

## EDUCATION

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**Ph.D, Mechanobiology** | National University of Singapore  
**B.Tech Biotechnology (Distinction)** | SASTRA University

*Sep 2016 - Aug 2021*  
*Jul 2011 - May 2015*

## WORK EXPERIENCE

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**Postdoctoral Fellow**, Paul Scherrer Institute  
**Visiting Scientist**, Paul Scherrer Institute & ETH Zürich  
**Consultant**, Computer Vision | [Qritive](#)  
**Research Assistant**, National University of Singapore

*August 2021 - Present*  
*Sep 2020 - July, 2021*  
*Sep 2019 - Dec 2019*  
*Sep 2015 - Jul 2016*

## SKILLS

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**Statistics:** Multivariate Statistics, Linear Algebra, Diffusion maps, Pattern recognition and Machine Learning.

**Computer Vision:** Segmentation, Feature generation and Particle tracking

**Computational Biology:** Analysis of bulk and single cell Microarray, RNA-Seq and HiC data.

**Experimental Skills:** Microscopy, Tissue engineering and mechanical manipulation of cells.

**Tools:** R, ImageJ, MATLAB, Python, QuPath, Git, LaTeX and Inkscape.

## SELECTED RESEARCH PROJECTS

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### **Automated segmentation and feature generator for 3D images**

- Built an automatic image processing pipelines for segmentation and feature generation that reduced the processing time by 60%.
- Engineered features for morphology, textural and spatial distribution of objects in images.
- Integrated multimodal features such as protein expression, RNA seq and image features to enable deduction of functional links.

### **Digital pathology platform for grading breast cancer stages at single cell resolution**

- Performed instance segmentation of single nuclei from patient tissue biopsies using U-Net based CNN and extracted geometric and textural features of nuclei.
- Built machine learning models to diagnose breast cancer stages at single cell resolution from patient breast tissue biopsies with 80% accuracy.
- Developed a single cell tumorigenesis score that characterises tumor progression.
- Identified regions of tissue tension using spatial statistics of nuclear images.

### **Deconvolving cell variability in cancer**

- Developed a 3D in-vitro organoid tissue model for cancer progression amenable to high-resolution imaging.
- Implemented a classifier to predict cell shape with an accuracy of 95% and used the latent feature vectors along with regression models to show that cell shape is coupled to its function.
- Demonstrated a causal relationship between cell shape and activation by cancer cells using multimodal-multivariate analysis.
- Established the use of tissue model to assay the treatment efficacy of radiotherapy.

### **Trajectory inference to accelerate reprogramming of skin cells to stem cells**

- Developed a novel technique to reprogram skin cells to stem cells with high efficiency.
- Performed statistical tests and pathway analysis on RNA seq data to characterize the temporal changes in the transcription profile during reprogramming.
- Modeled trajectories of reprogramming cells using clustering and diffusion models of single cell image features.
- Identified sources of low efficiency in large noisy image data which were experimentally validated to accelerate stem cell generation.

Complete list of publications [here](#)