Super Resolution of Ultrasound Doppler Imaging using Deep Learning

**Supervisor:** Regev Cohen regev.cohen@campus.technion.ac.il

Doppler ultrasound is a non-invasive and safe modality that is used for the estimation of blood velocities by transmitting high-frequency sound waves (ultrasound) and analyzing the signals reflected from circulating red blood cells. Doppler scans help diagnose many conditions, including: heart valve defects and congenital heart disease, artery occlusions and aneurysms.

In order to allow the medical doctor to navigate and choose the region in which the blood velocity is to be estimated, a B-mode image of the tissue is generated first. Only then, a velocity map of the blood is imaged on top (See image above). Nowadays, 2 interleaved transmission sequences are used, one for Doppler and one for B-mode imaging, which results in degraded B-mode image and corrupted velocity estimation.

In this project, we will perform super resolution on Doppler images using deep learning to yield a high quality B-mode image. The project will involve working with tensor flow and state of the art research oriented ultrasound system.

**Required background:**
Introduction to Digital Signal Processing (044198)
Learning System (046195)
Tensor Flow – Advantage