MICROCONTROLLER, THE FUTURE CORE PROCESSOR…!

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Abstract:

Microcontroller... the name itself speaks lot many things about. **Micro** means small and **Controller** means a device which can provide a control over. To be more specific it's basically a processor with limited amount of memory and peripherals built within a chip and utilized for dedicated jobs. Today and hereafter with the further development in technological aspect at every footstep the microcontroller will play a vital role. It's an entirely dedicated full proof portable embedded system. It has become popular since its introduction merely because of the unparallel features like speed, efficiency, size, accuracy and the most importantly its versatile applications.

It's a programmable and self contained system used in many appliances of day to day life and a day is not far away when its applications will spread in almost all walks of life. It has limited memory and thereby the program length. Thus naturally program run time reduces and speed goes up. As we are moving ahead time management is becoming a crucial factor and the microcontroller will definitely be one of the most important role players in it.

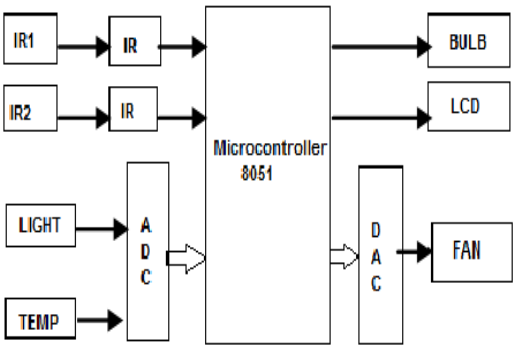
Index Terms **- Dedicated, Embedded, Programmable, Self contained, Runtime**

I Introduction

Embedded systems came into existence with the development of microcontrollers. Its basically a concept of putting entire things on a single chip. Whatever the gadgets today we are surrounded with are built around the microcontrollers. Some examples we can quote may be Remote locking systems, Door openers, Cameras, Automobile systems, washing machines, Ironing machines, Microwave ovens so on and so forth. All these and gadgets like these are not only processed by the microcontroller but their features are also controlled with it. The system starts with the sensing, processing and then reacting it to meet the purpose. Being dedicated system it's a processor with limited amount of RAM and ROM, timer and counters and is the thing why it's identified as a ***SYSTEM ON CHIP***. It has saved not only manpower but also time and energy and it's really easy to carry these systems being portable

Microcontrollers have played vital role in development of current IT and Semiconductor Industry. Nowadays most of the consumer products are built around Central Processing Unit for meeting reduced power consumption and increasing efficiency. Rapid and frequent changes in technology and increasing demands for the efficient products forces the manufacturers to go for the extensive use of systems on chip. Microcontroller embedded system market has been growing positive Year on Year in last few years and it's expected to do as well in future too.

II Generalized Block Diagram



Block diagram shows major peripherals in making a full fledge embedded system. This system deals with the sensing of light and temperature shown along with the sensors needed. ADC and DAC are basically the analogue to digital and digital to analogue converters these are for converting the sensed measurand in analogue form into digital one which is acceptable by the microcontroller and on processing and obtaining the equivalent digital output again to convert it back to analogue form acceptable by the output devices.

III. Processing

The entire process takes place in four major steps;

1) Sensing the measurand or physical change
2) Converting the sensed measurand or physical change into a Microcontroller acceptable form.
3) Processing the measurand.
4) Obtaining the expected result and converting it back into an acceptable form by the output device.

These four processes are mainly performed with the SENSOR/S, ADC Converter, Microcontroller and DAC Converter. [2]

IV. Concept of Embedded system with plus and minuses

Microcontroller being a complete system includes processor, memory and peripherals and as a whole Identified as an embedded system. Hence the system is having an advantages like small size, faster to load, easy to manage, low cost, engaging less resources and last but not the least is since these embedded operating system is dedicated to one device so the performance remain good and use less resources. Along with the advantages the embedded system is associated with shortcomings like; difficult to upgrade, needs to reset setting if problem occurs, not scalable, hardware is limited, difficult to troubleshoot, difficult to transfer data from one system to other. [3]

V. Programming Concept

Since microcontrollers are the system on chip, naturally the memory and thereby the Program length and space available will be minimum with the maximum speed and efficiency. Hence the typical microcontroller program must be accommodated in an available on-chip program memory. Otherwise adding an external memory is a costly affair. While designing a microcontroller aiding hardware and software developments of the target system/s, manufacturers are bound to design a special version of it. Initially EPROM versions having window on top were deployed wherein the program memory could have been erase exposing the memory to an ultraviolet light and could be reprogrammed many times. The most important feature of microcontroller is that they are having ***bit addressable instructions*** along with ***byte addressable instructions*** in general, because of which the data in bits can also be processed along with bytes and word length data.

VI. Prominent features

6.1 General Purpose I/O Pins

Microcontrollers contain general purpose input / output pins which can be configuring an input and /or output. While configuring input, input pins read sensors or external signals, while configuring output pins the said pins drives the output devices or displays or any other kind of output.

6.2 Pulse width Modulation [PWM]

It's a unit providing on / off signals on general purpose input output pins at a predefined frequency.

6.3 USART

It's a Universal Synchronous Asynchronous Receiver Transmitter allowing reception and Transmission of the data serially without loading CPU. [4]

VII. Conclusion

With so many features and in various versions, innumerous microcontroller based embedded systems are available and the time is not so far when almost every manual job will be carried out by the microcontroller based systems [5]. Also the Microcontroller applications and embedded systems concept will be highly appreciated in Internet of Things [IoT] concept where a network is formed between various things and all these things can then be operated through Internet and it can be considered as a need of future.

VIII. References

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