



IBM Research –Zurich



Contact: Dr. Abbas Rahimi  
Email: [abr@zurich.ibm.com](mailto:abr@zurich.ibm.com)

The thesis will be performed at the IBM Research-Zurich in Rüschlikon.



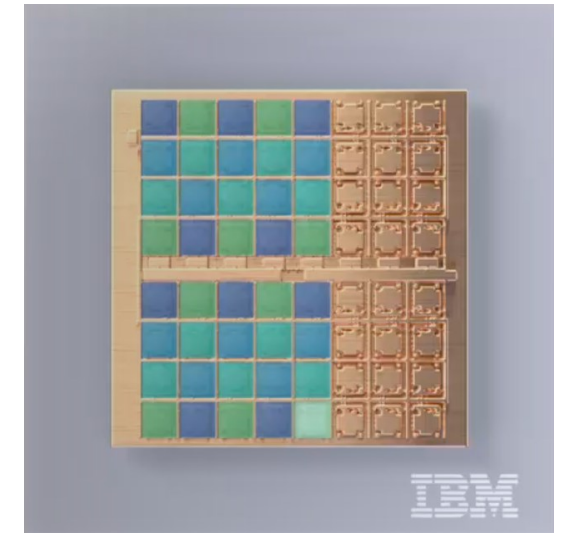
# Master Projects

## Accelerating Mixer-MLP with Computational Memory

### Introduction

Who cares about CNNs (Convolutional Neural Networks) or brand-new vision Transformer (based on attention networks), when neither of them are necessary?!

Very recently, MLP-Mixer [1], an architecture based exclusively on multi-layer perceptrons (MLPs) achieves comparable accuracy with the state-of-the-art CNNs and vision Transformers at higher throughput. Moreover, the simplicity of Mixer-MLP provides opportunities for efficient mapping on non-von Neumann architectures such as computational memories [2].



### Goal

We aim at efficiently mapping of Mixer-MLP models on the computational memory as an emerging hardware fabric.

### Tasks and Type

There are several challenges that need to be overcome at algorithmic (20%) and hardware (80%) levels. These include exploiting methods for quantization and noisy hardware-aware retraining, working with simulators, and performing actual hardware experiments with the computational memory setup. We are inviting applications from students to conduct their Master's thesis work on this exciting new topic. The work performed could span hardware design all the way to efficient implementations on the emerging hardware using phase-change material devices. It also involves interactions with several researchers across IBM research focusing on various aspects of the project. The ideal candidate should have a multi-disciplinary background, strong hardware and programming skills. Prior knowledge on machine learning, and architectures is a bonus but not necessary.