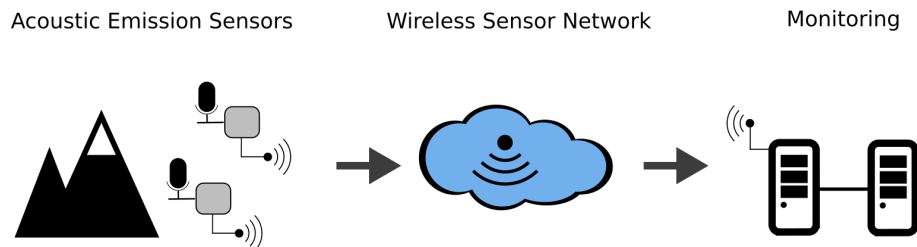


Semester/Master Thesis:

## Embedded Acoustic Sensing

**Motivation** Wireless sensor networks (WSN) with acoustic sensors can be used for acoustic event detection in environmental monitoring, e.g. for bird detection or hazard warning systems [1]. Since these devices are battery-powered, their energy efficiency is of paramount importance. The transmission of audio data through a WSN and its temporary storage on the node's memory has a big impact on the energy budget due to the high audio data rate. Currently a system is deployed in the Swiss Alps which transmits a continuous audio stream for analysis of geological phenomena. An audio event classification system based on Convolutional Neural Networks can be used to classify and discard unwanted event types, such as mountaineers or helicopters, directly on the node reducing the requirements for transmission and temporary storage.



**Task** For this thesis you will implement an audio classification system on an embedded device. The device will be chosen with regard to energy consumption, memory and processing capabilities. You will learn about neural networks and low-power embedded design. Finally, you will evaluate the performance and power dissipation for your implementation.

**Requirements** You should have basic knowledge in

- Signal processing (FFT, Convolutions, ...)
- Programming experience (C/C++, Python, ...)
- Embedded systems

**Interested?** Please have a look at <http://www.tec.ethz.ch/research.html> and contact us for more details!

### Contacts

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### References

- [1] A Custom Acoustic Emission Monitoring System for Harsh Environments: Application to Freezing-induced Damage in Alpine Rock Walls, L. Girard, et. al., Geoscientific Instrumentation, Methods and Data, 2012.