Programmable Embedded Systems
Assignment 2

Submitted by
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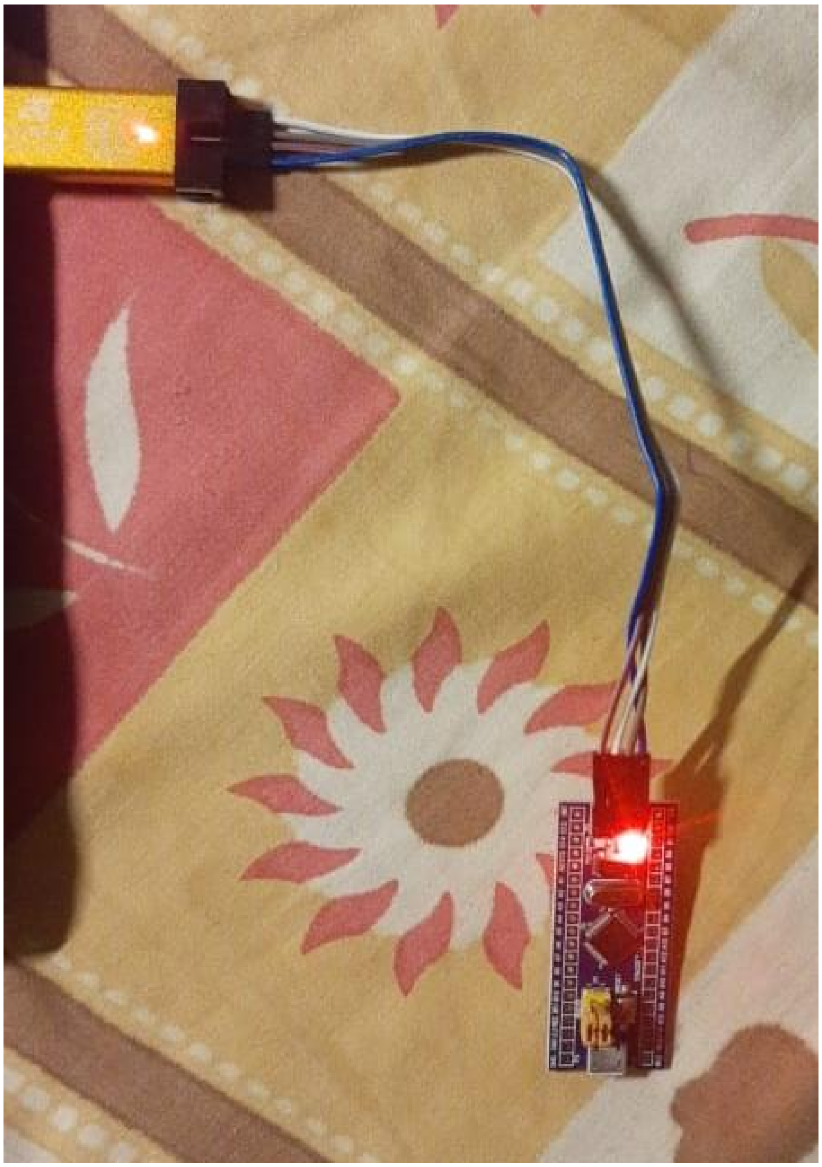
Hardware STM32 based implementation of FIR filter

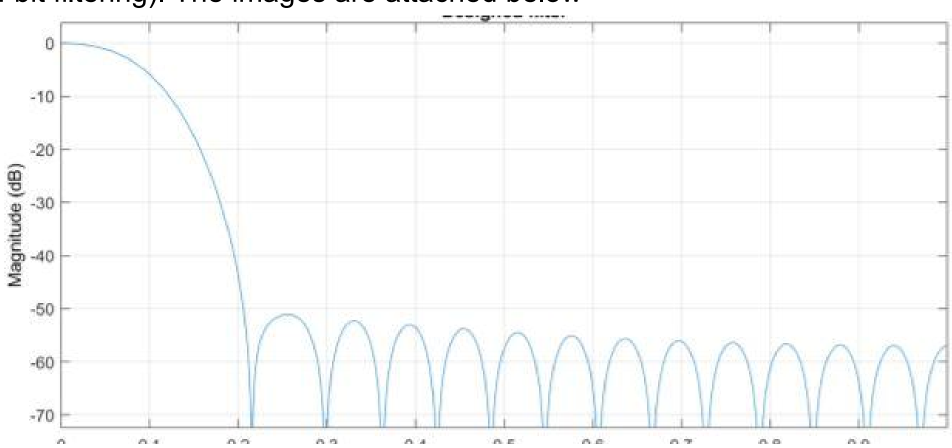
> The code screenshots have not been attached as all the codes were provided by Mam herself.

Setup

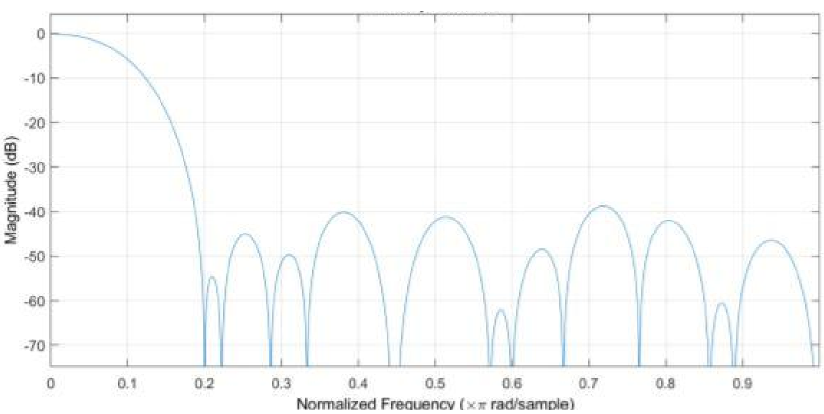
Connect debugger to laptops and female-female jumpers from the debugger to our STM board.



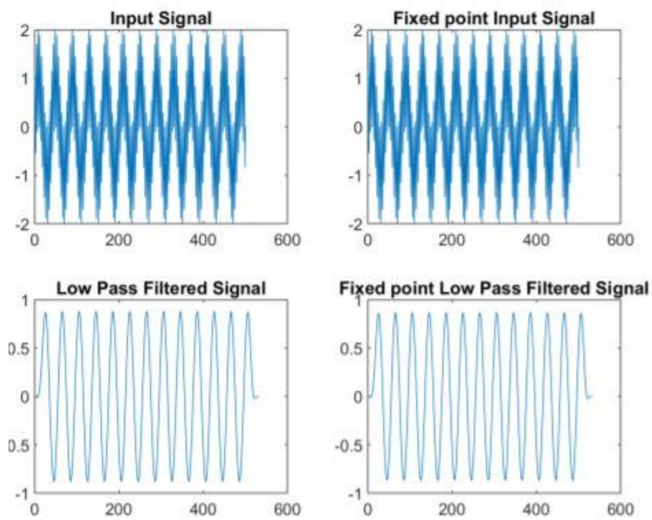
Now running the code in the file named FilterDesignMatlab.m to get our input, filter coefficients and expected output of the filter along with the gain frequency plot(for both 64 and 32-bit filtering). The images are attached below



64 bit

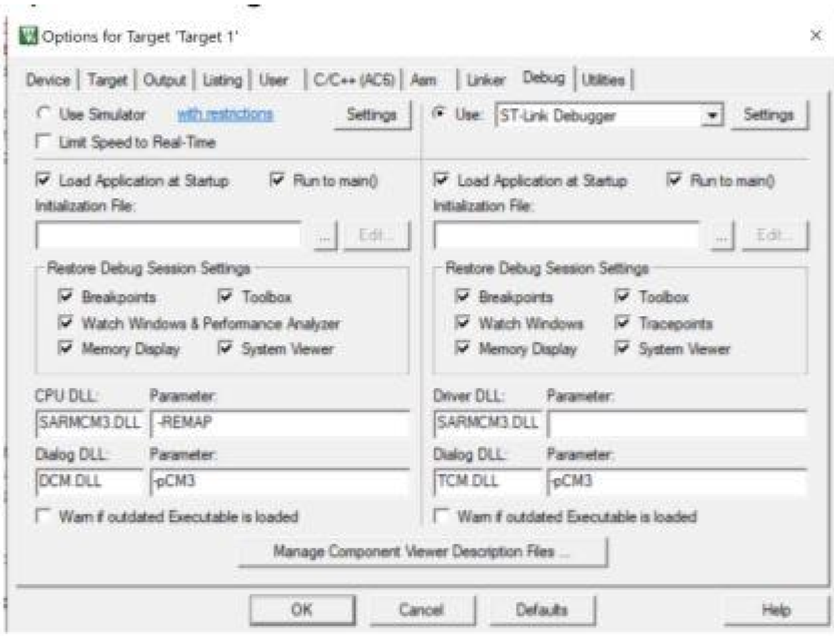


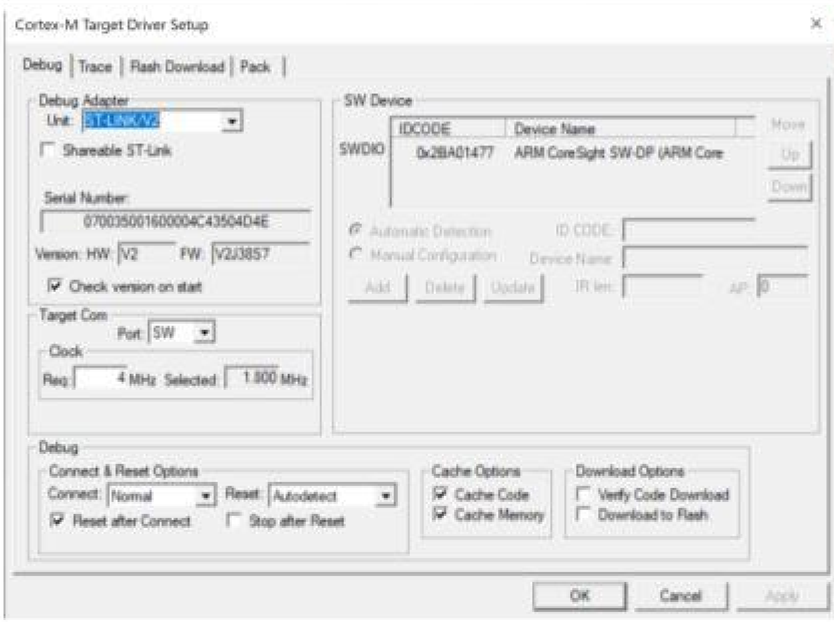
32 bit



Input vs output for both types of filtering

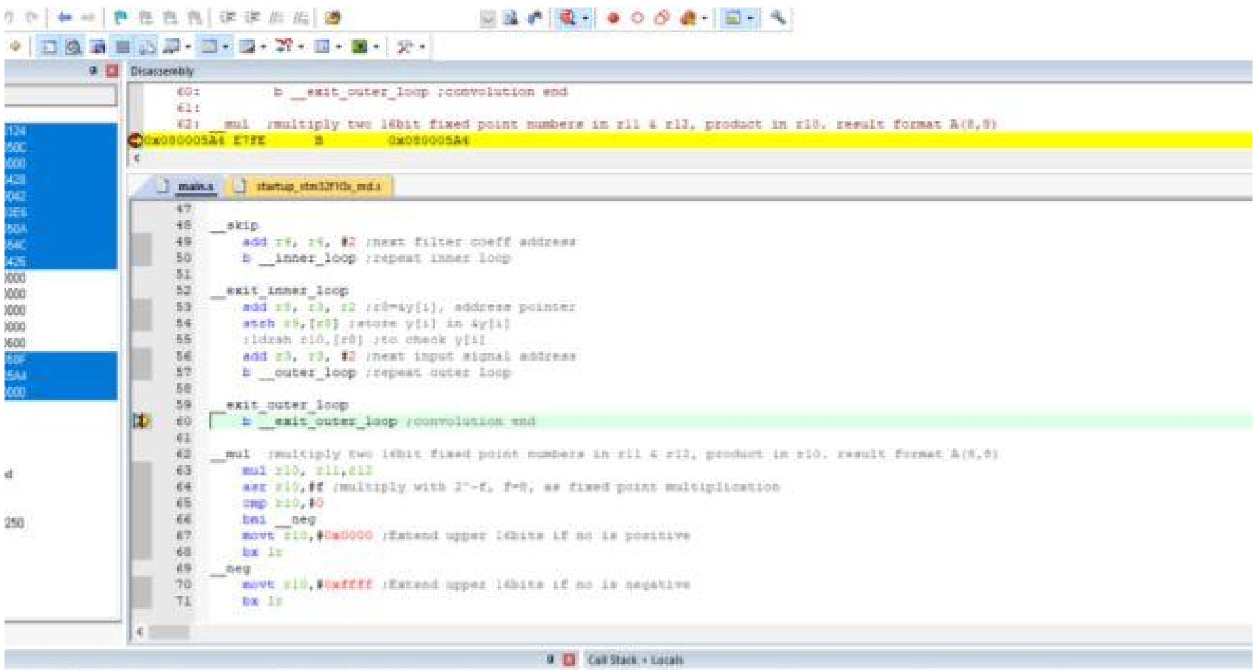
The next step is to take those filter coefficients and input signal onto Keil Uvision and write a fir filter code and use our connected stm32 as the debugger instead of the simulator
Options for target screenshots attached





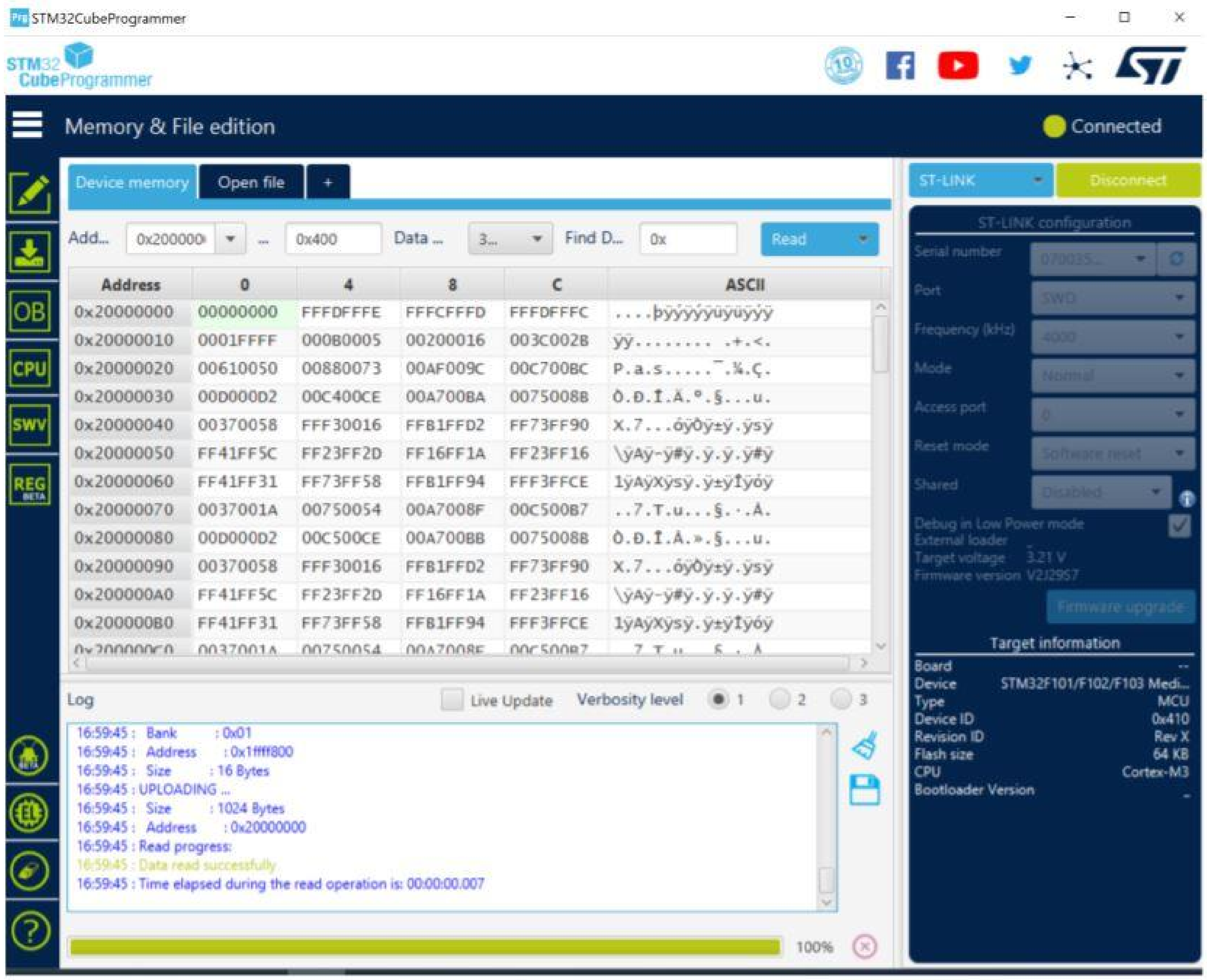
The device name is being shown so that means that Keil is able to detect the connected STM and we can run our filter through it

On running the filter the following addresses are stored in the registers

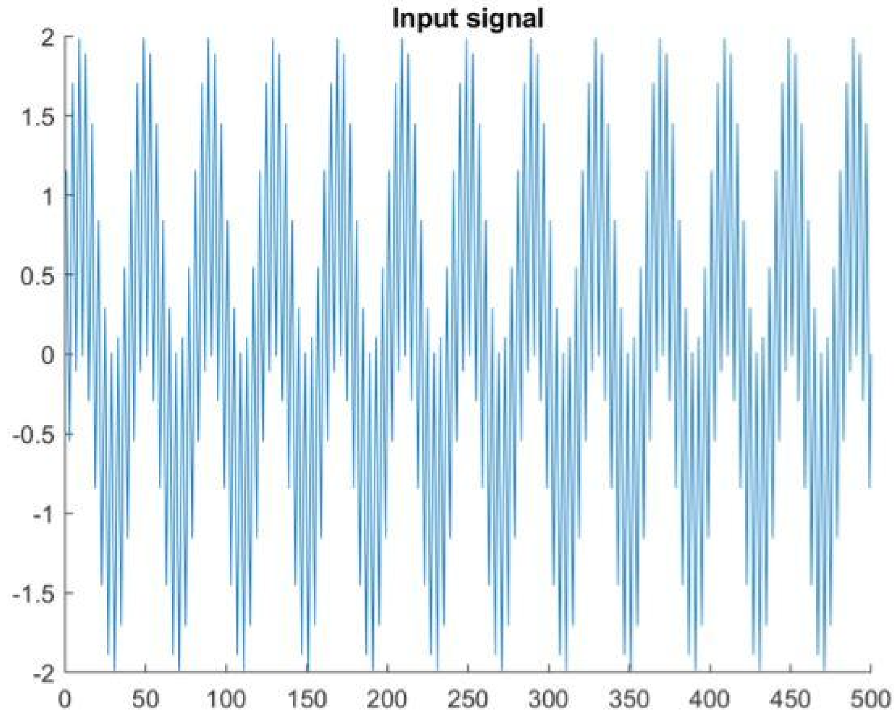


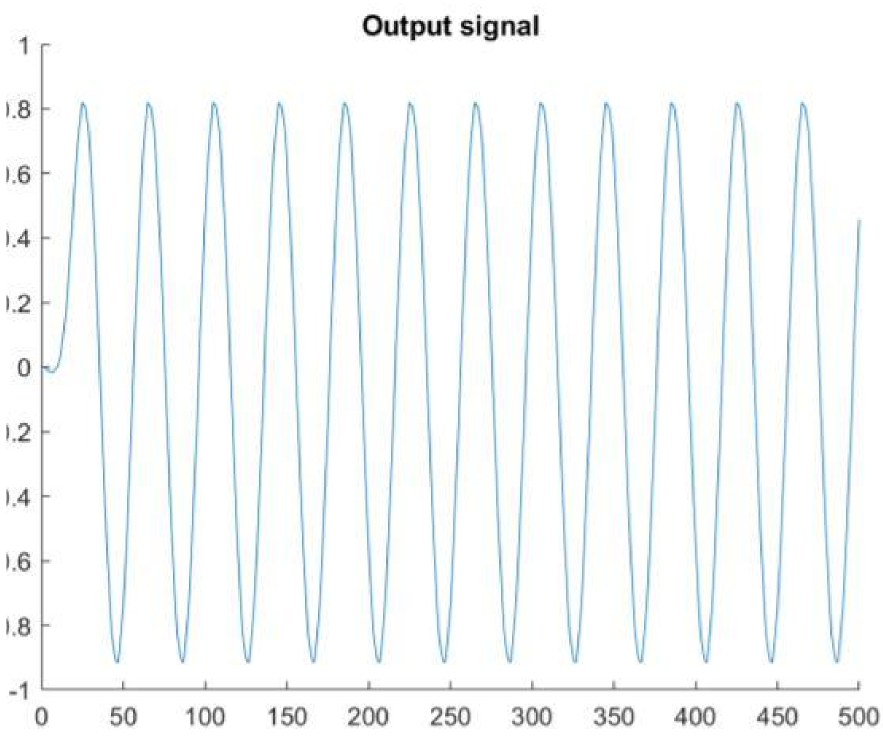
R0 has the starting address of the input signal
R1 has the address of the filter coefficients
R2 has the starting address of the output
R8 has the ending address of the output

Now, save .bin files for input and output using cube programmer software, example screenshot for output attached



Save bin files and then run the file matlab_reading_stm32.s for reading the input.bin and output.bin files and plot them
The plots are attached below





Hence it can be observed that our bin files stored the proper info, meaning our filter ran perfectly