CHRISTOPHER ILIFFE SPRAGUE

Researcher in structured artificial intelligence

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cisprague | cisprague | cisprague | cisprague

EXPERIENCE

Researcher

KTH Royal Institute of Technology | Robotics, Perception, and Learning Department

Dec 2017 – June 2022 | Stockholm, SE

- Made contributions at the intersection of artificial intelligence, control theory, and machine learning (adv. Petter Ögren and John Folkesson).
- Implemented planning and control algorithms on an in-house built autonomous underwater vehicle with ROS.
- Supervised multiple M.Sc. students to the completion of their theses.

Autonomous Underwater Vehicle Assistant

University of Tasmania | Institute for Marine and Antarctic Studies

Dec 2019 – Feb 2020 | Thwaites Glacier, Antarctica

- Assisted in the deployment of the Nupiri Muka AUV in Western Antarctica for under-ice data collection (adv. Peter King).
- Assisted in the recover of oceanographic moorings.

Researcher

European Space Agency | Advanced Concepts Team

Sep 2017 – Nov 2017 | Noordwijk aan Zee, NL

- Made contributions to spacecraft trajectory optimisation with machine learning and optimal control (adv. Dario Izzo).

Researcher

Japan Aerospace Exploration Agency | Institute of Space and Astronautical Science

Jun 2017 – Aug 2017 | Sagamihara, JP

- Researched machine learning for trajectory optimisation in the context of the lunar spacecraft mission EQUULEUS (adv. Yasuhiro Kawakatsu).

Learning Assistant

Rensselaer Polytechnic Institute

Aug 2016 – May 2017 | Troy, NY, USA

- Held private consultation sessions and created a variety of workshops for study skills, time management, and stress management in order to promote academic excellence and encourage student involvement.

Software Engineer

The Johns Hopkins University Applied Physics Laboratory

Jun 2015 – Aug 2015 | Laurel, MD, USA

- Produced targeted enhancements to the fault-protection systems of NASA's Solar Terrestrial Relations Observatory (adv. Dan Wilson and Kevin Balon).

SKILLS

Software

JAX | PyTorch | GPyTorch | Python | ROS

Theory

Optimal control | Stability | Order theory | Hybrid dynamical systems | Behavior trees | Machine learning | Physics-informed learning | Fluid/structural mechanics

EDUCATION

Ph.D. in Robotics

KTH Royal Institute of Technology

Dec 2017 – June 2022 (expected)

- Project on Robust, flexible and transparent mission planning and execution for autonomous underwater vehicles.
- Funded by Swedish Maritime Robotics Centre (SMaRC).

M.S. in Aerospace Engineering

Rensselaer Polytechnic Institute

May 2016 – May 2017

- Magna Cum Laude honours (adv. Kurt Anderson).

B.S. in Aerospace Engineering

Rensselaer Polytechnic Institute

Aug 2013 – May 2016

- Cum Laude honours.

GRANTS

JSPS Summer Program

Japan Society for the promotion of Science

2017 | ¥692,500

East Asia and Pacific Summer Institute Fellowship

National Science Foundation

2017 | $5,400

- Updated the spacecrafts' testbeds to emulate their current operational modes.

PUBLICATIONS

Journal Articles

- Ögren, P., & Sprague, C. I. [Christopher I]. (2021). Behavior trees in robot control systems. *Annual Review of Control, Robotics, and Autonomous Systems*, *5*.
- Sprague, C. I. [Christopher I], & Ögren, P. (2021). Continuous-time behavior trees as discontinuous dynamical systems. *IEEE Control Systems Letters*.
- Torroba, I., Sprague, C. I., Bore, N., & Folkesson, J. (2020). Pointnetkl: Deep inference for gicp covariance estimation in bathymetric slam. *IEEE Robotics and Automation Letters*, *5*(3), 4078–4085.
- Sprague, C. I. [Christopher Iliffe], & Ögren, P. (2018). Adding neural network controllers to behavior trees without destroying performance guarantees. *arXiv preprint arXiv:1809.10283*.

Conference Proceedings

- Bhat, S., Torroba, I., Özkahraman, Ö., Bore, N., Sprague, C. I. [Christopher Iliffe], Xie, Y., … Folkesson, J., et al. (2020). A cyber-physical system for hydrobatic auvs: System integration and field demonstration. In *2020 ieee/oes autonomous underwater vehicles symposium (auv)(50043)* (pp. 1–8). IEEE.
- Sprague, C. I. [Christopher Iliffe], & Ögren, P. (2020). Learning how to learn bathymetry. In *2020 ieee/oes autonomous underwater vehicles symposium (auv)(50043)* (pp. 1–2). IEEE.
- Sprague, C. I. [Christopher Iliffe], Özkahraman, Ö., Munafo, A., Marlow, R., Phillips, A., & Ögren, P. (2018). Improving the modularity of auv control systems using behaviour trees. In *2018 ieee/oes autonomous underwater vehicle workshop (auv)* (pp. 1–6). IEEE.
- Sprague, C. I. [Christopher Iliffe]. (2016). Modelling and simulation of autonomous cubesats for orbital debris mitigation. In *6th international conference on astrodynamics tools and techniques*. European Space Agency.

Congress-Bundestag Youth Exchange (CBYX) for Young Professionals

German Bundestag and U.S. Department of State

2015 Declined

NASA Fellowship

The Henry Foundation, Inc.

2015 $4000

LANGUAGES

English
Swedish
Spanish

REFEREES

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Prof. John Folkesson
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