www.ijecs.in
International Journal Of Engineering And Computer Science ISSN: 2319-7242
Volume 5 Issue 5 May 2016, Page No. 16333-16336

A survey on Energy Monitoring System

Krupa Pensalwar, Pooja Daas, Saloni Verma, Divya Rajwani
Guide: **Mrs. Varsha Pimprale**, Sponsored By: Cologicx Pvt. Ltd.

ABSTRACT

The rapidly growing energy consumption has raised concerns over exhaustion of energy resources and its impacts on the environment. The global contribution towards energy consumption of the developed countries including residential and industrial sector has steadily increased from 20% to 40%. For this reason, it is of utmost importance to manage and monitor the energy consumption and making it cost efficient for small and large scale industries, as industrial sector contributing the higher rate of energy consumptions. Therefore, the system is proposed to remotely manage and monitor the Energy utilization considering various parameters and generating the reports, log data for analytics. Thus, reducing fault logs providing live alerts by real time monitoring with a better performance and efficiency, finally reducing the cost. The approach is to ensure a robust system on aspects such as measure, store and report via high quality components and redundancies in the system design.

KEYWORDS

Energy Management System (EMS), Stakeholder, Web Server, (Software Requirement Specification) SRS, Sitesage Systems, (Home Energy Monitoring System) HEMS, Cloud Computing, GPRS, (Supervisory Control and Data Acquisition) SCADA.

I. INTRODUCTION

The main idea is based on Database management, mobile application and server programming done with the help of Server programming and various server scripting languages, database management technologies. Automating the process of record keeping, reducing man power requirements to collect energy readings and generating various reports for analytics by designing a system that gives the best performance in customer specific operating conditions. System can be configured on the cloud to prevent blocking system resources and allow central monitoring of multiple locations. The system will be also implemented by developing an Android mobile application for the company as well as end users (industries), and a website through which the user can easily monitor energy readings, control them, control respective machines and the system is maintained using Linux based cloud using Linode. The end users of the system are the managers of large manufacturing industries. More specifically, the system is designed to help the managers to remotely mange, control and monitor the power consumption of the machine in their industries. This includes the concept of Internet of Things (IOT). The analytical reports and graphs thus generated will help the managers to monitor and save energy also it will help in precisely defining the cost of the product. Thus, the system helps in managing and monitoring energy.

II. RELATED WORK

The term Energy Management System here can also refer to a computer system which is designed specifically for the automated control and monitoring of those electromechanical facilities in a building which yield significant energy consumption such as heating, ventilation and lighting installations. The scope may span from a single building to a group of buildings such as university campuses, office buildings, retail stores networks or factories. Most of these energy management systems also provide facilities for the reading of electricity, gas and water meters. The data obtained from these can then be used to

DOI: 10.18535/ijecs/v5i5.03

perform self- diagnostic and optimization routines on a frequent basis and to produce trend analysis and annual consumption forecasts.

This paper concentrates on the electrochemical facilities and the role of EMS in the field of chemical, and buildings constructions like that of universities, colleges.

In the system and application, the main concentration is based on the end users, that are the companies which will use the system for generating, monitoring, optimizing the energy and finally managing the energy systems so as to get the optimal efficiency at the end. The system will be accessible from the AWS and Linode database. Benefits:

- Cost savings:

It gives consumers an incentive to flatten electricity load. Consumers may then reduce their electricity costs to reduce peak power needed from the grid during the day

and to buy the needed electricity at off- peak times.

-

Application:

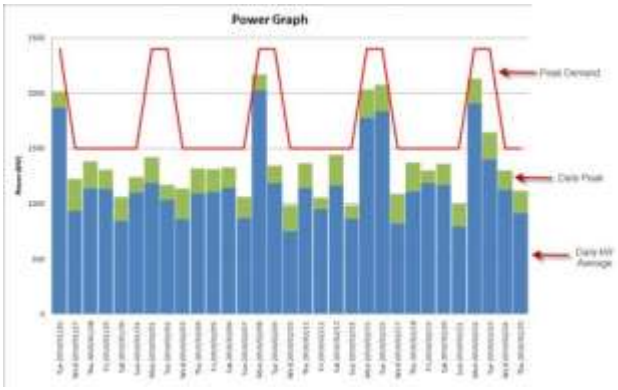
It is the easiest way a user can interact with the system directly taking a short time lapse. The connection of mobile application with the database on the server makes it dynamic.

III. MATHEMATICAL RELEVANCE

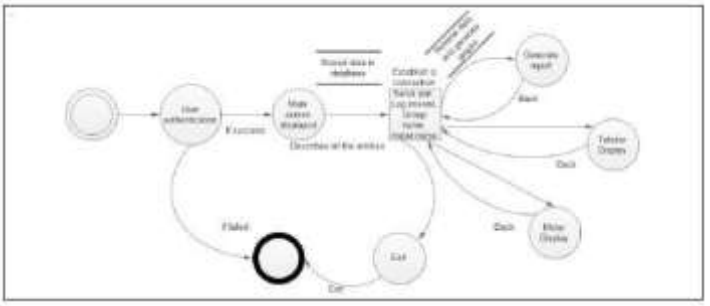
System ={s,e,X,Y,DD,NDD,success,failure,Mems hared,F}

where

s=start state
e=end state
Y=set of outputs
X=set of inputs
DD =deterministic data
NDD=non deterministic data
success= desired output
generated failure= desired output not generated



A Power graph representing readings



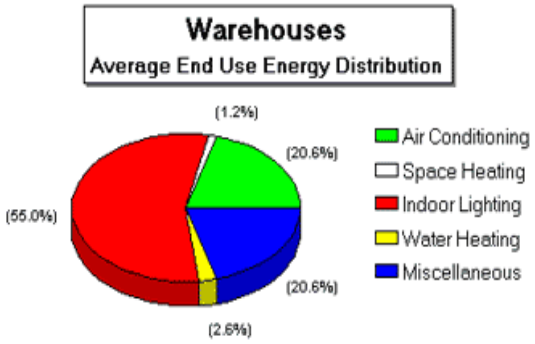
Formally, given set D1,D2,.....Dn a relation r is a subset of D1 x D2 x D3 x D4....x Dn. Thus, a relation is a set of n- tuples (a1, a2...an) where each ai ε Di a1,a2...an are attributes. Therefore, R= (a1,a2,....an) is a relation schema.

Basic Operators:
select: σ project: ∏ union: U
set difference : -Cartesian Product : x

Notation:
$\sigma_p(r)$ where p is called the selection predicate
Defined as : $\sigma_p(r) = \{t|t \varepsilon r \text{ and } p(t)\}$
Where, p is a formula in propositional

calculus consisting of terms connected by :^(and), V(or),¬(not) .

Construction of pie charts using the mathematical relevance is appropriate for obtaining the readings. A circular statistical graphic pie chart could be represented on the readings of the data obtained. The arc length of each slice is proportional to the quantity it represents.



Example o f a pie chart representing Energy usage Distribution

IV. PROPOSED SOLUTION

The system focuses on the process of record keeping, reducing man power requirements to collect energy readings and generating various reports for analytics by designing a system that gives the best performance in customer specific operating conditions. System can be configured on the cloud to prevent blocking system resources and allow central monitoring of multiple locations. The system is implemented by developing a mobile application for the company as well as end users (industries), and a website through which the user can easily monitor energy readings, control them, control respective machines and the system is maintained using Linux based cloud using Linode. The 'smart system' works with the collaboration of smart meters which update the database existing on Linode Server dynamically and provides the end users with options of generating reports, analyzing data, change the data, set security according to access of certain level's in industries. Including the concept of Internet of Things (IOT), the system is designed to help the managers to remotely mange, control and monitor the power consumption of the machine in their industries. The analytical reports and graphs generated will help the managers to monitor and save energy, also it will help in precisely defining the cost of the product. Thus, the system helps in managing and monitoring energy.The Highlights of the System are: Can be configured as a billing/prepaid system for commercial areas or malls. System is designed for dual source energy meters with different billing rates for different sources. Entire collection, payment and accounting for metering can be done via single software. On request- Reconciliation with diesel consumption/ mains power meter provided by Electric Billing(EB).On request- Live billing/balance SMS to customers. The Highlights of the energy monitoring system-

- Clean user friendly interface
- Can be configured to interface with the customer's Enterprise Resource Planning (ERP)/ (Systems Application Products) SAP system.
- Data logging at user defined intervals (Standard 1min – 30min)
- Daily consumption report – By shift or Time of Day (TOD).
- Up to 999 Energy meters can be configured in a single Personal Computer(PC) system
- Flexibility to communicate over Ethernet, Wireless, Optic Fiber, GPRS or a combination of these.
- Modular system allows additional meters/groups of meters to be included easily
- Auto generated Email/ SMS alerts for reports/faults
- Cloud data backup. PC data backup included in basic package

V. CONCLUSION

The System thus constructed shall provide would automate the process of record keeping, reducing manpower requirement to collect energy readings. Reports can be

scheduled for generation & mailing to user defined mailing list. Reports will always be standardized without errors and on schedule. SMS alerts let daily reports or fault alerts reach the correct recipients even if they do not have PC access. Access rights allow multiple users to view data basis permissions Granted. System is designed for best performance in the customer's specific operating conditions End to end solution so customers get a single window contact for all elements of the system in case of system issues. System can be configured on the cloud to prevent blocking system Resources and allow central monitoring of multiple locations EMS centralizes energy monitoring and control, in industrial and commercial applications. The system logs and monitors data, and allows a wide variety of alerts and reports to be configured as per the specific user requirements. The system helps to monitor energy usage and utility management by storing a data log of energy and other energy-related parameters.