POLITECNICO DI TORINO

Computer Engineering Master Degree

Operating Systems for Embedded Systems

Emanuele Garolla
Matricola 183638

18/12/2015

Resume Assignment n°1

1. Goals of the assignment

The assignment's purpose was to use the FRDM-K64F board and the HC-SR04 distance sensore in order to implement a proximity alert system.

2. Used tools

We used the following devices and softwares:
· Freedom K64F board;
· HC-SR04 ulstrasonic ranging module;
· Usb cable;
. IAR embedded workbench;
· Micrium uC/OSIII operating system;

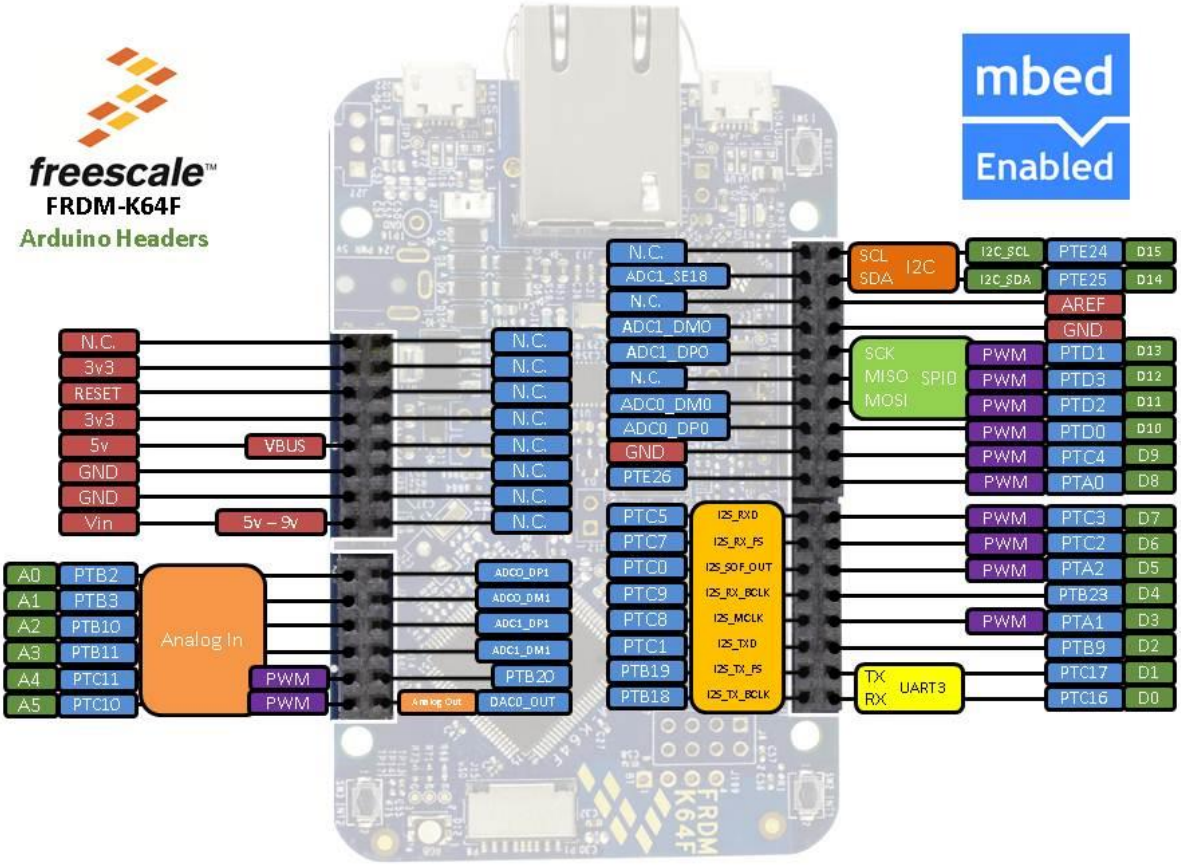
3. Software Architecture

I used two tasks , one interrupt handler and the Low Power Timer (LPTMR) module available on the K64F board.
The first task handles the trigger (PORTB - PIN23) of the HC-SR04 module, it sends a signal every 60 ms, roughly.
The second task handles the color and the blinking itself of the LED. The period of the blinking is instead choosed in the Interrupt Service Routine (ISR).
This routine is activated on both the edges of the echo signal (PORTB - PIN9).
On the rising edge it starts the LPTMR. On the falling edge it reads the counter register of the LPTMR, stops the counting and choose the period of the blinking accoriding to the distance calculated from the reading.
About the LPTMR I choosed to use the clock with a frequency of 32 KHz.

4. Pin assignment

K64F	HC-SR04
5V	Vcc
GND	GND
PTB23	Trig
PTB9	Echo

I suggest to use a breadboard to stuck the sensor.



5. How to use your project

The file “app.c” must be put into folder:
C:\\Micrium\Examples\Freescale\FRDM-K64F\OS3-KSDK

Instead “pin_mux.c”, “gpio_pins.h” and “gpio_pins.c” into:
C:\\Micrium\Examples\Freescale\KSDK\boards\frdmk64f120m

After the software configuration, using my project is really simple , you have to connect the wires as described in the “Pin Assignment”, connect the K64F on a USB to power supply and wit the magic.
The only advice, in order to collect useful data, is to use as object something perpendicular, smooth and big enough.

6. Conclusion

In my humble opinion, this is probably the most interesting thing I did in four years of Politecnico.
I really appreciated the possibility to do something in the real world, and not just on the paper.