

Efficient Embedded Microprocessor

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ABSTRACT:

In this research paper we are trying to introduce an embedded microprocessor which is combination of embedded system and microprocessor. These embedded are 8 bit devices microprocessors programmed in assembly language. These processors are used as microcontrollers in devices such as automative ignition control, digital radio tuning, printers, mobile phones, DVD players and washing machines. In these processor RISC microcontrollers such as ARM used as they are cheap and consume low power. These devices are cheap, easy to design software portable, high noise immunity, high speed, no component ageing and drift which makes them more useful than ordinary processors. In these devices we are replacing analog circuits with digital circuits.

KEYWORDS: Embedded system, Microprocessor, Microcontroller, Real-Time Operating

I. INTRODUCTION

Embedded system is a computer system designed to perform particular task, whereas microprocessor is a CPU designed on a single integrated circuit. When we combine both the embedded system and microprocessor then new term arises called embedded microprocessor. Now the question arises what is an 'Embedded Microprocessor'?? Embedded microprocessors are computer chips used inside devices (other than computer) to provide added functionality, in the areas of control and monitoring. They are also called real time operating system, because they allow microprocessor to respond in micro second to critical events. The advantages of embedded microprocessor are that they are cheap, ease to design, portable, high speed, and are reliable.

II.THEORY

EMBEDDED SYSTEM: Embedded system is a computer system designed to do some specific task, rather than be a general purpose computer for multiple Embedded systems task. that are programmable provided with are programming interfaces, and embedded systems programming is a specialized occupation. For example any alliance that has a digital clock, has a small embedded micro-controller that performs no other task than to display the clock. Other example of embedded system with I/O capability is a security alarm with an LCD status display, and a keypad for entering a password. Embedded systems are required to provide Real-Time response. Real-Time system is defined as a system whose correctness depends on timeliness of its response. Embedded system uses a special





operating system that helps meet called a real time operating system, or RTOS. The program instructions written for embedded system are referred as firm fare, and stored in read-only memory or flash memory chips. The hardware of embedded system includes the chips, wires, circuit boards, buttons and displays. The main goal of designing an embedded system is to minimize memory and power usage. High performance is specially emphasized in many embedded systems. The embedded system design consists of the following steps: modelling, refining, scheduling, and mapping. In modelling designing the system and experimenting with algorithms is involved. The application design is further refined into smaller pieces during the refining. Several set of instructions can access the same hardware by scheduling, therefore scheduling has to be completely accurate for correct functionality. The mapping involves the functional description into software that runs on a processor and/or custom or semi-custom hardware. Embedded system is divided into two parts Hardware and Software. The Hardware design implemented using hardware packages, hardware description language programs. The software part deals with the High level C or C++ programs that perform the sequence of steps necessary for the system to operate as specified. The software engineering and VLSI computer aided design (CAD) provide implementation techniques for the software and hardware components of the system.



A digital thermostat as an example of embedded system

MICROPROCESSOR: Microprocessor incorporates the functions of a Central Processing Unit (CPU) on a single integrated circuit. The microprocessor is a multipurpose, programmable device that accepts digital data as input, processes it according to instructions stored in memory, and provide result as output. For example, Intel's Pentium or AMD'S Athlon. The integration of CPU on a single integrated chip reduced the cost of processing power. The clock speed determines how many instructions per second the processor can execute, the higher the value, the more powerful the CPU. For example, a 32 bit International Journal of Research (IJR) Vol-1, Issue-10 November 2014 ISSN 2348-6848



microprocessor that runs at 50 MHz is more powerful than a 16 bit microprocessor that runs at 25 MHz the components of microprocessor are control unit, I/O units, arithmetic logic unit (ALU) registers, cache. The control unit reads the instructions, and generates the necessary digital signals to operate the other components. The I/O ports interface with the system memory (RAM), and also the other peripherals of a computer. ALU performs arithmetic operations. The registers are used by the programmer to store arbitrary data as needed, are called general purpose registers. Cache is used to read the data faster. The designing of microprocessor based controllers requires specific hardware and software programming and programming depends upon the type of software whether the operating software or application software. The high density memories reduced cost and package size dramatically and increased application flexibility. When microprocessor is activated it performs various actions the first step is to fetch action. This is the portion in which random access memory (RAM) is used, it provides memory for the CPU to be able to hold the instructions long enough them to be used. In that absence of RAM the computer slows down. The next step is decoding action, in this the CPU order the correct components to do their jobs, each part of the sequence number must be identified the and given correct operational parameters. The next step is execution, CPU tells the computer components to do their jobs. During this phase the microprocessor stays in constant contact with the components, making sure each activity is successfully completed and sent during the previous two steps. The last step involves write back function; CPU is making a copy of the actions and their results onto the computer main memory, usually found in the hard drive. This step is important in determining problematic issues when something goes wrong.



(a). GENERAL PURPOSE MICROPROCESSOR SYSTEM

EMBEDDED MICROPROCESSOR:

Embedded microprocessors are computer chips used inside devices (other than computer) to provide added functionality, in the area of control and monitoring. And we can also say that the embedded microprocessors are the hidden chips that control everything from cell phones and International Journal of Research (IJR) Vol-1, Issue-10 November 2014 ISSN 2348-6848



microwave ovens to jumbo jets and antilock brakes. For example, embedded microprocessor can be found in portable devices the like digital watches, digital cameras, GPS units and MP3 players. They are also called real-time operating systems. These processors are usually smaller and consume less power. We can carry RAM sizes with embedded system up to 128kb whereas the normal size of RAM is 4kb, 8kb, 32kb and 64 kb. In same way the size of cache memory can range from 32kb to 320kb, with the normal sizes being 32kb and 64kb. The digital signal processing (DSP), has become prevalent as the microprocessor, they are used in wireless telephones, digital telephone and cable modems. These processors combine a 32-bit RISC like instruction set and dual 16- bit multiply accumulate (MAC) signal processing functionality with the ease of use attributes found in general purpose microcontrollers. This combination of attributes enable the processor to perform equally well in both signal processing and control processing. The memory management unit provides for a memory protection format, when coupled with the core's users and supervisor modes can

support a full real time operating system. difference between The the microprocessor and microcontroller is that a microprocessor is contained within a microcontroller. The embedded microprocessors include variety of timers as well such as programmable interval timer. The purpose on analog to digital convertor to accept input from the devices they are controlling. The ADC converter allows the processor to send data to the device it is controlling. Many embedded processor do not include memory management units, the structure of the application software makes a memory management unit less useful. Timers are used to count events, to measure external time and to measure the lengths of time for scheduling. Embedded process microprocessor is qualified for automotive application. External memory controller with glue less support for SDRAM and asynchronous 8-bit and 16-bit memories. The processors have 64k bits of one-time programmable by the developer only once. The Real time clock (RTC) provides a robust set of digital features, including current time, stopwatch and alarm.



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III.CONCLUSION

In this review paper we concluded the embedded microprocessor systems are used every day by millions of people, but these systems are not seen because, they are buried inside the product or equipment. We found there are various that applications of embedded system, they can found in traffic lights, system controlling and factory controllers. plants The combination of embedded system and microprocessor increases the efficiency, consume less power, noise immunity is high, no component ageing and drift, and are portable. Various companies are making advancements in data processing and control technology in developing embedded microprocessors to optimize the speed and power of electronic devices to meet current and anticipated applications in the future.

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