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EMBEDDED OF WIFI AND GSM TECHNOLOGY FOR MONITORING OF ENERGY READING AND CONTROLLING OF HOUSE APPLIANCES RESPECTIVELY FOR SAVING ENERGY

Puli Naresh [1], M.Akhila [2], G. Ravindranath Kumar [3]

[1] *M.Tech (ES), Ece, Visvesvaraya College of Engineering And Technology,*
nareshpuli125@gmail.com
[2] *Assistant Professor,Ece, Visvesvaraya College of Engineering And Technology,*
akhilamudireddy@gmail.com
[3] *Professor, Ece, Visvesvaraya College of Engineering And Technology,*
hodecevcet1516@gmail.com

ABSTRACT

The main aim of this project is to monitor the usage power by using the energy meter. Normally we don't know how power we are using the daily and how much price it is up to month ending. But in this project we can know how power we are using every day or every hour. So we can reduce the usage of power by switch off the loads used in the homes or industry. In this project the energy meter sends the data for every day or every one hour by using the RTC, so we can control the usage of the power by switch off loads. In this project user can control loads with mobile through the Wi-Fi communications and web based things. Here we can observe the daily usage of the power and price by using the RTC, if the electricity load was high we switch off the unnecessary loads in the home and we can control any load with the internet of things and we can operate remotely. In this project we can see the every hour the usage of the power and price for that power , the usage of the sends to the PC through the wifi technology and the if the power usage was high we can switch off the lights by sending the message the to the controller through GSM technology.

Keywords*: Key* components; Smart Meter, Wifi, GSM, Ldr sensor, Arm board..

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1. Introduction

Now a days the electricity usage is day by day increasing faster more than production. So saving the power is very important, that's why we are implementing this project to avoid the wastage of electrical energy. This project we can measureable to knowledge power we have a tendency to are victimization a day or each hour. Thus we will scale back the usage of power by turn out the hundreds employed in the homes or trades The LAST-METER smart grid is the portion of the smart grid closer to the home, and the one with which customers interact. It allows a two-way data flow between customers and electric utilities, transforming the "traditionally passive end-users into active players" in the energy market.Considering the seven domains of the conceptual model of smart grids proposed by the National Institute of Standards and Technology , the last-meter smart grid corresponds to the "customer domain." It enables residential, commercial, and industrial customers based on their different energy needs to optimize energy consumption and local generation, and to actively participate to demand-response policies one of the most disrupting aspects of smart grids. Users and customer Nontechnical customers need a simple way to control energy consumption and production, and to exchange power usage data at the proper level of granularity with energy providers or distributors. From the point of view of market acceptance and penetration, the last-meter smart grid is just one aspect of the broader concept of smart home and smart buildings. The con-sequence of this consideration is that one can hardly imagine a situation in which the consumer side of the smart grid and other smart home applications rely on different and separate infrastructures or platforms.

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Embedded systems are electronic devices that incorporate microprocessors with in Their implementations. The main purposes of the microprocessors are to simplify the system design and provide flexibility. Having a microprocessor in the device means that removing the bugs, making modifications, or adding new features are only matters of rewriting the software that controls the device. Or in other words embedded computer systems are electronic systems that include a microcomputer to perform a specific dedicated application. The computer is hidden inside these products. Embedded systems are ubiquitous. Every week millions of tiny computer chips come pouring out of factories finding their way into our everyday products. Embedded systems are self-contained programs that are embedded within a piece of hardware. Whereas a regular computer has many different applications and software that can be applied to various tasks, embedded systems are usually set to a specific task that cannot be altered without physically manipulating the circuitry. Another way to think of an embedded system is as a computer system that is created with optimal efficiency, thereby allowing it to complete specific functions as quickly as possible. Embedded systems designers usually have a significant grasp of hardware technologies. They used specific programming languages and software to develop embedded systems and manipulate the equipment. When searching online, companies offer embedded systems development kits and other embedded systems tools for use by engineers and businesses.

Embedded systems technologies are usually fairly expensive due to the necessary development time and built in efficiencies, but they are also highly valued in specific industries. Smaller businesses may wish to hire a consultant to determine what sort of embedded systems will add value to your organization. An embedded system is a system which is going to do a predefined specified task is the embedded system and is even defined as combination of both software and hardware. A general-purpose definition of embedded systems is that they are devices used to control, monitor or assist the operation of equipment, machinery or plant. "Embedded" reflects the fact that they are an integral part of the system. At the other extreme a general-purpose computer may be used to control the operation of a large complex processing plant, and its presence will be obvious.

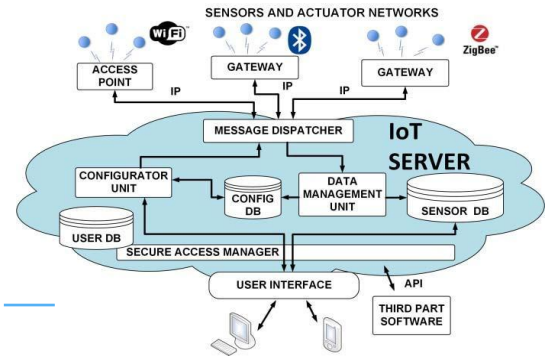

Fig. 1. Block diagram of the internet of things platform supporting the in-home smart grid.

this paper, we present an architecture for the last-meter smart grid that is embedded in a platform for the internet of things (IoT) . Our architecture has four main advantages and elements of novelty with respect to the state of the art, each corresponding to the basic requirement of being “customer-centric” and scalable, in order to improve market acceptance and ease of deployment. It seamlessly integrates smart grid with smart home applications. We assume that the typical early adopter of a last-meter smart grid is also a user of smart home applications (dedicated to security, entertainment, home automation, et cetera). In order to avoid duplication and enable possible synergy, the platform must support both smart grid
and other smart home applications. It can gather data from heterogeneous sensor communication protocols. The last-meter smart grid exploits existing infrastructure for in-home connection to smart meters. Therefore, its architecture allows different wire-less or wired protocols to be used for communications between meters, users, and other parts of the system. It provides secure and

differentiated access to data. Single customers have complete fine-grained access to their own data, and can enable access by third parties.

2. **Ease Of Use**

An embedded system is a system which is going to do a predefined specified task is the embedded system and is even defined as combination of both software and hardware. A general-purpose definition of embedded systems is that they are devices used to control, monitor or assist the operation of equipment, machinery or plant. "Embedded" reflects the fact that they are an integral part of the system. At the other extreme a general-purpose computer may be used to control the operation of a large complex processing plant, and its presence will be obvious. All embedded systems are including computers or microprocessors. Some of these computers are however very simple systems as compared with a personal computer. The very simplest embedded systems are capable of performing only a single function or set of functions to meet a single predetermined purpose.

In more complex systems an application program that enables the embedded system to be used for a particular purpose in a specific application determines the functioning of the embedded system. The ability to have programs means that the same embedded system can be used for a variety of different purposes. In some cases a microprocessor may be designed in such a way that application software for a particular purpose can be added to the basic software in a second process, after which it is not possible to make further changes. The applications software on such processors is sometimes referred to as firmware.

Arm processor review:

ARM stands for Advanced RISC Machines. It is a 32 bit processor core, used for high end application. It is widely used in Advanced Robotic Applications. It performs number of instruction in a single cycle compare with other controllers it have advanced features. The Arm CPU with real-time emulation and embedded trace support, that combine microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and a unique accelerator architecture enable 32-bit code execution at the maximum clock rate.

For critical code size applications, the alternative 16-bit Thumb mode reduces code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption, LPC2141/42/44/46/48 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. Serial communications interfaces ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power .

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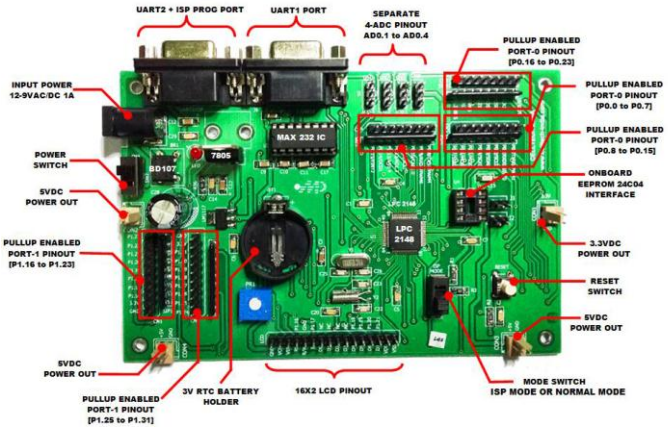

Key features:

1. 16-bit/32-bit ARM7TDMI-S microcontroller in a tiny LQFP64 package.
2. 8 kB to 40 kB of on-chip static RAM and 32 kB to 512 kB of on-chip flash memory. 128-bit wide interface/accelerator enables high-speed 60 MHz operation.
3. In-System Programming/In-Application Programming (ISP/IAP) via on-chip boot loader software. Single flash sector or full chip erase in 400 ms and programming of 256 bytes in 1 ms.

Existing System

This system we have to existing the usage power by energy meter. Commonly we have a tendency to don't knowledge power we have a tendency to are victimization the daily and the way abundant value it's up to month ending. Energy meter we have to developed to homes and how much power usages to calculate the watts same as every month ending to see how much power usages in our homes to calculate watts and to electricity bill.

Proposed System

In proposed system user can control loads with mobile and sensors remotely . Here we observe daily usage of units and prices using RTC , if the electricity usage is high then we avoid unnecessary usage of home appliances (loads) and we can control any load with the internet of things and we can operate remotely. In this Project sensors play very important role. In this Proposed system we reducing the wastage of power.

A model described here is for its low price and great possibilities most frequently used in practice. It is based on the HD44780 microcontroller (*Hitachi*) and can display messages in two lines with 16 characters each. It displays all the alphabets, Greek letters, punctuation marks, mathematical symbols etc. In addition, it is possible to display symbols that user makes up on its own. Automatic shifting message on display (shift left and right), appearance of the pointer, backlight etc. are considered as useful characteristics.

IN-HOME SMART GRID IMPLEMENTATION

We have implemented an in-home prototype on the IoT platform, building dedicated hardware and software. This first prototype only includes a Wifi network connected to the IoT server through a wifi IP gateway. The sensors are smart plugs, placed between home appliances and a wall socket, and able to collect real-time power

consumption data from the loads. Customers can have a visual feedback of their energy consumption and can remotely control each load. Let us consider in detail the elements of the system.

Smart Meter

The smart plug is enclosed in a plastic case with a plug and a socket section and can be inserted in a standard wall socket. The smart plug collects load information from the attached electrical equipment. Information includes: single-phase active, reactive, and apparent power; power factor; sampled waveforms; root mean square (RMS) current and volt-age; on/off status. The smart plug is also an actuator, since it can turn the load on and off. Our smart plug has no buttons and can be completely configured and controlled through the user interface.

Smart meter

Wifi ESP8266

Continuing from my previous diary post concerning Hi-Link HLK-RM04 module, I even have finally received the ESP8266 Serial-to-WiFi module that I've been expecting. As I same antecedently, with the recognition of lot devices, there's AN increasing demand for low-priced and easy-to use WLAN modules. ESP8266 may be a new player during this field: it's small (25mm x 15mm), with straightforward pin connections (standard 2×4 pin headers), and better of all, it's extraordinarily low-cost, What is Serial-to-WiFi merely place, it suggests that victimization serial TX/RX to send and receive local area network buffers, and equally, victimization serial commands to question and alter configurations of the WLAN module. this is often quite convenient because it solely needs 2 wires (TX/RX) to speak between microcontroller and WLAN, however a lot of significantly, it offloads WiFi-related tasks to the module, permitting the microcontroller code to be terribly light-weighted.

GSM

GSM (Global System for Mobile communications) is an open, digital cellular technology used for transmitting mobile voice and data services.GSM (Global System for Mobile communication) is a digital mobile telephone system that is widely used in Europe and other parts of the world. GSM uses a variation of Time Division Multiple Access (TDMA) and is the most widely used of the three digital wireless telephone technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot.

It operates at either the 900 MHz or 1,800 MHz frequency band. It supports voice calls and data transfer speeds of up to 9.6 kbit/s, together with the transmission of SMS (Short Message Service). History In 1982, the European Conference of Postal and Telecommunications Administrations (CEPT) created the Group Special Mobile (GSM) to develop a standard for a mobile telephone system that could be used across Europe. In 1987, a memorandum of understanding was signed by 13

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countries to develop a common cellular telephone system across Europe. Finally the system created by SINTEF lead by Torleiv Messenger was selected.

GSM module

In 1989, GSM responsibility was transferred to the European Telecommunications Standards Institute (ETSI) and phase I of the GSM specifications were published in 1990. The first GSM network was launched in 1991 by Radiolinja in Finland with joint technical infrastructure maintenance from Ericsson. By the end of 1993, over a million subscribers were using GSM phone networks being operated by 70 carriers across 48 countries. As of the end of 1997, GSM service was available in more than 100 countries and has become the de facto standard in Europe and Asia.

Working

When we give the power supply 230v/50 Hz , it is convert into 12v/50Hz by using of step down transformer. The ARM controller is working with only Dc voltage ,that's why we are giving 3.3v dc voltage . The controller performs entire operations , it is the heart of Project, The thing is when we switch on the controller it will start working, the main purpose of this project is to monitor the usage power by using the energy meter. Normally we don't know how power we are using the daily and how much price it is up to month ending. But in this project we can know how power we are using every day or every hour. So we can reduce the usage of power by switch off the loads used in the homes or industry. In this project the energy meter sends the data for every day or every one hour by using the RTC, so we can control the usage of the power by switch off loads. In this project user can control loads with mobile through the Wi-Fi communications and web based things. Here we can observe the daily usage of the power and price by using the RTC, if the electricity load was high we switch off the unnecessary loads in the home and we can control any load with the internet of things and we can operate remotely. In this project we can see the every hour the usage of the power and price for that power , the usage of the sends to the PC through the wifi technology and the if the power usage was high we can switch off the lights by sending the message the to the controller through GSM technology.

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Fig Working operation board

3. CONCLUSION

We have presented an architecture, an implementation, and a demonstration of the Customer Domain of the smart grid, based on a platform for the IoT that can host a broad range of smart home applications. Novelty in this field must be found in the architectural concept, in the system integration, and in the prioritization requirements. In this sense, our proposal has unique advantages and elements of novelty with respect to the state of the art: it is customer centric, it minimizes the deployment of specific smart grid infrastructure, and it leverages possibly available smart home applications, sensors, and networks. We believe this is key for a widespread acceptance of smart grid applications and equipment to be deployed at home.

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Puli Naresh
M.Tech (ES)
Visvesvaraya College Of Engineering And Technology, Patelguda, Ibrahimpatnam, RangaReddy dist., Telangana.

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M.Akhila,
Assistant Professor
Visvesvaraya College Of Engineering And Technology, Patelguda, Ibrahimpatnam, RangaReddy dist., Telangana.

G.Ravindranath Kumar,
HOD,
working as Professor from Visvesvaraya College of Engineering And Technology, Patelguda, Ibrahimpatnam, RangaReddy dist., Telangana.