P6 – 2-5 I2CB

Welcome back to Cypress Academy, PSoC 6 101. In this video, I will show you how to add the I2C interface to our BLE-controlled robotic arm project. I’m going to use the bridge control panel as a dashboard display to show the position of the motors. So, as we change the position of the motors you’ll see a graph update in the bridge control panel showing where they are. Sound cool?

Open the BLE-Controlled Robotic arm project’s schematic.

I’ll add the EZ-I2C component from the catalog. Change its name to EZI2C and leave the rest as default.

Assign the pins to P6[1] and P6[0] for SDA and SCL.

Generate the application.

Then we create and edit ezi2cTask.h. This file will just have #pragma once and a definition of the ezi2cTask.

Once that is done we can edit the CM4 main application. When the whole main controller is done there will be two ways to display updates to the position of the motors - specifically the EZI2C and the BLE. In order for everyone to know that there has been a change to the PWMs I am going to use an event group. An event group is essentially an RTOS safe global uint32 variable. All of the tasks can read the status of an event group without fear of a race condition. They can also wait for a change in the event group. This is how we are going to communicate from the PWM task to the ezi2cTask.

Let's get to editing in main\_cm4.c. First include ezi2ctask.h and the FreeRTOS event\_groups.h. Next define the event group pwmEventGroup. And in the main function I'll initialize the PWM event group by calling xEventGroupCreate and start the EZI2C task.

Before anyone can use the PWM event group I need to add it to global.h. In this file I'll add the include for event\_groups, add an extern for the pwmEventGroup and finally create a definition of the event group. Basically, a bit mask. The first bit will be for the I2C and the second bit will be for the BLE.

In pwmTask.c all I need to do is set all of the bits when the PWM has changed using the xEvenGroupSetBits RTOS command.

Now let’s create and edit the file ezi2cTask.c. This is a fairly straight forward file. First include the project dot h, the FreeRTOS dot h, and the pwmTask dot h. Next make the function ezi2cTask … I’ll setup a variable to store the percent value of the motors so the I2C master, the bridge control panel in this case, can use it to read and display that data. I’ll call it motorPercent, an array of two unsigned 8-bit integers for the two motors.

I’ll start the EZI2C component. Setup the buffer and mark it as read only. Start the infinite loop and then initialize the motorPercent array with the current value of each motor’s PWM compare value. Then I’ll wait for a change in the event group, and do it again.

What happens is this task will go to sleep until the pwmTask changes the event group. When that happens, the task wakes up, then updates the values in the buffer, then waits for another change.

That’s it! Slick isn’t it?

Now build, program and test. Remember if you still have the bridge control panel open and connected to the kit, you need to disconnect the kit from the software by clicking on the disconnect icon in the bridge control panel. Then go back to PSoC Creator and hit program again.

Now, go back to the bridge control panel and re-connect to the kit.

Let’s setup the chart so we can graph the motor percent values. Go to the chart menu, select variable settings. For the first row, click active and type M1 as the variable name; second row, click active and M2. Okay.

Next in the editor I’ll type w 8 0 r 8 @M1 @M2 p; What this does is sets the offset pointer to zero and then reads in two bytes which it stores in M1 and M2. Now press enter a few times to see it work.

Then go to the chart tab.

And hit repeat.

Now you can change the values via the UART interface by using the keys o, p, k and l in a terminal client that we setup before.

Success!

Now we have an I2C dashboard interface for our robotic arm project. In the next video, I will walk you through how to add custom digital logic to implement the Terminator-kill, or safety-switch to the design that will safely stop the motors.

You can post your comments and questions in our PSoC 6 community or as always you are welcome to email me at alan\_hawse@cypress.com or tweet me at @askioexpert with your comments, suggestions, criticisms and questions.