

GAUTAM PAI

Present Position:

PhD Candidate
Department Of Computer Science,
Technion - Israel Institute Of Technology

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RESEARCH INTERESTS

My research interests lie in the intersection of Numerical Geometry, Machine Learning, Signal Processing and Computer Vision. In particular, I am interested in developing computational routines motivated from modern learning systems for exploring and understanding geometric structures in data.

EDUCATION

Doctor Of Philosophy

Technion - Israel Institute Of Technology, Haifa-Israel
Advisor: Professor Ron Kimmel

October 2015 - Present
Grade: **95.8/100**

Master Of Engineering

Indian Institute Of Science - Bangalore
Major: Signal Processing
Advisor: Dr. Venu Madhav Govindu

2011 - 2013
CGPA: **6.6/8**
Dissertation Grade: **8.0/8.0**
First Class

Bachelor Of Engineering

Sardar Patel College Of Engineering - University Of Mumbai
Major: Electrical Engineering

2007 - 2011
80.77%
First Class with Distinction

RESEARCH AND PROFESSIONAL EXPERIENCE

- 1. PhD Student, Geometric Image Processing Laboratory, Technion** 2015 - Present
I am currently working on my PhD with Professor Ron Kimmel in the Computer Science Department at the Technion. My research focuses on exploring the relationship between the computational routines of numerical geometry and modern learning systems like convolutional neural networks.
- 2. Senior Research Engineer, Philips Research Bangalore:** 2013 - 2015
 - (a) Vital Signs Camera Project:** I worked on developing signal and image processing algorithms for extraction of human vital signs like the heart and respiration rate from videos. My role was to design filters for robust estimation of these signals and set up the integration with a patient monitoring system.
 - (b) Non-Invasive Anemia Screening Solution:** This project involved building a non-invasive solution for the detection of anemia. My work involved building statistical models for screening anemia based on the signs and symptoms of low hemoglobin obtained via images of the eye and other inputs. I also managed and supervised the clinical data-collection process of this project which was conducted in the rural areas of Mysore District, Karnataka in India.
- 3. Masters Student, Computer Vision Laboratory, IISc Bangalore:** 2011 - 2013
I did my masters dissertation with Professor Venu Madhav Govindu in the Electrical Engineering Department at IISc Bangalore. My work was based on non-parametric and data adaptive filters for de-noising of natural images. In this thesis, we proposed a novel consistency principle

for non-parametric filtering of images and showed how it leads to desirable *symmetric smoothing filters* with interesting properties. We explain the action of our filter using spectral graph theory and develop a simple algorithm to boost de-noising performance of natural images.

PUBLICATIONS

1. **Deep Eikonal Solvers**
Moshe Lichtenstein, Gautam Pai, and Ron Kimmel.
International Conference on Scale Space and Variational Methods in Computer Vision (SSVM) 2019
2. **DIMAL: Deep Isometric Manifold Learning Using Sparse Geodesic Sampling**
Gautam Pai, Ronen Talmon, Alex Bronstein and Ron Kimmel.
IEEE Winter Conference on Applications Of Computer Vision (WACV) 2019
3. **Sparse Approximation of 3D Meshes Using the Spectral Geometry of the Hamiltonian Operator**
Yoni Choukroun, Gautam Pai and Ron Kimmel.
Journal of Mathematical Imaging and Vision (JMIV) 2018
Short Version:
Schrodinger Operator For Sparse Approximation of 3D Meshes
Yoni Choukroun, Gautam Pai and Ron Kimmel.
Symposium on Geometry Processing (SGP) 2017 - Posters.
4. **Learning Invariant Representations Of Planar Curves**
Gautam Pai, Aaron Wetzler and Ron Kimmel.
International Conference on Learning Representations (ICLR) 2017.
5. **Symmetric Smoothing Filters from Global Consistency Constraints**
Sheikh Mohammadul Haque*, Gautam Pai* and Venu Madhav Govindu
IEEE Transactions on Image Processing (TIP) 2015. *Equal Contribution
6. **Camera based respiration rate of neonates by modeling movement of chest and abdomen region**
Vishnu Makkapati, Pujita Raman and Gautam Pai
IEEE - International Conference on Signal Processing and Communications (SPCOM) 2016, Bangalore, India

ACADEMIC HIGHLIGHTS

- **Excellence Scholarship Award** from the Department of Computer Science - Technion, 2018
- **Technion Cyber Security Research Fellowship 2016-2018** for PhD studies at the Technion - Israel Institute Of Technology, Haifa-Israel
- **Lady Davis Fellowship 2015-2016** for Graduate studies at the Technion - Israel Institute Of Technology, Haifa-Israel
- Recipient of a tuition-waiving scholarship for two consecutive years in 2008 and 2009 by the **Sir Ratan Tata Trust - Mumbai** for excellence in Engineering Studies.
- All India Rank: **33 (top 0.04%)** in Graduate Aptitude Test in Engineering (GATE)-2011.
- All India Rank - **238 (top 5 %)** in JEST 2011. (JEST is an all India examination conducted for admission to Phd Programmes in Theoretical and Experimental Physics at many leading institutes like TIFR,RRI,IISc etc).
- Awarded the Institute Second Merit Prize for two consecutive years at SPCE, Mumbai in 2008-2010.
- Recipient of scholarship from the Ministry Of Human Resources (MHRD) - Government Of India during my Masters Program from 2011-2013

COMPUTER SKILLS

Simulation Softwares: MATLAB, Simulink
Programming Languages: C, C++, Lua, Python
Platforms: Windows, Linux
Others: AUTOCAD

EXTRACURRICULAR ACTIVITIES

Indian Classical Music: Tabla Percussions

- Student of Hindustani Classical Music for 10 years, I was awarded the **Sangeet Visharad (Bachelor Of Music)** by the Akhil Bharatiya Gandharva Mahavidyalaya- Miraj. I have qualified all levels of the Bachelor's Music program : Prarambhik, Madhyama ,and Visharad with **first class honors**.
- Awarded the Shyamlal Santdas Narang award by Sharda Sangeet Vidyalaya, Mumbai for excellence in Indian Classical Music-Tabla Percussions in 2005.
- I was also a member of the organizational committee in *Marathi Mandal*, a group for organizing many of the Maharashtraian festive activities in IISc. I co-ordinated the music division and was involved in organizing most of the events year-round.

REFERENCES

1. **Professor Ron Kimmel**
Professor, Department Of Computer Science,
Technion-Israel Institute Of Technology, Haifa, Israel - 3200003.
<http://www.cs.technion.ac.il/~ron/>
2. **Dr. Venu Madhav Govindu**
Associate Professor, Department Of Electrical Engineering,
Indian Institute Of Science, Bangalore - 560012.
<http://www.ee.iisc.ac.in/people/faculty/venu/index.html>