# Design of an Automated Monitoring and Centralized Control System for analyzing Sustainable Energy Distribution Using GSM based Energy Meter running on NI LABVIEW Platform

## CHAPTER 1

## Abstract

Resource allocation in itself is a crucial decision making task. If electricity generated at Power Station is distributed in an unplanned way and is not monitor at consumer level then it would be very difficult to track the energy consumption, wastage, theft and hence will not generate enough in-turn revenue for further generation. Hence for attaining such a challenging task of sustainable energy distribution system, the first step is measurement (monitoring) and then controlling.

This abstract presents a novel idea for measurement (monitoring) and controlling by integrating GSM Modem to household or commercial energy meters. This system consists of a GSM modem installed along with a pre-programed microcontroller in every electricity consuming site which will be capable of sending the meter reading (data) continuously or on request from a GSM Energy monitoring system running on NI LABVIEW Software at the electricity transmitting site (Sub Stations). So, at the electricity transmitting site a GSM Energy monitoring system has to be developed on NI

LABVIEW platform to monitor and control the entire consumer. This system aims to benefit every member in the hierarchy ranging from the electricity board chairman, employee and consumers.

## Identifying the need

Traditional meter reading for electricity consumption and billing is done by human operator manually and hence face numerous difficulties such as:

1. An employee of electricity board has to cover every single house in a block collecting the reading data from the electric meter. This requires huge number of labor operators and long working hours to achieve area data that includes reading and billing.
2. Human operator billing are prone to reading error as sometime the house's electric power meter is placed in a location where it is not easily accessible.
3. Being a human being, he/she can also be manipulated by bribery.
4. Labor billing job is also sometimes restricted and slowed down by bad weather condition.
5. Data gathering in rural areas is a lot more complicated. Most of the meters in villages are disabled. A little aggression from the employee leads to violence hence employees choose not to take reading from villages resulting in minimum amount in bill readings.
6. The readings gathered are then delivered to computer operators who feed those data into the system. As this work is done manually, there has to be errors.
7. When an individual is involved the probability of corruption is never zero. Hence to eliminate these discrepancies the whole system has to be automated.

8. Increasing residential housing and commercial building in the developing country such as India requires more human operators and longer working hours to complete the meter reading task, this increases the operation cost with low efficiency.

Hence GSM Energy Meter (GPM) system can plays an important role to achieve efficient meter reading, nullify billing errors and decreasing operation costs. GPM is an effective means of data collection that allow substantial saving through the reduction of meter re-read, greater data accuracy, allow frequent reading, improved billing and customer service, more timely energy profiles and consumption trends updates, and better deployment of human resource.

## Requirements

Our product must meet the following requirements:

1. Reading from all the meters must be accessible to electricity board by a single click at any time from any place for which we need to develop a system using NI LABVIEW platform.
2. Elimination of manual labor and introduction of automation to maximum extent possible.
3. Consumers must enjoy transparency, i.e. they must be able to monitor how much power is used by them.
4. Detect power theft to a specific block.
5. The monitoring system must be tamper proof.
6. The electricity board must be able to monitor his employees. (Centralized monitoring software in NI LABVIEW)

# CHAPTER 2

## Pre-Project Planning

We have broken our project into several modules. These modules will be worked upon in a standalone manner. When all the modules are constructed and successfully tested, they will be merged together. These modules include:

**Module 1:** Obtaining the reading from single phase electronic energy meter into the microcontroller.

**Module 2:** Communication between microcontroller and GSM module.

**Module 3**: Sending and receiving data through the GSM module.

**Module 4:** Serial communication between PC (**NI LABVIEW)** and GSM module.

**Module 5:** Application that includes both backend and frontend models in **NI-LABVIEW**.

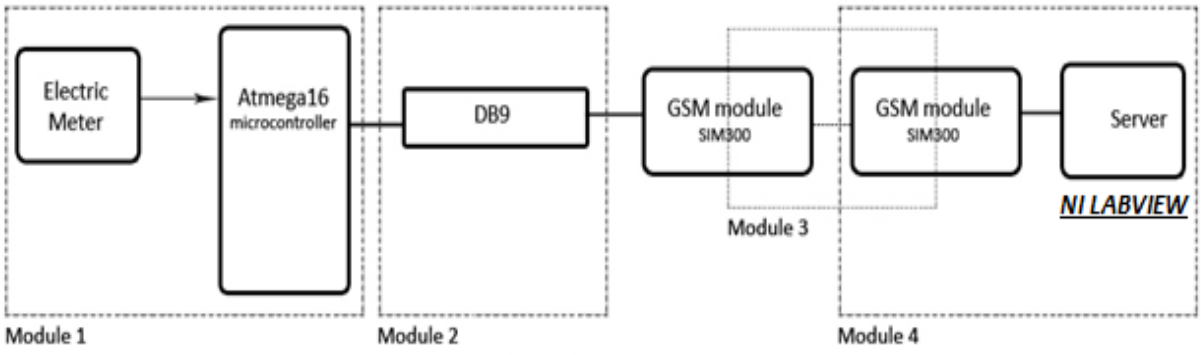
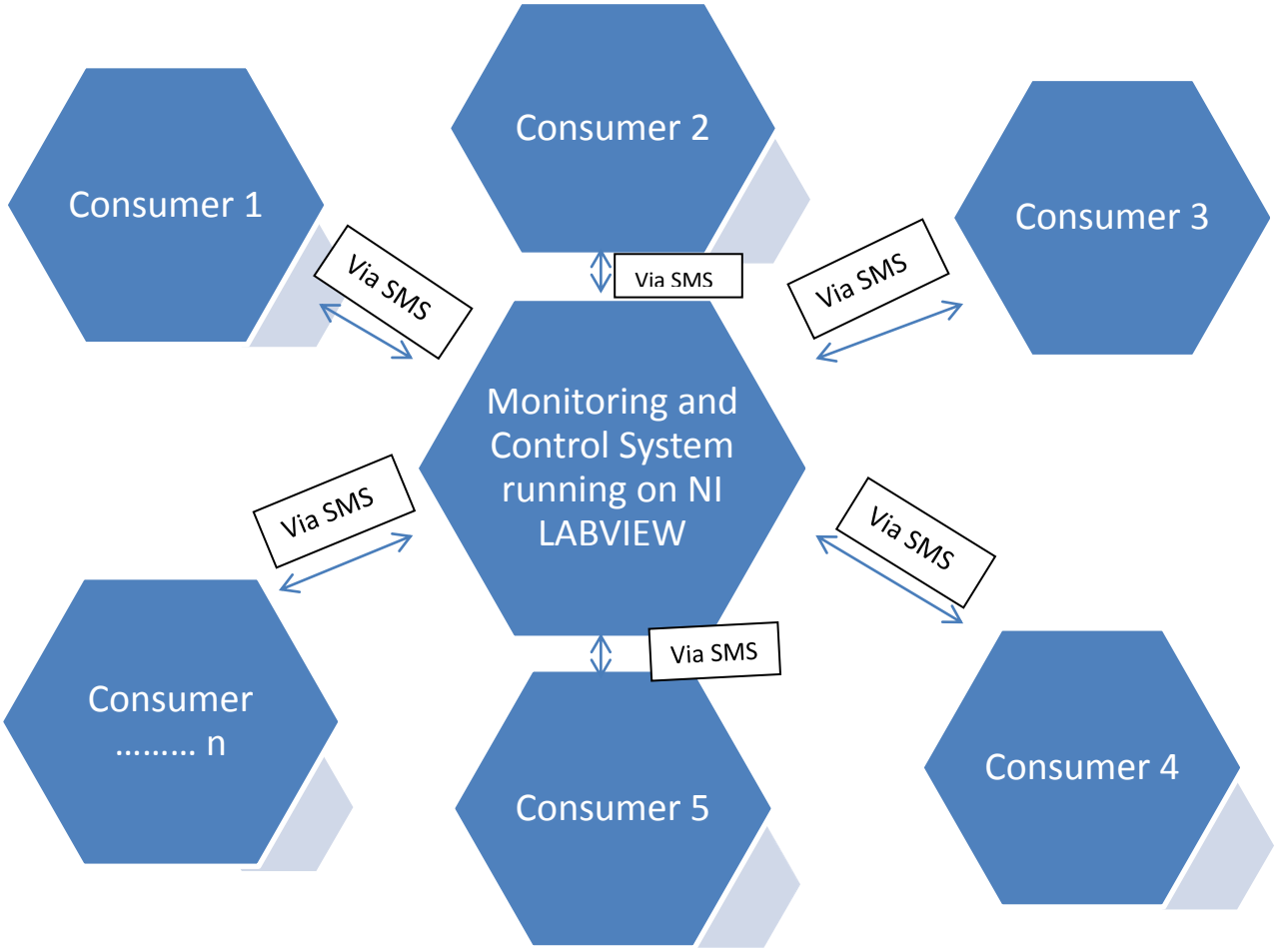



Fig 1: Bird's eye view

## An Overview




- ***This automated system along with Full Fledged Application on NI LABVIEW will allow the centralized monitoring and controlling and will help in automated billing task and further data analysis in LABVIEW will help in theft control & load shift (i.e. if in a particular area energy consumption is low and another area it high then we can shift the power to later from former area) and all this factors will lead to a sustainable energy distribution system.***

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