

Thomas J. Stastny

PH.D CANDIDATE · RESEARCH ASSISTANT

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Autonomous Systems Lab

ETH Zürich, LEE J 314, Leonhardstrasse 21
8092 Zürich, Switzerland

Education

Swiss Federal Institute of Technology (ETH) Zürich

Zürich, Switzerland

PH.D IN ROBOTICS

Expected 2019

- Research focus: local perception, planning, and control for small fixed-wing UAVs

University of Kansas

Lawrence, KS, USA

M.S. WITH HONORS IN AEROSPACE ENGINEERING

2012 - 2014

- Thesis: Collision and Obstacle Avoidance for Fixed-wing UAVs using Morphing Potential Field Navigation with Robust and Predictive Control
- GPA: 4.0/4.0

Delft University of Technology (TU Delft)

Delft, Netherlands

SEMESTER ABROAD

Spring 2012

- Coursework in Systems & Control and Aerospace Engr. MSc Programs.

University of Kansas

Lawrence, KS, USA

B.S. IN AEROSPACE ENGINEERING

2008 - 2012

- GPA: 3.7/4.0

Research Positions

Autonomous Systems Lab, ETH Zürich

Zürich, Switzerland

RESEARCH ASSISTANT

2014 - Present

- Design/development of local perception, planning, and control algorithms for small fixed-wing UAVs as well as aircraft instrumentation and integration. See [Research Projects](#) ▼.

Center for Remote Sensing of Ice Sheets (CReSIS), University of Kansas

Lawrence, KS, USA

RESEARCH ASSISTANT

2012 - 2014

- Designed/developed system identification/modeling techniques, controllers, and planning algorithms for ice-penetrating radar -mounted UAVs. See [Research Projects](#) ▼.

Autonomous Flight Systems Group, University of Kansas

Lawrence, KS, USA

UNDERGRADUATE RESEARCH ASSISTANT

2011

- Developed perturbation based and 6DoF, nonlinear flight simulators and flight test data analysis tools for fixed wing UAVs. Assisted flight test team in UAS flight tests.

Aerospace Adaptive Structures and Materials Laboratory, University of Kansas

Lawrence, KS, USA

UNDERGRADUATE RESEARCH ASSISTANT

2008 - 2009

- Fabricated testing articles and conducted pressurizing tests for an adaptive honeycomb morphing wing structure.

Research Projects

Sun2Ice: Monitoring calving glaciers from solar-powered UAVs (2017 - Present)

SUPPORTED BY ETH GRANT ETH-12 16-2

Milestones: Demonstrated the *first-ever* autonomous, solar-powered flights of a UAV in a polar region, including a flight of more than 12 hours duration, and the survey of the calving front of Bowdoin Glacier, **North-west Greenland**, which revealed the opening of a crack leading to a major calving event the following week. **Role:** Lead UAV operations in Qaanaaq, Greenland during glacier monitoring field campaign. ☞ <http://sun2ice.ethz.ch>

powered flight with the AtlantikSolar UAV while live-streaming onboard infrared camera feed and tracking thermal updrafts. **Role:** Developed and deployed autonomous take-off and landing algorithms/logic for the AtlantikSolar UAV.

Adventura AtlantikSolar@Brazil (2015)

SUPPORTED BY SWISSNEX BRAZIL, SWISSANDO, AND ETH GLOBAL

Milestones: Performed the *first-ever* autonomous solar-powered flight over the **Amazon rain forest**. Supported Brazilian partners at SIPAM (Brazilian Amazon Protection System, part of the Brazilian Ministry of Defense) in the aerial monitoring and mapping of a disaster site on the Rio Pará - a sunken ship involving 4400 dead cattle and 750 tons of spilled oil. **Role:** Co-organized field campaign, supported field demonstrations, gave public workshops and talks. ☞ <http://www.swissnexbrazil.org/atlantiksolar/>

SolAIR: Solar-powered Automated Aerial Imaging and Reconnaissance using Infrared Cameras (2016)

SUPPORTED BY ARMASUISSE SCIENCE & TECHNOLOGY (CONTRACT #043-12)

Milestones: Demonstrated a fully autonomous, 26 hour, solar-

AtlantikSolar: A UAV for the first-ever autonomous solar-powered crossing of the Atlantic Ocean (2014 - 2017)

SUPPORTED BY PRIVATE INVESTORS AND INTERNAL LABORATORY BUDGET

Milestones: Current world solar-powered endurance record for aircraft below 50kg after 81.5hr flight demonstration in Summer 2015. **Role:** System identification & modeling, flight control, guidance, & planning for robust autonomous flight behavior in high winds and uncertain environments. Investigation and testing of local perception techniques and sensors for near terrain flight. Autopilot and onboard computation framework development. <http://www.atlantiksolar.ethz.ch/>

SHERPA: Smart collaboration between Humans and ground-aerial Robots for improving rescuing activities in Alpine environments (2014 - 2017)

SUPPORTED BY THE EUROPEAN COMMISSION UNDER THE 7TH EUROPEAN FRAMEWORK PROGRAMME (#600958)

Milestones: Field demonstration of an autonomous multi-UAV, collaborative aerial mapping and 3-D reconstruction mission with the senseSoar solar-powered UAV and an R-MAX helicopter. **Role:** Platform specific integration within SHERPA Delegation Framework: C++/ROS based programming for task allocation among the multi-actor SHERPA team. Aircraft integration, flight-testing, and autonomy development for senseSoar solar-powered UAV. <http://www.sherpa-project.eu/>

ICARUS: Robotic Search and Rescue (2014 - 2016)

SUPPORTED BY THE EUROPEAN COMMISSION UNDER THE 7TH EUROPEAN FRAMEWORK PROGRAMME (#285417)

Milestones: Field demonstration of robotic search and rescue mis-

sions including real-time victim detection from fixed-wing aircraft with live-streaming GPS localization. **Role:** Designed and demonstrated a LiDAR-based auto-landing controller for fixed-wing platforms. Supported final field-trials in Marche-en-Famenne, BE. <http://www.fp7-icarus.eu/>

Multi-Agent Airborne Laboratory for Cryospheric Remote Sensing (2014)

SUPPORTED BY THE PAUL G. ALLEN FAMILY FOUNDATION

Milestones: Development and testing of distributed sensors in coordinated flight in order to better measure and characterize the impact of climate changes on fast-flowing glaciers. **Role:** Aided writing of full proposal. Applied integrated guidance, control, and trajectory generation to the case of UAS formation concepts supporting aerial ice penetrating synthetic aperture radar systems in a relative formation holding approach.

CReSIS: Center for Remote Sensing of Ice Sheets (2012 - 2014)

SUPPORTED BY THE NATIONAL SCIENCE FOUNDATION (NSF) UNDER GRANT ANT-0424589

Milestones: Conducted the first successful bedrock mapping of Antarctic ice sheets via radar sounding from an autonomous UAS. **Role:** Designed and manufactured various components for radar integration and Arctic outfitting of the University of Kansas Aerospace Department's G1X UAS. Participated in **8-week deployment** as mission planner and ground station operator for autonomous operations of a radar-integrated UAS platform in **Western Antarctica**. <https://www.cresis.ku.edu/>

Publications

Published work available at: <https://scholar.google.com/citations?user=R5Fs1A4AAAAJ&hl=en>

Skills

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|--------------------|--|
| Robotics | State estimation, system identification/modeling, control theory/design, and path planning for unmanned aerial systems. Flight instrumentation experience including avionics and sensors. Basic knowledge of electronic components and circuits, soldering, and crimping techniques. Basic knowledge of structural design/fabrication. Radio controlled piloting experience on small fixed-wing platforms. |
| Software | MATLAB/Simulink, MSC Nastran/Patran (Finite Element Analysis), Unigraphics NX (CAD), National Instruments LabVIEW, DARC Corp Advanced Aircraft Analysis (AAA), LaTeX, MS Office, Gimp (open-source graphics editor), Inkscape (open-source graphics editor), Ubuntu(Linux)/Mac/Windows Operating Systems |
| Programming | C/C++, Python (limited), Robotic Operating System (ROS), Open-source software management with version control (Git), microcontroller programming (ARM), HTML |

Awards

- | | |
|------|---|
| 2018 | O. Hugo Schuck Best Paper Award http://a2c2.org/awards/o-hugo-schuck-best-paper-award
For paper: "Gone with the wind: Nonlinear Guidance for Small Fixed-wing Aircraft in Arbitrarily Strong Windfields" |
| 2014 | Awarded United States Department of Defense Antarctica Service Medal |
| 2012 | University of Kansas Aerospace Undergraduate Researcher Award |