

Fredrik Heintz (Updated September 16, 2009)

CONTACT INFORMATION	Fredrik Heintz Kungsgatan 14A 582 18 Linköping Sweden	Office: +46-(0)13-28 24 28 Mobile: +46-(0)70-207 43 88 E-mail: frehe@ida.liu.se WWW: http://www.ida.liu.se/~frehe
CITIZENSHIP	Sweden	
DATE OF BIRTH	15 December 1975	
LANGUAGES	Native speaker of Swedish. Fluent in English. Basic command of German.	
EDUCATION	Linköping University, Sweden Ph.D., Computer Science, March 2009 <i>Thesis</i> DyKnow: A Stream-Based Knowledge Processing Middleware Framework <i>Advisor</i> Professor Patrick Doherty M.S., Computer Science, April 2000 <i>Thesis</i> RoboSoc a System for Developing RoboCup Agents for Educational Use <i>Advisor</i> Professor Dimitar Driankov Teaching in Higher Education (university pedagogy courses) <ul style="list-style-type: none">• Learning, instruction and knowledge (LUK), 4 weeks, 2003.• Design, evaluation and organization for teaching (DUO), 4 weeks, 2004. Swedish Armed Forces A3 Hässleholm (the artillery), 1995–1996 Miami-Yoder High School, Colorado, USA Exchange Student, 1992–1993	
AWARDS	Best poster award for <i>FlexDx: A Reconfigurable Diagnosis Framework</i> at the MOVIII Strategic Research Center Workshop 2008. Dean's Teaching Award for AI Programming Fall 2006. Award given to teachers on courses that get a total course evaluation score ≥ 4.2 (of 5.0).	
EMPLOYMENTS	Department of Computer and Information Science, Linköping University, Sweden <i>Research Engineer</i> July 2008 – present <i>PhD Student</i> April 2000 – June 2008 <i>Teaching Assistant</i> January 2000 – March 2000 <i>Teaching Assistant</i> Part time 1998–1999 <i>Undergraduate Research Assistant to Erik Sandewall</i> Summer 1998 Prevas AB, Malmö, Sweden Summer 1999 ABB AB, Malmö, Sweden Summer 1994, Summer 1995, Summer 1996	

JOURNAL
PUBLICATIONS

[4] **Fredrik Heintz**, Jonas Kvarnström, and Patrick Doherty. Bridging the Sense-Reasoning Gap: DyKnow – Stream-Based Middleware for Knowledge Processing. *Advanced Engineering Informatics*, 2009.

[3] Patrick Doherty, Jonas Kvarnström, and **Fredrik Heintz**. A Temporal Logic-based Planning and Execution Monitoring Framework for Unmanned Aircraft Systems. *Journal of Autonomous Agents and Multi-Agent Systems*, 2009.

[2] **Fredrik Heintz** and Patrick Doherty. DyKnow: A Knowledge Processing Middleware Framework and its Relation to the JDL Fusion Model. *Journal of Intelligent and Fuzzy Systems*, 17(4), 2006.

[1] **Fredrik Heintz** and Patrick Doherty. DyKnow: An approach to middleware for knowledge processing. *Journal of Intelligent and Fuzzy Systems*, 15(1), 2004.

REFEREED
INTERNATIONAL
CONFERENCE
PUBLICATIONS

[9] **Fredrik Heintz**, Jonas Kvarnström, and Patrick Doherty. A Stream-Based Hierarchical Anchoring Framework. In *Proceedings of the International Conference on Intelligent Robots and Systems (IROS)*, 2009.

[8] **Fredrik Heintz**, Jonas Kvarnström, and Patrick Doherty. Knowledge Processing Middleware. In *Proceedings of the International Conference on Simulation, Modeling, and Programming for Autonomous Robots (SIMPAR)*, 2008.

[7] Mattias Krysander, **Fredrik Heintz**, Jacob Roll, and Erik Frisk. Dynamic Test Selection for Reconfigurable Diagnosis. In *Proceedings of the 47th IEEE Conference on Decision and Control (CDC)*, 2008.

[6] Jonas Kvarnström, **Fredrik Heintz**, and Patrick Doherty. A Temporal Logic-Based Planning and Execution Monitoring System. In *Proceedings of the 18th International Conference on Automated Planning and Scheduling (ICAPS)*, 2008.

[5] **Fredrik Heintz** and Patrick Doherty. DyKnow federations: Distributing and merging information among UAVs. In *Proceedings of the 11th International Conference on Information Fusion*, 2008.

[4] **Fredrik Heintz**, Piotr Rudol, and Patrick Doherty. From Images to Traffic Behavior - A UAV Tracking and Monitoring Operation. In *Proceedings of the 10th International Conference on Information Fusion*, 2007.

[3] **Fredrik Heintz** and Patrick Doherty. A Knowledge Processing Middleware Framework and its Relation to the JDL Fusion Model. In *Proceedings of the 8th International Conference on Information Fusion*, 2005.

[2] Patrick Doherty, Patrik Haslum, **Fredrik Heintz**, Torsten Merz, Tommy Persson, and Björn Wingman. A distributed architecture for intelligent unmanned aerial vehicle experimentation. In *Proceedings of the 7th International Symposium on Distributed Autonomous Robotic Systems (DARS)*, 2004.

[1] **Fredrik Heintz**, Johan Kummeneje, and Paul Scerri. Using Simulated RoboCup to Teach AI in Undergraduate Education. In *Proceedings of the 7th Scandinavian Conference on Artificial Intelligence (SCAI)*, 2001.

OTHER REFEREED
PUBLICATIONS

[7] **Fredrik Heintz**, Jonas Kvarnström, and Patrick Doherty. Stream Reasoning in DyKnow: A Knowledge Processing Middleware System. In *Proceedings of the 1th Stream Reasoning Workshop*, 2009.

[6] **Fredrik Heintz**, Mattias Krysanter, Jacob Roll, and Erik Frisk. FlexDx: A Reconfigurable Diagnosis Framework. In *Proceedings of the 19th International Workshop on Principles of Diagnosis (DX)*, 2008.

[5] **Fredrik Heintz**, Piotr Rudol, and Patrick Doherty. Bridging the sense-reasoning gap using DyKnow: A knowledge processing middleware framework. In *KI 2007: Advances in Artificial Intelligence*, 2007.

[4] **Fredrik Heintz**, Patrick Doherty. A Knowledge Processing Middleware Framework and its Relation to the JDL Fusion Model. In *Proceedings of the National Swedish Artificial Intelligence Workshop (SAIS)*, 2005.

[3] **Fredrik Heintz** and Patrick Doherty. Managing dynamic object structures using hypothesis generation and validation. In *Proceedings of AAAI Workshop on Anchoring Symbols to Sensor Data*, 2004.

[2] **Fredrik Heintz** and Patrick Doherty. DyKnow: A framework for processing dynamic knowledge and object structures in autonomous systems. In *International Workshop on Monitoring, Security and Rescue Techniques in Multi-Agent Systems (MSRAS)*, 2004.

[1] **Fredrik Heintz**. Chronicle recognition in the WITAS UAV project - a preliminary report. In *Proceedings of the National Swedish Artificial Intelligence Workshop (SAIS)*, 2001.

OTHER
PUBLICATIONS

[8] **Fredrik Heintz** and Jonas Kvarnström, editors. Proceedings of the Swedish AI Society Workshop, 2009.

[7] **Fredrik Heintz**, Jonas Kvarnström, and Patrick Doherty. Bridging the Sense-Reasoning Gap: DyKnow - A Middleware Component for Knowledge Processing. Invited paper to the Intelligent Robots and Systems (IROS) Workshop on Current Software Frameworks in Cognitive Robotics Integrating Different Computational Paradigms, 2008.

[6] **Fredrik Heintz** and Patrick Doherty. A knowledge processing middleware framework and its relation to the JDL data fusion model. In Petter Ögren, editor, *Proceedings of the Swedish Workshop on Autonomous Robotics (SWAR)*, 2005.

[5] Mao Chen, Ehsan Foroughi, **Fredrik Heintz**, ZhanXiang Huang, Spiros Kapetanakis, Kostas Kostiadis, Johan Kummeneje, Itsuki Noda, Oliver Obst, Patrick Riley, Timo Steffens, Yi Wang, and Xiang Yin. *Soccerserver Manual Ver. 7*, 2001.

[4] **Fredrik Heintz**, Johan Kummeneje, and Paul Scerri. Using simulated RoboCup in undergraduate education. In *RoboCup-2000: Robot Soccer World Cup IV*, 2001.

[3] Anneli Dahlström, **Fredrik Heintz**, Martin Jacobsson, Johan Thapper, and Martin Öberg. The NOAI team description. In *RoboCup-2000: Robot Soccer World Cup IV*, 2001.

[2] **Fredrik Heintz**. FCfoo99. In *RoboCup-99: Robot Soccer World Cup III*, 2000.

[1] Emiel Corten, Klaus Dorer, **Fredrik Heintz**, Kostas Kostiadis, Johan Kummeneje, Helmut Myritz, Itsuki Noda, Jukka Riekkki, Patrick Riley, Peter Stone, and Tralvex Yeap. *Soccerserver Manual Ver. 5.1*, 1999.

INVITED TALKS

[6] Centre for Autonomous Systems, School of Computer Science and Communication, Royal Institute of Technology, Stockholm, Sweden, September 2009.

[5] Intelligent Autonomous Systems Group, Computer Science Department, Technical University of München, München, Germany, June 2009.

[4] Intelligent Robotics and Cognitive Architectures Lab, University of Birmingham, Birmingham, UK, February 2009.

[3] Intelligent Robots and Systems (IROS) Workshop on Current Software Frameworks in Cognitive Robotics Integrating Different Computational Paradigms, Nice, France, September 2008.

[2] Language Technology Lab, The German Research Center for Artificial Intelligence (DFKI), Saarbrücken, Germany, April 2008.

[1] Swedish Defence Research Agency (FOI), Stockholm, Sweden, June 2007.

RESEARCH PROJECTS

The Linnaeus Center for Control, Autonomy, and Decision-making in Complex Systems (CADICS), 2008–present

- Funded by 55MSEK from the Swedish Research Council (VR) and 20MSEK from Linköping University, 2008–2018.
- The goal of CADICS is to establish an internationally leading research environment constituting a sharp and growing multidisciplinary front prepared to attack the demanding future research challenges in decision and control.
- My main contribution so far is as the webmaster of CADICS.

MOVIII: Modeling, Visualization and Information Integration. A center for decision support in complex systems, 2006–present

- Funded by 45MSEK from the Swedish Foundation for Strategic Research (SSF), 2006–2010.
- The mission of MOVIII is to develop tools and techniques for integrated decision support and autonomy for complex systems, grounded in experience with a wide spectrum of deployed systems and applications.
- My main contribution so far is the flexible and reconfigurable diagnosis framework FlexDx.

NFFP4-S4203 Cooperative Cognitive Computing with UAVs in a Network-Centric Perspective, 2006–2008

- Funded by 7.5MSEK from the National Aviation Engineering Research Programme (NFFP) and 7.5MSEK from SAAB AB, 2006–2008.
- The project resulted in theoretical results and live demonstrations of heterogeneous UAV platforms working in a cooperative manner to solve missions for search and rescue and search and pursuit of moving objects.
- My main contributions are a temporal logic-based execution monitoring functionality integrated with an existing forward chaining logic-based planner (TALplanner) and an extension of DyKnow to support distribution and fusion of knowledge among multiple UAVs (DyKnow Federations).

FP6 004381 Multi-sensory Autonomous Cognitive Systems Interacting with Dynamic Environments for Perceiving and Using Affordances (MACS), 2004–2006

- Funded by the European Commission 6th Framework Programme within the Cognitive Systems and Robotics unit, 2004–2007.
- The result of the MACS project is a autonomous mobile robot prototype acting goal-directedly in a dynamic environment which explores and exploits the concept of affordances for its design and implementation.
- My main contributions are the Entity Structure Generation Module and the Event and Execution Monitor based on my previous work on DyKnow, chronicle recognition and execution monitoring. Both of these components are part of the resulting affordance-based control architecture.

NFFP3+ 539 Components for Autonomous Systems (COMPAS), 2004–2005

- Funded by 2MSEK from the National Aviation Engineering Research Programme (NFFP) and 2MSEK from SAAB AB, 2004–2005.
- The project resulted in key components to build systems with autonomous behavior such as a distributed software architecture, a probabilistic path planner and a temporal logic-based execution monitoring component.
- My main contributions are the knowledge processing middleware framework which is part of the distributed software architecture and the temporal logic-based execution monitoring component.

The Wallenberg laboratory for research on Information Technology and Autonomous Systems (WITAS), 2000–2005

- Funded by three grants from the Wallenberg Foundation 1997–2005.
- A basic research project in the area of intelligent autonomous systems. The main result of the project is the development of fully operational autonomous unmanned aerial vehicles capable of making rational decisions based on various sources of knowledge including pre-stored knowledge and knowledge obtained from sensors.
- My main contribution is the knowledge processing middleware framework DyKnow which is used by the UAV to achieve situational awareness. The focus was on reasoning about and detecting traffic situations using chronicle recognition.

TEACHING EXPERIENCE

Linköping University

AI Programming, Course leader, 2000–present

- A multiagent programming course where the students develop their own RoboCup teams with a focus on implementing AI techniques.
- Developed the course, the lectures, the laboratory exercises and the software framework (RoboSoc) used in the course.

Research at Linköping Institute of Technology, Guest lecturer, 2009

- Gave an invited lecture “From Sensing to Reasoning in Autonomous UAVs”.

Programming under Pressure, Course leader, summer 2003

- Developed and held a course to teach students to solve algorithmic problems in groups of three under time pressure.

Data and Program Structures, Teaching assistant, 2000

- A programming course in Scheme based on Structure and Interpretation of Computer Programs by Abelson and Sussman.

Royal Institute of Technology (KTH)

Guest lecturer, 2006

- Two lectures in a RoboCup-based programming project course.

SUPERVISING

Linköping University

Master Students

- Johan Larsson, expected to finish in October 2009.
- Tommy Persson, Evaluating the Use of DyKnow in Multi-UAV Traffic Monitoring Applications, March 24 2009.
- Magnus Nordfeldt and Fredrik Skogman, Extending TACSI with Support for Group Behavior, May 2005. Nominated to the SAIS Best AI Master’s Thesis Award 2006.

PROFESSIONAL
SERVICE

Swedish AI Society (SAIS)

Secretary, 2000–present

- Responsible for the yearly SAIS Master’s Thesis Award.
- Webmaster, designed and programmed the website.
- Responsible for the Swedish AI history project.

ACM International Collegiate Programming Contest (ICPC)

Subregional Contest Director of the Nordic Collegiate Programming Contest (NCPC), 2003–2004, 2007–present

- Organized the first Nordic Collegiate Programming Contest in 2003. In 2007 we made the competition open to the general public (ICPC is only open to students).

National Contest Director Sweden, 2002–present

Contest Director Linköping, 2001–present

Coach Linköping University, 2001–present

RoboCup

Maintainer of the RoboCup simulation library archive and co-maintainer of the RoboCup simulator team repository, 2000–2006.

Co-author of the Soccer Server Manual (v. 5.1 – v. 7), 1999–2001.

Organized the first Swedish Championship in RoboCup simulation league, 2000.

Linköping University

PhD student representative on the faculty board of Linköping Institute of Technology (LiTH), 2001–2007

Numerous commissions of trust as a PhD student and as an undergraduate student on all levels within the university with a focus on education and information technology issues.

Department of Computer and Information Science at Linköping University

Coordinator for the Computer Science program, 2008–

Organizing Committees

Swedish AI Society Workshop (SAIS), 2009 (Workshop chair)

Program Committees

Skvde Workshop on Information Fusion Topics (SWIFT), 2009

International Workshop on Hybrid Control of Autonomous Systems (HYCAS), 2009

Scandinavian AI Conference (SCAI), 2006 and 2008.

Swedish AI Society Workshop (SAIS), 2001–present

Reviewing

Advanced Engineering Informatics Special Issue on Current software frameworks in cognitive robotics integrating different computational paradigms, 2009

Skvde Workshop on Information Fusion Topics (SWIFT), 2009

International Workshop on Hybrid Control of Autonomous Systems (HYCAS), 2009

Scandinavian AI Conference (SCAI), 2006 and 2008.

Swedish AI Society Workshop (SAIS), 2001–present

SKILLS

Organizational Skills

Leadership and management experience mainly from volunteer organizations such as being the president of the student cinema club Kårrullen, which shows movies every week, is run by a group of about 10 students and had about 1400 members.

Knowledge and information management skills mainly from being the secretary and the webmaster of several organizations, including the Swedish AI Society and Munkskänkarna.

Event organization skills from being responsible for organizing many different types of events ranging from a medium sized workshop with about 60 participants, to movie screenings for up to 600 people, to large student parties with almost 1000 visitors.

Technical Skills

Extensive programming experience mainly in C++ on UNIX where I have developed two large scale (more than 100 000 lines of code each) software frameworks from scratch, DyKnow and RoboSoc. DyKnow is a stream-based knowledge processing middleware framework implemented using TAO/ACE CORBA which has been deployed on autonomous UAV and ground robot platforms and used both in a reconfigurable diagnosis framework and by researchers in the EU funded MACS project. RoboSoc is a software framework for developing RoboCup agents which has been used in an AI Programming since 2000 and by students all over the world.

EXTRA CURRICULAR ACTIVITIES

Munkskänkarna (national wine tasting association)

Secretary Linköping section, 2007–present

1st place in regional wine tasting competition, 2009

1st place in local and 2nd place in regional wine tasting competition, 2008

Lecturing on wine and wine tasting, 2007–present

Kårrullen (student cinema club)

President, 2001–2003

Webmaster, 2000–2001