The purpose is to implement a proximity alert system based on STM32-F7 Discovery board with *uCLinux* OS inside and the HC-SR04 Ultrasonic Ranging Module. The board read the distance of any object located in front of the HC-SR04 sensor, and then it actives the LED, which blinks depending on the distance of the detected object.

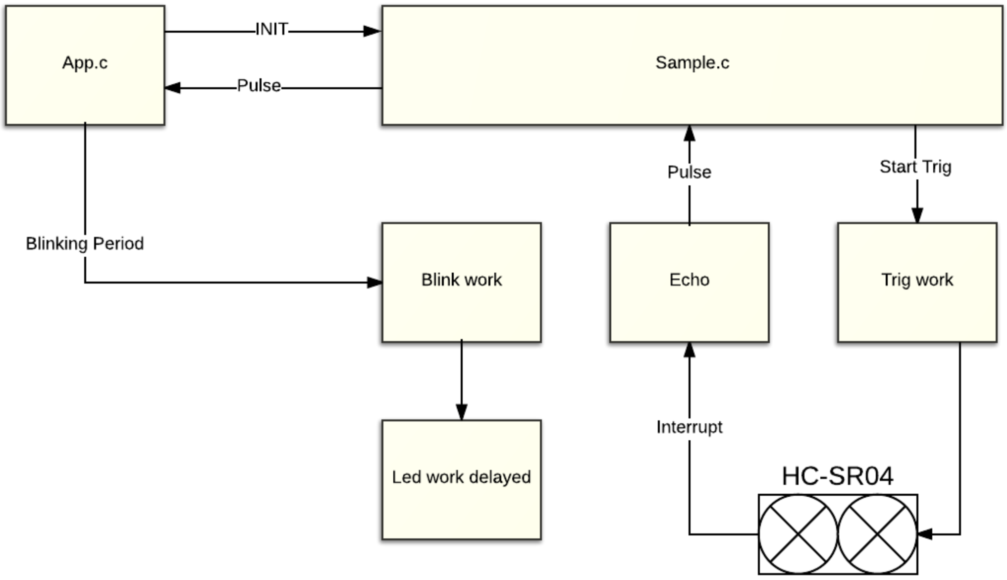
The implemented solution relies on Interrupt that is generated every time a sensor signal arrives on a certain pin. Now let's see the configuration of the board and GPIOs.

The source code is composed by two parts: *sample.c* that is a device driver, a loadable kernel module and implements a character based device, in particular the driver for the HCSR04 sensor. *App.c* is the test program that allows you to use, from user space, the services provided by the device driver through the Virtual File Interface.

In the main function of the *app.c* file are initialize the two workqueue for the trigger and the blinking of the LED. Once the trigger starts, an echo signal is received and a new interrupt is generated. The interrupt handler manage the computation of the pulse and allows a new trigger signal creating a new work on the specific workqueue. In the app.c, the pulse is read over the read function, the distance is calculated and a filter is applied to reduce the fluctuations due to the sensor. Finally, the exact blinking period is written on the driver.

The Blink work is in charge to create a new Led work delayed of the same time of the blinking period, which toggles the value of the LED and increase a semaphore to allow a new creation of Led work delayed with the same delay. If the blinking period changes, the work on queue is deleted and a new work with the new delay is created.

With the use of the workqueue, the problem of the latency is solved without the possible issues due to the different layers of software that you have to traverse from the user space to the kernel space.


App.c
INIT
Pulse
Sample.c
Pulse
Start Trig
Blinking Period
Blink work
Echo
Trig work
Led work delayed
Interrupt
HC-SR04