Microcontroller Application Market Overview

Microcontrollers are microprocessors that are specially configured to monitor and control mechanisms and processes rather than manipulate data. The systems they are embedded in are often called real-time control systems; microcontrollers always incorporate some form of timer structure to allow synchronization with the outside or "real" world.

There are many useful configurations of microcontroller systems that require more than a single microcontroller. A network of micro-controllers can be used for interprocessor communications. One or more microcontroller might be required to communicate with a CRT terminal used to supervise or monitor the system. Another might be a simple CRT terminal design based on a microcontroller that needs one serial port for communication and another for driving a slave printer.

Other microcontrollers serve as intelligent controllers for remote peripherals. However, they can also be used as intelligent front-end helpers for a microprocessor, which can extensively off-load control functions for the CPU.

The wide base of applications cuts across all industry segments. The following six application segments list microcontroller applications.

CONSUMER APPLICATIONS

Consumer products are the largest users of microcontrollers. In fact, some applications use several 4-bit MCUs in a single product. Feature content and low cost are the most important issues for use in consumer products. High performance is secondary. Typical consumer applications are listed below:

* Home entertainment

    - Video tape recorders

    - Television tuners and decoders

    - Clock radios

    - Music synthesizers

    - High-end video games

    - Automatic hi-fi turntables

    - Compact audio disk players

    - Laser disk drives

Microcontroller Application Market Overview

* Appliances

    - Rice cookers

    - Microwave ovens

    - Washers and dryers

    - Food processors

    - Sewing machines

    - Electric ranges

* Household environment

    - Air conditioners/heat pumps

    - Smart thermostats

    - Security systems

    - Lighting control

    - Utility meters

* Games and education

    - Language translators

    - Teaching toys

    - Games

INDUSTRIAL APPLICATIONS

Microcontrollers are widely used in industrial products. Although a new microcontroller may be ideally suited to an application and provide cost and performance benefits, market acceptance must wait until the end product is revised. Industrial products frequently require 6 to 18 months from product concept to initial production, so there is a long gestation period between early samples and volume production. In addition, the introduction and market acceptance of the final product may take several months, thereby lengthening the microcontroller life cycle. Industrial products often are sold to equipment manufacturers, so an intermediate product design phase may affect the life cycle of a microcontroller.

Microcontroller Application Market Overview

Typical industrial applications of microcontrollers are listed below:

- Motor control
- Medical instrumentation
- Scales
- Liquid and gas chromatographs
- Vending machines
- Oscilloscopes
- Beverage dispensers
- Speech recognition
- Speech synthesis

- Elevators
- Power tools
- Gas pumps
- Timers
- Machinery control
- Process control
- Robot control
- Numerical control
- Intelligent transducers

COMMUNICATIONS APPLICATIONS

With the merging of communications and computer technologies in various systems such as videotex and teletext, electronic communications will be vital to the social and economic development of every industrialized country. Several telephone equipment suppliers have created PABXs using microcontrollers. These systems are more reliable, easier to maintain, easier to upgrade, and less expensive than competitive equipment based on more traditional ICs. Listed below are several applications of MCUs in the communication field:

- Telephones
- Pagers
- Videotex
- Modems

- CB radios
- Facsimile
- Intelligent line card control

AUTOMOTIVE APPLICATIONS

Smart Cars--Safe and Friendly Too

Auto makers have been forced to incorporate more and more high-technology electronics. Government standards on safety, exhaust emissions, and fuel efficiency have pushed automotive designs beyond the bounds of traditional mechanics. Some of today's autos have seven microprocessors or microcontrollers, and future cars may have twice that number. Listed below are some typical applications of microcontrollers and microprocessors in automobiles:

- Engine control
- Electronic fuel injection
- Emission control
- Exhaust gas recirculation
- Automatic transmission control
- Oil service reminder
- Engine system diagnostics
- Transmission control
- Navigation aids
- Voice pattern recognition
- Electronically controlled air suspension
- Spark advance
- Choke control
- Digital speedometers

- Ignition controllers
- Trip computers
- Antiskid braking
- Voice information system
- Climate control
- Instrumentation cluster
- Vehicle security
- Steering
- Obstacle warning
- Axle loading
- Component condition
- Failure warning
- Routing
- Driver performance
- Component performance

DATA PROCESSING APPLICATIONS

Microcontrollers are used widely in business applications because they are the building blocks to automate the collection and transmission of vital information. In addition to computers and communications, several other business-related MCU applications are listed below:

- Electronic typewriters
- Credit card verification
- Turnstile counters
- Electronic locks.
- Parts counting and weighing
- Freezer alarms
- Copying machines
- Cash registers

- Time clocks
- Postage meters
- Bar code readers
- Food scales
- Plotters
- Winchester disk drives
- Tape drives
- Impact and nonimpact printers

Personal computers have been one of the fastest-growing market segments. Microcontrollers are so prevalent in personal computers that it is common to find three or more in a typical system: one or more controlling the printer, one controlling the keyboard, and one controlling the disk drive. Microcontrollers are frequently used as interface devices between a host computer and peripheral equipment.

MILITARY APPLICATIONS

Military applications include the following:

- Missile control
- Torpedo guidance control
- Smart munitions
- Aerospace guidance systems

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