

ARM BASED DISTRIBUTED ELECTRICITY MONITORING AND CONTROL USING GSM MODEM

Pankaj Chitte¹, Vikas Gujar², Sarang Mahajan³, Savita Shete⁴

¹Professor, Electronics Engg. Pravara Rural Engg. College, Loni, Maharashtra, India

²Student, BE Electronics Engg. Pravara Rural Engg. College, Loni, Maharashtra, India

³Student, BE Electronics Engg. Pravara Rural Engg. College, Loni, Maharashtra, India

⁴Student, BE Electronics Engg. Pravara Rural Engg. College, Loni, Maharashtra, India

ABSTRACT

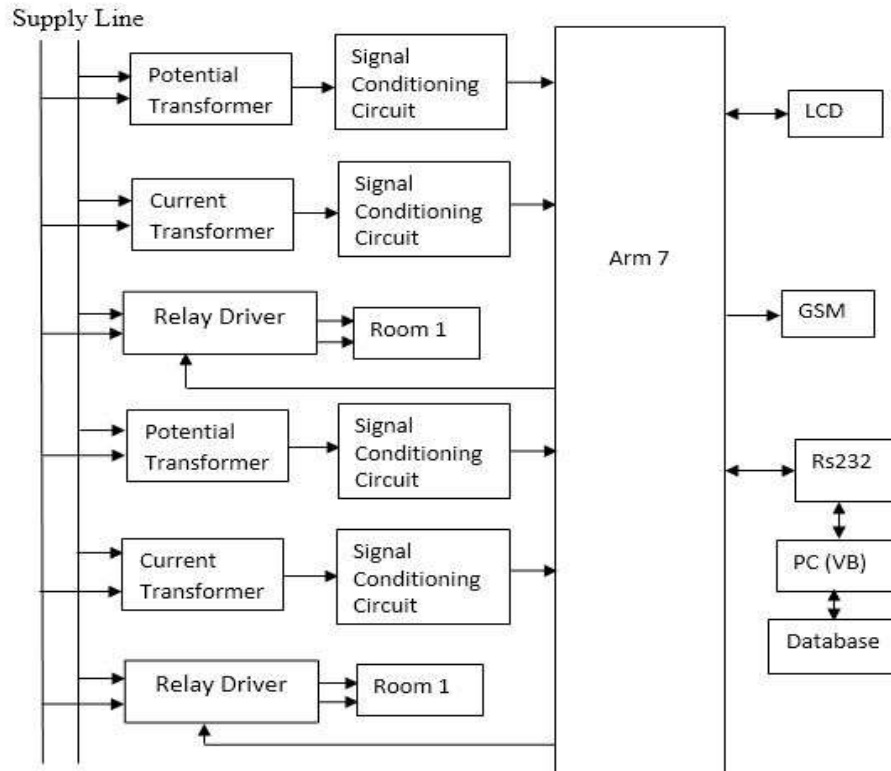
The purpose of this paper is to accumulate the far flung electric parameters like current and voltage and send these real time values over GSM network the use of GSM Modem or telephone and laptop of the owner. This undertaking is likewise designed to govern the electrical circuitry by operating an Electromagnetic Relay. This Relay gets activated by means of the owner while the electricity invoice exceed the predefined values. The Relay can be used to perform a Circuit Breaker to interchange off the primary electric supply. User can send instructions within the form of SMS messages to examine the far flung electrical parameters. This device also can automatically send the actual time electrical parameters periodically (based totally on time settings) within the shape of SMS. This venture makes use of an onboard pc which is typically termed as microcontroller. This onboard pc can efficaciously communicate with the distinctive sensors being used. The controller is provided with some internal memory to keep the code. This memory is used to unload some set of meeting instructions into the controller. And the functioning of the controller is depending on those assembly instructions.

Keyword: - Electricity, Relay, Controller, and GSM

1. INTRODUCTION:

Electricity is a really on hand and beneficial shape of strength. It plays an ever developing role in our current industrialized society. The electrical strength structures are incredibly non-linear, extraordinarily huge and complex networks. Such electric powered electricity systems are unified for good value blessings, extended reliability and operational blessings. Electric energy systems may be divided into sub-structures, specifically, transmission systems and distribution structures. The principle method of a transmission gadget is to transfer electric energy from electric generators to client vicinity, whereas a distribution system gives a final hyperlink among excessive voltage transmission structures and client offerings. The cause of this assignment is community to accumulate the far off electrical parameters like contemporary and voltage and ship those actual time values over GSM the use of GSM Modem/phone and pc of the proprietor. This undertaking is likewise designed to control the electrical circuitry with the aid of operating an Electromagnetic Relay. This Relay receives activated by means of the proprietor when the strength bill exceeds the predefined values. The Relay may be used to perform a Circuit Breaker to exchange off the primary electric supply. This task makes use of an onboard pc which is normally termed as microcontroller. This onboard pc can correctly communicate with the different sensors being used. The controller is provided with some internal memory to maintain the code. The controller is programmed the use of Embedded interval.

2. BLOCK DIAGRAM



2.1 Microcontroller Unit:

The μC is the very last decision making body on the device. The logic is developed and then this system is burned in the microcontroller and the other peripherals are accessed via microcontroller only.

The ARM7TDMI-S is a popular reason 32-bit microprocessor, which offers excessive-overall performance and really low electricity consumption. The ARM architecture is based totally on reduced instruction Set computer (RISC) ideas, and the guidance set and related decode mechanism are a good deal easier than those of micro programmed complex instruction Set computer systems (CISC). This simplicity effects in a high preparation throughput and extraordinary real-time interrupt response from a small and price-powerful processor middle. Pipeline strategies are hired so that all components of the processing and memory systems can function continuously. Usually, at the same time as one instruction is being achieved, its successor is being decoded, and a 3rd training is being fetched from memory.

The ARM7TDMI-S processor additionally employs a completely unique architectural method referred to as Thumb, which makes it ideally suited to excessive-quantity packages with memory restrictions, or programs in which code density is a difficulty. The important thing concept behind Thumb is that of a extraordinary-decreased practice set. Essentially, the ARM7TDMI-S processor has two instruction sets:

- The standard 32-bit ARM set.
- A 16-bit Thumb set.
- A 16-bit Thumb set.

The Thumb set's 16-bit preparation duration lets in it to approach twice the density of widespread ARM code at the same time as preserving maximum of the ARM's performance advantage over traditional sixteen-bit

processor using 16-bit registers. That is viable because Thumb code operates at the same 32-bit register set as ARM code. Thumb code is capable of provide as much as 65 % of the code length of ARM, and a hundred and sixty % of the performance of an equivalent ARM processor connected to a 16 bit memory gadget. The effect on the general code size can be minimal but the velocity may be expanded through 30% over Thumb mode.

2.2 Current Transformer:



A current transformer (CT) is used for measurement of alternating electric powered currents. Present day transformers, collectively with voltage transformers (VT) (potential transformers (PT)), are known as device transformers. The current in a circuit is too excessive to use without delay to measuring instruments, a current transformer produces a discounted modern accurately proportional to the current within the circuit, which may be without difficulty related to measuring and recording devices. A present day transformer isolates the measuring devices from what may be very high voltage in the monitored circuit. Current transformers are generally utilized in metering and defensive relays in the electrical energy enterprise

2.3 Potential Transformer:

A potential transformer is an electrical tool that varies the amounts of modern-day and voltages flowing thru energy lines. Which means that, a transformer steps up the current at the same time as lowering the voltage and vice versa, consistent with the sort of the transformer. A transformer that steps up the voltage is called a step up transformer, at the same time as the opposite is called the step down transformer.

3. WORKING OF SYSTEM

The strength meter facts the amount of energy consumed via the burden. Inside the older day's electro mechanical form of energy meter are available and now a day's virtual power meter are to be had. The energy meter particularly works on the current increment in amount of contemporary flow thru circuit causes the disc to rotate, way that the rotational speed of disc is immediately proportional to the quantity of current flowing via circuit. Vintage type rotation effect of disc type meter reasons the tools mechanism to paintings consequently and in comparable manner energy intake via the load is recorded by means of the micro controller the blinking fee of LED incorporated inside the meter.

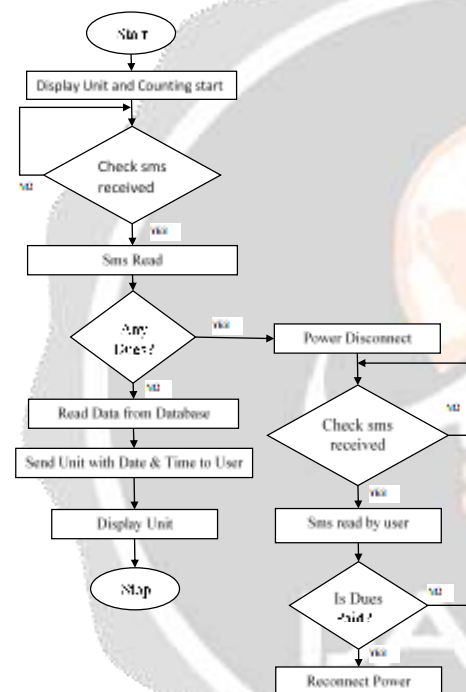
Gift sort of power meter also had a blinking led for the counting the pulses from this LED are fed to microcontroller for remember operation i.e. those pulses are sent to the microcontroller and those readings are stored into outside memory of the micro controller. External reminiscence is an EEPROM. This reminiscence is able to store previous energy consumed as properly in case one desires to test gift electricity consumed status liquid crystal display is hooked up with microcontroller, microcontroller sends a message to LCD show unit so that we can view

the reputation of GSM Modem. GSM communicate over Wi-Fi systems, GSM modem is connected to the microcontroller unit thru MAX 232 IC.

GSM modem communicates at RS232 standard voltage tiers whilst μC is aware TTL common sense ranges so MAX 232 serves as voltage degree converter. MAX 232 converts the Rs232 voltage stages into TTL voltage degrees and MAX 232 converts the TTL voltage levels into RS232 voltage levels. On every occasion a message is sent to the GSM modem, it communicates the message to the micro controller and micro controller is responded returned as the preset cellular quantity via the program. The load is likewise managed by means of sending the message to the GSM modem, it decodes the message and cargo is managed by the strength branch if the customer fails to pay the payments.

4. ALGORITHM & FLOWCHART

4.1 Flowchart:



4.2 Algorithm:

Step 1:- Start

Step 2:- Display unit and counting start

Step 3:- Check sms received, if received then Go to step 4 else go to step 2

Step 4:- Read the sms

Step 5:- Any dues on customer, if yes then go to step 6 else go to step 11

Step 6:- Disconnect the power

Step 7:- Check sms received by user, if Received then go to step 8 else go to Step 7

Step 8:- Sms read by user

Step 9:- Check whether dues paid or not, if Paid then go to step 10 else go to step 7

Step 10:- Reconnect the power

Step 11:- Read data from database

Step 12:- Send unit with date & time to use

Step 13:- Display unit

Step 14:- Stop

5. ADVANTAGES & APPLICATION

5.1 Advantages:

- It is very efficient.
- It provides great performance, very less interference and low cost.
- It provides benefits to both customer as well as service provider.
- It reduce the man power.
- Consumer can get the exact unit consumed by the meter.

5.2 Application:

- In hostel
- In industrial plant
- In house
- In commercial Buildings

6. CONCLUSION

- It provides great performance, less interference and low cost.
- It provides some features like automatic connect/disconnect power cut information.
- It provides benefits to both customer as well as service provider.

REFERENCES:

- [1] V.K.Mehta and Rohit Mehta, "Principles of Power System", 4th ed, S. Chand publication 2008.
- [2] C. Jägerlind, "Improvements for the automatic meter reading process in electricity distribution companies," Master Thesis, Dep. Industrial Info and Control Systems, Royal Institute of Technology, Stockholm, Sweden 2006.
- [3] P.Corrall, B.Corondo, A.C.D.C.Lima, O.Ludwig,"Design of Automatic Meter Reading Based On ZigBee" IEEE Latin America Transactions, Vol.10, no.1, 2012
- [4] Wireless Automatic Meter Reading System" In Proceedings of the World Congress on Engineering 2008.
- [5] Vinu V Das,"Wireless Communication System for Energy Meter Reading" in International Conference on Advances in Recent Technologies in Communication and Computing 2009