John-Paul Ore

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Employment History

North Carolina State University ..... Raleigh, NC, USA
8/2019–present **Assistant Professor in the Department of Computer Science**
University of Nebraska—Lincoln ..... Lincoln, NE, USA
7/2011–7/2019 **Graduate Research Assistant**
Current Rutledge ..... Seattle, WA, USA
2/2006–6/2011 **Video Production Assistant, Grip, and Web Developer**
Samadhi Yoga Center ..... Seattle, WA, USA
8/2003–1/2006 **Web Developer**
Electronic Evidence Discovery ..... Seattle, WA, USA
4/2002–7/2003 **Manager** Technical Analysis Group
9/1999–3/2002 **Analyst** Technical Analysis Group
Deloitte Consulting ..... Chicago, IL, USA
2/1997–8/1998 **Consultant** Requirements Gathering and Testing
7/1996–1/1997 **Analyst** UI Development for a claims processing system

Education

University of Nebraska ..... Lincoln, NE, USA

2019 **Doctor of Philosophy in Computer Science**
"Dimensional Analysis for Robot Software without Developer Annotations"
Advisors: Sebastian Elbaum and Carrick Detweiler
Award: Outstanding PhD Thesis

2014 **Master of Science in Computer Science**
"Autonomous Aerial Water Sampling"
Advisors: Carrick Detweiler and Matt Dwyer
Award: Outstanding Master's Thesis

University of Chicago ..... Chicago, IL, USA

1996 **Bachelor of Arts in Philosophy**

Refereed Conference Publications

10. Sayali Kate, John-Paul Ore, Xiangyu Zhang, Sebastian Elbaum, and Zhaogui Xu. "Phys: Probabilistic Physical Unit Assignment and Inconsistency Detection." In: *Foundations of Software Engineering*. ESEC/FSE'18. 2018. pp. 563–573. https://dl.acm.org/citation.cfm?id=3236035 (**Artifact:** https://zenodo.org/record/1310129)

9. John-Paul Ore, Sebastian Elbaum, Carrick Detweiler, and Lambros Karkazis. "Assessing the Type Annotation Burden." In: *Automated Software Engineering*. ASE'18. 2018 pp. 190–201. https://dl.acm.org/citation.cfm?doid=3238147.3238173

8. John-Paul Ore, Carrick Detweiler, and Sebastian Elbaum. "Dimensional Inconsistencies in Code and ROS Messages: A Study of 5.9M Lines of Code." In: *International Conference on Intelligent Robots and Systems*. IROS'17. 2017. pp. 712–718. https://doi.acm.org/10.1145/3092703.3098219.

7. John-Paul Ore, Carrick Detweiler, and Sebastian Elbaum. "Phriky-Units: a Lightweight, Annotation-Free Physical Unit Inconsistency Detection Tool (Tool Paper)." In: *International Symposium on Software Testing and Analysis*. ISSTA'17. 2017. pp. 352–355. https://doi.acm.org/10.1145/3092703.3098219 **Award: Best Tool Demonstration**

6. John-Paul Ore, Carrick Detweiler, and Sebastian Elbaum. "Lightweight Detection of Physical Unit Inconsistencies without Program Annotations." In: *International Symposium on Software Testing and Analysis*. ISSTA'17. 2017. pp .341–351. https://doi.acm.org/10.1145/3092703.3092722

5. John-Paul Ore and Carrick Detweiler. "Sensing Water Properties at Precise Depths from the Air." In: *Field and Service Robotics*. FSR'17. 2017. pp. 205–220. https://doi.org/10.1007/978-3-319-67361-5_14

4. David Anthony, Elizabeth Basha, Jared Ostdiek, John-Paul Ore, and Carrick Detweiler. "Surface Classification for Sensor Deployment from UAV Landings." In: *International Conference on Robotics and Automation*. ICRA'15. 2015. pp. 3464–3470. https://doi.org/10.1109/ICRA.2015.7139678

3. Jacob Palmer, Nicholas Yuen, John-Paul Ore, Carrick Detweiler, and Elizabeth Basha. "On Air-to-Water Radio Communication between UAVs and Water Sensor Networks." In: *International Conference on Robotics and Automation*. ICRA'15 2015. pp. 5311–5317. https://doi.org/10.1109/ICRA.2015.7139940

2. David Anthony, John-Paul Ore, Elizabeth Basha, and Carrick Detweiler. "Controlled Sensor Network Installation with Unmanned Aerial Vehicles." In: *Embedded Networked Sensor Systems*. SenSys'14. 2014. pp. 348–349. https://doi.org/10.1145/2668332.2668358

1. John-Paul Ore, Sebastian Elbaum, Amy Burgin, Baoliang Zhao, and Carrick Detweiler. "Autonomous Aerial Water Sampling." In: *Field and Service Robotics*. FSR'13. 2013. pp. 137–151.

Refereed Journal Publications

5. John-Paul Ore, Carrick Detweiler, and Sebastian Elbaum. "Assessing the Type Annotation Burden." In: *ACM Transactions of Software Engineering and Methodology*. (In preparation.)

4. John-Paul Ore and Carrick Detweiler. "Sensing Water Properties at Precise Depths from the Air." In: *Journal of Field Robotics*. 2018. pp. 1–17. https://doi.org/10.1002/rob.21807

3. Michaella Chung, Carrick Detweiler, Michael Hamilton, Jim Higgins, John-Paul Ore, and Sally Thompson. "Obtaining the Thermal Structure of Lakes from the Air." In: *Water*. 2016. pp. 6467–6778. https://www.mdpi.com/2073-4441/7/11/6467

2. Carrick Detweiler, John-Paul Ore, David Anthony, Sebastian Elbaum, Amy Burgin, and Aaron Lorenz. "Bringing Unmanned Aerial Systems Closer to the Environment." In: *Cambridge Journal of Environmental Practice*. 2015. pp. 188–200. https://doi.org/10.1017/S1466046615000174

1. John-Paul Ore, Carrick Detweiler, Amy Burgin, and Sebastian Elbaum. "Autonomous Aerial Water Sampling." In: *Journal of Field Robotics*. 2015. pp. 1095–1113. https://doi.org/10.1002/rob.21591

Refereed Workshop

3. John-Paul Ore, Carrick Detweiler, and Sebastian Elbaum. "Towards Code-Aware Robotic Simulation." In: *Proceedings of the 1st International Workshop on Robotics Software Engineering*, RoSE'18. 2018. pp. 40–43. https://doi.org/10.1145/3196558.3196566

2. John-Paul Ore, Amy Burgin, Valerie Schoepfer, Carrick Detweiler. "Towards Monitoring Saline Wetlands with Micro UAVs." In: *Robot Science and Systems Workshop on Robotic Monitoring*, RSS'14. 2014.

1. John-Paul Ore, Sebastian Elbaum, Baoliang Zhao, and Carrick Detweiler. "Towards Autonomous Aerial Water Sampling." In: *Robot Science and Systems Workshop on Robotic Monitoring*, RSS'13. 2013.

Patents

2017 Aerial Water Sampler *#US9606028B2*

Teaching Activities

** a new course I developed*

North Carolina State University

Spring 2020 CSC 326: Software Engineering (145 students)

Fall 2019 CSC 591/791: Software for Robotics Today* (14 students)

University of Nebraska—Lincoln

Spring 2018 GTA for SOFT 260: Software Engineering II (60 students)

Tools and Dataset

PHRIKY `https://github.com/unl-nimbus-lab/phriky-units`

PHRIKY is a static analysis tool that detects physical unit inconsistencies in `C++` code written with the Robot Operating System (ROS). PHRIKY has an 87% TP rate in an evaluation on 213 open-sourced systems.

PHYS `https://unl-nimbus-lab.github.io/phys`

PHYS performs abstract type inference to detect inconsistencies in ROS `C++` code. PHYS builds a probabilistic graphical model to represent the connections between uncertain evidence from variable names and dataflow and then uses belief propagation to determine the most likely physical unit type. PHYS has an 85% TP rate in our evaluation.

Dataset: `https://unl-nimbus-lab.github.io/phys/docs/data.html`

The first publicly available dataset of physical unit inconsistencies.

Honors and Awards

2019 **Outstanding PhD Thesis Award** UNL Computer Science and Engineering

2018 ACM SIGSOFT Travel Grant ($300)

2017 **Best Tool Demonstration** PHRIKY (ISSTA'17)

2014 **Outstanding Master's Thesis Award** UNL Computer Science and Engineering

2014–18 Othmer Fellowship ($8000 per annum)

2013 RSS'13 Travel Grant ($500)

Selected Talks

2018 *"Phys: Probabilistic Physical Unit Assignment and Inconsistency Detection"* (FSE)

2018 *"Assessing the Type Annotation Burden"* (ASE)

2018 *"Towards Code-Aware Robotic Simulation"* at Workshop on Robotic Software Engineering (RoSE, part of ICSE)

2017 *"Sensing Water Properties at Precise Depths from the Air"* (FSR)

2017 *"Detecting Bugs in Robotic Systems"* at Workshop on Testing Embedded and Cyber-Physical Systems (TECPS, part of ISSTA)

2017 *"Lightweight Detection of Physical Unit Inconsistencies without Program Annotations"* (ISSTA)

2017 *"Phriky-Units: a Lightweight, Annotation-Free Physical Unit Inconsistency Detection Tool (Tool Paper)"* (ISSTA Tool-Track)

2017 *"Dimensional Inconsistencies in Code and ROS Messages: a Study of 5.9M Lines of Code"* (IROS)

2016 *"Flying Robots"* Bright Lights Summer Camp, Lincoln Public Schools

2015 *"Bringing Aerial Robots Closer:Sensing, Sampling, and Safety"* Nebraska Agricultural Technologies Association Conference (NEATA)

2014 *"Towards Monitoring Saline Wetlands with Micro UAVs"* (RSS Workshop on Environmental Monitoring)

2013 *"Autonomous Aerial Water Sampling"* (FSR)

2013 *"Toward Autonomous Aerial Water Sampling"* (RSS Workshop on Environmental Monitoring)

Service

Program Committee Member (conference)

2020 New Ideas and Emerging Results (NIER, part of ICSE)

2020 International Symposium on Software Testing and Analysis Tool Track

2020 Foundations of Software Engineering – Artifacts

Program Committee Member (workshop)

2020 Agents and Robots for Reliable Engineered Autonomy (AREA, part of European Conference on Artificial Intelligence)

2020 Engineering Resilient Robot Software (ERRoSS, part of IEEE International Conference on Robotic Computing (IRC 2020))

2018–19 *Workshop on Robotic Software Engineering* (RoSE, part of ICSE)

North Carolina State University Departmental Committees

2020 *Diversity in Admissions and Matriculation (DAM)*

2019–20 *Written preliminary Examination Committee*

Reviewer

2018 *IEEE Robotics and Automation Letters*

2018 *International Conference on Formal Methods and Models for System Design*

2015–18 *Journal of Field Robotics*

2014–18 *International Conference on Robotics and Automation*

2018 *International Journal of Mining Reclamation and Environment*

2017 *Journal of Software Testing, Verification and Reliability*

2017 *Field and Service Robotics*

2017 *Limnology and Oceanography: Methods*

Students

PhD Committee Member

- Afsoon Afzal (Carnegie Mellon University, external member) Expected graduation 2021

Graduate Independent Study (NC State)

- Weijie Zhou 1/2020–05/2020
- Garima Fnu Sarangal 1/2020–05/2020
- Gurman Singh 1/2020–05/2020

Undergraduate Research in CS (NC State)

- Amr Moussa 5/2020–08/2020
- Lucy Agamaite 1/2020–05/2020

Memberships

ACM-W, ACM, ACM-SIGSOFT, IEEE

Certifications

Certified Remote UAS Drone Pilot under FAA Part 107.