David Juergens

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CURRENT POSITION

Postdoctoral Scholar — ***Dec 2024 - present***
Stanford University
Advisor: Todd J. Martínez

EDUCATION

University of Washington, Seattle, WA — ***Sep 2019 - Jun 2024***
Doctor of Philosophy, Molecular Engineering and Sciences
Advisor: David Baker

University of Washington, Seattle, WA — ***Sep 2019 - Mar 2023***
Master of Science, Molecular Engineering

University of Washington, Seattle, WA — ***Sep 2015 - Jun 2019***
Bachelor of Science, Chemical Engineering
Degree focus: *Nanoscience Molecular Engineering*

PUBLICATIONS (First author)

1. David E. Kim[*], Joseph L. Watson[*], **David Juergens**[*], Sagardip Majumder[*], Stacey R. Gerben, Alex Kang, Asim K. Bera, Xinting Li, David Baker, "Parametrically guided design of beta barrels and transmembrane nanopores using deep learning", *bioRxiv preprint*, 2024

2. **David Juergens**[*†], Joseph L. Watson[*†], Nathaniel R. Bennett[*], Brian L. Trippe[*], Jason Yim[*], Helen E. Eisenach[*], Woody Ahern[*], Andrew J. Borst, Robert J. Ragotte, Lukas F. Milles, Basile I.M. Wicky, Nikita Hanikel, Samuel J Pellock, Alexis Courbet, William Sheffler, Jue Wang, Preetham Venkatesh, Isaac Sappington, Susana Vázquez Torres, Anna Lauko, Valentin De Bortoli, Emile Mathieu, Sergey Ovchinnikov, Regina Barzilay, Tommi S. Jaakkola, Frank DiMaio, Minkyung Baek, David Baker, "De novo design of protein structure and function with RFdiffusion", *Nature*, 2023, 620, 1089-1100

3. Jue Wang[*], Sidney Lisanza[*], **David Juergens**[*], Doug Tischer[*], Joseph L. Watson[*], Karla M. Castro, Robert Ragotte, Amijai Saragovi, Lukas F. Milles, Minkyung Baek, Ivan Anishchenko, Wei Yang, Derrick R. Hicks, Marc Expòsit, Thomas Schlichthaerle, Jung-Ho Chun, Justas Dauparas, Nathaniel Bennett, Basile I.M. Wicky, Andrew Muenks, Frank DiMaio, Bruno Correia, Sergey Ovchinnikov, David Baker, "Scaffolding protein functional sites using deep learning", *Science,* 2022, 377 (6604), 387-394

4. Stephen Rettie[*], **David Juergens**[*], Victor Adebomi*****, Yensi Flores Bueso, Qinqin Zhao, Alexandria N. Leveille, Andi Liu, Asim K. Bera, Alex Kang, Evans Brackenbrough, Mila Lamb, Stacey R. Gerben, Analisa Murray, Paul M. Levine, Maika Schneider, Vibha Vasireddy, Sergey Ovchinnikov, Joshua A. Kritzer, Joseph D. Mougous, David Baker, Frank DiMaio, Gaurav Bhardwaj, "Accurate de novo design of high-affinity target binding macrocycles using deep learning", *bioRxiv preprint* (2024)

[*]Equal contribution

[†]J.L.W. and D.J. agree that the order of their respective names may be changed to best suit their own interests for personal pursuits (please see author contributions on paper).

PUBLICATIONS (Non-first author)

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1. Anna Lauko, Samuel J. Pellock, Ivan Anischanka, Kiera H Sumida, **David Juergens**, Woody Ahern, Alex Shida, Andrew Hunt, Indrek Kalvet, Christoffer Norn, Ian R Humphreys, Cooper S Jamieson, Alex Kang, Evans Brackenbrough, Banumathi Sankaran, KN Houk, David Baker, "Computational design of serine hydrolases", *bioRxiv preprint*, 2024

2. Linna An, Meerit Said, Long Tran, Sagardip Majumder, Inna Goreshnik, Gyu Rie Lee, **David Juergens**, Justas Dauparas, Ivan Anishchenko, Brian Coventry, Asim K. Bera, Alex Kang, Paul M. Levine, Valentina Alvarez, Arvind Pillai, Christoffer Norn, David Feldman, Dmitri Zorine, Derrick R. Hicks, Xinting Li , Mariana Garcia Sanchez , Dionne K. Vafeados , Patrick J. Salveson, Anastassia A. Vorobieva and David Baker, "Binding and sensing diverse small molecules using Shape Complementary Pseudocycles", *Science*, 2023, 385 (6706) 276-282

3. Florian Praetorius[*], Philip JY Leung[*], Maxx H. Tessmer, Adam Broerman, Cullen Demakis, Acacia F Dishman, Arvind Pillai, Abbas Idris, **David Juergens**, Justas Dauparas, Xinting Li, Paul M Levine, Mila Lamb, Ryanne K Ballard, Stacey R Gerben, Hannah Nguyen, Alex Kang, Banumathi Sankaran, Asim K Bera, Brian F Volkman, Jeff Nivala, Stefan Stoll, David Baker, "Design of stimulus-responsive two-state hinge proteins", *Science*, 2023, 381 (6659) 754-760

4. Susana Vázquez Torres[*], Philip J.Y. Leung[*], Preetham Venkatesh[*], Isaac D. Lutz, Fabian Hink, Huu-Hien Huynh, Andy Hsien-Wei Yeh, **David Juergens**, Nathaniel R Bennett, Andrew N Hoofnagle, Eric Huang, Michael J MacCoss, Marc Expòsit, Gyu Rie Lee, Paul M Levine, Xinting Li, Mila Lamb, Elif Nihal Korkmaz, Jeff Nivala, Lance Stewart, Joseph L. Watson, Joseph M Rogers, David Baker, "De novo design of high-affinity binders to bioactive helical peptides", *Nature*, 2023, https://doi.org/10.1038/s41586-023-06953-1

5. Sanaa Mansoor, Minkyung Baek, **David Juergens**, Joseph L. Watson, David Baker, "Zero-shot mutation effect prediction on protein stability and function using RoseTTAFold", *Protein Science,* 2023, https://doi.org/10.1002/pro.4780

6. Christoffer Norn[*], Basile I. M. Wicky[*], **David Juergens**, Sirui Liu, David Kim, Doug Tischer, Brian Koepnick, Ivan Anishchenko, Foldit Players, David Baker, Sergey Ovchinnikov, "Protein sequence design by conformational landscape optimization", *Proceedings of the National Academy of Sciences,* 2021, 118 (11)

7. Andrew T. Bender, Benjamin P. Sullivan, Jane Y. Zhang, **David Juergens**, Lorraine Lillis, David S. Boyle, Jonathan D. Posner , "HIV detection from human serum with paper-based isotachophoretic RNA extraction and reverse transcription recombinase polymerase amplification", *Analyst*, 2021, 146, 2851-2861

[*]Equal contribution

PRESENTATIONS

Oral:

1. "Antigen-tailored nanoparticle vaccine design with symmetric RoseTTAFold diffusion" ***Mar 2024***
   Rosetta Conference, Cambridge MA
2. "De novo protein design with modern structure prediction networks**"** ***May 2023***
   Inserm Workshop 271, Bordeaux, France
3. "Broadly applicable protein design with RFdiffusion" ***Feb 2023***
   ML for Protein Engineering Seminar, Boston MA
   Recording - https://www.youtube.com/watch?v=wIHwHDt2NoI
4. "Broadly applicable protein design with RFdiffusion" ***Jan 2023***
   Seminar for Korean BioDesign Society, Seol, Republic of Korea
5. "Scaffolding protein functional sites using deep learning" ***May 2022***
   ML for Protein Engineering Seminar, Boston MA
   Recording - https://youtu.be/-EJ8SXTBin0

Poster:

1. "All-atom protein function design with arbitrary geometric constraints and symmetry" ***Mar 2024***
   Rosetta Conference, Cambridge MA
2. "A data-driven algorithm for protein sequence design" ***Sep 2020***
   University of Washington Chemical Engineering graduate student symposium, Seattle WA
3. "A data driven algorithm for protein sequence design" ***Aug 2020***
   Rosetta Conference, Seattle WA

AWARDS AND HONORS

1. Stanford Energy Fellowship, Stanford University ***2025***
2. Schmidt Science Fellowship Nominee, University of Washington ***2024***
3. Honorable Mention, NSF GRFP Fellowship ***2019***
4. Commencement speaker, University of Washington Chemical Engineering ***2019***
5. R.W. Moulton Scholarship Recipient, University of Washington Chemical Engineering ***2018***
6. Montrose Award Recipient, University of Washington Chemical Engineering ***2018***

TEACHING

AI Applications for Bioengineers, UW - *Invited lecturer* ***May 2024***
Lecture on the use of generative deep learning for protein design

18.S997, Generative AI in Biology, MIT - *Invited lecturer* ***April 2024***
Lecture on diffusion models for *de novo* protein design

FORMAL MENTORSHIP

Baker Lab Graduate Rotation Students (Joined Lab) ***Jun 2019 - Oct 2024***
8 trainees

Rosetta Commons summer REU student #2 ***Jun 2023 - Aug 2023***
Project: "Design of symmetric cyclic peptide complexes using RFdiffusion"
Current position: PhD student, Cornell University Computational Biology

Rosetta Commons summer REU student #1 ***Jun 2022 - Aug 2022***
Project: "Functional de novo protein design by adaptive deep network hallucination"
Current position: PhD student, University of Washington Computer Science