Adam Seewald

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Webpage	adamseewald.cc
Email	adam@seewald.email
Phone	+1 (203) 627-3508
Address	Mason Lab, Room B5, Yale University 9 Hillhouse Avenue New Haven, CT 06511 USA

- Currently, I am a Postdoc at the GRAB Lab at the Department of Mechanical Engineering and Materials Science at Yale University
- My research interests lie at the intersection of robotics, computer science, and optimal control, applied to the navigation and control of field robots

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**

Thesis	Analysis, porting and testing of parallel code for images recognition on CUDA Jetson TK1 platform
Advisor	Prof. Nicola Bombieri

Research Experience

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

Project	Mobile ground-based and aerial robots for biodiversity surveying
Supervisor	Prof. Aaron Dollar
Details	I am investigating techniques for navigation, control, and planning of mobile robotics platforms for nature conservation and surveying. These platforms include, e.g., legged, aerial, and wheeled robots jointly developed by multiple lab members.

2018-2021 **Ph.D. Researcher, Unmanned Aerial Systems Center, University of Southern Denmark**

Project	TeamPlay–Time, Energy, and security Analysis for Multi/Many-core heterogeneous PLAtforms
Funding	European Union's Horizon2020 program under grant agreement number 779882
Supervisor	Prof. Ulrik Pagh Schultz
Details	My contributions included the development of the aerial robotics use case and an open-source energy modeling tool written in C++ [j1], [c1] used by project partners such as the University of Amsterdam in the Netherlands, the University of Bristol in the United Kingdom, INRIA in France, and Irida Labs in Greece. To this end, I have applied energy optimizing techniques–including MPC and data-driven control [c4]–to aerial robots in flight [c2] and simulation using ROS [c3] and MATLAB(R) [c2], [c4] and investigated other energy-critical systems [w2].

Publications

My publications include one journal article, four conference articles, two workshop articles (all articles were peer-reviewed), a Ph.D. thesis, and software.

j1	**Adam Seewald**, Ulrik Pagh Schultz, Emad Ebeid, and Henrik Skov Midtiby Coarse-grained computation-oriented energy modeling for heterogeneous parallel embedded systems International Journal of Parallel Programming. 2021; vol. 49, no. 2, pp. 136–157. DOI: 10.1007/s10766-019-00645-y, preprint: adamseewald.cc/short/coarse2019
c1	**Adam Seewald**, Ulrik Pagh Schultz, Julius Roeder, Benjamin Rouxel, and Clemens Grelck Component-based computation-energy modeling for embedded systems Proceedings Companion of the ACM SIGPLAN International Conference on Systems, Programming, Languages, and Applications: Software for Humanity (SPLASH'19), pp. 5–6. DOI: 10.1145/3359061.3362775, preprint: adamseewald.cc/short/component2019
c2	**Adam Seewald**, Héctor García de Marina, Henrik Skov Midtiby, and Ulrik Pagh Schultz Mechanical and computational energy estimation of a fixed-wing drone Proceedings of the 4th IEEE International Conference on Robotic Computing (IRC'20), pp. 135—142. DOI: 10.1109/IRC.2020.00028, preprint: adamseewald.cc/short/mechanical2020
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 Proceedings of the 4th IEEE International Conference on Robotic Computing (IRC'20), pp. 294—297. DOI: 10.1109/IRC.2020.00054, preprint: adamseewald.cc/short/energy2020
c4	**Adam Seewald**, Héctor García de Marina, Henrik Skov Midtiby, and Ulrik Pagh Schultz Energy-aware planning-scheduling for autonomous aerial robots Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'22), p. 8, to appear. Preprint: adamseewald.cc/short/energy2022
w1	**Adam Seewald**, Emad Ebeid, and Ulrik Pagh Schultz Dynamic energy modelling for SoC boards: Initial experiments Workshop on High-Level Programming for Heterogeneous and Hierarchical Parallel Systems (HLP-GPU), p. 4. Preprint: adamseewald.cc/short/dynamic2019
w2	**Adam Seewald** Beyond traditional energy planning: The weight of computations in planetary exploration Proceedings of the IROS Workshop on Planetary Exploration Robots: Challenges and Opportunities (PlanRobo'20), p. 3. ETH Zürich. DOI: 10.3929/ethz-b-000450120, preprint: adamseewald.cc/short/beyond2020
o1	**Adam Seewald**, Ulrik Pagh Schultz, Emad Ebeid, and Henrik Skov Midtiby `powprofiler` computations energy modeling tool. DOI: 10.5281/zenodo.5562457, source: github.com/adamseew/powprofiler
o2	**Adam Seewald** Energy-aware coverage planning and scheduling for autonomous aerial robots Ph.D. thesis, p. 184. Syddansk Universitet. Det Tekniske Fakultet, 2021. DOI: 10.21996/7ka6-r457, preprint: adamseewald.cc/short/phdthesis

Teaching

I co-taught a course at the Master's level.

Spring 2019, and 2020 **Optimization and Control**, course for Master's students in Robotics

Role	Teaching assistant
Supervisor	Prof. Agus Hasan
Details	I taught constrained optimization and sequential quadratic programming and assisted in the practical parts of the course–an elective for the Master's students in Robot Systems at the University of Southern Denmark.

Conference Participation

I have presented my work at conferences and workshops in robotics and computer science.

'21	Energy-aware dynamic planning: Merging path planning and computations scheduling for the drone use-case Workshop presentation at the Time, Energy, and Security Analysis for Multi/Many-core Heterogeneous Platforms Final Workshop (TeamPlay'21) Odense, Denmark (virtual), May 26–27, 2021.
'20	Mechanical and computational energy estimation of a fixed-wing drone, and energy-aware design of vision-based autonomous tracking and landing of a UAV Conference papers presentation at the 4th IEEE International Conference on Robotic Computing (IRC'20) Taichung, Taiwan (virtual), November 9–11, 2020. Beyond traditional energy planning: The weight of computations in planetary exploration Workshop presentation at the IROS Workshop on Planetary Exploration Robots: Challenges and Opportunities (PlanRobo'20) Las Vegas, USA (virtual), October 29–30, 2020. Energy estimation and modeling for the drone use-case Workshop presentation at the Time, Energy, and Security Analysis for Multi/Many-core Heterogeneous Platforms Workshop (TeamPlay'20) at the European Network on High-performance Embedded Architecture and Compilation conference (HiPEAC'20) Bologna, Italy, January 20–22, 2020.
'19	Component-based computation-energy modeling for embedded systems Conference abstract presentation at the ACM SIGPLAN International Conference on Systems, Programming, Languages, and Applications: Software for Humanity (SPLASH'19) Athens, Greece, October 20–25, 2019. Dynamic energy modelling for SoC boards: Initial experiment Workshop presentation at the High-Level Programming for Heterogeneous and Hierarchical Parallel Systems Workshop (HLPGPU) at the European Network on High-performance Embedded Architecture and Compilation conference (HiPEAC'19) Valencia, Spain, January 21–23, 2019.

Academic Service

- **Program Committee member** at the 6th IEEE International Conference on Robotic Computing (IRC'22)
- **Reviewer** for the IEEE 31st International Conference on Robot and Human Interactive Communication (Roman'22)
- **Reviewer** for the IEEE International Conference on Unmanned Aircraft Systems (ICUAS'22)
- **Reviewer** for the 4th International Workshop on Robotics Software Engineering (RoSE'22)
- **Program Committee member** at the 5th IEEE International Conference on Robotic Computing (IRC'21)
- **Co-organizer** of the Time, Energy, and Security Analysis for Multi/Many-core Heterogeneous Platforms Final Workshop (TeamPlay'21)
- **Reviewer** for the IEEE International Conference on Unmanned Aircraft Systems (ICUAS'21)
- **Reviewer** for the IEEE 16th International Conference on Control, Automation, Robotics and Vision (ICARCV'20)

References

- Prof. Aaron Dollar, Professor, Department of Mechanical Engineering and Materials Science, Yale University, aaron.dollar@yale.edu
- Prof. Ulrik Pagh Schultz, Professor, SDU UAS Center, Mærsk Mc-Kinney Møller Institute, University of Southern Denmark, ups@mmmi.sdu.dk
- Prof. Agus Hasan, Professor, Department of ICT and Natural Sciences, Norwegian University of Science and Technology, agus.hasan@ntnu.no