November 29, 2019

RE: Master Project on 3-dimensional (3D) 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 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-dimentional (2D) images that are acquired during breath-hold. Children with congenital heart disease are too young or ill that cannot hold their breath. Therefore, in this project, we aim to develop a free-breathing 3D acquisition that does not require breath holding and can replace the conventional 2D image acquisition technique. The 3D acquisition should have sufficient blood-to-myocardium contrast-to-noise ratio and should 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 3D radial acquisition technique.

- To correct for the respiratory motion and possible eddy current artifacts.

- 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:

mehdi.hedjazimoghari@childrens.harvard.edu