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Microprocessor and Microcontroller – The difference

Last Updated on December 5, 2011 by jojo in Microcontrollers with 30 Comments

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When you start learning about **Microprocessors** (in most case you will begin with Intel 8085) and **Microcontrollers** (usually you will begin with Intel 8051 from the MCS 51 micro controller family), the first question that pops up is **"hey… what's the difference in between"** ? In this article I am explaining the basic differences and similarities between a microprocessor and micro controller. In fact you can call this article a simple comparison of both micro computing devices. This comparison will be same (at the basic level) for any micro processor and controller. So lets begin.

At the basic level, a microprocessor and micro controller exist for performing some operations – they are – fetching instructions from the memory and executing these instruction (arithmetic or logic operations) and the result of these executions are used to serve to output devices. Are you clear? Both devices are capable of continuously fetching instructions from memory and keep on executing these instructions as long as the power is not turned off. Instructions are electronic instructions represented by a group of bits. These instructions are always

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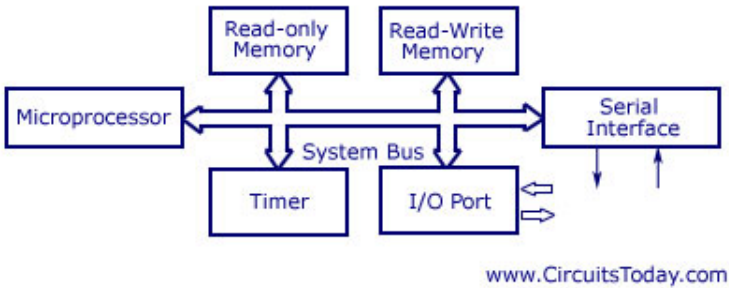
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fetched from their storage area, which is named as memory. Now lets take a closer look at block diagrams of a microprocessor based system and a micro controller based system.

Microprocessor based system

Take a closer look at the block diagram and you will see a micro processor has many support devices like Read only memory, Read-Write memory, Serial interface, Timer, Input/Output ports etc. All these support devices are interfaced to microprocessor via a system bus. So one point is clear now, all support devices in a microprocessor based system are external. The system bus is composed of an address bus, data bus and control bus.

Okay, now lets take a look at the microcontroller.

Micro controller system
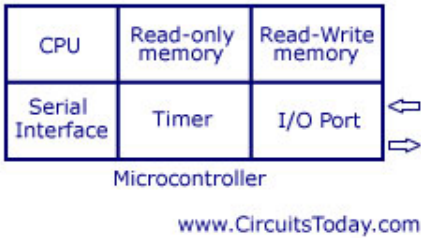
The above block diagram shows a micro controller system in general. What's the primary difference you see? All the support devices like Read only memory, Read – Write memory, Timer, Serial interface, I/O ports are internal. There is no need of interfacing these support devices and this saves a lot of time for the individual who creates the system. You got the basic understanding ? A micro controller is nothing but a microprocessor system with all support devices integrated inside a single chip. There is no need of any external interfacing in a micro controller unless you desire to create something beyond the limit, like interfacing an external memory or

Categories

DAC/ADC unit etc. To make this microcontroller function, you need to give a DC power supply, a reset circuit and a quartz crystal (system clock) from external source.

Okay, so we have an idea about the basic difference between a microprocessor and microcontroller. Now lets compare some features of both systems.

Comparison

As you already know, support devices are external in a microprocessor based system where as support devices are internal for a micro controller. Micro controllers offer software protection where as micro processor base system fails to offer a protection system. This is made possible in microcontrollers by locking the on-chip program memory which makes it impossible to read using an external circuit. Okay! So that are basic differences, now you can come up with some more. As we need to interface support devices externally in a microprocessor based system, time required to build the circuit will be more, the size will be more and power consumption will be more in a microprocessor based system compared to microcontroller.

So you wanna read more about a specific microprocessor and micro controller ? Here is:-

Intel 8085 (microprocessor) and Intel 8051 (micro controller)

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30 thoughts on "Microprocessor and Microcontroller – The difference"

Pavan kumar Puppala August 5, 2015 at 3:05 am

i am very interested in microprocessing so please guide me to learn more

Reply

Priyanka.n July 24, 2015 at 4:47 pm

Hello sir this tutorial is simple to understand & i got few new thing about microprocessor and controller
Thank you for your service sir

Reply

lee July 7, 2015 at 6:21 am

excellent info thanks

Reply

lee July 7, 2015 at 6:20 am

Pile of shite

Reply

Prachi March 22, 2015 at 3:58 am

Very helpful , logical and easy to understand.

Reply

sharmila January 23, 2015 at 9:27 pm

it is very useful info

Reply

ankitasambhare June 30, 2014 at 9:50 pm

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What's the difference between RISC & CISC???? Thanks for the above info, would be better if differences were arranged in tabular form rather than big paragraphs...

Reply

sandeepsingh April 12, 2014 at 3:59 am

Thank u a lot.it helps me a lot.as a rural backgrund.

Reply

Divya January 27, 2014 at 8:51 pm

Really good, helped me a lot …. thank you

Reply

Dilupa December 25, 2013 at 2:25 pm

well,this article is really helpful. thank you for sharing.

Reply

Mahesh April 18, 2013 at 9:48 pm

Sir,what is on chip program memory and serial interface? Can u explain in detail….

Reply

riya sharma February 24, 2013 at 7:20 pm

today is my papr nd it is so useful 4 me :):) thnk u so much sir 🙂

Reply

goutham January 10, 2013 at 5:15 pm

Can you explan electronics?

Reply

venkatesh December 28, 2012 at 8:56 am

Hie,

It is a good theory with proper explanation.

Thanks

Hope u keep on posting such explanations about the electronic circuits and components too.

Reply

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TUHIN December 13, 2012 at 2:13 am

what is the difference between microprocessor and microcontroller based on software?

Reply

jojo December 13, 2012 at 8:42 am   Post author

@Tuhin – They both differ mainly on hardware. I think there's not much of a difference in the way "software" is handled for both!

Reply

rizwana September 1, 2012 at 8:43 pm

dear sir, could you pls suggest some ideas on embedded system project.. pls reply soon..

Reply

devendra thakur May 25, 2012 at 3:38 am

i want even a deep explanation………….

Reply

ham March 27, 2012 at 9:47 pm

dear sir can u explain about the timing diagrams of the microprocessor

Reply

kavi priya December 16, 2011 at 5:39 am

good eve sir,i want to know the traffic light controller program based on 8051.thank u sir

Reply

udaya kumar December 10, 2011 at 4:23 am

udayakumar
dec 10,2011 at 5.45pm

sir, i am having a project on implementation of modifying single phase preventer with meu-p 8051 micro controller.sir can you please help me with the circuit diagram and programming for 8051.please help me as soon as possible.

Reply

umesh yadav December 10, 2011 at 3:20 am

dear
sir i need detail of the programing detail of the MC908JL16CPE micro

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Reply

umesh yadav December 10, 2011 at 3:17 am

dear
sir i wanted to know all detais of the fir alarm system and abut circuit
dagram detail and latest fire alarm system

Reply

shweta k. December 9, 2011 at 6:14 am

Sir,I am having a project on interfacing a temperature sensor with mue-p
8085 if able also with mue-c 8051,along with two seven segment
displays,which will sense the temperature and display it on the seven
segment display.Sir,can you please help me with the pcb design circuitary
and programming for both?Sir,Please help me as soon as possible.

Reply

jojo December 9, 2011 at 5:38 pm   Post author

Hello shweta, please wait one or two weeks, we will come up
with articles on 8051 interfacing very soon. We are working to
develop complete tutorial for 8051.

Reply

sameer gupta December 8, 2011 at 7:06 pm

Sir,please publish an article on microcontroller programming.For this I am
searching in many websites but not clear.
I want to program a chip through my laptop(windows7).What are the
hardwares,softwares,cables & ports required to program a
microcontroller?

Reply

mahipal December 8, 2011 at 6:23 am

Sir, I am seeing your mails everyday. It is very useful to me.Thanking many
more

Reply

priya August 6, 2013 at 10:12 pm

i need major feature between microprocessor and
microcontroller

Reply

V. MANI December 7, 2011 at 8:46 am

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Sir, Please tell me what is the major difference between the ICs of the CD 4011B and GD 4011B.

Reply

V. MANI December 7, 2011 at 4:07 am

Dear Sir, I am seeing your mails everyday. It is very useful to me. I am watching your topics everyone in your website at free of cost. Thanking many more.

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