Low Power Considerations and Timing Simulation Analysis of Recent 8-Bit Embedded Controllers including AT89C5130A/31A-M-Frozen-in-Idle-State MCUs for WSN Applications

Abstract

This is an era of SOC (System-on-Chip) based computing. Embedded systems play significant role in representing computing power in the smallest possible device that too in the most liberal way. Microcontroller is represented as a major embedded system product and is responsible to carry computing power on any-time-any-where basis. The modern PC or
PC-based industrial applications use many small microcontroller circuits in keyboards, printers, modems, disk controller, sound card, CD-ROM drive, mouse, bar-code reader (printing industries), power drill machines (automobile industries), SCADA system (process industries), fire alarm system (security and safety engineering) and smart cards (banking industry) to name a few. Microcontroller makes it possible to empower the simplest application and the product with computing intelligence at an affordable cost. The selection of the microcontroller is based on the facts, such as, availability of software development aids, market trend and design expertise, power consumption and computing speed, instruction set and on chip memory, prototype size and design, I/O and timer availability, possibilities of an application specific integrated circuit (ASIC) based implementation and upward compatibility.

This paper deals with detailed comparative study of the features of the recent 8-bit microcontrollers available till December 2010 from leading manufacturers and the timing simulation analysis of some useful microcontrollers. The outcome of the comparative study and timing simulation analysis is presented in terms of recommendations readily available to the designers and first generation entrepreneurs to encourage low power and low cost designs, particularly for precision agriculture and WSN based applications. In the developing countries, such as in India, electronics hardware production increased from Rs. 50,500 crore in 2004-05 to Rs. 97,260 crore in 2008-09, with a cumulative annual growth rate of 17.3%. The production of electronics hardware in India has grown from Rs. 97,260 crore in 2008-09 to Rs. 109,940 crore in 2009-10, registering a growth of 13%, slightly low due to global slowdown [10]. The control, instrumentation and industrial sector of electronics industry use critical hardware technologies and systems with built-in software. Low cost and low power microcontroller based system design can play a significant role to increase employability and the export in this sector, particularly, in the developing country.

Reference

Index Terms

Computer Science

Information Processing

Key words

Microcontroller PIC Atmel Wireless

Sensor Network

Low Power Device

Pico Power Technology