

UNIT - III

Class - IIIrd Year 6th Sem.

Subject - Micro Controller for
Embedded System.

Paper Code - BT-607

Lecture - 06

Faculty Name - Dr. Nidhi Chauhan

Topic - Data transfer using
DMA

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Subject

Topic - Data transfer using DMA

DMA or Direct Memory access is one of the most complicated module on microcontrollers with all its terminology and supposed complexity. In order to look at the DMA on the PIC 32 microcontroller let us first consider what exactly is DMA.

DMA allows data transfer to take place b/w the memory and peripherals of the microcontrollers without the need for the CPU to become involved. The DMA can also transfer from memory to memory.

This is important because usually when a CPU is performing reading and writing of some peripheral it cannot respond to another else.

When you use the DMA controller to transfer data, the CPU simply initiates the data transfer without itself taking part in the actual transfer of data. This is powerful because it allows the microcontroller to transfer data at a rate faster than the CPU can possibly manage on its own.

DMA is especially useful for the tasks such as refreshing displays where a lot of data is needed to be transferred to the display.

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Note → When you use the DMA Controller to transfer data, the CPU simply initiates the data transfer without itself taking part in the actual transfer of data. This is powerful because it allows the Microcontroller to transfer data at a rate faster than the CPU can possibly manage on its own.

The DMA Controller has six transfer modes selected by the DMA_{MF} bit. Each channel is individually configurable for its transfer mode. Example, Channel 0 may be configured in single transfer mode, while channel 1 is configured for burst-block transfer mode, and channel 2 operates in repeated block mode. The transfer mode is configured independently from the addressing mode. Any addressing mode can be used with any transfer mode.

Two types of data can be transferred selectable by the DMA_{CTL} DST_{BYTES} and SRC_{BYTES} fields. The source and/or

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destination location can be either byte or word data. It is also possible to transfer bytes to byte, word to word, or any combination.

DMA Transfer Modes

DMA DT	Transfer Mode	Description
000	Single transfer	Each transfer requires a trigger, DMAEN is auto cleared when DMAxS ₂ transfer have been made.
001	Block transfer	A complete block is transferred with one trigger.
010, 011	Burst-block transfer	CPU activity is interleaved with a block transfer
100	Repeated Single transfer	Each transfer requires a trigger
101	Repeated block transfer	A complete block is transferred with one trigger
110, 111	Repeated burst-block transfer	CPU activity is interleaved with a block transfer

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Lecture no. - 07

Topic - Analog Interfacing

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Topic - Analog Interfacing

ADC is the Analog to Digital Converter, which converts analog data into digital format, usually it is used to convert analog voltage into digital format. Analog has infinite no. of values like a sine wave or our speech, ADC converts them into particular levels or steps, which can be measured in numbers or a physical quantity instead of continuous conversion. ADC converts data periodically, which is usually known as sampling rate.

Telephone mode is one of the examples of ADC, which is used for internet. It converts analog to digital data, so that computer can understand because computer can only understand digital data.

The major advantage of using ADC is that we noise can be efficiently eliminated from the original signal and digital signal can travel more efficiently than analog one.

That's the reason that digital audio is very clear while listening.

In present times there are lots of microcontroller in market which has

Inbuilt ADC with one or more channel. And by using their ADC register we can interface. When we select 8051 Micro-Controller family for making any project, in which we need of an ADC conversion, then we use external ADC.

Some external ADC chips are 0803, 0804, 0808, 0809 and there are many more.

Components →

- * 8051 Micro Controller (AT89S52)
- * ADC 0808/0809
- * 16x2 LCD
- * Resistor (1k, 10k)
- * POT (10k x 4)
- * Capacitor (10uF, 100uF)
- * Red led
- * Bread board or PCB
- * 7805
- * 11.0592 MHz crystal
- * Power
- * Connecting wires.