Lab 2: Learning how to use BLE and sensor shield on F401RE

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All of the following experiments are using the board Nucleo-F401RE.

Part 1: Sensor Shields

In this part we learn how to read the values given by the sensor shield by using the module X\_CUBE\_MEMS. Not much difficulty had occurred at this part.

Part 2: Create a dummy Heartrate sensor and use BLE to connect with it

This part gave us much more headaches, since the original source is not compilable on Keil uVision due to file size limit. Thus we turned to the ARM online mbed compiler. At first, we tried to utilize the “BLEDevice” class, which is provided by ST, like much tutorial on the web. But the thing is, the Bluetooth expansion board “X-NUCLEO-IDB05A1” seems to be incompatible with the implementation. To be specific, we could compile and flash the binary with no issues, but the GAP just doesn’t show on our phone. After some googling and experiments, we found that the expansion board is happier with the “BLE” class, which is the generic BLE implementation by ARM. Decided not to dive too deep on why the ST implementation isn’t compatible with the expansion board, we use the generic library to complete the lab.

Part 3: Using BLE to send out datas given by the sensor shield

As the source given in lecture is still way too big for uVision, and that it also uses the ST “BLEDevice” class that doesn’t work well on our expansion board, we again have no choice but to reconstruct the project using the ARM “BLE” class. We learnt how Gatt and Gap worked in it, and constructed our own GattService to correctly broadcast the data we want. It’s actually just a combination of the two parts above. The only pitfall would be we must respect how the device transmits data on the low level: endian matters; though it’s taught in many courses and that we’ve encountered this kind of problem before, but we still spent another two hours on this.