Programming Embedded Systems 2018 – Exercise 4

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Task

The task was to implement an interrupt driven co-oprative embedded operationg system that uses a scheduler to run periodic tasks. The task to be run was to to read the value from the MSP's integrated temperature sensor and convert the signal using the built in ADC on the MSP. The Leds should blink at a frequency corresponding to the temperature read, also the blinking should be enabled / disabled using the switch.

Equipment used

- Texas Instruments LaunchPad MSP430g2553 microcontroller
- Laptop

Preformed work

I started off by simplifying the code for the led blinking and make the switch toggle the blinking on and off. The timer still makes an interrupt every 10 ms.

Next I implemented the ADC as described in the lab session. This was pretty easy, the only challenge was how to convert the value from the ADC which was an integer between 0 and 1024. I tried different approaces but only got error with the datatypes, so I chose to just display the raw ADC value in the serial line using the uart. When I got the adc working and outputting values to the serial line I started working on the scheduler.

The scheduler consists of a list of tasks to be run. Each task contain a pointer to a task function, the delay that counts how long until the task should be run, the duration before the task should be repeated and a flag if the task should be run or not. The task list is updated with the update function that is run in the time ISR, which marks due tasks for running. In the main loop the dispatcher function runs any tasks that are to be run and then is put into low power mode until there is another interrupt. The dispatcher also deletes tasks that have a reapeat value of 0, indicating that the are not to be repeated.

Results

The scheduler works as intended but I had trouble making the blinking interval correspond to the temperature. Anyway the scheduler is precise and checks the temperature every 3 seconds and blinks every second.

If the switch is pressed the blinking stops. Again there is some problems with the switch functionality because I have not used an interrupt for it but instead check inside the blinking task. That leads to the switch pressing not registering sometimes.