



Why have I done? What have I done? How have I done? and What will I do?

Teng-Jui (Owen) Lin
Undergraduate Research Assistant
Department of Chemical Engineering
PI: Elizabeth Nance
Disease Directed Engineering Lab at the University of Washington

*Lab Meeting
19 May 2023*

Land Acknowledgement

The University of Washington acknowledges the Coast Salish peoples of the land on which we teach, learn, and study - the land which touches the shared waters of all tribes and bands within the Duwamish, Puyallup, Suquamish, Tulalip and Muckleshoot nations.

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Entering, the COVID era

Dear Professor Nance,

I am Owen Lin, a first-year engineering undeclared undergraduate student interested in drug delivery. I have been following your research on nanoparticles and was referred by the ChemE advisor when discussing major choices of chemical engineering and bioengineering. I wonder if it is possible to connect with you via virtual meetings or emails to gain a more thorough understanding of the position of drug delivery in these two majors as well as how their curriculums are connected to drug delivery? I would totally understand if potential meeting would be weeks out, as the situation now is extraordinary. A resume is attached to help learn more about me if needed. Some topics/questions that I would like to discuss are also attached.

P.S. I am also very interested in the available **image analysis** position, as it is well-suited for me, but I will wait until later when the coronavirus situation is relaxed to express more about my interest per your guideline.

Thank you for your time! Stay safe and take care.

Sincerely,
Teng-Jui (Owen) Lin
UW '23 Engineering Undeclared

Hi Teng-Jui,

I'd be happy to chat! How does next week look for you? Please let me know your typical availability and I will find a time that aligns in my schedule.

I'd also be happy to talk about research opportunities in my group. For transparency, undergrad in-person research in the lab is on hold until June 15th at the earliest. At that time, I'll re-evaluate our status and ability to abide by our Covid-19 SOP to begin to bring undergraduate researchers back into the lab in mid July at the earliest, since I'm phasing in grad students to return in-person from June - mid-July. I will also be polling my graduate students at that time to see how they feel about onboarding new undergraduates when we return to less restricted research operations. All undergraduates in the lab are paired with a graduate mentor, and I like to make sure the grads feel they have the bandwidth to provide high quality mentoring on a project. However, with 7 undergraduates graduating this June, I anticipate that at least by mid summer or end of summer, we will be seeking new lab members for experimental work. Unfortunately, our rate limiting step for the near future is just limits on number of people per lab space (no more than 2 in each of our 3 spaces) and no access to office space!

I look forward to speaking with you!

best,
Prof Nance

Chemical engineering it is.

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Teng-Jui,

I enjoyed our interview on Monday **and your insightful thought and questions about my research area** within the Nance Lab. I am happy to offer you a position as an undergrad mentee within the lab.

To get started: Please let me know what times work for you (and your timezone) next week for an hour long startup meeting.

Regards,
Hawley

Hi Hawley,

Thank you for your offer of the position! I am delighted to accept your offer, and I look forward to joining the team!

I am working in GMT+8 time zone, 15 hours ahead of PDT. Attached is my available times next week.

Best,
Teng-Jui (Owen) Lin

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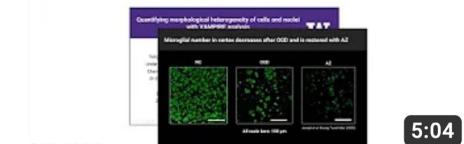
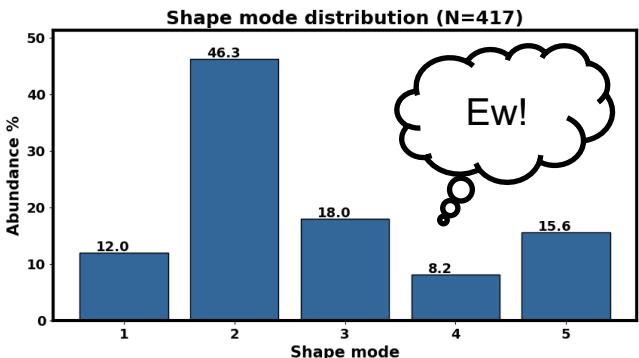
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Computational research it is.

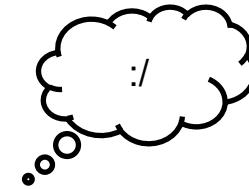
TEXTILE & VAMPIRE Training

- Strengthened prior Python skills and apply to research data analysis
- Preliminarily learned paper reading and structure
- Gave 2 lab meeting “presentations” of 2-min walk through recordings

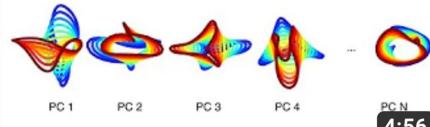


Crafting effective academic presentations

19 views • 2 years ago



VAMPIRE Analysis



Quantifying morphological heterogeneity of cells and nuclei...

45 views • 2 years ago

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Everything Remote...

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Everything In Person Au21!



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In Person is Fun!



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VAMPIRE Package Development

- Cleaned all the code and organized into functions
- Wrote documentations and tests
- Applied and received Mary Gates Research Scholarship Au21

Name	Date Modified
1 Teng-Jui Lin - Mary Gates Research Statement_v1.docx	2021/10/03 at 22:36
2 Teng-Jui Lin - Mary Gates Research Statement_HH.docx	2021/10/09 at 10:44
3 Teng-Jui Lin - Mary Gates Research Statement_HH_revised.docx	2021/10/04 at 12:32
4 Teng-Jui Lin - Mary Gates Research Statement_EN.docx	2021/10/09 at 10:44
5 Teng-Jui Lin - Mary Gates Research Statement_EN_rough_revised.docx	2021/10/20 at 23:03
6 Teng-Jui Lin - Mary Gates Research Statement_EN_revised.docx	2021/10/25 at 10:31
7 Teng-Jui Lin - Mary Gates Research Statement_EN_revised_ref.docx	2021/10/25 at 11:08
103938 Lin Teng Jui (Owen) Essay.pdf	2021/10/25 at 11:07



[Home](#) > [User Guide](#) > [Overview](#)

Overview

license [GPL-3.0](#) docs [passing](#) pypi [v0.0.1](#)

VAMPIRE (Visually Aided Morpho-Phenotyping Image Recognition) quantifies and visualizes shape modes of cell and nucleus morphology [1]. VAMPIRE has been used to analyze morphological changes of

1. *in vitro* cancer cells in cancer metastasis [2],
2. *ex vivo* rat microglia in response to oxygen-glucose deprivation [3],
3. *ex vivo* ferret microglia in response to oxygen-glucose deprivation [4],
4. *ex vivo* rat microglia in response to brain-derived extracellular vesicle treatment [5],
5. *in vivo* MGLuR5 rat model's microglia at different ages and sexes [6].

vampire-analysis provides a reproducible, fully-documented, and easy-to-use Python package that is based on the method and software used in the [vampireanalysis](#) GUI (GitHub source) [1]. Main advantages include:

- Operating-system-independent package API
- Full documentation with easy-to-read code

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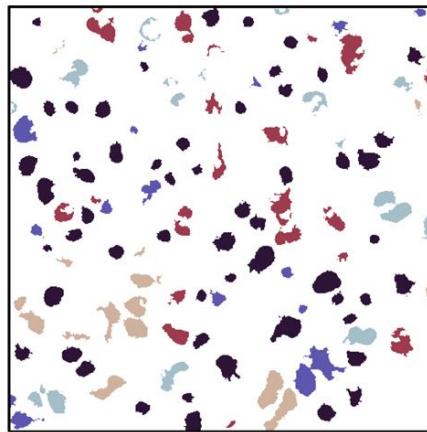
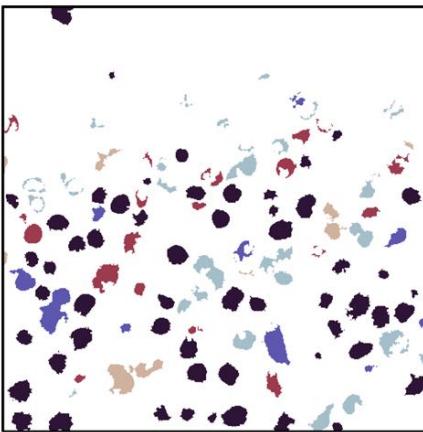
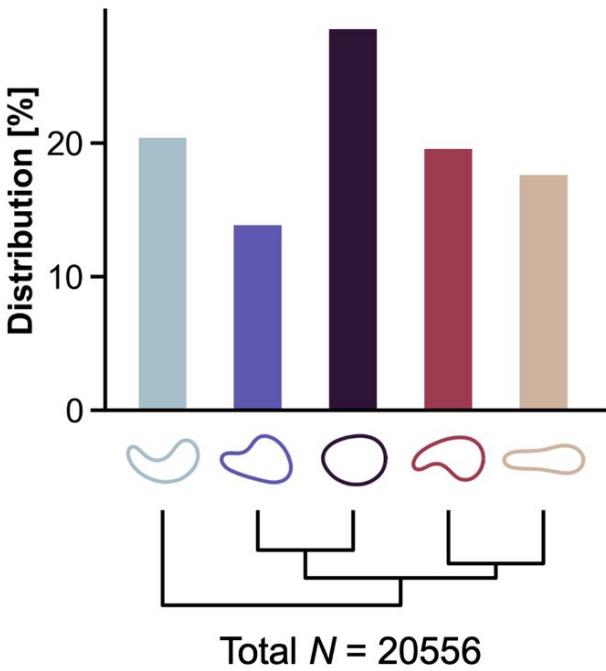
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VAMPIRE analysis of rat oxygen glucose deprivation (OGD) and lipopolysaccharide (LPS) model



- Model hyperparameter
 - Number of points sampled from contour = 50
 - Number of clusters in K-Means clustering = 5
 - Number of principal components kept = 20
- Otsu threshold, all treatments, all regions

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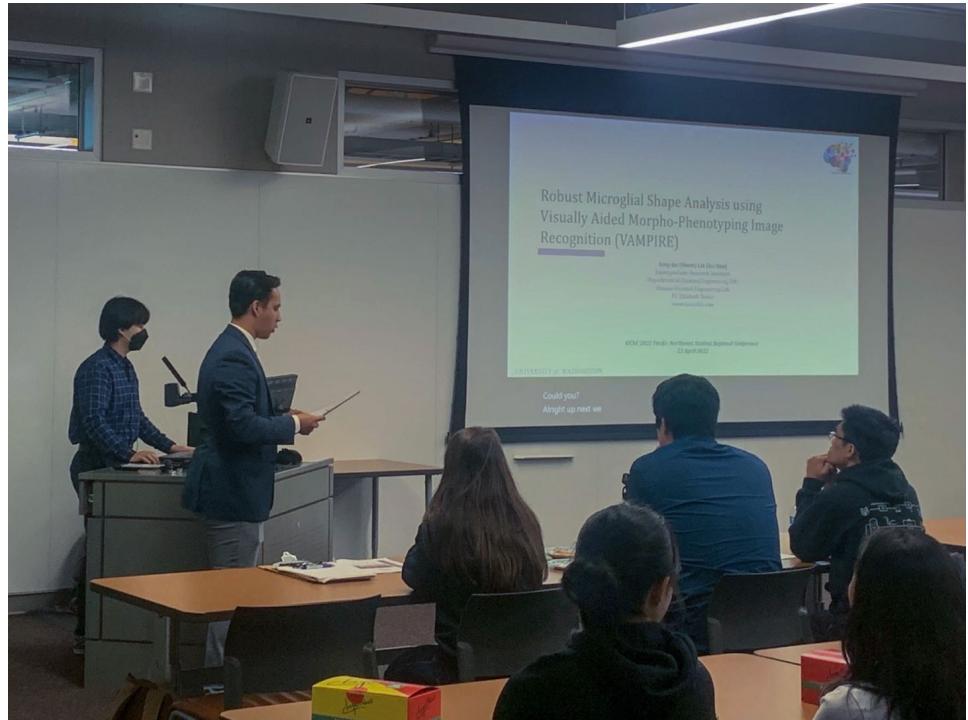
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2022 AIChE Pacific Northwest Student Regional Conference (Seattle, WA)



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2022 UW Undergraduate Research Symposium



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What about summer?

2020

Status	Institution	City	State	Name	Website	Start date	End date	Accept dat	Duration	Spots	Stipend
Accepted	STROBE	VARIOUS		Summer Undergraduate Research Program	https://strobe.colorado.edu/education-outreach	2022/6/6	2022/8/6	- end Mar	10	20	\$6,000
Rejected, once	Allen Institute	Seattle	WA	Internship	https://alle.org/	2022/6/1	2022/8/6	- end Mar	10	22	\$6,908
Rejected	UW Institute for Stem Cell & Regenerative Medicine	Seattle	WA	Research Experience for Undergraduates	https://iscr.washington.edu/	22/6/14	22/8/19		10		\$6,000
Submitted	Harvard School of Engineering and Applied Sciences	Boston	MA	REU	https://www.seas.harvard.edu/reu	2022/6/1	2022/8/1	? early May	10	20	\$5,000
Rejected	Fred Hutchinson Cancer Research Center	Seattle	WA	Summer Undergraduate Research Program	https://www.fhcrc.org/research/undergrad-research-program	22/6/13	22/8/12	late Feb	9		\$4,938
Rejected	University of Minnesota	Minneapolis	MN	Summer Lando/NSF REU	https://cse.umn.edu/reu	22/6/6	22/8/12		10	-	\$5,500
Rejected	Harvard University Stem Cell Institute	Boston	MA	Harvard Stem Cell Institute Internship	https://hscicenter.hms.harvard.edu/internship	22/6/12	22/8/12	early Mar	10	20	\$5,000
Rejected	Cold Spring Harbor Laboratory	Cold Spring Harbor, NY	NY	Undergraduate Research Program	https://www.cshl.edu/research/undergraduate-research-program	22/6/6	22/8/6	end Mar	10	20	\$5,500
Submitted	UW Harborview Injury Prevention & Research Center	Seattle	WA	INSIGHT Research Program	https://dej.washington.edu/reu	22/6/21	22/8/13		8		\$3,200

- > 0 Recommendation Letter
- > 01-07 Fred Hutchinson Cancer Research Center
- > 01-15 Cold Spring Harbor Laboratory
- > 01-18 Allen Institute
- > 01-22 UW Institute for Stem Cell & Regenerative Medicine
- > 01-31 The Rockefeller University
- > 02-01 UW Harborview Injury Prevention & Research Center
- > 02-04 STROBE
- > 02-04 University of Minnesota
- > 02-06 Harvard University Stem Cell Institute
- > 02-28 Harvard Engineering
- > 02-28 UCLA Institute of Quantitative & Computational Biosciences
- > Cajal Neuroscience
- > Exact Sciences
- > Novo Nordisk
- Undergraduate Summer Research Fellowship REU.xlsx

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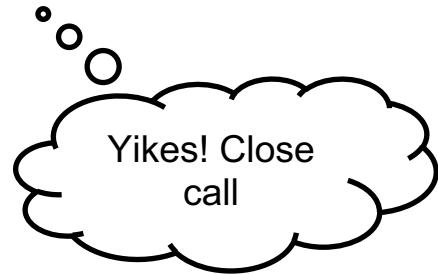
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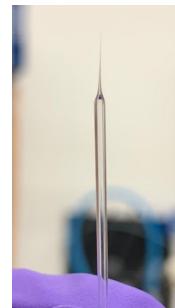
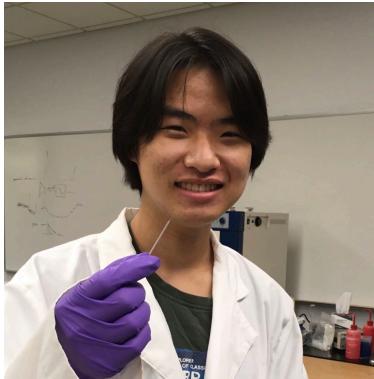
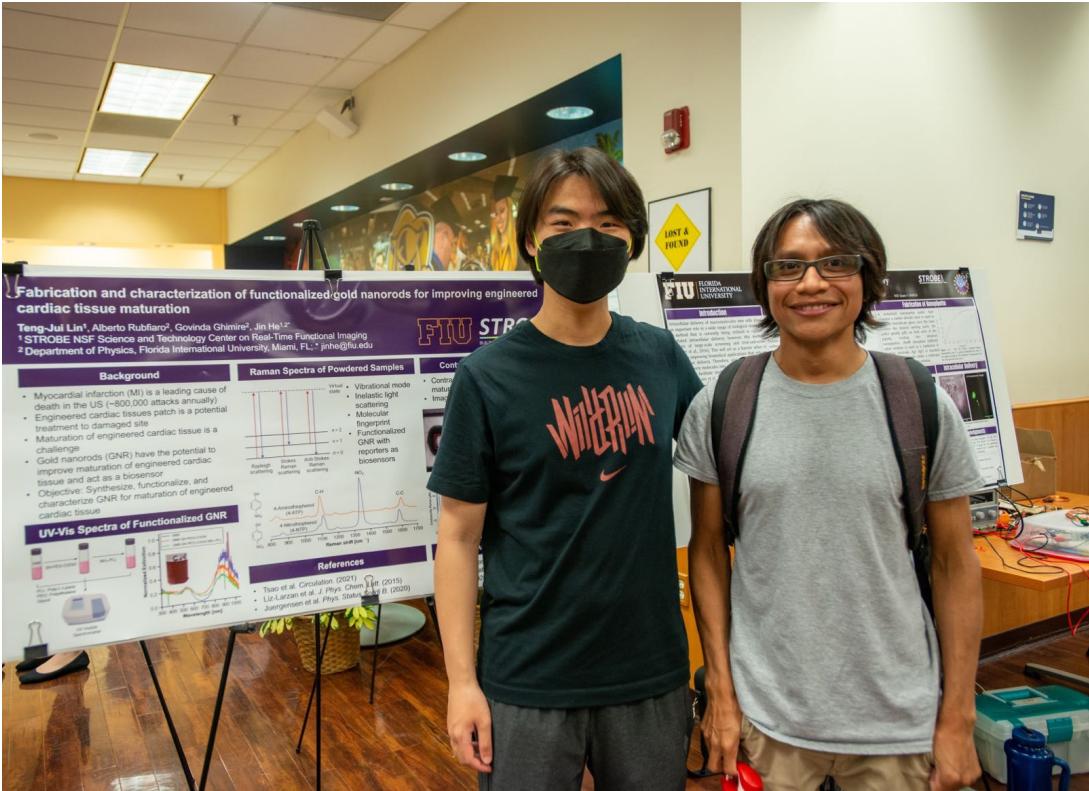
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NSF Science and Technology Center on Real-Time Functional Imaging (STROBE) (Miami, FL)



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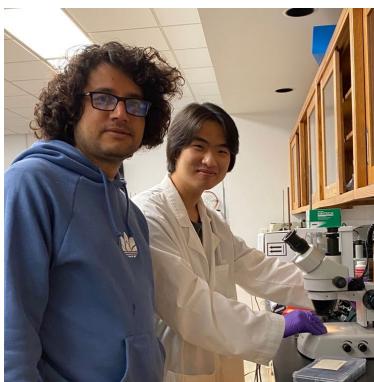
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WRF/Levinson Scholarship Application

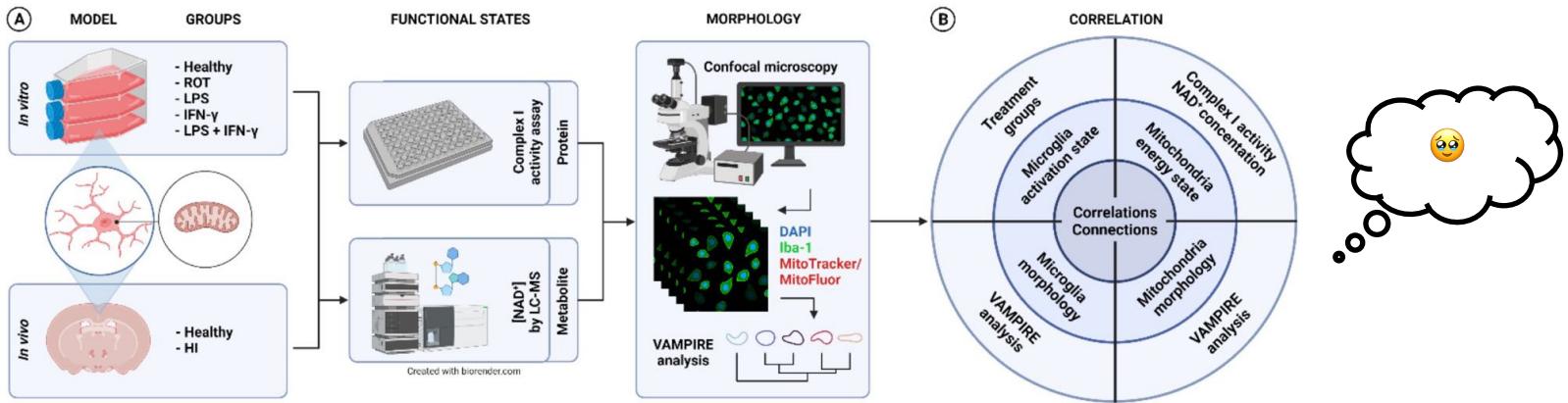


Figure 4. Overview of proposed work. **(A)** Workflow of quantifying microglia and mitochondria morphology and states *in vitro* and *in vivo*. **(B)** Research objective supported by experiments.

Model	Task	Autumn		Winter		Spring				
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
<i>In vitro</i>	Establish BV-2 microglia culturing and staining									
	Measure mitochondria activity and metabolite production				■	■	■			
	Stimulate and image BV-2 microglia and mitochondria				■	■	■			
	Perform VAMPIRE analysis on BV-2 microglia and mitochondria				■	■	■			
<i>In vivo</i>	Stain and image HI microglia and mitochondria				■	■	■			
	Perform VAMPIRE analysis on HI microglia and mitochondria				■	■	■			

Figure 5. Proposed timeline of the project.

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Time to be a busy bee in senior year

- Graduate school applications
- Conference traveling
- ChemE cores



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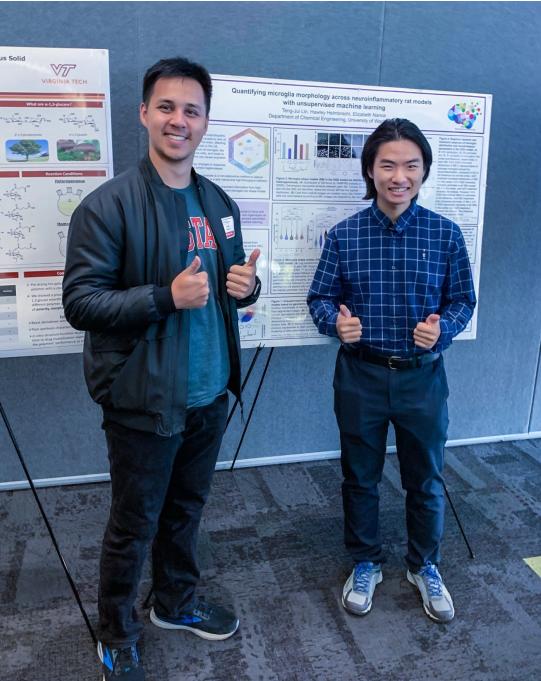
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NC State Future Leaders in Chemical Engineering (Rayleigh, NC)

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2022 AIChE Annual Student Conference (Phoenix, AZ)



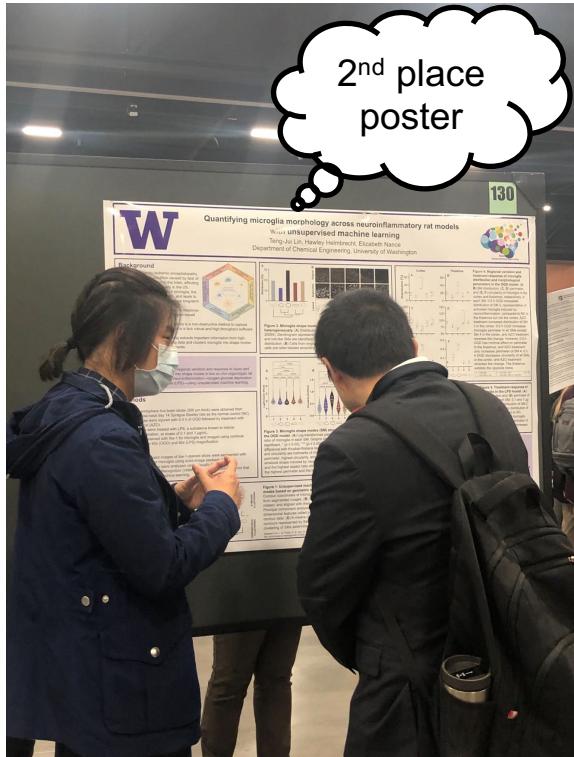
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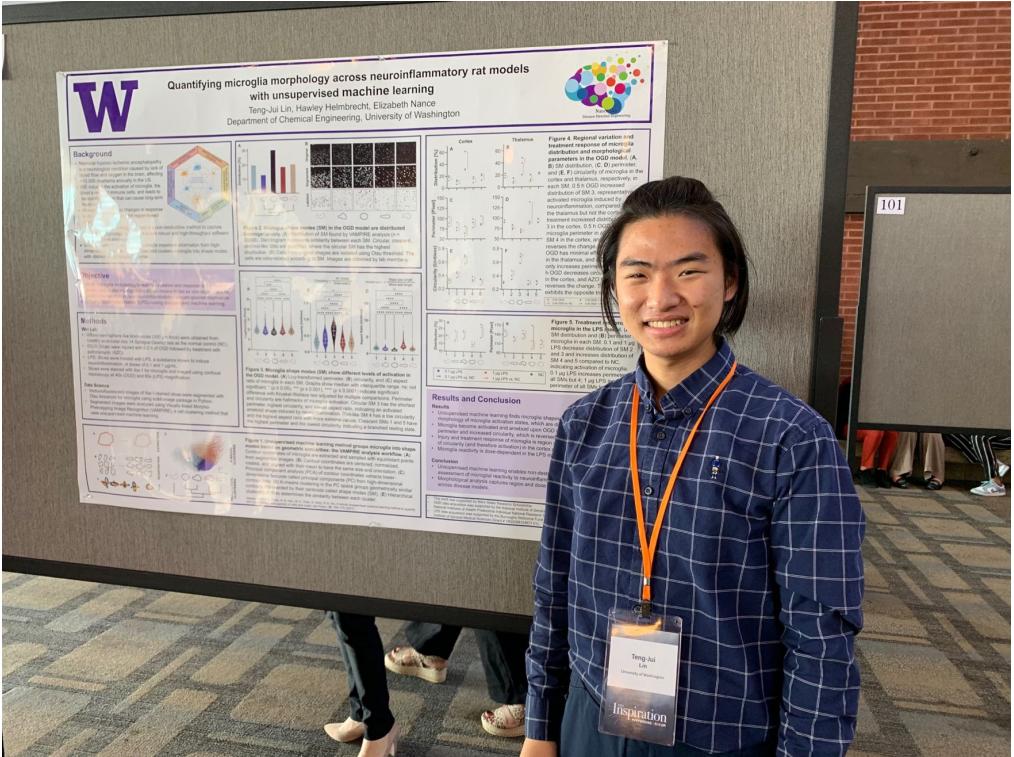
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2022 Southern California Conference for Undergraduate Research (Malibu, CA)



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Graduate school applications are daunting

EC	JB	JP	EN	AP	Status	Status Date	School Name	Program Name	Travel St	Travel Dead	Travel Da	Application Type	
x	x	x	x	-	Rejected	2023-02-06	MIT	Chemical Engineering		March 3-5	2022-11-19	PhD	
-	x	x	x	x	Rejected	2023-01-20	MIT	Biological Engineering			2022-12-15	PhD	
x	x	x	x	-	Rejected	2023-04-04	Caltech	Bioengineering			2022-12-01	PhD	
x	x	x	x	-	Accepted Offer	2023-01-13	UC Berkeley	Chemical and Biomolecular Engineering	RSVPed	ASAP	Feb 23-25	2022-12-01	PhD
x	x	x	x	-	Rejected	2023-01-10	Stanford	Chemical Engineering			2022-12-01	PhD	
-	x	x	x	-	Rejected	2023-02-16	Harvard	Bioengineering			2022-12-15	PhD	
x	x	x	x	-	Rejected	2023-03-23	UCSD	Bioengineering			2022-11-30	PhD	
-	x	x	x	-	Declined Offer	2023-01-16	University of Michigan	Chemical Engineering	Visited	2023-01-22	Feb 16-18	2022-12-01	PhD
-	x	x	x	-	Submitted		Duke	Biomedical Engineering			2022-12-15	PhD	
-	x	x	x	-	Declined Offer	2023-01-11	Johns Hopkins	Chemical and Biomolecular Engineering	RSVPed	2023-02-10	Mar 23-25	2022-12-15	PhD
x	x	x	x	-	Declined Offer	2023-01-11	CU Boulder	Chemical and Biological Engineering	RSVPed	2023-01-24	Mar 16-19	2022-12-01	PhD

Nance notes on labs to look at

Hammond, Galloway, Langer

Shapiro (great culture, similar to ours)

Landry (great culture, similar to ours)

Bao, DeSimone, Mai

Mitragotri, Mooney

Fraley, Kwon (Suzie Pun PhD alumni, similar culture to ours), lots of other good people but Stephanie and Ester I know best outside of Lola, I don't know people as well here

Gray (Mikey Chungoun, former nance lab UG is in this lab), Ensign-Hodges (adjunct appointed in ChemE), Spangler

- Recommendation letters (Nance, Pfaedtner, Berg, [Prybutok])
- Personal statement
- Diversity statement

> 0 CV
> 0 Recommendation Letter
> 0 Transcript
< Accepted
> 2022-12-01 CU Boulder ChemE
> 2022-12-01 UMICH ChemE
> 2022-12-15 Johns Hopkins ChemE
< Committed
> 2022-12-01 UC Berkeley ChemE
< Rejected
> 2022-11-20 MIT ChemE
> 2022-11-30 UCSD BioE
> 2022-12-01 Caltech BioE
> 2022-12-01 Stanford ChemE
> 2022-12-15 Duke BME
> 2022-12-15 Harvard BioE
> 2022-12-15 MIT BE
> Statement Template.docx
> Teng-Jui Lin - Graduate Program Visits.xlsx
> Teng-Jui Lin - Graduate Programs_EN notes.xlsx

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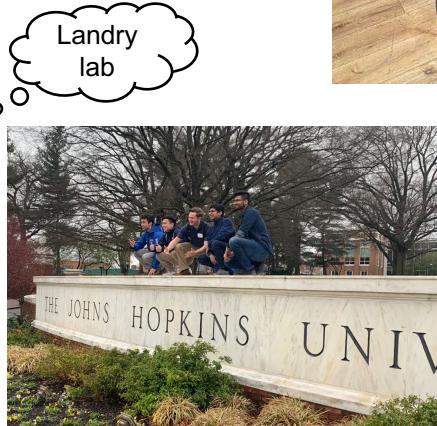
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Graduate school visits are fun but exhausting



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Recent work: nonstop VAMPIRE analysis on new data

- Ferret OGD model
- Cross species (healthy)
 - Mouse
 - Rat
 - Rabbit
 - Ferret
 - Pig
- Cross model
 - Rat HIE model + non-treated control



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2023 AIChE Pacific Northwest Student Regional Conference (Corvallis, OR)



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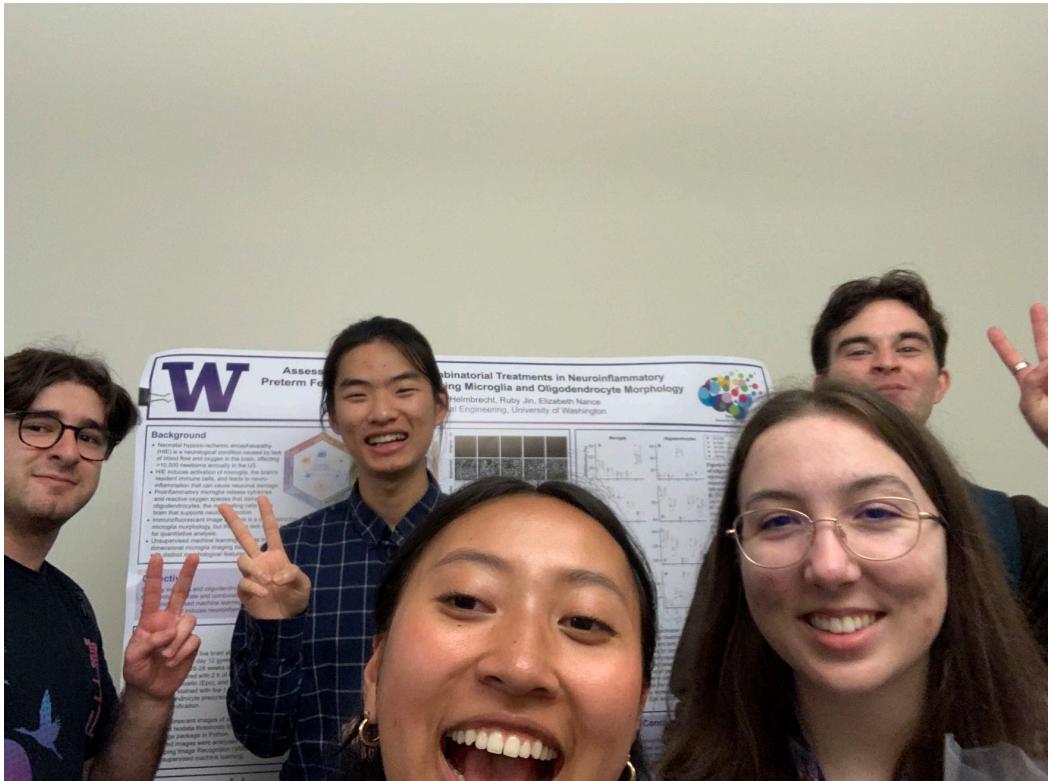
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2023 UW Undergraduate Research Symposium (minutes ago)



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Okay Owen, I'm not here to listen you to list your CV.

2020

4	5	6
7	8	9
10	11	12

Get me some take-aways!

2021

1	2	3
4	5	6
7	8	9
10	11	12

2022

1	2	3
4	5	6
7	8	9
10	11	12

2023

1	2	3
4	5	6
7	8	9

Advice to undergrads (a note to past self)

2020

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7	8	9
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2021

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7	8	9
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2022

1	2	3
4	5	6
7	8	9
10	11	12

2023

1	2	3
4	5	6
7	8	9

- 1. Apply to whatever resources available!** Application writing is good practice.
 1. You have nothing to lose.
- 2. Do everything early!** Ask for rec letters and draft edits in advance.
 1. But don't be afraid to ask if you're late!
- 3. Document everything you do!** Everything. Short term and long term.
 1. Lab notebook
 2. Jupyter notebook, code doc, comments (You'll thank yourself later. 😊)
- 4. Connect with people and be nice!** You'll never know when you'll say "Hi again!"

Advice to undergrads (a note to past self)

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2023

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1. Research paradigm
 1. **Think:** Need? Question? Hypothesis? Expected results? Experimental design?
 2. **Do** (while code not working: code; error; debug;)
 1. Code development, model tweaking (rapid iteration for trial and error)
 2. Wet lab experiment (slower trial and error – so think hard before trying)
 3. **Analyze** (for all data: apply model; stats; make pretty graphs)
 1. Analyze early so you can iterate the analysis process.
 2. Graphs gives confidence (psychologically, not statistically)
 4. **Think**
 1. **Results:** What does the result mean? Biological, clinical significance? What do the numbers tell you?
 2. **Significance:** How does your work fit into the bigger picture of the lab and the field? Answer the “so what” question.
 5. **Disseminate:** oral presentations, posters, papers

Advice to grads (a note to future self)

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1	2	3
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1. Transparency and clear communication is key
2. Set clear expectations
3. Set quantitative short-term (quarterly) and long-term (yearly) goals
4. Let undergrads know that you don't (and can't) know everything
5. Encourage undergrads to talk to peer undergrads and other grads

Okay Owen, theories make me sleepy, tell me what's next.

2020

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- University of California, Berkeley – Markita Landry's lab

2021

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2023

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Berkeley
UNIVERSITY OF CALIFORNIA

Okay Owen, theories make me sleepy, tell me what's next.

- University of California, Berkeley – Markita Landry's lab



Single-walled carbon nanotubes

- Molecular Imaging in animal brains
- Targeted gene delivery for plant engineering
- Nanoparticle protein corona



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2023

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Pop quiz: How many states have I been to thanks to the Nance Lab? (Excluding WA)

- Florida (STROBE REU, 2022-06)
- North Carolina (NC State Future Leaders in ChemE, 2022-10)
- Arizona (AIChE Annual Student Conference, 2022-11)
- California (SCCUR, 2022-11; UC Berkeley, 2023-02)
- Michigan (University of Michigan Visit, 2023-02)
- Colorado (CU Boulder Visit, 2023-03)
- Maryland (Johns Hopkins Visit, 2023-03)
- Oregon (AIChE Pacific Northwest Regional Conference, 2023-04)

Answer: 8

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Our team and our funding



We thank our funding support:



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Hawley Helmbrecht
Jeremy Filteau
Phuong Nguyen
Brendan Butler
Nuo Xu
Nels Schimek
Sydney Floryanzia
Gabrielle Balistreri
Emily Du
Ruby Jin

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Eleanor Wu
Ali Toghani
Gisele Charpentier
Najma Hashi
Jonny Harrigan
Mia Yamada-Heidner
Manasvini Calmidi
Kristin Bennett
Malcolm Renney
Seoyoung Lee
Andrew Ball
Sofia Dahlgren
Olivia Colwell
Cheyenne Yung

Our animals



Lab Alumni, and many others!

Dr. Chris Nyambura
Dr. Mike McKenna
Dr. Andrea Joseph
David Shackelford, M.S.
Robin Lin, M.S.
July Zhou, M.S.
Dr. Rick Liao
Dr. Mengying Zhang
Dr. Chad Curtis

Check us out!

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