

Adam Seewald

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| Webpage | adamseewald.cc | <ul style="list-style-type: none">• 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 |
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| Address | Mason Lab, Yale University 9 Hillhouse Avenue New Haven, CT 06511 USA | |

Education

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

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| 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**

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| 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**

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| 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**

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| 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 [c6], and wheeled [c5] robots jointly developed by multiple lab members. |

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

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| Project | TeamPlay–Time, Energy, and security Analysis for Multi/Many-core heterogeneous PLAT-forms |
| 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. Two articles are currently under review.

- [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.
DOI: [10.1007/s10766-019-00645-y](https://doi.org/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, in: *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](https://doi.org/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, in: *Proceedings of the IEEE International Conference on Robotic Computing (IRC'20)*, pp. 135–142.
DOI: [10.1109/IRC.2020.00028](https://doi.org/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, in: *Proceedings of the IEEE International Conference on Robotic Computing (IRC'20)*, pp. 294–297.
DOI: [10.1109/IRC.2020.00054](https://doi.org/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, in: *Proceedings of the IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS'22)*, pp. 2946–2953.
DOI: [10.1109/IROS47612.2022.9981285](https://doi.org/10.1109/IROS47612.2022.9981285), preprint: adamseewald.cc/short/energy2022

- [c5] • **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, 2023, submitted for publication, p. 7.
Preprint: adamseewald.cc/short/rb52023

- [c6] • **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, 2023, submitted for publication, p. 7.
Preprint: adamseewald.cc/short/energo2023

- [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.
Preprint: adamseewald.cc/short/dynamic2019

- [w2] • **Adam Seewald**
Beyond traditional energy planning: The weight of computations in planetary exploration, in: *Proceedings of the IROS Workshop on Planetary Exploration Robots: Challenges and Opportunities (PlanRobo'20)*, p. 3. ETH Zürich.
DOI: [10.3929/ethz-b-000450120](https://doi.org/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](https://doi.org/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](https://doi.org/10.21996/7ka6-r457), preprint: adamseewald.cc/short/phdthesis

Teaching

I co-taught courses at graduate and undergraduate level.

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| Fall 2022 | You, Your Planet, and a Sustainable Future , course for undergraduate students | |
| Role | Teaching assistant | |
| Supervisor | Prof. Aaron M. Dollar | |
| Details | I prepared lecture material and assisted in the theoretical parts of the course – a survey course in engineering and environmental science for undergraduate students at Yale University. | |
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| 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 course 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.

- Energy-aware planning-scheduling for autonomous aerial robots, conference paper presentation at the IEEE /RSJ International Conference on Intelligent Robots and Systems (IROS'22). Kyoto, Japan (virtual), October 23–27, 2022.
- 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.
- 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.
- 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 (HLP-GPU'19) 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 IEEE International Conference on Robotic Computing (IRC'23)
- **Reviewer** for the IEEE International Conference on Automation Science and Engineering (CASE'23)
- **Program Committee member** at the IEEE International Conference on Robotic Computing (IRC'22)
- **Reviewer** for the IEEE 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 International Workshop on Robotics Software Engineering (RoSE'22)
- **Program Committee member** at the 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 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