Adam Seewald, Curriculum Vitae

Most recent version: adamseewald.cc/cv, ✎

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- I am currently a postdoc at ETH Zürich.
- My research focuses on robotics and computer science and involves autonomous robots in different environmental use cases.
- My fields of research interest are aerial robotics, energy and environment-aware automation, field robots, and motion and path planning, among others.

Education

2018-2022 **Ph.D., Engineering Science, University of Southern Denmark**

Thesis Energy-aware coverage planning and scheduling for autonomous aerial robots, ⬈

Advisor Prof. Ulrik Pagh Schultz

2016-2018 **Master, Computer Science and Engineering, University of Verona, Italy**

Thesis Evaluation of optimal trajectories for quadrotors with indirect methods in the presence of intermediate constraints

Advisor Prof. Paolo Fiorini

2013-2016 **Bachelor, Computer Science, University of Verona, Italy**

Experience

2024- **Postdoc, Environmental Robotics Lab, Dept. of Environmental Systems Science, ETH Zürich**

Project Robot-assisted collection of eDNA for pest detection in precision agriculture, ⬈ (PI: Stefano Mintchev)

Funding World Food System Center and Fenaco's research program on smart sustainable farming

- Develop robots for pest detection in precision agriculture (RGB-D perception, controls, planning, etc.)
- Coordinate research across organizations (World Food System Center, Agroscope, and AXA Climate)
- Serve as a teaching assistant for a course on robotics in precision agriculture

2022-2024 **Postdoc, GRAB Lab, Dept. of Mechanical Eng. and Materials Science, Yale University**

Project Mobile ground-based and aerial robots for biodiversity surveying, ⬈ (PI: Aaron M. Dollar)

Funding Yale University's discretionary research fund

- Develop robot autonomy for surveying [c6, c7] (navigation, controls, planning, communication, etc.)
- Manage undergraduate and graduate projects at the GRAB and Intelligent Robot Autonomy Labs (Yale U.)
- Assist NSF grant proposal focused on certifiable control
- Serve as a teaching assistant for course on sustainable technologies

2018-2022   **Ph.D. Researcher, Unmanned Aerial Systems Center, University of Southern Denmark**

     Project   TeamPlay – Time, Energy, and security Analysis for Multi/Many-core heterogeneous PLAtforms, ⤤ (PI: Ulrik Pagh Schultz)

     Funding   European Union's Horizon2020 program under grant agreement number 779882

- Develop aerial robotics use case [c4] (fixed-wing aerial robot for precision agriculture)
- Develop C++/ROS modeling/planning library [j1] (utilized by U. of Amsterdam, U. of Bristol, INRIA, etc.)
- Manage EU project TeamPlay ⤤ , coordinated industry collaboration (Sky-Watch, Irida Labs, etc.)
- Serve as a teaching assistant for courses on robotic numerical optimization

Research

Peer-reviewed journal publication:

[j1] • <u>Adam Seewald</u>, Ulrik Pagh Schultz, Emad Ebeid, and Henrik Skov Midtiby, "**Coarse-grained computation-oriented energy modeling for heterogeneous parallel embedded systems**," in International Journal of Parallel Programming. 2021; vol. 49, no. 2, pp. 136–157. 10.1007/s10766-019-00645-y, ⤤

Peer-reviewed conference publications (7):

[c7] • <u>Adam Seewald</u>, Cameron J. Lerch, Marvin Chancán, Aaron M. Dollar, and Ian Abraham, "**Energy-aware ergodic search: Continuous exploration for multi-agent systems with battery constraints**," in IEEE International Conference on Robotics and Automation (ICRA'24), pp. 7048–7054. ⤤

[c6] • <u>Adam Seewald</u>, Marvin Chancán, Connor M. McCann, Seonghoon Noh, Omeed Fallahi, Hector Castillo, Ian Abraham, and Aaron M. Dollar, "**RB5 Low-cost explorer: Implementing autonomous long-term exploration on low-cost robotic hardware**," in IEEE International Conference on Robotics and Automation (ICRA'24), pp. 5977–5983. ⤤

[c5] • Benjamin Rouxel, Christopher Brown, Emad Ebeid, Heiko Falk, Clemens Grelck, Jesper Holst, Shashank Jadhav, Yoann Marquer, Marcos Martinez Alejandro, Kris Nikov, Ali Sahafi, Ulrik Pagh Schultz, <u>Adam Seewald</u>, Vangelis Vassalos, Simon Wegener, and Olivier Zendra, "**The TeamPlay project: Analysing and optimising time, energy, and security for cyber-physical systems**," in Design, Automation and Test in Europe Conference (DATE'23), pp. 1–6. 10.23919/DATE56975.2023.10137198, ⤤

[c4] • <u>Adam Seewald</u>, Héctor García de Marina, Henrik Skov Midtiby, and Ulrik Pagh Schultz, "**Energy-aware planning-scheduling for autonomous aerial robots**," in IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'22), pp. 2946–2953. 10.1109/IROS47612.2022.9981285, ⤤

[c3] • Georgios Zamanakos, <u>Adam Seewald</u>, Henrik Skov Midtiby, and Ulrik Pagh Schultz, "**Energy-aware design of vision-based autonomous tracking and landing of a UAV**," in IEEE International Conference on Robotic Computing (IRC'20), pp. 294–297. 10.1109/IRC.2020.00054, ⤤

[c2] • <u>Adam Seewald</u>, Héctor García de Marina, Henrik Skov Midtiby, and Ulrik Pagh Schultz, "**Mechanical and computational energy estimation of a fixed-wing drone**," in IEEE International Conference on Robotic Computing (IRC'20), pp. 135–142. 10.1109/IRC.2020.00028, ⤤

[c1] • <u>Adam Seewald</u>, Ulrik Pagh Schultz, Julius Roeder, Benjamin Rouxel, and Clemens Grelck, "**Component-based computation-energy modeling for embedded systems**," in ACM SIGPLAN International Conference on Systems, Programming, Languages, and Applications: Software for Humanity (SPLASH'19), pp. 5–6. 10.1145/3359061.3362775, ⤤

Peer-reviewed workshop publications (2):

[w2] • <u>Adam Seewald</u>, "**Beyond traditional energy planning: The weight of computations in planetary exploration**," in IROS Workshop on Planetary Exploration Robots: Challenges and Opportunities (PlanRobo'20), p. 3. ETH Zürich. 10.3929/ethz-b-000450120, ⬀

[w1] • <u>Adam Seewald</u>, Emad Ebeid, and Ulrik Pagh Schultz, "**Dynamic energy modelling for SoC boards: Initial experiments**," in Workshop on High-Level Programming for Heterogeneous and Hierarchical Parallel Systems (HLP-GPU'19), p. 4. ⬀

Others (2):

[o2] • <u>Adam Seewald</u>, "**Energy-aware coverage planning and scheduling for autonomous aerial robots**," Ph.D. thesis, p. 184. Syddansk Universitet. Det Tekniske Fakultet, 2021. 10.21996/7ka6-r457, ⬀

[o1] • <u>Adam Seewald</u>, Ulrik Pagh Schultz, Emad Ebeid, and Henrik Skov Midtiby, "`powprofiler` **computations energy modeling tool**," v. 1.0.2, 2021. 10.5281/zenodo.5562457, ⬀

Invited lectures

- **Innovations in robotics for sustainable crop production**. Invited Talk at the Innovations for Sustainable Local Food Systems day at ETH Zürich World Food System Center. June 14, 2024. ⬀

- **Ergodic control applications: Energy optimal control**. Invited Speaker at the ICRA Tutorial on Ergodic Control, IEEE International Conference on Robotics and Automation. May 13, 2024. ⬀

- **Energy-aware dynamic planning: Merging path planning and computations scheduling for the drone use-case**. Invited Talk at the TeamPlay Final Workshop, (Virtual Event). May 27, 2021.

- **Energy estimation and modeling for the drone use-case**. Invited Talk at the TeamPlay Workshop, European Network on High-Performance Embedded Architecture and Compilation Conference. January 22, 2020.

Teaching and advising

Teaching at graduate and undergraduate levels (3):

Fall 2024   **Introduction to Agricultural Robotics**, ETH Zürich

Role   Teaching assistant (PI: Stefano Mintchev)

- Elective introductory course on robotics techniques in precision agriculture for master's students from different backgrounds

Fall 2022   **You, Your Planet, and a Sustainable Future**, Yale University

Role   Teaching assistant (PI: Aaron M. Dollar)

- Survey course on sustainable technologies for undergraduate students in engineering and environmental science

Spring 2019, '20   **Optimization and Control**, University of Southern Denmark

Role   Teaching assistant (PI: Agus Hasan)

- Elective course on numerical optimization, methods and solvers, for master's students in robot systems

Advising of graduate and undergraduate students (2):

- **Omeed Fallahi**, undergraduate student in computer science, Yale University, 2022–2023
- **Magnus O. C. Liisberg**, master's student in robot systems, University of Southern Denmark, 2018–2019

Professional and outreach activities

- **Member**, Institute of Electrical and Electronics Engineers (IEEE), 2019–
- **Member**, Association for Computing Machinery (ACM), 2019–

- **Organizer** of the Time, Energy, and Security Analysis for Multi/Many-core Heterogeneous Platforms Final Workshop (TeamPlay'21)

- **Program Committee member**, IEEE International Conference on Robotic Computing (IRC'23, '22, '21), ⤴

- **Reviewer**, IEEE Robotics and Automation Letters (RA-L), ⤴
- **Reviewer**, International Symposium on Distributed Autonomous Robotic Systems (DARS'24), ⤴
- **Reviewer**, IEEE International Conference on Soft Robotics (RoboSoft'24), ⤴
- **Reviewer**, IEEE International Conference on Robotics and Automation (ICRA'24), ⤴
- **Reviewer**, IEEE International Conference on Automation Science and Engineering (CASE'23), ⤴
- **Reviewer**, IEEE International Conference on Robot and Human Interactive Communication (Ro-man'22)
- **Reviewer**, IEEE International Conference on Unmanned Aircraft Systems (ICUAS'22), ⤴
- **Reviewer**, International Workshop on Robotics Software Engineering (RoSE'22), ⤴
- **Reviewer**, IEEE International Conference on Unmanned Aircraft Systems (ICUAS'21)
- **Reviewer**, IEEE International Conference on Control, Automation, Robotics and Vision (ICARCV'20)

Fellowships and awards

- **Doctoral Fellowship**, Mærsk Mc-Kinney Møller Institute, University of Southern Denmark, 2018–2021
- **Academic Scholarship**, University of Verona, 2013–2018

References

Prof. Aaron M. Dollar, ⤴	Prof. Ulrik Pagh Schultz, ⤴	Prof. Agus Hasan, ⤴
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