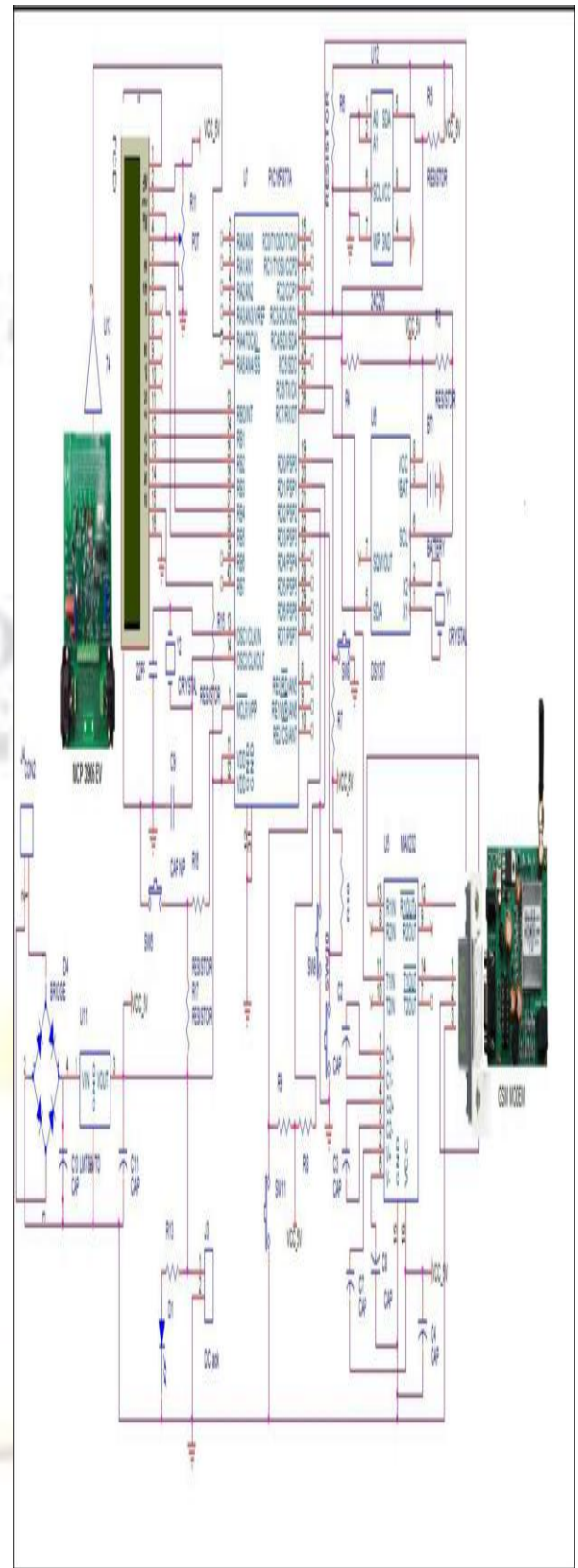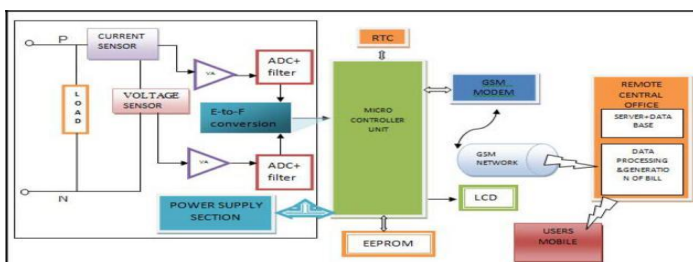

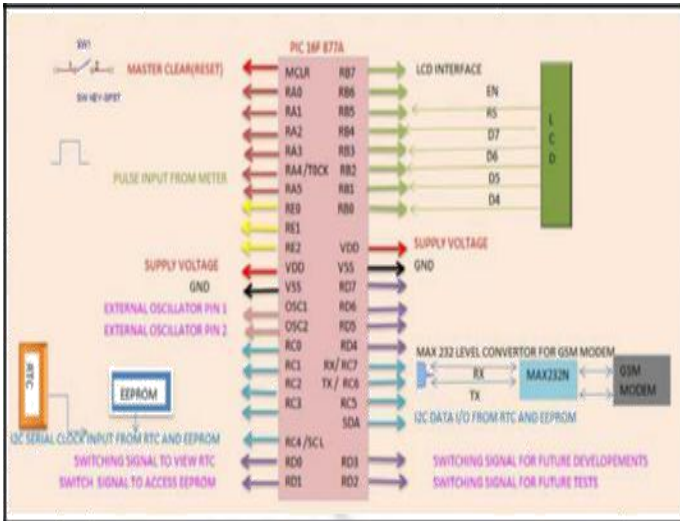
Fig. 2 Detailed Circuit of energy mete

Fig. 3 Configuration of PIC Ports

In the office, the GSM unit will receive these data and software will calculate the total consumption of each user. The design can be discussed as two broad categories, Hardware detailed design and software web portal design.

IV. HARDWARE DETAILED DESIGN

It fills in as a correction gave that adherents "24"Vac into "12" Vdc. "1000"uf Capacitors uses direct in power supply for purifier of Ac realize the yield volts of an alteration on circuit. Here we are using three "7805" voltage settled IC'S that settled the voltage at 5volt. Enroll having 1k ohm regard and LED'S are moreover related together in game plan for meter sign. By and by "R","Y","B" stages wires from this circuit at to board go to LCD board. 3 wired are relationship from three stick connector. This LCD board require an outside e.m.f control gave proposed to work circuit board related with 9v battery used from it. there we used to connector 16x2 line LCD DISPLAY and ATMEGA-328-PU microcontroller.18th& 19 stick of microcontroller are open. 20th& 21st stick connect with VCC i.e.5v. 22nd stick goes to ground and 23rd-28th stick are open. Right when system work truly LCD get presented and show welcome back rub on it. If store hustles to relate at meter to it appeared on LCD DISPLY as load contraption control estimation to a stack unit send GSM send the back rub to a proficient person.

With the assistants of this watching and scouring structure we can without a lot of a stretch pay the meter bill as easily to figure customer and checker. With the help of AT COMMANDS GSM send the message no less than one than control singular it depend on you how much number you incorporate it. This structure is interfaces with control substation unit in addition.

This framework utilizes in installed innovation of the propose framework likewise has been intended to Energies of "Keen Meter" on GSM innovation an executes. The framework can furnished the voltage with a "2A" flows at a controlled 5 supply voltage. This compares to gadget discovery. The

framework planned of comprises esteem characterize of two gadgets, one outside peruser gadget and one implantable gadgets. The outer peruser gadget electrical load control unit show of information to the Electrical and hardware gadgets by Smart meter information screen

a very small coin cell (3V CMOS battery) which runs continuously even in power failure.
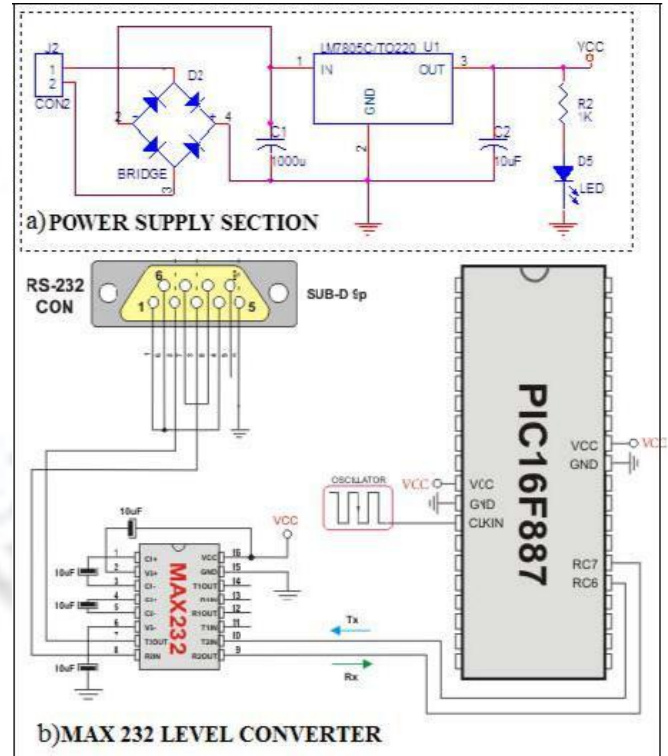

Fig. 4 Power supply (b) MAX 232 interfacing.

D. Implementation Details

A "GSM" shrewd meter control likewise given the data of aggregate stacked utilized in a houses on asked for whenever. Add up to stacked utilized in any houses can be "eq-1" ascertained by watched or recorded N number of load beats in T time that is portrayed.

An Energy meter additionally sends a SMS alarming to the energies supplier organizations and clients if any people utilizes more than indicate cutoff of load. The vitality supplier organization can disengage the intensity of separate client. So clients deals with their home power utilization.

Vitality per check, $E_{pc} = (I_{max} \times V_{rms})/3200$.   (1)

Where Imax is the most extreme load current and Vrms is the RMS voltage.

Vitality per LED beat, $E_{pp} = 1000 \times 3600/Mpr$.   (2)

where Mpr is the beat rate of the meter in drive/kWh.

The natureVac of the voltages and current in DC control framework is portrayed by having a steady esteem except if the volts 0.705 pf level or loads current are changed.

Fig.5. Transmitter prototype.

PCB format for the meter steered with the guide of Cadence Orcad 9.2 suite and relating printed board are appeared in Fig.9.Mechanical structure and get together of the created meter is appeared in Fig.10.The gadget has a plastic walled in area. It has less weight and simple to deal with. For status sign, a green LED is put in front side. 20x4 LCD show is there on the highest point of the meter to show the perusing and RTC time date data. Push catch changes are given to peruse EEPROM content
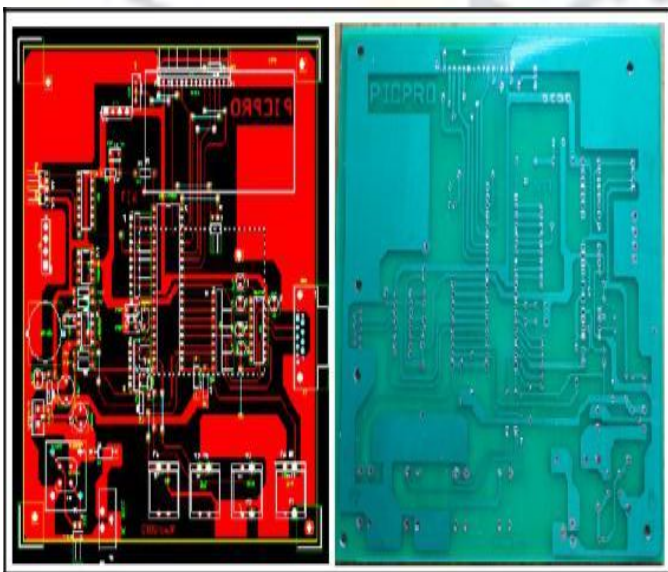

Fig.6. Orcad layout and printed PCB.

V. SOFTWARE DETAILED DESIGN

A. Microcontroller software design

All software used for the PIC16F877 in the control circuitry was developed in Mikroelektronika'sMikroC PRO 4.15 IDE.The meter PIC MCU is programmed via the In-System Programming (ISP) interface. PICkit 2 v 2.61 is used for programming the target PIC. GSM modem is controlled by using AT command for all kinds of operations.The algorithm for meter were developed by considering all the required outputs. The brain of the meter is this developed firmware. It

Fig.7 GSM Meter after casing and sample results on display.

VI. RESULTS

Designed meter is able to send the usage value at a predefined time and the status is displayed in LCD for the next 5 minutes after sending, as shown above in Fig. 10.

Example of the prepared bill by a staff member is shown in Fig.14.Consumer can login to view this bill. By selecting a particular month he can view his usage history any time.
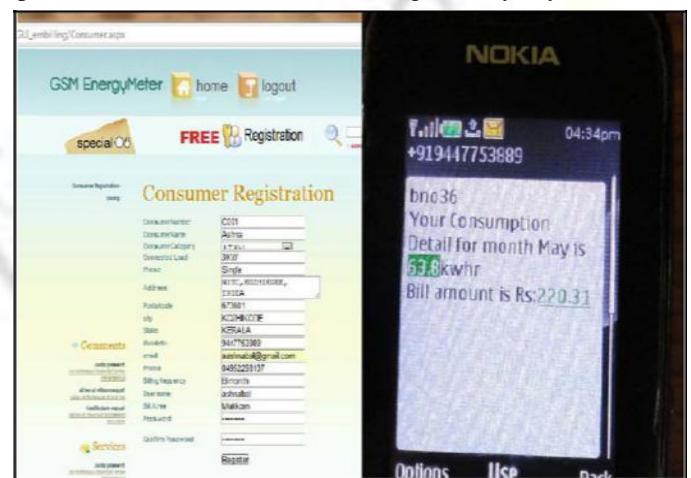

Fig.8 Consumer registration example and SMS reception in that consumer's phone.

The consolidated bill prepared sent to the users mobile, for a particular month of usage, for a particular consumer is depicted in Fig.15**.** Prepared Bill is successfully sent back to the registered consumer at the time of bill generation itself. Backend database details and HTML source code details can be accessed anytime by the administrator.

can be modified and updated any time, even in the field. The firmware is written in embedded C

VII. CONCLUSION

By By the "Shrewd Meter" scrutinizing at data accumulated and plans recognized, it is clears a that is an other kind stamp for each electrical power unit and home machine and these check can be uses to sifting to perceive each device astoundingly with a promising precision. This allows to channel powers usage data from all things considered use data. Despite that, each device has its technique for working reliant on human commitment. It gives differing strategies for operational of devices. Each electrical unit contraption taking care of its Ac cycle of powers usage.

For correct distinctive confirmation of an electrical devices, there must be a complete game plan of data covering the full cycle. For electric and equipment unit devices likes mobile phones, hotter, fan, iron, oven and single or obliged mode machines have a higher exactness in perceived by the structure. For the unusual mode undertaking devices like PC, PC, radio and practically identical devices, the arrangement is the most import ants things to be enhanced the circumstance an increasingly drawn out period.

"GSM" based "Astute meter" is definitely not hard to foundation and supportive for data watching or energies provider and purchaser. Splendid GSM meter dealing with at the issues of force usage another show the meter data cloud watching out for consequent to examining yet furthermore give additional component, for instance, control data checking as a result of uncommon purchaser, control interface after time information assemble, powers cut alert, treating alert. Sharp meter in like manner gives the information of total stacked of used instrument all create in a house on sifting at whatever point. It send a SMS unit cost to energies provider association whether a man using more than decide purpose of imprisonment of load.
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