
ARDUINO UNO BASED AUTOMATIC SMART METER

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ABSTRACT:

This paper present a analysis conducted in two phase .The presented work consists of two tasks to study the effect of power optimization techniques implemented on two evaluation boards. The design and implementation of an embedded system consisting of a DSP, a Microcontroller, controlled by power management processor and implementation of power optimization techniques and estimation of power.

KEYWORDS:

MICROCONTROLLER, DNA SEQUENCING, OPTIMIZATION TECHNIQUES, SMART METER.

INTRODUCTION:

An embedded system is a computer system which performs a specific function according to our given application requirements with specific hardware environment. Some critical applications such as automotive design, controls designs (robotic machine), railways, aircraft, aerospace, DNA Sequencing, neural network, Eye lens design and fingerprinting currently working on embedded technology [Fig 1]. The higher processing units and efficient memory management scheme are required to solve application dependent problems and embedded system implements our real-time applications development activity. Currently Multi-core and/or multi-threaded architectures used in the market for achieving high performance. An embedded system easily completes the computation task according to hardware units (memory and processor) require to reduce challenges arises in terms of scheduling time, low power, temperature, scalability, design complexity, efficiency, flexibility and heterogeneity.

Efficient co-design technology is required to reduce the operational complexity and challenges of application designing and effective memory design is required to reduce the operational complexity of the given application.

The software environment implements application developments and compilation process and hardware units implement user logic or behavior synthesis. The Hardware side of design most likely consists of interconnection components such as processors, memories and communication units (buses, output/input device I/O interfaces, sensor, RTOS devices etc.) [Fig. 1]. Embedded systems have used some specific constraints such as real time design metrics are a measurement of an application features such as Cost, Size, Power and High Performances. Reactive and real time design metrics required to implement the computing results which used in real time environments without any delay. Currently embedded system designer are being designed on a silicon chip and also design for critical applications like killer application (smart phone), smart card, video game, mobile internet, handheld embedded system, GBPS device, gigabyte per second LAN system.

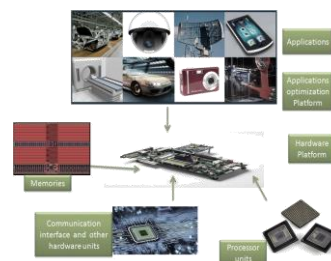


Fig. 1 Application requirements based embedded system design

PROPOSED METHODS AND MATERIAL

A. EXISTING METHOD

Energy consumption is measured using various methods. Bill for usage is generated and provided to the customer using certain methods. Payment is collected in electricity board from the customer. Recently, research into the field of Automatic Meter Reading System has continued to receive much attention in academia. Traditional Electro-mechanical meters were used to measure the energy consumption. It is an analog meter where readings are noted in person and were taken to Electricity board station where the bill is generated for the

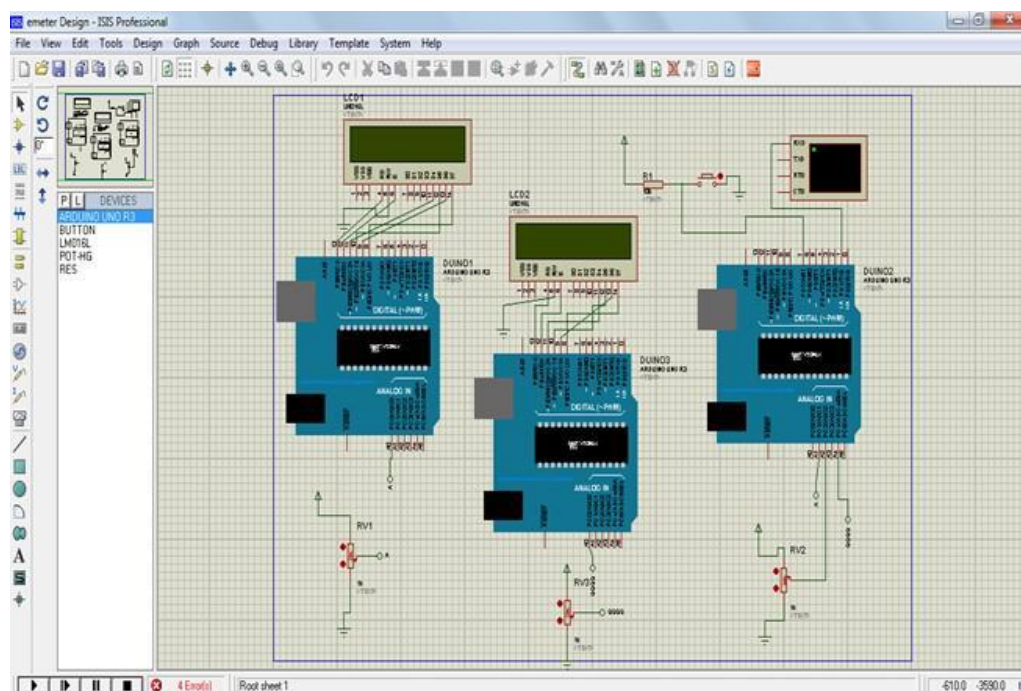
consumption. Consumer has to pay the bill for the usage in Electricity board station. Human error is the main disadvantage of this method. The Software developed here is with GUI which makes easier to work on it. It is created using .NET. It has database management system which helps to maintain the data. Customer can directly pay the amount in Electricity Board station where this software helps to complete the payment Developed a Bluetooth based system, were a method was introduced to retrieve data by means of wireless communication known as Automatic meter reading (AMR). AMR is a mechanism whereby the Energy meter sends the recorded power consumption of a household in certain interval of time to a „wirelessly“ connected reader, which could be a personal computer. The reading were noted in a database and the bill will be generated.

B. PROPOSED METHOD

The system consists of Automatic meter reading facility with the help of current sensor. Thus we can avoid human errors in measuring the readings

- AMR for measuring energy consumption.
- Microcontroller to calculate Energy consumption.
- Current sensors to detect a power theft in a transmission line.

SIMULATION



The simulation of the proposed method is done using proteus 7.6 sp4 and the fig shows the simulation of automatic energy measuring with power theft detection. The entire units were connected together to form a functional system. Normally, Arduino Uno are often mounted on top of the Arduino board.

RESULT COMPARISON

Automatic smart meter works by communicating directly with wireless data protocol with your energy supplier, so the company will always have an accurate meter reading and there's no need for you to take a meter reading yourself. Automatic Smart meters can work in a variety of different ways, including using wireless mobile phone type technology to send data.

Parameters	Without Load		With Load (40 watt Bulb)	
	Energy Meter	Smart Meter	Energy Meter	Smart Meter
Voltage	231.7V	232.15V	213.01V	213.46V
Current	0.0	0.0	0.39A	0.32A
Frequency	-	49.99	-	50.01
kwh	0.0	0.0	0.08	0.08
kVAh	0.0	0.0	0.08	0.08

Table Comparison between Conventional Energy meter and Smart Electricity meters

5.1 CONCLUSION

The characteristics and the important design metrics to be considered for embedded systems along with the challenges for the designer to optimize the design metrics with special focus on power has been discussed. The study of the related research papers describing various optimization techniques for static and dynamic power reduction through DVFS, Task scheduling, clock gating, sleep mode and software optimization techniques and also a

comparative analysis of power savings of earlier research work has been graphically represented .

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