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 avaialable 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

2019	**Applications and Challenges of Machine Learning to Enable Realistic Cellular Simulations** Vasan*, Rowan, Lee, Johnson,Rangamani, Holst	*In review*
2019	**Branched actin filament self-organization and force generation during Clathrin-mediated endocytosis** Akamatsu, Vasan*, Serwas, Ferrin, Rangamani, Drubin	*In review*
2019	**DLITE uses cell-cell interface movement to better infer cell-cell forces** Vasan*, Maleckar, Williams, Rangamani	*Biophysical Journal*
2018	**The role of traction in membrane curvature generation** Vasan*, Alimohamadi, Hassinger, Stachowiak, Rangamani	*Molecular Biology of the Cell*

Conferences and Awards

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

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