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Domestic Electrical Appliance Monitoring and Control Management System Using ARM, GSM Technology

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ABSTRACT: Electricity is both invisible and intangible. We can see, feel, hear and even smell its effects, but we cannot really perceive it. As the effects of electricity (**light, heat, gas.co2** and so on) often are taken for granted in our domestic homes today, electricity becomes even more invisible. In order to support increased awareness in the area of consumer energy consumption, on a large scale in society as well as on the mundane level of the home, it is crucial that people learn about different amounts of energy used by the electric products in their everyday life. If this awareness is increased, people might gain control over their own local relationship to this invisible global resource. Ultimately this will lead them to question their energy behaviours. Real-time information feedback delivered via technology has been reported to produce up to 20 percent declines in residential energy consumption. There are however large differences in the estimates of the effect of real-time feedback technologies on energy use. Improved feedback on electricity consumption may provide a tool for customers to better control their consumption and ultimately save energy.

KEYWORDS: ARM controller, Gas sensor, Temperature sensor, GSM

I. INTRODUCTION

Most domestic energy use, most of the time, is invisible to the user. Most people have only a vague idea of how much energy they are using for different purposes and what sort of difference they could make by changing day-to-day behaviour or investing in efficiency measures. Hence the importance of feedback in making energy more visible and more amenable to understanding and control. This review considers what is known about the effectiveness of feedback to householders. The focus is on how people change their behaviour, not on the detail of the technology used. Climate change is one the driving force behind a new wave of energy management systems. Most of the currently available energy management systems in domestic environment are concerned with real-time energy consumption monitoring, and display of statistical and real time data of energy consumption. Although these systems play a crucial role in providing a detailed picture of energy consumption in home environment and contribute towards influencing the energy consumption behaviour of household, but they all leave it to households to take appropriate measures to reduce their energy consumption. Some energy management systems do provide general energy saving tips but they do not consider the household profiles and energy consumption profiles of home appliances. The proposed system attempts to address this issue by taking into account household profiles and energy consumption profiles of electrical appliances. The motivation behind this approach is to provide households effective advice on their energy consumption there by enabling them to take focused and effective actions towards efficient energy use.

II. EXCITING WORK

2.1 RF Technology

Radio frequency (RF) technology is more flexible and allows the user to link electric home appliances distributed throughout the house. RF can be categorized as a narrow band or spread spectrum. Narrow band technology requires a clear channel uninterrupted by other digital appliances. Since each transmitter/receiver appliance transmits using its own frequency, it is unlikely to interfere with other RF appliances connected to the home network.

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2.2 Bluetooth Technology

Bluetooth technology provides a universal bridge to existing data networks, a peripheral interface and a mechanism to form small private ad hoc groupings of connected devices away from fixed network infrastructures. Designed to operate in a noisy radio frequency environment such as a home, the Bluetooth technology uses both a fast acknowledgement and a frequency-hopping scheme to make the link robust. Bluetooth technology, therefore, can replace the cumbersome cables used today to connect the PDA to any other digital device.

2.3. Wi-Fi, WAN technology

A home server is a hardware device connecting a home network with a wide area network (WAN) or the Internet. The residential gateway provides port translation (NAT), allowing all the computers in a small network to share the same IP address and Internet connection. The home server sits between the modem and the internal network, or, as an alternate, a DSL or cable modem may be integrated into the home server. A home server often combines the functions of IP router, firewall, multi-port Ethernet switch and Wi-Fi access point. Home servers that include routing capabilities are converged devices and sometimes referred to as home routers or broadband routers with “broadband” in this case referring not to the router function but to the Internet access function. Home servers are under standardization by the Home Gateway Initiative

III. PROPOSED EMBEDDED SYSTEM DESIGN

Our proposed advice generation system is work in progress that makes intelligent use of monitored energy consumption data collected by monitoring subsystem in order to detect abnormal patterns or behaviours in energy consumption. On detection of any abnormality the system tries to uncover the underlying cause of it by using available data on energy consumption and appliances profiles or interacting with user to get required information. The system connects energy consumption appliances and devices to an information system to enable better visibility and control of energy consumption appliances. The knowledge of energy consumed by each appliances connected to GSM network provides households the ability to fine tune their energy consumption in various situations. The main aim of this research is to provide an effective feedback and advice on appliance level electrical power consumption to household by making visible their energy consumption and the factors that contribute towards efficient energy consumption.

The objective of proposed system is to integrate and test the effectiveness of innovative persuasive strategies delivered via an intelligent electronic system infrastructure that is able to infer and reason the energy behaviour of the households, Received from a number of different sensing technologies; (1) electrical mains circuit sensing, (2) individual appliance level sensing, (3) ambient sensing such as temperature and (4) gas mains sensing. Electrical data collected via the first three sensing methods share the same architecture design on data communication, analysis and display. As domestic gas consumption data are collected, extra considerations need to be focused such as safety regulation and power supply.

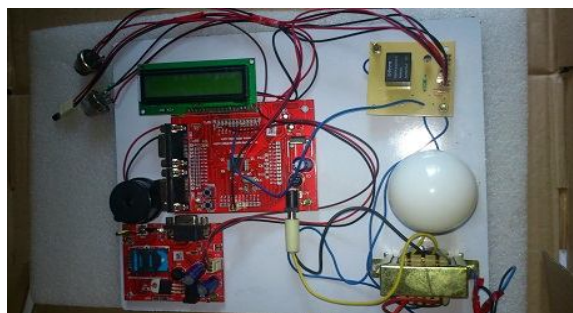


Fig1: Proposed image

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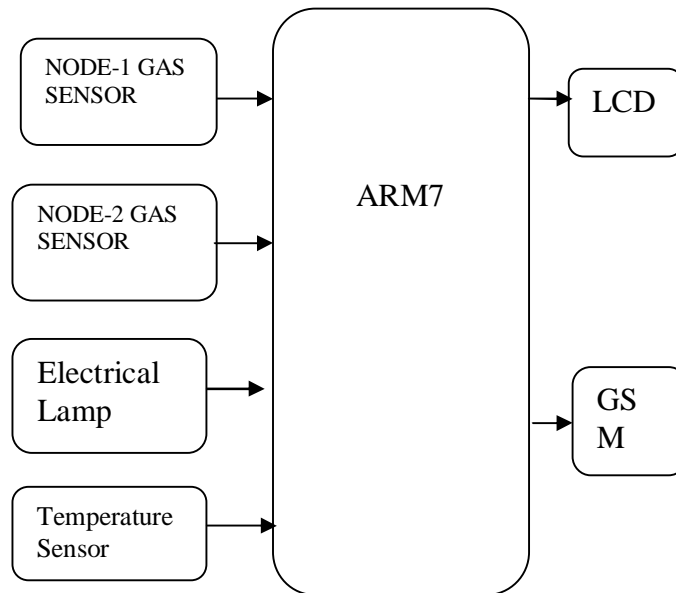


Fig.2. Proposed system

3.1. ARM7

ARM7 is a generation of **ARM** processor designs (see List of **ARM** microprocessor cores). Overview [This generation introduced the Thumb 16-bit instruction set providing improved code density compared to previous designs. ARM is a family of RISC architectures. “ARM “is the abbreviation of “Advanced RISC Machines”.

- .ARM7- von Neumann Architecture
- ARM9 –Harvard Architecture

3.2. GSM Technology

GSM (Global System for Mobile Communications, originally **Groupe Spécial Mobile**), is a standard developed by the European Telecommunications Standards Institute (ETSI) to describe protocols for second generation (2G) digital cellular networks used by mobile phones.



Fig.3: GSM Technology

3.3. Gas Monitoring

Gas detectors can be used to detect combustible, flammable and toxic **gases**, and oxygen depletion. This type of device is used widely in industry and can be found in a variety of locations such as on oil rigs, to **monitor** manufacture processes and emerging technologies such as photovoltaic.

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Fig.3: Gas Monitoring

3.4. Temperature Sensor

These **sensors** use a solid-state technique to determine the **temperature**. That is to say, they don't use mercury (like old thermometers), bimetallic strips (like in some home thermometers or stoves), nor do they use thermistor (**temperature** sensitive resistors).

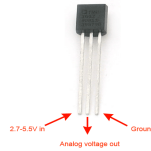


Fig.4: LM35 as Temperature Sensor

3.5 Proposed system images

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Fig.5: Proposed image



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IV. CONCLUSION

Our proposed System successfully utilizes wireless technology and monitoring, control the effects of electricity (**light, heat, gas.co2** and so on) often are taken for granted in our domestic homes. In order to support increased awareness in the area of consumer energy consumption, on a large scale in society as well as on the mundane level of the home.

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BIOGRAPHY

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