# Neerav Karani

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## Education

**ETH Zurich** — **Zurich, Switzerland**
*Master of Science in Biomedical Engineering [ GPA: 5.4/6 ],* — *Expected Graduation: April, 2017*
**Related Coursework:** Machine Learning, Advanced Topics in Machine Learning, Probabilistic Artificial Intelligence, Computational Intelligence Lab, Medical Image Analysis, Computer Vision, Mathematical Foundations of Computer Graphics and Vision, Quantitative Big Imaging, Magnetic Resonance Imaging in Medicine.

**Indian Institute of Technology Madras** — **Chennai, India**
*Bachelor and Master of Technology in Engineering Design [ GPA: 8.77/10 ],* — *May, 2013*
**Honors:** Best Academic Performance in the Department (2009-10).

## Academic Projects

**Temporal Interpolation of Abdominal MRIs using CNNs** — **Masters Thesis, ETH Zurich**
*Supervisors: Dr. Christine Tanner, Prof. Sebastian Kozerke, Prof. Ender Konukoglu* — *November, 2016 - April, 2017*
- Temporal image interpolation in navigated 2D multi-slice dynamic MR acquisitions with a fully convolutional neural network.
- 33.33% performance improvement over an interpolation-by-registration approach; in particular when motion is highly non-linear.
- Manifold-learning neural networks to uncover low dimensional linear representations.
- Generative adversarial networks for producing sharp interpolated images, even in the presence of large motion.

**Interactive Bone Segmentation in MR** — **Semester Project, ETH Zurich**
*Supervisors: Firat Ozdemir, Prof. Orcun Goksel* — *April, 2016 - July, 2016*
- Interactive segmentation tool using random forests and multi-resolution random walker.
- More than 75% time-gain over manual segmentations, with comparable accuracies, on 10 patient humerus MRIs.
- The novel multi-resolution random walker strategy lead to over 2000% time reduction for high-resolution images.

**Multi-modality Image Registration for Image Guided Surgery** — **Masters Thesis, IIT Madras**
*Supervisor: Prof. R Krishnakumar* — *December, 2012 - May, 2013*
- Registration of pre-operative MR images with intra-operative ultrasound images by maximizing mutual information.

## Publications

- Neerav Karani, Christine Tanner, Sebastian Kozerke, Ender Konukoglu. "Temporal Interpolation of Abdominal MRIs acquired during Free-Breathing." (Under review)
- Firat Ozdemir, Neerav Karani, Philipp Fürnstahl, Orcun Goksel. "Interactive Segmentation in MRI for Orthopedic Surgery Planning: Bone Tissue." IJCARS, 2017. (In press)

## Computer Skills

**Programming Languages:** Python, Matlab, C++. **Machine Learning libraries:** Tensorflow, scikit-learn.
**Image Processing and Visualization:** C++ based toolkits: ITK, VTK, IGSTK, MITK.

## Work Experience

**ETH Zurich** — **Zurich, Switzerland**
***Teaching Assistant, Machine Learning*** — *September 2016 - January 2017*

**Philips Healthcare, Research and Development** — **Pune, India**
***Senior Electrical Engineer*** — *July 2013 - May 2015*
- Embedded software development (motion control algorithms; CAN, SPI, UART protocols) for a diagnostic X-ray system.

**Trivitron Healthcare** — **Chennai, India**
***Intern*** — *January 2012 - June 2012*
- Software development for proof of concept of a cardiac image guided surgery system.