

November 29, 2019

RE: Master Project on 4D Flow Cardiac Magnetic Resonance Imaging (MRI)
Boston Children's Hospital, Harvard Medical School, Boston, Massachusetts, USA

Cardiovascular MRI Center at Boston Children's Hospital and Harvard Medical School is looking for a graduate student in the area of 4D flow data acquisition in cardiac MRI. The successful candidate should have background in mathematics, signal processing, and computer programming including MATLAB, C++, and Python.

Conventional cardiac MRI exams are based on 2-dimensional (2D) flow acquisitions to evaluate the systemic and pulmonary blood flow circulation. These 2 acquisitions are separately performed with 2 different velocity encoding factors while patients are normally breathing. The free-breathing acquisitions, however, degrade the image quality and flow measurements due to respiratory motion. In this project, we aim to develop a 4D flow acquisition technique with 2 velocity encoding factors to simultaneously evaluate the systemic and pulmonary blood flow. The 4D flow data should be corrected for respiratory motion and be highly under sampled to confine the imaging time to less than 10 minutes. The under sampled data should be then estimated using compressed sensing and convolutional neural network.

Task List

- To review the relevant literature.
- To develop a free-breathing 4D flow acquisition with 2 velocity encoding factors.
- To correct for the respiratory motion and possible phase aliasing artifact using 2 velocity encoding factors.
- To evaluate the developed technique on patients.
- To report the results at Journal of Magnetic Resonance in Medicine.

Requirements

- Solid background in mathematics, signal processing, and computer programming.
- Scholarship and/or own sufficient financial resources to cover the living expenditure (\$12,000-\$15,000).
- Starting the project in April 2020.
- The project will take about 6-8 months for Master Thesis.

Candidates with an interest in this position should contact Mehdi Hedjazi Moghari at Boston Children's Hospital by mid-January 2020:

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