

# Adam Seewald, Ph.D., Curriculum Vitae

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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.

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## 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

- Developing robotic techniques (motion and path planning, RGB-D perception, etc.) for the detection of pests in precision agriculture
- Coordinating research and dissemination across different organizations (World Food System Center, Agroscope, and AXA Climate)
- Integrating open-source aerial robots with manipulation capabilities for aerial-physical interaction on crops
- Serving as a teaching assistant for an introductory course on robotic techniques 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

- Developed mobile robotic autonomy (navigation, control, and planning algorithms and communication methodologies) for nature conservation and surveying [\[c6\]](#)
- Managed undergraduate and graduate students at the GRAB and Intelligent Robot Autonomy Labs at Yale
- Assisted in writing an NSF grant proposal focused on certifiable control
- Researched and disseminated novel robot control strategies (ergodic control) [\[c7\]](#)
- Served as a teaching assistant for a survey 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

- Developed aerial robotics use case [\[c4\]](#) (fixed-wing aerial robot for precision agriculture)
- Developed an open-source motion planning/computing energy modeling library [\[j1\]](#) utilized by a network of collaborators (University of Amsterdam, University of Bristol, and INRIA)
- Managed European Union Horizon 2020 project TeamPlay and coordinated international industry collaboration (Thales Alenia Space, Sky-Watch, Irida Labs, and AbsInt)
- Served as a teaching assistant for graduate courses on numerical optimization for robots

## Research

Peer-reviewed journal publication:

- [\[j1\]](#) • [Adam Seewald](#), 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):

- [\[c7\]](#) • [Adam Seewald](#), 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. [↗](#)
- [\[c6\]](#) • [Adam Seewald](#), 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 Grellck, Jesper Holst, Shashank Jadhav, Yoann Marquer, Marcos Martinez Alejandro, Kris Nikov, Ali Sahafi, Ulrik Pagh Schultz, [Adam Seewald](#), 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/DAT56975.2023.10137198](#), [↗](#)
- [\[c4\]](#) • [Adam Seewald](#), 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, [Adam Seewald](#), 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] • [Adam Seewald](#), 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] • [Adam Seewald](#), 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] • [Adam Seewald](#), “**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] • [Adam Seewald](#), 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] • [Adam Seewald](#), “**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] • [Adam Seewald](#), 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

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- **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

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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)

## References

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Prof. Aaron M. Dollar, [✉](#)

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Prof. Ulrik Pagh Schultz, [✉](#)

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