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Smart Energy and Overload Tracking Using Labview

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ABSTRACT: Maximum energy tracking is an important aspect in present distribution systems. The distribution companies are facing severe issues in designing a Tariff for individual consumers. The consumer is also facing various problems like Poor billing, penality for low power factor and poor reliability in Electric power supply. By continuously monitoring maximum demand, the quality of electric supply can be improved which ensure accurate billing. An improved Tariff structure will result in efficient billing system.

KEYWORDS: Smart Meter, LabVIEW, Energy consumption, Individual consumers, Tariff.

I. INTRODUCTION

The smart energy meter designed using LabVIEW meets all the challenges faced by an efficient billing system. The smart meter can bridge the gap between distribution companies and consumers. The paper mainly deals with Smart Energy Meter designed with LabVIEW utilizing the concepts of Virtual instrumentation. The maximum energy consuming electrical appliances are indicated continuously in VI diagram. The service provider as well as consumer will get notified with utilized energy with the corresponding bill. The consumer can have a control over his maximum energy consumption by setting threshold value and switch off extra loads. This scheme of connection provides a mode to conserve electrical energy. The government will get Considerable return on investment (ROI) through this technology. This system can also be used to protect domestic appliances from overload.

II. SMART ENERGY METER

The electronic device used to record electrical energy consumption that conveys information to the distribution companies for designing tariff and billing is said to be a Smart energy meter.The Smart meters frequently record energy that may be hour to hour or day to day and report at least within 24 hours. A two-way communication between Smart meter and the central system will result in an accurate billing. The Communication may be via fixed wired connections such as power line carrier (PLC) or Wireless like cellular communications, Wi-Fi, low power long range wireless (LORA), ZigBee (low power low data rate wireless) etc.Smart meters enable consumers to know exactly how much energy they are using and at what time they are doing that. It can also hold historical data about past energy use so that consumers can interpret their present level of energy consumption with past usage.The consumers with smart meters are provided with online tools. The energy consumption become eco-friendly with these tools.

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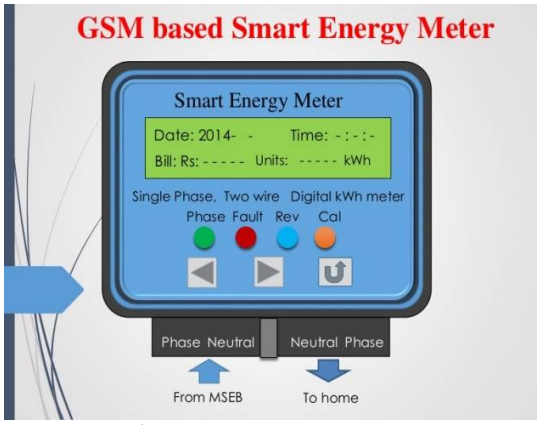

Fig.1: Smart Energy Meter

III. LABVIEW - A SMART TOOL

LabVIEW is a reliable software helps make the complexity of low-level programming and embedded hardware configuration invisible to the user, so the technical expert can focus on the design (algorithms, mathematical models, signal processing routines, and so on) instead of low-level software and hardware issues that are not the key subject matter of the research work. Technical experts can achieve this with a high level of abstraction using different computational models (data flow, state charts, scripts, and so on).

Thesoftware created that focused on the needs of the application is called Virtual instrumentation. These custom virtual instruments can apply real-time mathematics for processing, analysis, and control involving online (live) and/or offline (from a file / database) signal I/O that are built by researchers. Applied Mathematics is combined with real-time measurements using the virtual instrumentation approach, which helps researchers reduce the time to discovery and, potentially, the time to market and/or time to commercialization of potential products and services that result from research and development (R&D)

Advantages of LabVIEW

1. Drag-and-drop built-in functions
2. Multiple high-level development tools
3. Reduces cost and preserves investment
4. Flexibility and scalability
5. Visualization capabilities

IV. BLOCK DIAGRAM OF SMART ENERGY METER USING LABVIEW

A Smart Energy meter is designed with various If blocks connected with comparators, adders, multipliers, wait, selector, random variable and dividers for electrical appliances like lamps, AC's, Fans.

Room-1& Room-2 are equipped with domestic appliances like Fan & Air conditioner. The maximum power consumption by individual appliances in both the rooms is recorded continuously using LabVIEW. The program runs with basic If logic of computer language C.

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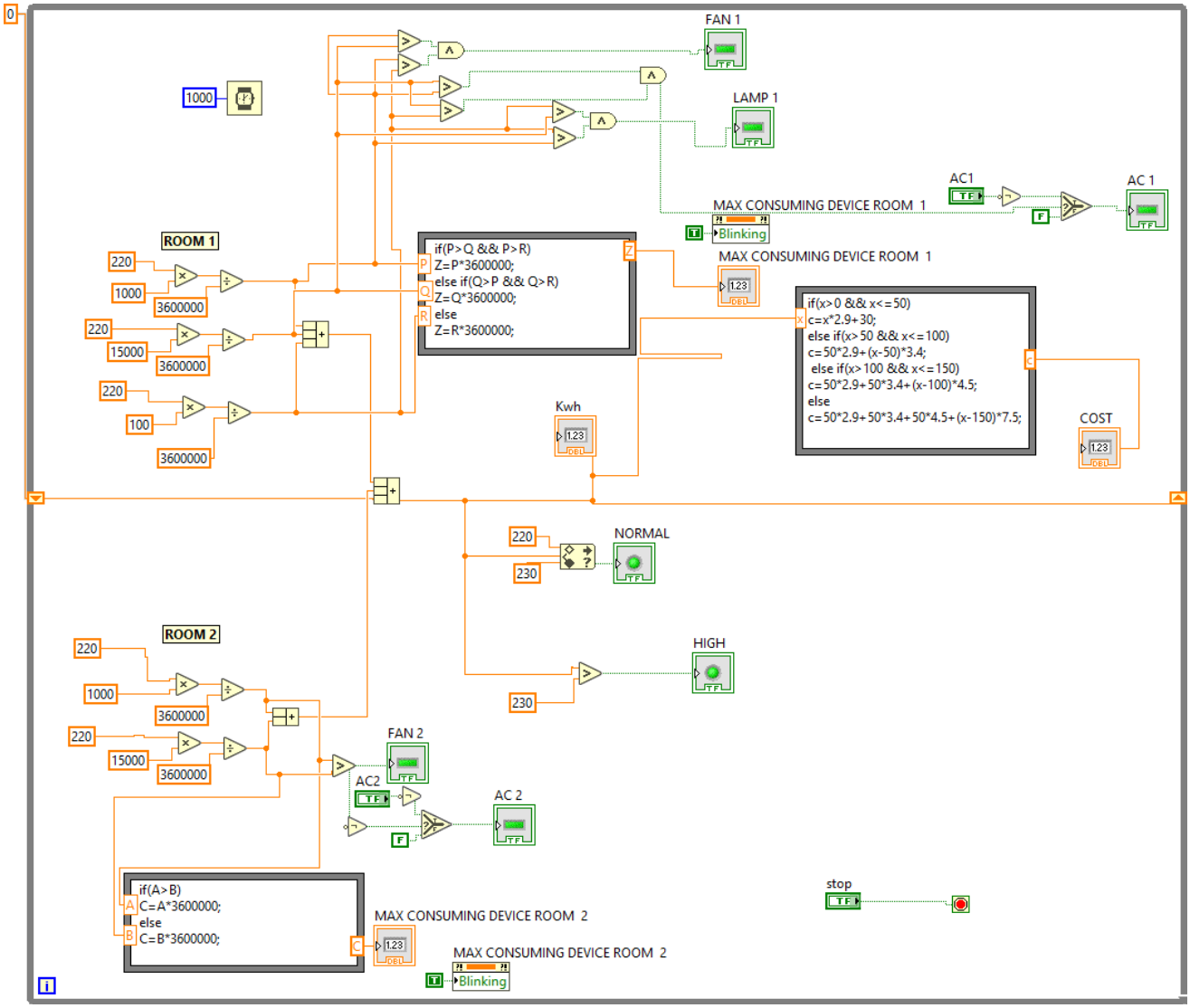

Fig.2: Virtual Instrumentation Diagram of Rooms 1 & 2

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V. RESULTS AND DISCUSSIONS

Case (1): Maximumpower consumption under two ACs

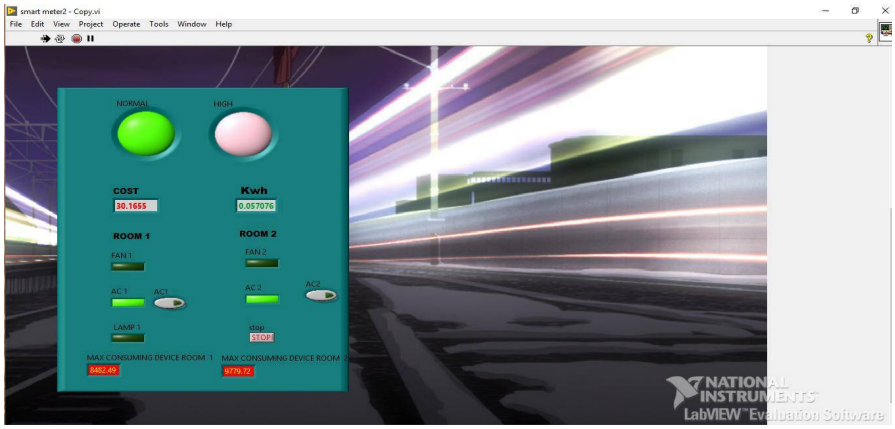

Fig.3: Maximum power consumption under two ACs

When two ACs are in operation, the maximum power consumption is recorded by two ACs and indicates NORMAL that is green LED glows as shown in Fig 3.

Case (2): Maximum power consumption under AC 1 & FAN 2

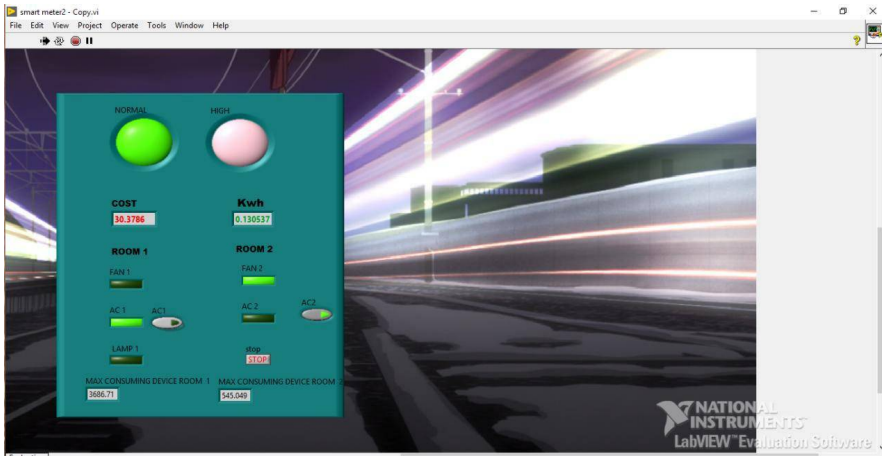

Fig 4: Maximum power consumption by AC1 & FAN2

When AC1 in room-1 is in operation and AC 2 in room-2 is not in operation, the maximum consumption is recorded by AC1 in room-1 and FAN 2 in room-2 and indicates NORMAL that is green LED glows as shown in Fig4.

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Case (3): Maximum power consumption under AC 2 & FAN 1

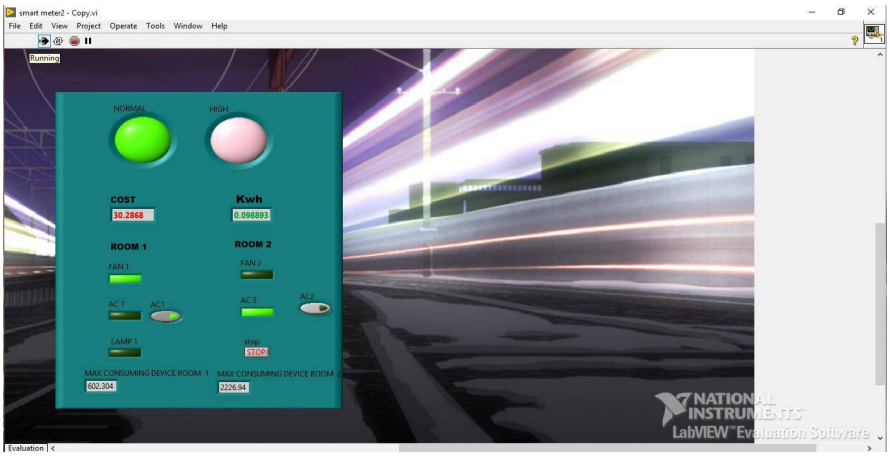

Fig 5: Maximum power consumption by AC2 & FAN1

When AC 2 in room-2 is in operation and AC 1 in room-1 is not in operation, the maximum consumption is recorded by AC 2 in room-2 and FAN 1 in room-1 and indicates NORMAL that is green LED glows as shown in Fig 5.

Case (4): Maximum power consumption under overload

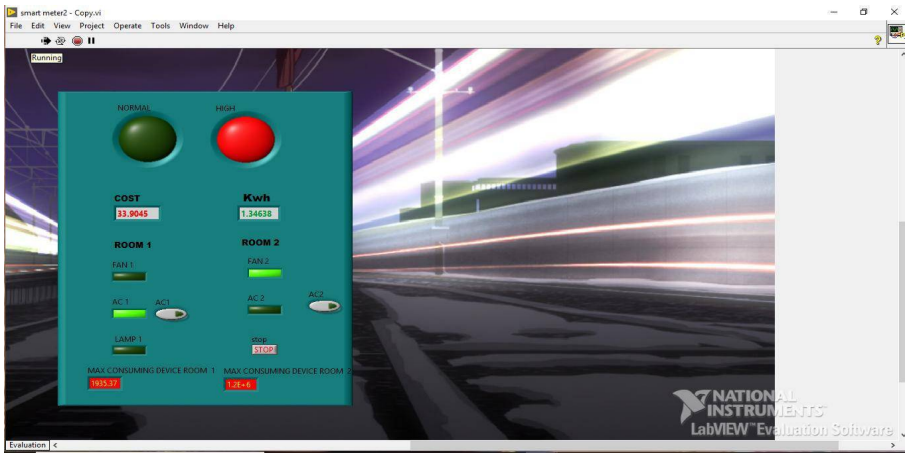

Fig 6: Maximum power consumption by AC1 & FAN2 under overload

When overload occurs in room-2, the maximum power consumption is recorded by AC 1 & FAN 2 and indicates HIGH that is red LED glows as shown in Fig 6.

VI. CONCLUSION

The home energy monitoring system has been developed to measure power consumption which helps to reduce the energy use in domestic areas through visible energy displays. Communication between LabVIEW and consuming power module helped us to monitor the power consumption for plotting recent and historical data to optimize control and planning of energy consumption. An attempt has been made to design a Smart energy meter using Lab VIEW which carried out with consumption patterns at various levels. It will be used in prepaid and postpaid energy meters.

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Even, this can be extended to generation plants to avoid voltage fluctuations and power theft. We can regulate the maximum power consumption loads then automatically life span of natural source will increase.

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BIOGRAPHY

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