

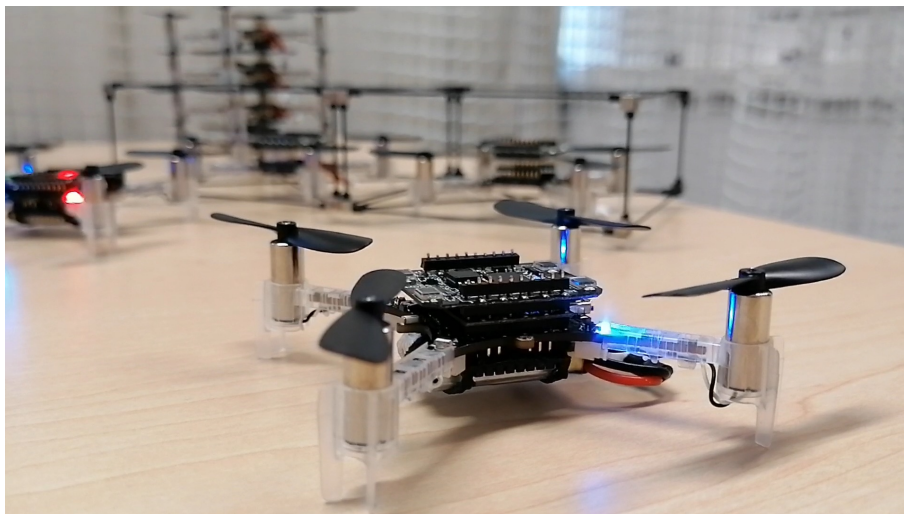


Thesis (B.Sc. / M.Sc.) FPGA-based Deep Neural Networks for UAVs

Drone swarms offer many possibilities for applications such as transportation, disaster relief operations, environmental exploration or ad-hoc communication networks. An important prerequisite to the application of decentralized drone swarms are on-board data processing techniques.

For example, one could use e.g. reinforcement learning to find a neural network controller for the drone. Similarly, other applications may require the on-board processing of image data through a deep convolutional neural network, e.g. to detect and follow a person during search-and-rescue missions.

Unfortunately, the evaluation of large neural networks may be too expensive to perform on a typical microcontroller. To efficiently run deep neural networks on heavily resource-constrained devices such as our UAVs, one solution could be to use FPGAs for the parallel evaluation of neural networks.



At BCS Lab's Dronelab, you will have the opportunity to work with Crazyflie 2.1 drones. You will investigate how to realize the evaluation of neural networks on FPGAs for on-board processing, ideally aiming at a publication in relevant venues. You are further encouraged to realize your own ideas.

Some of the following may or may not help:

- Experience with FPGAs (e.g. Lattice ice40up5k)
- Experience with embedded systems or C
- Knowledge of deep learning

For further information, please contact Kai Cui.

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