**CCD – TC1304DG**

We have the source codes to drive and read the CCD.

We want to modify main.c.

The source codes are from [TCD1304.wordpress](https://tcd1304.wordpress.com/).

The site contains all the documentations to understand the program and explains how to make modifications and compile de code.

I have created a github with the original project and the project with the modifications. I have already made some modifications, but there are not 100% good.

Github link : <https://github.com/ippersky/CCD_T1304_SensUs.git>

* Original project folder : sep19-TCD1304-uart-nohexinv
* Modified project : main\_mod.c
* SPL

The microcontroller is the Nucleo-F401RE from STM32 and the CCD is TCD1304DG from Toshiba.

Modifications to make in the main loop (setup) :

* Add 3 GPIO pins for 3 LEDS (output)
* Add 3 GPIO pins for 3 buttons (input)
* Add 7 GPIO pins for the LCD (D4 to D7, E and RS) (output)
* Add function to configure all new GPIO pins
* Add 6 buffers : two buffers per led 🡪 OR JUST NEED ONE?
* Add 2 rate buffer : 1 for led1 and
* 1 for led2

For the buttons (I don’t know if we actually need 3 buttons, or if 1 is enough)

* Loop :
* Press button to start acquisition with nothing?
* Press button to start acquisitions with water sample
* Press button to start acquisition with saliva sample

Important : how to deal with the first lecture? Outside of the loop?

void led\_on(uint8\_t led, uint16\_t buffer)

* Open led
* Read CCD
* If we do averages of CCD reading, we increase processing time, but add precision, if one CCD lecture fails 🡪 because we will have al least 200 reading per led, per sample, I don’t thing averaging is necessary.
* This represent switch (data\_flag)
* Counter : number of time led 1 was open (aka number of cycle)
* Put data in buffer.
* Output buffer to uart? Maybe at beginning to make sure everything is ok.
* Analyse buffer : find peak, curve fitting 🡪 call python function
* Find peak position with curve fitting (python function)
* Calculate rate : by how many pixels has the peak moved from buffer 1 to buffer 2?
* When rate is stable, we have found the concentration : call if(rate == 0) after X cycles to consider slow beginning.
* Compare rate of led 1 and 2. Rates must be the same or very very similar. If not, calculate average? Break
* Put rate value in rate buffer
* What to do with led3, which is the control led? How to we integrate it to our calculations? Will have to ask Ryma.
* HOW LONG WILL THIS TAKE??? 🡪 we want the integration time to be 15-20 ms
* Close led
* Delay of (1000 – 3\*integration time)/3. 🡪 we want the loop to last 1/3 second so that one cycle of the 3 leds opening will last 1 sec. delay because we need to be sure the opening of one led will not affect the result of another led