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## Flex+Scicos+Erika !!!

Posted by desmomito - 2008/05/15 16:33

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Hi,

I'd like to know more informations about the Flex+Scicos+Erika integration. I'll develop, using Flex Full board, three controllers for an hydraulic system using the Scicos code generator. I have the following questions in my mind :

- 1) When I use the Scicos code generator, does it use Erika RTOS routines ?
- 2) I need to design three controller running in the Flex board at different sampling times. Is it possible to manage the multi-tasking in Scicos ? Which is the best way ?
- 3) I've seen that the Flex Full has got inside a power supply (switching) which adapts the different voltage levels. Is it possible to use those voltage levels as output ? For example if a voltage level was 5V I'll happy to use it as power input for a optocoupler.

Thank you,  
Pasquale.

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## Re:Flex+Scicos+Erika !!!

Posted by paolo.gai - 2008/05/15 19:55

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Hi!

Here are some answers:

- 1) Yes... the ERIKA Kernel is used every time you compile code generated from Scilab. Please take a look at the files

`\examples\pic30\pic30_scicos\`

That is the template with ID "board\_flex" which is used as default by the code generator.

- 2) It is not yet possible to generate out-of-the-box multirate systems using the Scilab code generator, but it will be probably soon.

A way to obtain that is to generate three separated superblocks, which do not interact. Then you have to generate the code and manually assemble them.

For now the only thing supported out of the box are single rate systems.

- 3) Of course you can, depending of course from the kind of load you are putting on... the switching power supply has a maximum current which can be supplied! . In any case, take a look at the schematics you find on the FLEX CD-ROM. There you'll find the pinout of the connectors, which have GND and V+ pins you can use.

Regards,

Paolo

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## Re:Flex+Scicos+Erika !!!

Posted by desmomito - 2008/05/15 21:08

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Thank you very much.

I'll follow your suggestion for the multi-tasking procedure. I've seen the schematics and I think it depends on the LM2574 which is able to guarantee 0.5A as output current. So I think the maximum current which can be supplied is 0.5A. Is it correct ?

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Thank you,  
Pasquale.

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### Re:Flex+Scicos+Erika !!!

Posted by francesco - 2008/05/16 17:14

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Hi,

you are right, the maximum current that the LM2574 can provide is 0.5. You can use the +5V as well as the +3.3V provided by the switching regulator of flex full if you are going to power low power electronic components such as digital components (digital ports, optocouplers, ecc).

If you are going to power many devices, using the internal switching regulator, please make a rough calculation of the global power consumption. I strongly recommend you not to go beyond 0.3 A (flex does not have a thermal dissipator).

If you want to power servomotors or other "power" devices I suggest to use instead the +Vout pin (using also GND\_OUT) with an additional regulator (i.e. LM7805 for servo). In this case you can power many other electronic devices depending on wich power supply you are using (the limitation in this case is your power supply and the regulator that you add).

Ciao,  
Francesco.

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### Re:Flex+Scicos+Erika !!!

Posted by desmomito - 2008/05/18 18:37

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Ok,  
thank you very much. I'm gonna do a rough calculation about the current I need for the 5V devices but I think I won't have more than 0.1A.

What about a load of 12V-3A ? Do you think I can use the V\_OUT and GND\_OUT pins ?

What about having a common ground with all the devices (5V, 3.3V and 12V) ?

I'm trying to understand how to connect the Flex and my power PCB which has different voltage devices.

Thank you,  
Pasquale.

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### Re:Flex+Scicos+Erika !!!

Posted by francesco - 2008/05/19 11:09

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thank you very much. I'm gonna do a rough calculation about the current I need for the 5V devices but I think I won't have more than 0.1A.

... ok

What about a load of 12V-3A ? Do you think I can use the V\_OUT and GND\_OUT pins ?

Unfortunately the V\_OUT passes through the rectifier diodes, so you can not go over 1A of continuous current over the 1N4007. If you have to power devices that have current peaks of more than 3A the V\_OUT will be ok but if the load drains 3A continuously this could damage the rectifier diodes. If you use a 12V power supply and the V\_OUT remember that the V\_OUT will be around 10.5V so you will have to use at least a 13V power supply.

I suggest you to use one high current power supply for Flex and your electronics ( using the +V and gnd terminal of your

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power supply for powering separately your electronics and Flex). Then you can use optocouplers for using the digital signals of Flex. The optocouplers will allow you to use different voltages for your electronic side.

Ciao,

Francesco.

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**Re:Flex+Scicos+Erika !!!**

Posted by desmomito - 2008/05/19 12:16

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I suggest you to use one high current power supply for Flex and your electronics ( using the +V and gnd terminal of your power supply for powering separately your electronics and Flex).

...ok

Then you can use optocouplers for using the digital signals of Flex. The optocouplers will allow you to use different voltages for your electronic side.

What do you mean exactly ? Even if I use the 12V as power supply for the Flex and my power circuit separatly, can I still use the 5V and 3.3V from the Flex for my digital devices ? Or it's better to use linear regulator directly in my power circuit to obtain the 5V and 3.3V ?

The ground reference will be the same in any case (my power circuit, Flex, dsPIC etc..) ? I need to generate a PWM output is it that the low level is 0V and the high level 3.3V ?

Than you,  
Pasquale.

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**Re:Flex+Scicos+Erika !!!**

Posted by francesco - 2008/05/19 13:22

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Even if I use the 12V as power supply for the Flex and my power circuit separatly, can I still use the 5V and 3.3V from the Flex for my digital devices ?

No, because you will have a different ground reference. Like an example, if you use the PWM output of the Flex board (0-3.3V) you will have less than 3.3V on your electronic because of the rectifier diode (GND\_alim is different to GND\_OUT). The gnd reference is not the same.

As a solution you can generate the PWM from Flex and than you have two solution:

1- Use the V\_OUT and GND\_OUT. In this case you do not have problems in terms of voltage references and so on and you can use directly the PWM to drive you electronics (I think that this can be a digital low-power IC) and use the V\_OUT,GND\_OUT for the power stage of your circuit.

2- Use the V\_alim and GND\_alim. In this case you will need an additional regulator (i.e. LD1117 3.3V). Your reference will be GND\_alim so you will have to use a fast optocoupler to keep the isolation between the GND of the two circuits (see picture )

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**Re:Flex+Scicos+Erika !!!**

Posted by francesco - 2008/05/19 13:25

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Sorry, this is the image...

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## Re:Flex+Scicos+Erika !!!

Posted by francesco - 2008/05/19 13:28

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Sorry... <http://www.evidence.eu.com/images/fbfiles/images/schematic.png>

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## Re:Flex+Scicos+Erika !!!

Posted by desmomito - 2008/05/19 17:13

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Ok,

I understood what you mean. I'll just pilot the other optocoupler's pin otherwise I'll have a "NOT" PWM. I'll connect the diode LED's anode to the FLEX 3.3V and I'll pilot the cathode, of course I'll not have more the 16mA as current using the right resistor. Could be ok ?

Another question : I have also a current transducer. This one needs 5V and of course the 0V (ground). The maximum current that it absorbs is around 30mA. Where do you suggest me to connect it in order to have the right references and the right measures ?

Thank you,  
Pasquale.

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## Re:Flex+Scicos+Erika !!!

Posted by francesco - 2008/05/20 15:16

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I'll just pilot the other optocoupler's pin otherwise I'll have a "NOT" PWM

Not properly, I mean that you will not have the right reference voltage. The 3.3V are 3.3V for the Flex board considering GND or GND\_OUT. If you take the ground reference of the power supply GND\_alim, this will be GND\_OUT + or - 1,2V (the voltage across the rectifier diode).

I'll connect the diode LED's anode to the FLEX 3.3V and I'll pilot the cathode, of course I'll not have more the 16mA as current using the right resistor. Could be ok ?

You can drive the optocoupler with a buffer that will amplify a little bit the current from the dsPIC (es 74HCT244 search on RS) or you can simply drive the LED of the optocoupler with a BJT transistor (BC547) using the +5V output of Flex and a 1KOhm resistor for the base and try with a 100Ohm on collector. You can connect the diode directly between +5V (anode) and the collector resistance.

The maximum current that it absorbs is around 30mA. Where do you suggest me to connect it in order to have the right references and the right measures ?

I think that the current transducer that you are going to use has a small resistance in order to measure current, I am thinking to the MAX471. This could be placed in series with your load while the logic part that is isolated from the measurement resistance can be directly connected to GND (Flex) and +3V (Flex) and the voltage output can be sampled with dsPIC.

Ciao,  
Francesco.

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## Re:Flex+Scicos+Erika !!!

Posted by desmomito - 2008/05/21 00:08

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What about this scheme to connect the LED of the optocoupler ?  
<http://www.evidence.eu.com/images/fbfiles/images/opto.png>

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## Re:Flex+Scicos+Erika !!!

Posted by francesco - 2008/05/21 09:37

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You can not drive directly the diode of the optocoupler. You will need to add a transistor, BJT or MOS. The current on the led has to be 10mA but with the dsPIC you can drain maximum 4mA.

Try to match the resistance values on the base and the collector (maybe on a bread board). On the BJT transistor do not use less than 1KOhm.

Another important point is the PWM frequency. Depending on the frequency, you have to use fast optocouplers and fast transistors.

Ciao,

Francesco. <http://www.evidence.eu.com/images/fbfiles/images/opto-ecdd7d3c4a831afb38c6ee1332fc6dfd.png>

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## Re:Flex+Scicos+Erika !!!

Posted by desmomito - 2008/05/21 11:43

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OK,  
thank you very much but if you see the figure I've posted the current drains from the 3.3V. If the PWM is High = 3.3V the diode is OFF instead if the PWM is Low = 0V the diode is ON and the current drains from the 3.3V power supply into the dsPIC. The current is maximum 16mA in order to not destroy the dsPIC port. Is it wrong what I'm trying to explain ? Do you think is dangerous ?  
It's just a solution to avoid devices from the dsPIC to the optocoupler because I'll have a fast PWM (I've chosen a fast optocoupler).

Thank you,  
Pasquale.

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## Re:Flex+Scicos+Erika !!!

Posted by francesco - 2008/05/21 12:03

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So you want an active low PWM? I mean, when the PWM is high you want that the diode is in off state and when the PWM is low you want that the diode is emitting.

Unfortunately you can not drive directly the diode from the dsPIC. This is dangerous because the maximum current that you can source or drain from a dsPIC pin is 4mA.

Check the fet transistor at  
<http://it.rs-online.com/web/search/searchBrowseAction.html?method=getProduct&R=6362821>

This is fast enough (I think). J175 p channel. In this case when the Vgs is high (3.3V) the transistor is off.

Francesco.

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## Re:Flex+Scicos+Erika !!!

Posted by desmomito - 2008/05/21 12:29

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<http://www.evidence.eu.com/images/fbfiles/images/opto-ae0343d2a786f56558da0d44a34ae02c.png>

So you want an active low PWM? I mean, when the PWM is high you want that the diode is in off state and when the PWM is low you want that the diode is emitting.

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Correct. But if you see the figure now you'll understand why. Let me explain : PWM = 3.3V = ON, the left led is OFF so the right led is ON and the Vout (after the optocoupler) is ON = 5V; PWM = 0V = OFF, the left led is ON so the right led is OFF and the Vout (after the optocoupler) is OFF = 0V. This configuration let me have the same PWM generated with the dsPIC after the optocoupler but with different voltage. Using your configuration I'll have a different PWM after the optocoupler (negate one). What do you think about that ? How did you manage when you solved these problems ?

Unfortunately you can not drive directly the diode from the dsPIC. This is dangerous because the maximum current that you can source or drain from a dsPIC pin is 4mA.

I thought was 25mA, but I'm wrong than I'll change configuration.

This fast enough (I think). J175 p channel. In this case when the Vgs is high (3.3V) the transistor is off.

I'll check.

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### Re:Flex+Scicos+Erika !!!

Posted by francesco - 2008/05/21 13:59

Ok, with a p-channel fet you will obtain exactly what you want. In the diagram with the bjt you can substitute the bjt with the p-channel fet (with a lowest resistance). In this case when the PWM is high the fet is like an open circuit and the optocoupler led will be off, the optocoupler output will be +5V. When the gate voltage is 0V, the optocoupler diode will be on (the fet is like a short circuit) and the optocoupler output will be at 0V

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### Re:Flex+Scicos+Erika !!!

Posted by desmomito - 2008/05/21 16:38

OK,  
thank you very much for your availability. I'm asking to myself if it's strange what I'm trying to do. What do you think ? How would you use PWM and optoisolator ? Do you have any links where I can learn more ?

Thank you,  
Pasquale.

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### Re:Flex+Scicos+Erika !!!

Posted by francesco - 2008/05/22 10:36

Ciao,

Unfortunately this is the correct use of optoisolator, a safer approach. The use of transistors is quite regular in these applications. You have to consider that voltage isolation is a critical issue.

You can still use the optocoupler led drive circuit that I sent to you (the last picture that I uploaded). You can change the optocoupler output stage connection. See the image attached. In this case we have a pull-up connection. When the pwm is high the optocoupler transistor is on and the V\_out will be +5V. In your connection if the optocoupler transistor is on will pull-down the V\_out.

If you search in internet you can find lots of info (i.e. [http://www1.jaycar.com.au/images\\_uploaded/optocoup.pdf](http://www1.jaycar.com.au/images_uploaded/optocoup.pdf))

Francesco. <http://www.evidence.eu.com/images/fbfiles/images/pullup.png>

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### Re:Flex+Scicos+Erika !!!

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Posted by francesco - 2008/05/22 10:51

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Sorry,

just a remark on your schematic and my last message.

Try to remove the R2 in your schematic and link the pin 6 (optocoupler) directly to +5V. Link pin 5 to a resistance that goes to gnd (you can simply move R2 from the collector to the emitter). Than the V\_out (pwm output) will be pin 5. Make some trials to find the optimal emitter resistance.

Francesco.

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