GSM BASED ELECTRIC ENERGY CONSUMPTION REPORTING IN STEEL INDUSTRY

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Abstract - In steel industry at the end of every day Deputy General Manager (DGM) needs to know the total electric energy units consumption of various section. Since steel industry having different sections such as Steel Melting Shop (SMS), Cold Rolling Mill (CRM), Hot Rolling Mill (HRM). For that industry deputed a labor exclusively, this leads to increases of business expenditure and human error. To reduce the human intervention the automatic reporting system is proposed. This system has RS-232, ARM processor and GSM module (Global System for Mobile communications). Electricity units consumed from various sections is acquired through RS-485 from energy meter. ARM processor is deployed to create consolidated report in short message form and send to DGM through GSM module. Proposed system will provide on time reporting and reduce manual error in units recording and consolidating.

Key Words: ARM Processor, GSM Module, Energy Meter,

1. INTRODUCTION

Now a days the traditional manual meter reading was not suitable for longer operating purposes as it spends human power and material resource. It brings additional problems in calculation of readings and manual billing. Present industry is increasingly shifting towards automation. In order to avoid the tedious work and to serve the mankind, today there is a general tendency to develop an intelligent operation. This project proposes sending of Power consumption report by using GSM module. ARM processor is the of the device which handles entire sub devices connected across it. It has flash type reprogrammable memory; some peripheral devices precede this project as efficient and provide sufficient power to inbuilt peripheral devices. The peripheral devices also activates as low power operation mode.

For downloading the power consumption data, we programmed the ARM slave. This ARM slave output is given to the ARM master. After getting the output from

ARM master it is given to the GSM modem. RS-485 is used to download the data from digital Energy meter. Here the GSM modem is connected to the ARM via RS 232 which is a serial communication cable. So the data can be download and Send using ARM processor. Whenever the day complete, automatically it activates the processor to turn on the GSM modem. The output result can be simulated by using Keil IDE.

2. LITERATURE SURVEY

A. Vijayaraj *et al* [1] the paper titled as Automated EB Billing System Using GSM and Ad-Hoc Wireless Routing" In our system the central EB office has immediate access to all consumer homes in a locality with the help of an RF system. The EB meter present in each house is connected by wireless network with the EB office which periodically gets updates from the meter. The EB office using a backend database calculates the amount to be paid according to the number of units consumed and sends it back to the meter for display and also to the user's mobile phone.

Irf *Quail et al [2]* the paper titled as" Prepaid Energy Meter based on AVR Microcontroller" In this paper, the idea of pre-paid energy meter using AVR controller have been introduced. In this method 8051 has been replaced by AVR controller because, it is energy efficient i.e. it consume less power, it is fastest among all the microcontroller families, it has inbuilt ADC and have advanced RISC architecture. In this paper, energy meters have not been replaced which is already installed at our houses, but a small modification on the already installed meters can change the existing meters into prepaid meters, so this meters are very cheaper. The use of GSM module provides a feature of pre-paid through SMS.

3. METHODOLOGY

The prevailing system involves the user to visit every section manually and collect the power consumption report. The readings are taken by using an employee who is working in electrical department of steel industry.
  ➢   The industry having different sections.

> ➤ For an each phase they are collecting and reading the energy meter daily by using manual method.


3.1 OBJECTIVE OF THE PROJECT

This proposed project is mainly sending the power consumption details to the authorized person in steel industry it has a few objectives which have to be met:

➤ To collect the energy meter reading everyday by using the remote monitoring and report to DGM.

➤ To reduce the manpower, prevent from human error reduce industry expenditure by wages

3.2 SCOPE OF THE PROJECT

Steel industries currently are functioning with different sections where each section generally worked on measuring scheduled time. Hence it is completed the systems automatically activate and collect the data from energy meter using ARM processor. The collected data send through SMS using GSM modem is discussed and simulated through Keil IDE and ARM processor.

4. PROPOSED BLOCK DIAGRAM
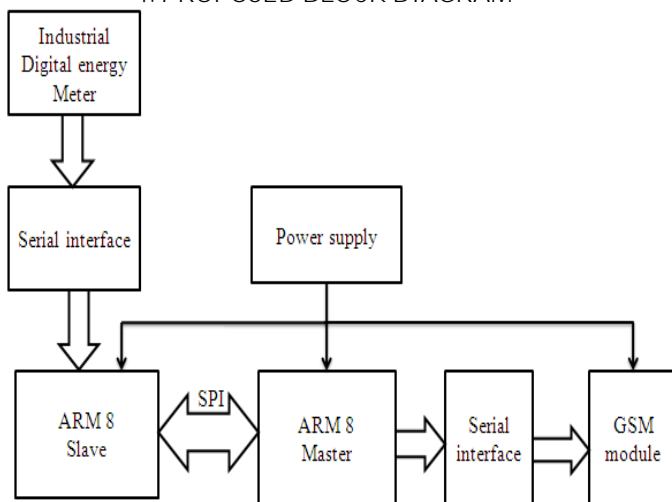
4.1. BLOCK EXPLANATION

In steel industry the work is generally proceed under power consumption. Now currently they are using digital energy meter, by measuring the reading usually manual, the proposed idea is used to function automatically by sending and reading status through wireless technology. Hence considering the block diagram in industrial digital energy meter is to send the data as serially to the ARM 8

slave, which is function to downloading the data from energy meter. Later, downloaded data from the digital energy meter been sent to ARM 8 master through the SPI. After collecting the data in ARM 8 slave that can be send to GSM module via serial interface. Finally it displays the reading in mobile phone.

5.0 HARDWARE DECRIPTION

5.1 GSM MODEM

The Communication Module consists of GSM Modem. It is used to transfer the data of the user meter from LPC2148 controller to remote station by GSM wireless module [7]. The serial communication with the modem is full duplex 8 bits, no parity, 1 stop bit and at 115200 bauds. We have used Subscriber Identification Module (SIM) in the modem.

5.2. DIGITAL ENERGY METER

Energy meter module is composed of ADE7757 which is energy metering IC with integrated oscillator and load and which produces the analog signal can be converted into digital signal and that digital signal in the form of pulses and ADE7757 outputs average real power information based on the load. These outputs are interfaced with the LPC2148.One of the feature in ADE7757 to enhance the capability of this work is having a power supply monitoring circuit on the VDD supply pin of the ADE7757. Due to this, proper device operation is achieved at power up and power down modes. High degree of immunity to false triggering from noisy supplies is attained due to build in hysteresis and filtering operations in power supply monitor of the ADE7757

5.3. ARM processor

UTLP (Unified Technology Learning Platform) is an ardent facilitator for aiding engineers gain hand-on, learn and understand complex and advance technologies simply. Eventually, UTLP embraces modern technologies to bridge the gap between academia and industry. It

increases individual learning towards subjects and supports and motivates students towards building and integrating concepts keeping in mind organizational practices.   Unified Technology Learning Platform (UTLP) is an integrated learning environment

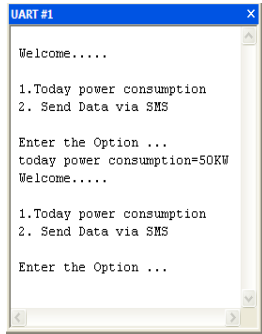## 6. SOFTWARE DEVELOPMENT
6.1. SIMULATION OUTPUT RESULT

Fig 6.1 Power Consumption Window

The serial communication or UART window displays the power consumption and message sending. If the user selects the option 1, the UART window displays the message sending option.
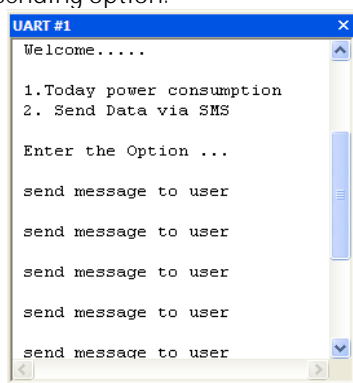

Fig 6.2User Window

If the user selects the option 2, the UART window displays the number of users

7. HARDWARE DEVELOPMENT
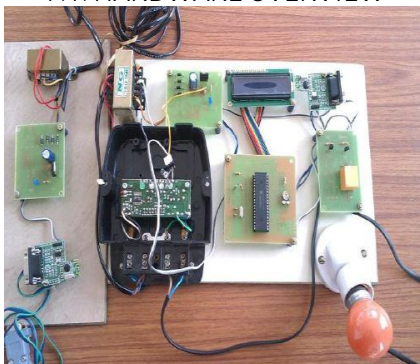### 7.1. HARDWARE OVERVIEW

Fig 7.1 Hardware with GSM

The serial communication or LCD displays the power consumption and message sending.
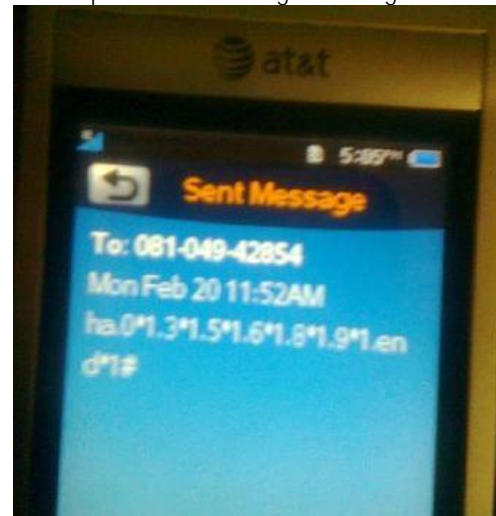

Fig 7.2 User Mobile

If the user selects the option 2, the user mobile displays the amount of energy consumed.

8. CONCLUSION

In the proposed work, energy meters reading in KWh of all the sections are collected and sent the consolidated report to Deputy General Manager by using ARM processor and GSM. Thus the simulation and hardware of this proposed system is represented in KEIL IDE. Model results indicate that the man power and the human error also get reduced. It also increases the time consumption and enacts very high accuracy.

9. REFERENCES

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