# SHAO-TING (STEVEN) CHIU

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link to this file (latest): https://git.io/JP2My

## HIGHLIGHTS

- **ECE Ph.D. student at Texas A&M University** (since 2022 Fall)
- **Intern at Pumas-AI, Inc.**, focusing on **scientific machine learning (SciML)** and its application to **pharmaceutics**.
- Rich research experience across **mathematical modeling, machine learning, and SciML** for solving complex biosystems.
- Familiar with Python, C, and Julia for **scientific computing**. Established open-source packages for analyzing ODE systems.

## EDUCATION

**Ph.D. student** *Aug. 2022 – Current*

*Dept. of Electrical and Computer Engineering, Texas A&M University – College Station*

**Master of Science** *Sept. 2018 – Aug. 2021*

*Graduate Institute of Biomedical Electronics and Bioinformatics (BEBI), EECS, National Taiwan University* *GPA: 4.05/4.3*

- Master Thesis: "**Mathematical Modeling and Analysis of Mitochondrial Retrograde Signaling Dynamics**"
- Selected Courses: Medical Image Analysis, Intro. to Biomedical Informatics, Data Structure & Algorithms.

**Bachelor of Electrical Engineering** *Sept. 2014 – July. 2018*

*Dept. of Electrical Engineering, National Taiwan University* *GPA: 3.76/4.3*

- Featured Project: **Image classification on mitochondrial toxicity with convolutional nerual network (CNN)**.
- Selected Courses: Control Systems, Modeling and Simulation in Systems Biology, Switching Circuit and Logic Design, Genomics, Linear Algebra, Complex Variables, Information Theory.

**Dental Student (Fifth grade)** *Feb. 2016 – Jan. 2022*

*Dept. of Dentistry, National Yang Ming Chiao Tung University* *GPA: 2.73/4.3*

- **Special Admission as Intel ISEF Grand Award Winner**.
- Achievement: **Passed National Board Dental Examination Part I**[30310185].
- Featured Project: **Applied U-Net for identifying calculus region with OCT tomography.**

## TECHNICAL SKILLS

- **Programming Language** C11, Python, Julia, TEX, Matlab, Makefile, Shell scripting, Bash, Git, YMAL
- **Machine learning & SciML** Scikit-learn, Keras, Flux.jl, DiffEqFlux.jl, DataDrivenDiffEq.jl, NeuralPDE.jl
- **Mathematical Modeling & Simulation** SciPy, NetworkX, ModelingToolkit.jl, DifferentialEquations.jl, Catalyst.jl, Pumas.jl
- **Image Processing** Scikit-image, OpenCV, Images.jl
- **High Performance Computing & Optimization** Numpy, JuMP, Distributed.jl, ForwardDiff.jl, Zygote.jl, Optim.jl
- **Debugging & CI/CD** gdb, gprof, valgrind, pdb, Infiltrator.jl, Github Action
- **Visualization & Literal Programming** Matplotlib, Makie.jl, Plots.jl, Tectonic, LATEX, TikZ, StaticWebpages.jl, Documenter.jl

## PUBLICATION & PATENT

[1] Niklas Korsbo, Chris Elrod, Francesco Brizzi, Andreas Noack, **Shao-Ting Chiu**, Raj Dandekar, Julius Martenssen, Antoine Soubret, Christopher Rackaukas, and Vijay Ivaturi. "Automatic Identification of Non-obvious Prognostic Factors in Big Data with DeepNLME$^{TM}$ in Pumas". In: *American Conference on Pharmacometrics (ACoP12)*. 2021. **Poster award**.

[2] **Shao-Ting Chiu**, Wen-Wei Tseng, and An-Chi Wei. "Mathematical Model for the Study of Mitochondrial Retrograde Signaling Dynamics". In: *bioRxiv* (2021). DOI: 10.1101/2021.03.27.437239 Submitted to *iScience*

[3] **Shao-Ting Chiu** and An-Chi Wei. "Understanding the System Dynamics of Mitochondrial Retrograde Signaling from a Differential Equation-based Framework". In: *The 20th International Conference on Systems Biology (ICSB2019)*. 2019, p. 22. **Oral**

[4] Chan-Min Hsu, An-Chi Wei, **Shao-Ting Chiu**, Zih-Hua Chen, and Ko-Hong Lin. "Subcellular mitochondria structure prediction in label-free microscope images using convolutional neural networks". In: *The 20th International Conference on Systems Biology (ICSB2019)*. 2019, p. 51. Poster

[5] **Shao-Ting Chiu**. "System and method for multi-direction searching feedback". patenttw I645386. **Shao-Ting Chiu**. Aug. 31, 2018

[6] **Shao-Ting Chiu**, Jun-Yi Leu, and An-Chi Wei. "The Influences of Mitochondrial Depolarization on Mitochondrial Network Structures". In: *2017 Annual Meeting of Biomedical Engineering Society (BMES2017)*. 2017, p. 243. **Oral**

[7] **Shao-Ting Chiu**, Jun-Yi Leu, and An-Chi Wei. "Information Transduction Capacity of Mitochondrial Retrograde Signaling". In: *Single-Cell Biophysics: Measurement, Modulation, and Modeling*. Biophysical Society, 2017, p. 57. Poster

# WORK AND RESEARCH EXPERIENCE

**Scitific Machine Learning Lab** *Aug. 2022*
*Ph.D. student* *Current*

**Pumas-AI, Inc** *May. – Dec. 2021*
*Intern* *Remote*

- Applied **Scientific Machine Learning (SciML)** on recovering hidden dynamics with **nonlinear mixture effects (NLME)**.
- Used **Universal ODE** to provide personalized prediction from populational data with **Bayesian interference**.
- Established **neural indirect response model** with the mixture of physical modeling and CNN approximation.
  - Support **functional API for constructing neural ODE problem** with indirect response.
  - Implemented primarily with **DiffEqFlux.jl, Pumas.jl and DifferentialEquations.jl**.

**Biological Systems & Simulation Lab** *June. 2017 - Sept. 2021*
*Dr. An-Chi Wei, BEBI, EECS, National Taiwan University* *Taipei, Taiwan*

- Proposed novel mathematical model of mitochondrial infra-cell communication.
  - Selected **oral presentation in ICSB2019**.
- Established classification of mitochondrial depolarization with graphical network and CNN based on fluorescent images.
  - Selected **oral presentation in BMES2017**.

**Taipei City Hospital** *June. – Sept. 2020*
*Clerk of Dentistry. Instructed by Dr. I-Chiang Chou* *Taipei, Taiwan*

- Practical clinical training including oral diagnosis and treatment planning with panoramic and sectional X-ray images.

**Cardiovascular Biophysics Lab** *June. 2018 – Sept. 2018*
*Dr. Brian O'Rourke, Dept. of Medicine, Johns Hopkins University* *Baltimore, USA*

- Researched on damage propagation of mitochondrial depolarization via **optogenetics method**.
  - Applied image segmentation from microscopic images with **OpenCV**, and extracted graphical topology with **NetworkX**.

**Evolutionary Genetics Lab** *May. 2012 – Sept. 2016*

*Dr. Jun-Yi Leu, Inst. of Molecular Biology, Academia Sinica* *Taipei, Taiwan*

- Discovered necessary genetic conditions for rejuvenation in yeast via nucleus and mitochondrial genetic modification.
- **4th place grand award winner** and 1st special award from Americal Association of Microbiology in **Intel ISEF 2014**.

# PACKAGES

**FindSteadyStates.jl**: *Multi-threaded Steady State Explorer (v0.1.1, Registered)*

**PotentialMap.jl**: *Potential Map with A-type Integration*

**EstimHill.jl**: *Ultrasensitivity Analysis for Dose-Response Curve*

**RetroSignalModel.jl**: *Simlulation toolbox for mitochondrial retrograde signaling*

**ReportTex**: *A LaTeX template supporting both English and Traditional Chinese. Powered by Tectonic*

# SELECTED PROJECTS

**Selected Topics of Data Structure & Algorithms** C11 CI/CD *Feb - May. 2021*

*Assignments of CSIE1212. Instructed by Dr. Hsuan-Tien Lin.*

**Circadian Simulation with ModelingToolkit.jl** Julia *Jan. 2020*

*Course Final Project of Neural Science (LS5083)*

- Applied **stiff ODE solver of DifferentialEquations.jl** for simulating circadian oscillations.

**Surrogation of Fokker-Planck Equation with Nerual Differential Equation** Julia *Dec. 2019*

*Pilot project of graduate research*

- Used **Neural PDE** to simplify simulation of the PDE, and derive the potential map of **stochastic ODE**.

**Dental Calculus Segmentation with OCT Imaging and U-Net** Python *Feb. - May. 2019*

*Student project with Dr. Shyh-Yuan Lee at Dept. of Dentistry*

- Used **OpenCV and Keras** for preprocessing and landmark segmentation with **supervised learning method**.

**Mitosis classification with CNN and explainable model** Python *Feb. - June. 2018*

*Final project of Medical Image Analysis (DBME7019)*

- Performed **image classification** from light sheet microscopic images on mitosis stages with CNN via **Keras**.
- Applied **LIME algorithm** for the explanation of the trained neural network.

**Selected Topics of Biological Modeling & Simulation** Python *Feb. - June. 2017*

*Assignments of BEBI5009. Instructed by Dr. An-Chi Wei.*

# HONORS & AWARDS

**Electrical and Computer Engineering Merit Fellowship**, Texas A&M university — College Station *Feb. 2022*

**Pen Wen Yuan Memorial Scholarship**, Industrial Technology Research Institute, Hsinshu, Taiwan *Nov. 2019*

**Best Presentation**, International Student Science Forum, HCMC, Vietnam *Dec. 2018*

- Essay: "Digital Dentistry: When dental sciences encounter Industry 4.0, what should we learn about it?"

**Best Presentataion**, International Student Science Forum, HCMC, Vietnam *June. 2017*

- Essay: "A Spectral Information Coding System for the Visually Impaired"

**Selected participant**, Asian Science Camp, Bangalore, India *Aug. 2016*

**Silver Award**, Wu Chien-Shiung Science Camp, Taiwan *Jul. 2015*

**4th Place Winner in Grand Award**, Intel International Science Fair (Intel ISEF) *May. 2014*

- Essay: "The state of parental mitochondria influences the replicative life span of zygotes of *Saccharomyces cerevisiae*"

**1st Place Winner in Special Award**, Intel International Science Fair (Intel ISEF), LA, USA *May. 2014*

**1st Place & Young Scientist Award**, Taiwan International Science Fair *Jan. 2014*

# LANGUAGES

**English** TOEFL iBT: R26/L26/S24/W24 *Aug. 2021*

**Traditional Chinese** Native

**Vietnamese** Intermediate (A2)