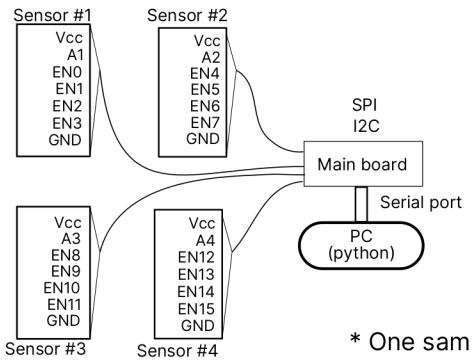
Electronics design exercise

Goal

Your task is to design a data acquisition board (referred to as the *main board*) that connects to 4 sensor boards. Each sensor board outputs 4 analog signals resulting in a total of 16 signals to be acquired. Additionally, each sensor on each sensor board can be enabled and disabled with separate digital inputs. To read a specific signal the enable pin corresponding to it needs to first be set high (3.3V logic) after which the sample may be read. Only one sensor per board can be enabled at a time but sensors on separate boards may be enabled concurrently. The current draw of a single sensor in an enabled state is approximately 50 mA.



Amplitude	0 to 3.3 V
Resolution	minimum of 12 bit
Sample rate*	100 samples per second readable in python
USB powered (2.0 power spec)	

* One sample here refers to a frame with readings from all 16 sensors

The sensor boards have a footprint of 12 by 12 mm and you can choose any type of connector that meets this requirement. The system is purposefully *under constrained* and incompletely described here. Make reasonable assumptions where needed (explain these in your deliverable).

Some design considerations

- Signal integrity and noise
- Longevity of the design (futureproofing for additional prototyping iterations)
- Compactness, wiring and connectors (device is mounted on the wrist and wiring should not encumber usage)
- Ergonomy and ease of development (think of the machine learning engineer using your board as your customer)
- Software support and toolchains for your embedded system of choice

> ***Explain your design choices, we are interested to see your thought process***

Deliverable

The final deliverable should be a document of approximately 3 to 4 pages including the pictures, tables, calculations that you consider relevant. You can choose any system architecture and any SoC / MCU / other digital logic device you see fit. Depending on your area of expertise / interest you can focus on the signal processing domain, embedded system domain, manufacturing domain or firmware domain. Feel free to showcase your specialities (e.g. circuit simulation, BOM optimization, PCB design combined with 3D modeling etc.). You can come up with your own structure for the deliverable but some topics are listed below to help you get started

- System architecture and bill of materials
- Noise performance considerations
- Manufacturing plan
- Firmware development roadmap and requirements