Sambit **Panda**

Ph.D. Candidate · Biomedical Engineer · Data Scientist

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Research Interests

Machine Learning, Data Science, Biomedical Engineering, Neuroscience

Education

Johns Hopkins Medical Institute

Baltimore, MD

Ph.D. in Biomedical Engineering — *2020 - Present*

- Advisor: Joshua T. Vogelstein
- Received a departmental fellowship to fund my first year.

Johns Hopkins University

Baltimore, MD

M.S.E. in Biomedical Engineering — *2018 - 2020*

- Advisor: Joshua T. Vogelstein
- Thesis: Multivariate independence and k-sample testing

NC State University & UNC Chapel Hill

Raleigh & Chapel Hill, NC

B.S. in Biomedical Engineering and Biology — *2014 - 2018*

- Advisor: Leslie Sombers
- Received the near full-ride Goodnight Scholarship and also the National Merit Corporate Scholarship to fund my education.

Experience

NeuroData, Johns Hopkins

Baltimore, MD

Master's & Ph.D. Student — *Jan. 2019 - Present*

- Wrote numerous journal articles developing powerful nonparametric multivariate hypothesis tests, some based on Random Forest.
- Developed and maintained open-source Python software packages with 100s of users such as `hyppo` and ported algorithms in core packages such as `scipy`.
- Presented work at international conferences such as the BRAIN Intiative meeting and served in leadership positions for the SciPy conference.
- Reviewed a paper related to my work for SoftwareX.

Sombers Lab, NC State

Raleigh, NC

Research Assistant — *Jan. 2015 - May 2018*

- Created a new electrochemical sensor and wrote a paper about it in ACS Analytical Chemistry.
- Investigated the chemical basis of abnormal involuntary movements (AIMs) during Parkinson's Disease.
- Presented research at international conferences such as society of neuroscience (SfN) and Pittcon.
- Analyzed data and engineered numerous solutions for a number of additional projects.

Burleson Research Technologies

RTP, NC

Intern — *May 2015 - Sep. 2015*

- Tested pharmaceutical drugs on rats and mice through various methods such as oral gavage, *i.p.*, and *i.v.*.
- Helped lab run under good laboratory practices (GLP).

Developmental Neurobiology Group, NIEHS

RTP, NC

Research Assistant — *June 2014 - Apr. 2016*

- Tested pharmaceutical drugs on rats and mice through various methods such as oral gavage, *i.p.*, and *i.v.*.
- Helped lab run under good laboratory practices (GLP).

Publications

Journal Articles

2. Shen, C., **Panda**, **S.**, & Vogelstein, J. T. (2022). The chi-square test of distance correlation. *Journal of Computational and Graphical Statistics*, *31*(1), 254–262. https://doi.org/10.1080/10618600.2021.1938585
1. Wilson, L. R., **Panda**, **S.**, Schmidt, A. C., & Sombers, L. A. (2018). Selective and mechanically robust sensors for electrochemical measurements of real-time hydrogen peroxide dynamics in vivo. *Analytical Chemistry*, *90*(1), 888–895. https://doi.org/10.1021/acs.analchem.7b03770

Preprints

6. Bridgeford, E. W., Powell, M., Kiar, G., Noble, S., Chung, J., **Panda**, **S.**, Lawrence, R., Xu, T., Milham, M., Caffo, B., & Vogelstein, J. T. (2023, March 12). Batch effects are causal effects: Applications in human connectomics. https://doi.org/10.1101/2021.09.03.458920
5. Xu, H., Dey, J., **Panda**, **S.**, & Vogelstein, J. T. (2022, November 10). Simplest streaming trees. https://doi.org/10.48550/arXiv.2110.08483
4. Xu, H., Kinfu, K. A., LeVine, W., **Panda**, **S.**, Dey, J., Ainsworth, M., Peng, Y.-C., Kusmanov, M., Engert, F., White, C. M., Vogelstein, J. T., & Priebe, C. E. (2021, November 2). When are deep networks really better than decision forests at small sample sizes, and how? https://doi.org/10.48550/arXiv.2108.13637
3. **Panda**, **S.**, Palaniappan, S., Xiong, J., Bridgeford, E. W., Mehta, R., Shen, C., & Vogelstein, J. T. (2021, April 1). Hyppo: A multivariate hypothesis testing python package. https://doi.org/10.48550/arXiv.1907.02088
2. **Panda**, **S.**, Shen, C., Perry, R., Zorn, J., Lutz, A., Priebe, C. E., & Vogelstein, J. T. (2021, April 1). Nonpar MANOVA via independence testing. https://doi.org/10.48550/arXiv.1910.08883
1. Shen, C., **Panda**, **S.**, & Vogelstein, J. T. (2020, September 11). Learning interpretable characteristic kernels via decision forests. https://doi.org/10.48550/arXiv.1812.00029

Other Publications

1. **Panda**, **S.** (2020, May 5). *Multivariate independence and k-sample testing* (Thesis). Johns Hopkins University. Retrieved June 25, 2023, from https://jscholarship.library.jhu.edu/handle/1774.2/62706

Software

`scipy.stats.multiscale_graphcorr` *GitHub*

Original Developer & Maintainer *2019 - Present*

- Added Multiscale Graph Correlation, a powerful multivariate independence test, to SciPy (the first such test).

`hyppo` (originally `mgcpy`) *GitHub*

Original Developer & Maintainer *2018 - Present*

- Developed and maintain a comprehensive multivariate hypothesis testing package in Python.

Presentations

Talks

7. **Panda**, **S.**, Shen, C., Perry, R., Zorn, J., Lutz, A., Priebe, C. E., & Vogelstein, J. T. (2022, January). Nonparametric manova via independence testing [Global Young Scientists Summit, Online]. https://www.youtube.com/watch?v=rJyuTwkgfjQ&list=PLXusWh0JoRx-KFPi8PSVqnatHFGOzq65J&index=16
6. **Panda**, **S.**, Wilson, L. R., & Sombers, L. A. (2018, May). Hydrogen peroxide, dopamine, and serotonin: Overlapping chemical systems contribute to the control of dyskinetic movements in the rat during chronic l-dopa treatment for parkinson's disease [Honors Capstone Celebration, Raleigh, NC, USA]
   ↪ 🏆 **Won the Richard L. Blanton Outstanding Capstone Award for best capstone**
5. **Panda**, **S.**, Riley, S., Wiggins, K., Kathard, R., Alredge, T., & Krause, E. (2018, May). Developing solutions for hand spasticity [i4 Final Pitch, RTP, NC, USA]
4. **Panda**, **S.**, Riley, S., Wiggins, K., Kathard, R., Alredge, T., & Krause, E. (2018, February). Developing solutions for hand spasticity [i4 Pitch 2, RTP, NC, USA]
   ↪ 🏆 **Won 1st place for pitch**
3. **Panda**, **S.**, Riley, S., Wiggins, K., Kathard, R., & Alredge, T. (2017, November). Developing solutions for hand spasticity [i4 Pitch 1, RTP, NC, USA]
   ↪ 🏆 **Won 1st place for pitch**
2. **Panda**, **S.**, & Lucas, S. (2016, February). Surgical site infection prevention [i4 Pitch 2, RTP, NC, USA]
1. **Panda**, **S.**, & Lucas, S. (2015, October). Surgical site infection prevention [i4 Pitch 1, RTP, NC, USA]
   ↪ 🏆 **Won 1st place for pitch**

Posters

13. **Panda**, **S.**, Shen, C., Perry, R., Zorn, J., Lutz, A., Priebe, C. E., & Vogelstein, J. T. (2021, June). Nonparametric manova via independence testing [BRAIN Initiative Meeting, Online]
12. **Panda**, **S.**, Wilson, L. R., Schmidt, A. C., & Sombers, L. A. (2018, May). Highly selective and mechanically robust sensors for electrochemical measurements of real-time hydrogen peroxide dynamics in vivo [Triangle Society for Neuroscience, RTP, NC, USA]. https://www.trianglesfnchapter.org/_files/ugd/70b47c_ceaa288b748c455d9bc3e098645cfc5f.pdf#page=31
    ↪ 🏆 **Won the Undergraduate Travel Award for best poster**
11. **Panda**, **S.**, Riley, S., Wiggins, K., Kathard, R., Alredge, T., & Krause, E. (2018, April). Developing solutions for hand spasticity [BME Design Symposium, RTP, NC, USA]
10. **Panda**, **S.**, Wilson, L. R., & Sombers, L. A. (2018, February). Hydrogen peroxide-specific sensors for in vivo measurements using carbon-fiber microelectrodes [Pittcon, Orlando, FL]
9. Wilson, L. R., **Panda**, **S.**, & Sombers, L. A. (2017, November). Hydrogen peroxide-specific sensors for in vivo measurements using carbon-fiber microelectrodes [Society for Neuroscience, Washington, DC, USA]. https://www.abstractsonline.com/pp8/index.html#!/4376/presentation/19683
8. **Panda**, **S.**, Wilson, L. R., & Sombers, L. A. (2017, August). Hydrogen peroxide specific sensors for *In Vivo* measurements using chronically implanted carbon-fiber microelectrodes [Summer UGR Symposium, Raleigh, NC, USA]
7. **Panda**, **S.**, Wilson, L. R., & Sombers, L. A. (2017, April). Determining the sources that contribute to extracellular hydrogen peroxide dynamics in the striatum [Triangle SfN, RTP, NC, USA]. https://www.trianglesfnchapter.org/_files/ugd/70b47c_42aa665faa94404fb0f52646801378a7.pdf#page=28

6. **Panda**, **S.**, Wilson, L. R., & Sombers, L. A. (2017, April). Hydrogen peroxide specific sensors for *in vivo* measurements using chronically implanted carbon-fiber microelectrodes [Spring UGR Symposium, Raleigh, NC, USA]
5. **Panda**, **S.**, Wilson, L. R., & Sombers, L. A. (2016, December). Multiple sources contribute to extracellular hydrogen peroxide dynamics in the striatum [Keck Center for Behavioral Biology Conference, Raleigh, NC, USA]
4. **Panda**, **S.**, Wilson, L. R., Schmidt, A. C., & Sombers, L. A. (2016, November). Multiple sources contribute to extracellular h2o2 dynamics in the striatum [Society for Neuroscience, San Diego, CA, USA]. https://www.abstractsonline.com/pp8/index.html#!/4071/presentation/22335
3. **Panda**, **S.**, Wilson, L. R., & Sombers, L. A. (2016, August). Multiple sources contribute to extracellular h_2o_2 dynamics in the striatum [Summer UGR Symposium, Raleigh, NC, USA]
2. **Panda**, **S.**, Wilson, L. R., & Sombers, L. A. (2016, April). Determining the sources that contribute to extracellular hydrogen peroxide dynamics in the striatum [Triangle SfN, RTP, NC, USA]. https://www.trianglesfnchapter.org/_files/ugd/70b47c_42aa665faa94404fb0f52646801378a7.pdf#page=28
1. **Panda**, **S.**, Wilson, L. R., & Sombers, L. A. (2016, April). Determining the sources that contribute to extracellular h2o2 dynamics in the striatum [Spring UGR Symposium, Raleigh, NC, USA]

Awards & Honors

2020	**Computational Biology Fellowship**, Johns Hopkins University	*Baltimore, MD*
2018	**AWS IMAGINE Grant**, Amazon Web Services (Supported the `mgcpy` (now `hyppo`) package)	
2018	**Magna Cum Laurde**, NC State University	*Raleigh, NC*
2018	**University Honors Program**, NC State University	*Raleigh, NC*
2014-18	**Dean's List**, NC State University	*Raleigh, NC*
2014-18	**Enrichment Grants**, Goodnight Scholars Program, NC State University	*Raleigh, NC*
2014	**Goodnight Scholarship**, NC State University	*Raleigh, NC*
2014	**National Merit Corporate Scholarship**, National Merit Scholarship Corporation	

Teaching

NeuroData Design I (EN.580.237/437/697) & II (EN.580.238/438/638), JHU

Baltimore MD

Teaching Assistant — *2020-21, 2021-22*

- Formulated projects for students and guided students during weekly presentations
- Graded students final projects (which involved code-review of a pull-request)

Computer Methods in Biomedical Engineering (BME 201), NC State

Raleigh, NC

Teaching Assistant — *Fall 2017*

- Taught multiple lab sections in which students would solve coding problems assigned to them
- Graded students' code, homework assignments, and tests

Biomedical Electronics (BME 210), NC State

Raleigh, NC

Teaching Assistant — *Spring 2017*

- Ran lab sections where students were taught the basics of circuits
- Graded students' lab quizzes and homeworks

Service

Research

A-Level Capital

Baltimore, MD

Life Sciences Advisor — *Mar. 2022 - Present*

- Advised students on scientific validity of start-ups and sourced early-stage life sciences companies.

SoftwareX

Virtual

Journal Reviewer — *Nov. 2022 - Jan. 2023*

SciPy Conference

Online & Austin, TX

Co-Chair & Reviewer — *2020, 2021, 2023*

- Co-Chair Tracks: Scientific Applications of Biology and Bioinformatics (2020); Biology and Neuroscience (2021), Bioinformatics, Computational Biology, & Neuroscience (2023)
- Reviewer Tracks: Machine Learning and Data Science (2020); Scientific Applications of Machine Learning and Data Science (2021)

Other

Ramchandra Panda Scholarship Trust

Balasore, Orissa, India

President

June 2012 - Present

- Mission: Provide rural students the opportunity to build a better education by providing a monetary investment and by helping preserve traditions for future generations.
- Started as a math competition given to 50 rural students in my home-village in India, and has grown to 300+ students in both the village and neighboring town specializing in math, traditional Indian dance, art, and music.

Goodnight Scholars Program

Raleigh, NC

Various Leadership Positions

Sep. 2014 - May 2018

- Committee Chair/Member: Planned yearly scholar events including the Goodnight Scholars Brick Build and Shack-a-thon.
- Ambassador: Raised awareness about the scholarship in the local community.
- Mentor: Helped first-year scholars transition to NC State.
- Tutor: Helped younger scholars in various classes.
- Senior Gift Member: Raised money for the state Science Olympiad and served as a judge there.

Neurosciences Hospital (UNC Healthcare)

Chapel Hill, NC

Volunteer

July 2017 - Jan. 2018

- Assisted nurses and medical staff in order to improve the safety, comfort, and care of the patients.
- Ensured patient comfort through conversation and general care.

FIMRC (Foundation for International Medical Relief of Children)

Kodaikanal, Tamil Nadu, India

Student Volunteer

Dec. 2017

- Took vital signs of patients and shadowed various local physicians.
- Performed physicals on some local children.
- Built chimneys for some residents.