

# Shreyasvi Natraj

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## ● WORK EXPERIENCE

### ETH ZÜRICH - SCIENTIFIC ASSISTANT

15/06/2023 – Present

- Developed optical-based YOLOv8 event detection neural network for Mitochondrial mobility quantification & Fission/Fission event detection in neuronal cells using iSIM based live-cell imaging data.
- Carrying out transcriptomics data analysis such as Differential Expression using DESeq2, Differential Splicing using DEXSeq and rMATS, Gene Ontology, KEGG Pathway and Signaling Pathway Impact Analysis using gseGO & gseKEGG for ZNF451 isoform knockout transcriptomics data and Gene Ontology analysis.
- Carried out multimer structure analysis using AlphaFold and conducted experiments involving cloning, expression and protein purification of wild-type, mono-SUMOylated and tetraSUMOylated EME1 proteins using BL21 DE3 competent cell lines and performed In-vitro ubiquitination assays using purified proteins to understand poly-SUMOylated EME1 MUS81 and TRIM25 interactions.

(Supervisors: [Tatjana Kleele](#), [Andrea Pichler](#), [Matthias Peter](#))

YOLOv8, DESeq2/DEXSeq2, rMATS, gseGO/gseKEGG, SnapGene, Fiji, Cloning-Expression-Protein Purification, Western Blotting, alphafold

### NATIONAL CENTRE FOR COMPETENCE IN RESEARCH SYNAPSY - RESEARCH ASSISTANT

01/02/2019 – 31/01/2023

- Developed gaze, audio & video neural network classifiers for screening of autism spectrum disorder.
- Analyzed deep learning tools relation with clinical scores for digital phenotyping of autism spectrum disorder.
- Worked on optogenetics, EEG signal and behavioral pattern analysis for Shank3 knockout mice interactions.
- Contributing to writing several research articles and research grants ([Swiss National Foundation Sinergia grant](#)).
- Worked on developing PACS platform using [XNAT](#) and [DCM4CHEE](#) and carried out structural MRI data analysis during summer internship at FCBG (Campus Biotech) under [Dr. Michael Dayan](#)

(Supervisors: [Marie Schaer](#), [Thomas Maillart](#))

Slurm, Seaborn, PyTorch, Scipy, Keras/TensorFlow, OpenCV, Pandas, R-Caret, Streamlit, freesurfer, MRI/fMRI & EEG Analysis

### CERN - TECHNICAL STUDENT

01/07/2021 – 30/06/2022

- Benchmarked high-energy physics and HPC workloads over [EOSC Testsuite](#).
- Developed a [Openshift](#) based web interface/dashboard for results visualization and analysis.
- Conducted [FAIR](#) testing and developed several kubernetes-based tools for the [Archiver project](#).
- TestSuite awarded [best demo](#) at [EGI Conference 2021](#), Archiver Awarded by the [Digital Preservation Coalition](#).

(Supervisors: [Joao Fernandes](#), [Bob Jones](#))

Terraform, Ansible, kubernetes, docker, slurm, GCP, Azure, AWS, IBM Cloud, Tensorflow/Keras, PyTorch

### CERN - OPENLAB SUMMER STUDENT

04/06/2018 – 31/08/2018

- Developed automated damage analysis extraction tool for stereo image pair & shuttle radar topography-based digital elevation models and structure point data for Aleppo, Syria & Herat, Afghanistan.
- Developed [mechanical turk](#) web instances for refugee camp polygon data generation. ([Talk](#))
- Implemented event tracker for social media-based disaster data collection tool called [E2MC](#)
- Carried out ionized gas simulations using [Garfield++](#) to determine ionization/excitation rates, gain curves and penning effect transfer probabilities. ([Github Repo](#))

(Supervisors: [Lars Bromley](#), [Francois Grey](#), [Sofia Vallecorsa](#))

Pandas, OpenCV, AWS M-Turk, GCP, HTML, CSS, JS, QGIS, Pybossa, DBSCAN, KNN, Garfield++, Root

### UNIVERSITY OF GENEVA - TSINGHUA UNIVERSITY INITIATIVE - SUMMER STUDENT

26/06/2017 – 03/07/2017

- Implemented multiple CNN models for object detection and trash classification in an automated trash sorting system.
- Successfully generated annotated dataset from crude data using crowdsourced [Zooniverse campaign](#)
- Launched [Alcrowd challenge](#) and developed low-cost scanner for digitalization of UNOG Archives. ([Press Release](#))
- Contributed to making SPI for FPGA-RPi communication ([cosmic pi](#)).

(Supervisor: [Francois Grey](#), [Colin Wells](#))

OpenCV, TensorFlow, GCP, Microsoft Azure Services, Xilinx Vivado/VHDL, Raspberry Pi, Lattice ICE40HX8

### MIT MEDIA LAB (GRAVIKY LABS & LVPEI MITRA) - SUMMER RESEARCH INTERN

01/05/2016 – 30/08/2016

- Developed an electrostatic system for a device called [Kaalink](#) to convert PM2.5 into [Air-Ink](#)
- The [project was showcased in a documentary](#) at the Cannes Film Festival.
- Worked on developing BullsEye, a smartphone attachment to determine corneal topography during an [MIT Media Lab summer internship at LVPEI](#). ([Awarded Certificate of team excellence](#))

(Supervisors: [Anirudh Sharma](#), [Nikhil Kaushik](#))

Solidworks (3D Modeling & Simulation), Manufacturing/assembly, Dry Lab Skills, Ansys, slicer, C++

## ● EDUCATION AND TRAINING

- **ETH Zurich:** 01/08/2024 - 01/08/2028 - Doctor of Philosophy (Health Science and Technology)
- **University of Geneva:** 08/09/2019 - 01/08/2022 - Master of Science (Neuroscience), **CGPA:** 5.56/6
- **R.V. College of Engineering:** 01/05/2015 - 30/05/2019 - Bachelor of Engineering (Biotechnology), **CGPA:** 8.55/10

## ● PUBLICATIONS

- **Using 2D Video-based Pose Estimation for Automated Prediction of Autism Spectrum Disorders in Preschoolers**  
S. Natraj\*, N. Kojovic\*, S.P. Mohanty, T. Maillart & M. Schaer, Scientific Reports 11 (\* first co-author), 23/07/2021 ([article](#))
- **COVID-19 Activity Risk Calculator as a Gamified Public Health Intervention Tool**  
S. Natraj, M. Bhide, N. Yap, M. Liu, A. Seth, C. Glorioso, Scientific Reports 13 - 11/08/2022, ([article](#))
- **Video-Audio Neural Network Ensemble For Comprehensive Screening Of Autism Spectrum Disorder in Young Children**  
S. Natraj, N. Kojovic, T. Maillart & M. Schaer, PLoS One (Under Production) - 05/06/2023 ([preprint](#))
- **Gesture imitation performance and visual exploration in young children with autism spectrum disorder**  
K. Latrèche, N. Kojovic, I. Pittet, S. Natraj, M. Franchini, I. M. Smith, M. Schaer, BMC journal of neurodevelopmental disorders (Under Review) - 03/04/2023 ([preprint](#))
- **Rapid identification of autism diagnosis from short video segments: which are the most relevant features?**  
N. Kojovic, F. Journal, S. Natraj, N. Thillainathan, K. Latrèche, S. Solazzo, M. Godel, F. Robain, M. Giraud, I. Pittet, L. Ilen, J. Husman, C. Feller, M. Schneider and M. Schaer, (In preparation) - 15/03/2024
- **MitoHub: Mitochondrial segmentation and Mobility estimation using YOLO and Optical flow Techniques**  
S. Natraj, K. Wentinck, T. Kleele (In preparation) - 30/07/2024

## ● SELECTED PROJECTS

- **NeuralWorks:** Developed several non-invasive BCI and Neurofeedback projects using signal processing and machine learning under NeuralWorks using different EEG headsets (Muse, G-tec, OpenBCI).
- **Abbie (AR/VR Sensor Based roBot for Intuitive Exploration):** Used Google project tango's area learning and RaspberryPi to build an [autonomous pod-like vehicle](#). (*KPIT Sparkle 2017 National top 15 finalist project*).
- **Casie (Context Acquired detail Sensing in Indoor/outdoor Environment):** Developed a deep-learning model to ensure efficient understanding of online lectures using video recordings of students. (EMEA region top 10 projects)
- **Drosophila Flight Pattern Tracking:** Used [Lime software-defined radio \(SDR\)](#) in order to track drosophila and their interaction/behavior through flight patterns (*Remote Internship under NCBS, Bangalore-India*).
- **SRISTI-UNICEF Summer School 2017:** Developed a [low-cost toxic gas detector](#) for the prevention of gas poisoning among salt farmers due to poisonous gas leakages in Rann Of Kutch region in Gujarat.
- **UV Hyperspectral Imaging of Teeth:** Developed a low-cost UV Hyperspectral Imaging camera using modified CMOS and filter lens for identification of fluoride content in teeth. (*Remote Internship under Carnegie Mellon University*)

## ● ACHIEVEMENTS

- [NeuralWorks](#) project awarded [Talentkick](#) 2022 and [Blaze Accelerator](#) 2022 grants,
- Indian Defence Research & Development Organisation [Dare to Dream 4](#) competition National First Prize Winner,
- Selected among top 10 startups for Venturelab's [AIT 2020 Program](#),
- Microsoft Imagine Cup 2020 EMEA [Top 10 Finalists](#),
- [HackZurich 2020](#) and 2023 Sponsor Challenge Winner and [PennApps 2023](#) Best Use of Statistics Hack Winner,
- SRISTI UNICEF 2015 Award Winner,
- Awarded Best Outgoing Student at R.V. College of Engineering, Class of 2019
- [National Entrepreneurship Challenge](#) 2015/16 Winner

## ● SKILLSET

**Languages & Softwares:** Python, R, C++, freesurfer, SnapGene, Chimera, Zeiss Zen, FIJI, Matlab, Solidworks  
**Other Skills:** Wet Lab Skills, Microcontroller/ARM architecture based sensing and signal processing