

Volker Strobel

PhD researcher in swarm robotics & blockchain technology

IRIDIA - CP 194/6
Université Libre de Bruxelles
phone: +32 483 42 21 04
vstrobel@ulb.ac.be
<http://iridia.ulb.ac.be/~vstrobel/>
Born: 10-11-1987, German

Education

- 2016 – present** **PhD research fellow (F.R.S.-FNRS Aspirant Research fellowship)**,
IRIDIA, Université Libre de Bruxelles, Brussels, Belgium.
PhD topic: Blockchain-based smart contracts for the secure coordination of robot swarms.
Supervisor: Prof. Marco Dorigo
- 2014 – 2016** **Artificial Intelligence (M.Sc.)**,
Radboud University, Nijmegen, Netherlands.
Honours (Dutch grading system): Cum Laude (Letter Grade: A; First-class honours)
Thesis: Machine Learning-based Indoor Localization for Micro Aerial Vehicles.
Supervisors: Dr. Guido de Croon (TU Delft) and Dr. Louis Vuurpijl (Radboud University)
Additionally, I was a guest student in **Computer Science (M.Sc.)**, TU Delft, Delft, Netherlands.
- 2010 – 2014** **Cognitive Science (B.Sc.)**,
University of Tübingen, Tübingen, Germany.
Honours (German grading system): Sehr gut (Letter Grade: A; First-class honours)
Thesis: MyPDDL – A Modular Framework for the Planning Domain Definition Language.
Supervisors: Dr. Alexandra Kirsch and Prof. Martin Butz
- 2007 – 2010** **Investment Fund Specialist (Dual IHK Apprenticeship)**,
Deutsche Asset & Wealth Management Investment GmbH, Frankfurt, Germany.
Honours (German grading system): Sehr gut (Letter Grade: A; First-class honours)
I learned at applied the skills around the investment fund business (trading, transactions, marketing) at one of the largest European fund companies.

Research visits

- 2018** **Massachusetts Institute of Technology**,
MIT Media Lab, Cambridge, Massachusetts, U.S.A.
During two months at MIT, I collaborated with blockchain experts to study how blockchain technology can secure robot swarms and human interactions.
Supervisors: Prof. Alex “Sandy” Pentland and Dr. Eduardo Castelló Ferrer
- 2015 – 2016** **TU Delft**,
Micro Aerial Vehicle Lab (MAVLab), Delft, Netherlands.
For my graduation project, I conducted research on efficient indoor localization of micro aerial vehicles.
Supervisor: Prof. Guido de Croon

Technical skills

Operating systems	Linux (including server administration), macOS, Microsoft Windows
Programming	Python, C/C++, Java, R, MATLAB, Lisp, Haskell, Prolog, Git
Robotics software and hardware	OpenCV, Paparazzi Project, ARGoS3; Parrot AR.Drone2.0, Parrot Bebop2 drone, e-puck mobile robot
Typesetting	L ^A T _E X, B _I B _T E _X
Web	HTML, CSS, Flask

Languages

German	Native language	
English	Full professional proficiency	<i>I spent more than six years in international environments.</i>
Dutch	Advanced proficiency	<i>I live in the Dutch-speaking part of Belgium.</i>
French	Conversational level	<i>I can have a basic conversation in French.</i>

Projects

- Open-source software on GitHub (<https://github.com/Pold87>):
- Academic keyword occurrence
 - myPDDL — A Modular Knowledge Engineering Tool for PDDL

Scholarships

- 2017** I was accepted for a full PhD grant (F.R.S.-FNRS Aspirant Research fellowship) of the Belgian National Science Foundation for investigating how robot swarms can be securely coordinated via blockchain technology.

Selected publications

I have received more than 100 citations and have an *h*-index of 4 (see Google Scholar). The next page states my full list of publications. Here, I selected the two most important publications of my PhD research:

Journal article

- [J01] **Strobel V.**, Castelló Ferrer E., and Dorigo M. (2020). Blockchain Technology Secures Robot Swarms: A Comparison of Consensus Protocols and Their Resilience to Byzantine Robots. *Frontiers in Robotics and AI*, 7: 54.

Conference paper

- [P03] **Strobel V.**, Castelló Ferrer E., and Dorigo M. (2018). Managing Byzantine Robots via Blockchain Technology in a Swarm Robotics Collective Decision Making Scenario. In *Proceedings of the 17th Conference on Autonomous Agents and MultiAgent Systems (AAMAS 2018)*. Int. Foundation for Autonomous Agents and Multiagent Systems, Richland, SC, USA, 541–549.

Full list of publications

Journal articles

- [J01] **Strobel V.**, Castelló Ferrer E., and Dorigo M. (2020). Blockchain Technology Secures Robot Swarms: A Comparison of Consensus Protocols and Their Resilience to Byzantine Robots. *Frontiers in Robotics and AI*, 7: 54.

Book chapters

- [C01] **Strobel V.** and Kirsch A. (2020). MyPDDL: Tools for Efficiently Creating PDDL Domains and Problems. In *Knowledge Engineering Tools and Techniques for AI Planning*, Springer, Cham, Switzerland, 67–90.

Conference papers

- [P05] Pacheco A., **Strobel V.**, and Dorigo M. (2020). A Blockchain-Controlled Physical Robot Swarm Communicating via an Ad-Hoc Network. In *Swarm Intelligence – Proceedings of ANTS 2020 – 12th International Conference*, Vol. 12421 of Lecture Notes in Computer Science (LNCS). Springer, Cham, Switzerland, 3–15.
- [P04] **Strobel V.** and Dorigo M. (2018). Blockchain Technology for Robot Swarms: A Shared Knowledge and Reputation Management System for Collective Estimation. In *Swarm Intelligence – Proceedings of ANTS 2018 – 11th International Conference*, Vol. 11172 of Lecture Notes in Computer Science (LNCS). Springer, Cham, Switzerland, 425–426.
- [P03] **Strobel V.**, Castelló Ferrer E., and Dorigo M. (2018). Managing Byzantine Robots via Blockchain Technology in a Swarm Robotics Collective Decision Making Scenario. In *Proceedings of the 17th Conference on Autonomous Agents and MultiAgent Systems (AAMAS 2018)*. Int. Foundation for Autonomous Agents and Multiagent Systems, Richland, SC, USA, 541–549.
- [P02] **Strobel V.**, Meertens R., and de Croon G.C.H.E. (2017). Efficient Global Indoor Localization for Micro Aerial Vehicles. In *Proceedings of the 9th International Micro Air Vehicle Conference and Flight Competition (IMAV 2017)*.
- [P01] **Strobel V.** and Kirsch A. (2014). Planning in the Wild: Modeling Tools for PDDL. In *Proceedings of KI 2014 – 37th Annual German Conference on Artificial Intelligence (Lecture Notes in Artificial Intelligence)*, Vol. 8736 of Lecture Notes in Computer Science (LNCS). Springer, Cham, Switzerland, 273–284.

Technical reports

- [R01] Pacheco A., **Strobel V.**, and Dorigo M. (2020). A Framework for Swarm Robotics Experimentation with Pi-puck Robots and an Ethereum-based Blockchain. *Technical Report TR/IRIDIA/2020-001*, IRIDIA, Université Libre de Bruxelles, Brussels, Belgium.

Theses

- [T02] **Strobel V.** (2016). Machine Learning-based Indoor Localization for Micro Aerial Vehicles. *M.Sc. Thesis*, Radboud University, Netherlands.
- [T01] **Strobel V.** (2014). MyPDDL – A Modular Knowledge Engineering Tool for PDDL. *B.Sc. Thesis*, University of Tübingen, Germany.