

Ritvik Vasan

BIOPHYSICS · MACHINE LEARNING

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Summary

I am a 5th year PhD candidate working on computational mechanobiology. I have expertise in applying theoretical and statistical algorithms to biophysical problems.

Education

University of California, San Diego

9500 Gilman Drive, San Diego, CA

PHD IN MECHANICAL ENGINEERING (3.97/4.00)

2016 - 2020

M.S. IN MECHANICAL ENGINEERING (3.97/4.00)

2015 - 2016

BITS Pilani

Pilani, Rajasthan, India

B.S. IN MECHANICAL ENGINEERING (8.76/10.00)

2011 - 2015

Experience

Laboratory for computational and cellular mechanobiology

University of California, San Diego

PHD CANDIDATE

Dec 2015 - Present

- Developed theoretical frameworks adopting differential geometry techniques used in computer graphics to estimate forces from cell membrane shapes at the nanometer length scale. (github.com/ritvikvasan/EMM)
- Designed a pipeline that models the spatio-temporal distribution of actin filaments during mammalian clathrin-mediated endocytosis. (github.com/DrubinBarnes/AkamatsuCMEmanuscript)
- Validated a 3D membrane mechanics Iso-Geometric Analysis (IGA) framework using axisymmetric modeling to investigate constriction and scission of tubular membrane necks. (github.com/ritvikvasan/Membrane-neck-formation)
- Led collaborative teams of scientists across multiple universities.
- Mentored multiple high school, undergraduate and masters students on various projects.

Allen Institute for Cell Science

Seattle, WA

SUMMER TRAINEE

June - Sept 2018 and 2019

- Implemented a conditional variational autoencoder (cVAE) on Gaussian distributions using PyTorch to study encoding distributions from an information theoretic framework, with a goal to build a fully factorizable probabilistic model of structures inside a cell (github.com/AllenCellModeling/CVAE_testbed).
- Created an open source force-inference Python package named DLITE to estimate cell-cell forces from max projects of z-stacks in segmented images (github.com/AllenCellModeling/DLITE). Press release available at phys.org/news/2019-11-cell-cell-snapshots-time-lapse-videos-cells.html

Applied physics and instrumentation lab

Indian Institute of Science

RESEARCH ASSISTANT

July 2014 - Aug 2015

- Designed a proof of concept of an affordable and portable cell-phone microscope for malaria diagnosis.
- Selected as one of the top innovation projects in India for the Gandhian award by SRISTI.
- Publicized work through national newspapers and networks.

Selected Publications

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|------|---|--------------------------------------|
| 2019 | Applications and Challenges of Machine Learning to Enable Realistic Cellular Simulations | <i>In review</i> |
| | Vasan, Rowan, Lee, Johnson, Rangamani, Holst | |
| 2019 | DLITE uses cell-cell interface movement to better infer cell-cell forces | <i>Biophysical Journal</i> |
| | Vasan, Maleckar, Williams, Rangamani | |
| 2018 | The role of traction in membrane curvature generation | <i>Molecular Biology of the Cell</i> |
| | Vasan*, Alimohamadi*, Hassinger, Stachowiak, Rangamani | |

Conferences and Awards

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| 2019 | Chair Cell mechanics, mechanosensing and motility | <i>Biophysical Society</i> |
| 2019 | Talk Biophysical Society meeting | |
| 2018 | Poster American Society for Cell Biology meeting | |
| 2017 | Outstanding graduate student Mechanical and Aerospace Engineering | <i>UCSD</i> |
| 2016 | Frontiers of Innovation and Scholars Program (FISP) | <i>UCSD</i> |

Skills

Programming	Python, JAVA, LaTeX, PyTorch, Tensorflow, MATLAB, Jython, OpenCV, Git,
Software and hardware packages	COMSOL, Solidworks, Inventor, Cadence, LabView, AutoCAD, Raspberry Pi, Arduino, Beaglebone black