

## Extended CV for Fredrik Heintz (Updated January 25, 2014)

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CONTACT INFORMATION	Fredrik Heintz Kungsgatan 21A 582 18 Linköping Sweden	Office: +46-(0)13-28 24 28 Mobile: +46-(0)70-207 43 88 E-mail: <a href="mailto:fredrik.heintz@liu.se">fredrik.heintz@liu.se</a> WWW: <a href="http://www.ida.liu.se/~frehe">http://www.ida.liu.se/~frehe</a>
CITIZENSHIP	Sweden	
DATE OF BIRTH	15 December 1975	
RESEARCH STATEMENT	<p>My main research focus is developing theories, algorithms and systems for stream reasoning grounded through sensing. The long term goal is to make collaborative cognitive autonomous systems that are situationally aware about their environment allowing them to make timely, optimal and rational decisions. A major challenge is bridging the gap between the information acquired through sensing and the information required for reasoning. This problem is related to the fundamental problem of symbol grounding. My research lies in the intersection between AI, knowledge representation and reasoning, semantic technologies, and robotics and greatly benefit from having access to several different very sophisticated unmanned aircraft systems and my research connections to the electrical engineering department. Improving the theoretical and practical foundations for bridging the sense-reasoning gap makes a significant contribution that is essential to develop cognitive robots capable of for example assisting emergency services in dangerous disaster situations such as Fukushima and carrying out monotonous missions requiring constant attention such as border patrol and power line inspection.</p> <p>My two main research achievements so far are (1) the DyKnow Knowledge Processing Middleware Framework supporting grounded stream reasoning and resulting in an initial solution to the problem of bridging the sense-reasoning gap; and (2) the Delegation Framework for collaborative unmanned aircraft systems providing an initial solution to the problem of mixed-initiative collaboration between humans and autonomous systems supporting multi-agent planning, scheduling and execution through a flexible constraint-based approach.</p>	
EDUCATION	<p><b>Linköping University, Sweden</b></p> <p>Docent, Computer Science, January 2014</p> <p>Ph.D., Computer Science, March 2009 <i>Thesis</i> DyKnow: A Stream-Based Knowledge Processing Middleware Framework <i>Advisor</i> Professor Patrick Doherty</p> <p>M.S., Computer Science, April 2000 <i>Thesis</i> RoboSoc a System for Developing RoboCup Agents for Educational Use <i>Advisor</i> Professor Dimiter Driankov</p> <p>Teaching in Higher Education (university pedagogy courses)</p> <ul style="list-style-type: none"><li>• Learning, instruction and knowledge (LUK), CUL, 4 weeks, 2003.</li><li>• Design, evaluation and organization for teaching (DUO), CUL, 4 weeks, 2004.</li><li>• Supervision in Doctoral Studies, CUL, 4 weeks, 2011.</li></ul> <p>Dialogue seminar training, Combitech, 2013.</p> <p><b>Munich Technical University, Germany</b></p> <p>Visiting postdoc to professor Michael Beetz and the Intelligent Autonomous Systems Group. June 2009.</p>	

## Swedish Armed Forces

A3 Hässleholm (the artillery), 1995–1996

### AWARDS

Best poster award for *FlexDx: A Reconfigurable Diagnosis Framework* 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  $\geq 4.2$  (of 5.0).

### EMPLOYMENTS

**Department of Computer and Information Science**, Linköping University, Sweden

*Parental leave* **September 2012 – December 2012**

*Forskarassistent* **June 2010 – present**

*Research Engineer* **July 2008 – May 2010**

*PhD Student* **April 2000 – June 2008**

*Teaching Assistant* **January 2000 – March 2000**

*Teaching Assistant* **Part time 1998–1999**

*Undergraduate Research Assistant to Erik Sandewall* **Summer 1998**

**Prevas AB**, Malmö, Sweden **Summer 1999**

**ABB AB**, Malmö, Sweden **Summer 1994, Summer 1995, Summer 1996**

### GRANTS AS PRINCIPLE INVESTIGATOR

Stream-Based Reasoning Grounded Through Sensing, The Center for Industrial Information Technology, 2.85MSEK, 2010 – 2015.

Dialogseminariemetodiken fr kad genomstrmning och mer professionella civilingenjrer, Pedagogiska Utvecklingsgruppen LiTH, 250kSEK, 2014.

Computational Thinking i Diskret Matematik, Pedagogiska Utvecklingsgruppen LiTH, 200kSEK, 2013.

Automatrttning av examination med anpassad återkoppling, Nämnden för Data- och Medieteknik LiTH, 190kSEK, 2012.

Tävlingar som inlärningsstöd i programmeringskurser, Pedagogiska Utvecklingsgruppen, LiTH 150kSEK, 2011.

### JOURNAL PUBLICATIONS

[J7] Patrick Doherty, **Fredrik Heintz**, and Jonas Kvarnström. High-level mission specification and planning for collaborative unmanned aircraft systems using delegation. *Journal of Unmanned Systems*, 1(1):75–119, 2013.

[J6] **Fredrik Heintz**, Jonas Kvarnström, and Patrick Doherty. Stream-based hierarchical anchoring. *Künstliche Intelligenz*, 27(2):119–128, 2013.

[J5] Mattias Krysander, **Fredrik Heintz**, Jacob Roll, and Erik Frisk. FlexDx: A Reconfigurable Diagnosis Framework. *Engineering Applications of Artificial Intelligence*, 23(8):1303–1313, 2010.

[J4] **Fredrik Heintz**, Jonas Kvarnström, and Patrick Doherty. Bridging the Sense-Reasoning Gap: DyKnow – Stream-Based Middleware for Knowledge Processing. *Advanced Engineering Informatics*, 24(1):14–26, 2010.

[J3] 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*, 19(3):332–377, 2009.

[J2] **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):335–351, 2006.

[J1] **Fredrik Heintz** and Patrick Doherty. DyKnow: An approach to middleware for knowledge processing. *Journal of Intelligent and Fuzzy Systems*, 15(1):3–13, 2004.

#### BOOK CHAPTERS

[BC2] Patrick Doherty, Jonas Kvarnström, Mariusz Wzorek, Piotr Rudol, **Fredrik Heintz**, and Gianpaolo Conte. *Handbook of Unmanned Aerial Vehicles*, chapter HDRC3: A Distributed Hybrid Deliberative/Reactive Architecture for Unmanned Aircraft Systems. Springer Verlag, 2014.

[BC1] Patrick Doherty, **Fredrik Heintz**, and David Landén. *Agent-Oriented Software Engineering XI*, chapter A Delegation-Based Architecture for Collaborative Robotics, pages 205–247. LNCS 6788. Springer-Verlag, Berlin Heidelberg, 2011.

#### REFEREED CONFERENCE PUBLICATIONS

[C26] **Fredrik Heintz** and Inger Erlander Klein. The Design of Sweden’s First 5-year Computer Science and Software Engineering Program. In *Proceedings of SIGCSE*, 2014.

[C25] Patrick Doherty, **Fredrik Heintz**, and Jonas Kvarnström. Robotics, Temporal Logic and Stream Reasoning. In *Proceedings of Logic for Programming Artificial Intelligence and Reasoning (LPAR)*, 2013.

[C24] **Fredrik Heintz** and Tommy Färnqvist. Återkoppling genom automaträttning. In *Proceedings of 4:de Utvecklingskonferensen för Sveriges ingenjörsutbildningar*, 2013.

[C23] **Fredrik Heintz** and Inger Erlander Klein. Utvecklingen av Civilingenjör Mjukvaruteknik vid Linköpings Universitet – Ml, Design och Erfarenheter. In *Proceedings of 4:de Utvecklingskonferensen för Sveriges ingenjörsutbildningar*, 2013.

[C22] **Fredrik Heintz**. Semantically grounded stream reasoning integrated with ROS. In *Proceedings of IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS)*, 2013.

[C21] **Fredrik Heintz** and Daniel de Leng. Semantic information integration with transformations for stream reasoning. In *Proceedings of the 16th International Conference on Information Fusion (FUSION)*, 2013.

[C20] **Fredrik Heintz** and Tommy Färnqvist. Pedagogical experiences of competitive elements in an algorithms course. In *Proceedings of LTHs 7:e Pedagogiska Inspirationskonferens (PIK)*, 2012.

[C19] **Fredrik Heintz** and Zlatan Dragisic. Semantic information integration for stream reasoning. In *Proceedings of the 15th International Conference on Information Fusion (FUSION)*, 2012.

[C18] Patrick Doherty and **Fredrik Heintz**. Delegation-Based Collaboration. In *Proceedings of the 5th International Conference on Cognitive Systems (CogSys)*, 2012.

[C17] Patrick Doherty and **Fredrik Heintz**. A delegation-based cooperative robotic framework. In *Proceedings of the IEEE International Conference on Robotics and Biomimetics (IEEE-ROBIO)*, 2011.

- [C16] Patrick Doherty, David Landén, and **Fredrik Heintz**. A distributed task specification language for mixed-initiative delegation. In *Proceedings of the 13th International Conference on Principles and Practice of Multi-Agent Systems (PRIMA)*, 2010.
- [C15] David Landén, **Fredrik Heintz**, and Patrick Doherty. Complex task allocation in mixed-initiative delegation: A UAV case study (early innovation). In *Proceedings of the 13th International Conference on Principles and Practice of Multi-Agent Systems (PRIMA)*, 2010.
- [C14] **Fredrik Heintz** and Patrick Doherty. Federated DyKnow, a distributed information fusion system for collaborative UAVs. In *Proceedings of the International Conference on Control, Automation, Robotics and Vision (ICARCV)*, 2010.
- [C13] **Fredrik Heintz**, Jonas Kvarnström, and Patrick Doherty. Stream-based middleware support for autonomous systems. In *Proceedings of the European Conference on Artificial Intelligence (ECAI)*, 2010.
- [C12] **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.
- [C11] **Fredrik Heintz**, Jonas Kvarnström, and Patrick Doherty. Knowledge Processing Middleware. In *Proceedings of the International Conference on Simulation, Modeling, and Programming for Autonomous Robots (SIMPAN)*, 2008.
- [C10] 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.
- [C9] **Fredrik Heintz**, Mattias Krysander, Jacob Roll, and Erik Frisk. FlexDx: A Reconfigurable Diagnosis Framework. In *Proceedings of the 19th International Workshop on Principles of Diagnosis (DX)*, 2008.
- [C8] 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.
- [C7] **Fredrik Heintz** and Patrick Doherty. DyKnow federations: Distributing and merging information among UAVs. In *Proceedings of the 11th International Conference on Information Fusion*, 2008.
- [C6] **Fredrik Heintz**, Piotr Rudol and Patrick Doherty. Bridging the Sense-Reasoning Gap Using DyKnow: A Knowledge Processing Middleware Framework. In *Proceedings of the 30th Annual German Conference on Artificial Intelligence (KI)*. In series: Lecture Notes in Computer Science #4667. Springer.
- [C5] **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.
- [C4] **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.
- [C3] 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.

[C2] **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.

[C1] **Fredrik Heintz**, Johan Kummeneje, and Paul Scerri. Using simulated RoboCup in undergraduate education. In *RoboCup-2000: Robot Soccer World Cup IV*, 2000.

#### BOOKS

[B2] Luc De Raedt, Christian Bessiere, Didier Dubois, Patrick Doherty, Paolo Frasconi, **Fredrik Heintz**, and Peter Lucas, editors. *20th European Conference on Artificial Intelligence (ECAI)*. IOS Press, 2012.

[B1] Anders Kofod-Petersen, **Fredrik Heintz**, and Helge Langseth, editors. *11th Scandinavian Conference on Artificial Intelligence (SCAI)*. IOS Press, 2011.

#### OTHER REFEREED PUBLICATIONS

[W11] Patrick Doherty, **Fredrik Heintz**, and David Landén. A delegation-based collaborative robotic framework. In *Proceedings of the 3rd International Workshop on Collaborative Agents - Research and development (CARE)*, 2011.

[W10] Patrick Doherty, Jonas Kvarnström, **Fredrik Heintz**, David Landn and Per-Magnus Olsson. Research with Collaborative Unmanned Aircraft Systems. In *Proceedings of the Dagstuhl Workshop on Cognitive Robotics*. In series: Dagstuhl Seminar Proceedings #10081. Leibniz-Zentrum für Informatik, 2010.

[W9] **Fredrik Heintz**, Jonas Kvarnström and Patrick Doherty. Stream-Based Reasoning in DyKnow. In *Proceedings of the Dagstuhl Workshop on Cognitive Robotics*. In series: Dagstuhl Seminar Proceedings #10081. Leibniz-Zentrum für Informatik, 2010.

[W8] **Fredrik Heintz**, Jonas Kvarnström, and Patrick Doherty. Stream-Based Middleware Support for Embedded Reasoning. In *Proceedings AAAI Spring Symposium on Embedded Reasoning*, 2010.

[W7] **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.

[W6] **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.

[W5] **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.

[W4] **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.

[W3] **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.

[W2] **Fredrik Heintz** and Patrick Doherty. DyKnow: A framework for processing dynamic knowledge and object structures in autonomous systems. In *Interna-*

*tional Workshop on Monitoring, Security and Rescue Techniques in Multi-Agent Systems (MSRAS)*, 2004.

[W1] **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

[O5] **Fredrik Heintz** and Jonas Kvarnström, editors. Proceedings of the Swedish AI Society Workshop, 2009.

[O4] 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.

[O3] Anneli Dahlström, **Fredrik Heintz**, Martin Jacobsson, Johan Thapper, and Martin Öberg. The NOAI team description. In *RoboCup-2000: Robot Soccer World Cup IV*, 2001.

[O2] **Fredrik Heintz**. FCFoo99. In *RoboCup-99: Robot Soccer World Cup III*, 2000.

[O1] Emiel Corten, Klaus Dorer, **Fredrik Heintz**, Kostas Kostiadis, Johan Kummeneje, Helmut Myritz, Itsuki Noda, Jukka Rieki, Patrick Riley, Peter Stone, and Tralvex Yeap. *Soccerserver Manual Ver. 5.1*, 1999.

INVITED TALKS

[T30] “The Sky is the limit! Utilizing UAV:s in Civil Applications”, popular science talk to LiTH students, Visualization Center Norrköping, November 2013.

[T29] “Software Architectures for Autonomous Systems”, SAAB technology leader seminar, Linköping, November 2013.

[T28] “AIICS/IDA Humanoid Robot Lab”, IEEE Symposium on Safety, Security and Rescue Robotics, Linköping, October 2013.

[T27] “Grounded Stream Reasoning for Autonomous Systems”, ELLIIT Workshop, Lund, October 2013.

[T26] “ICPC Auto Analyst”, Competitive Learning Initiative Symposium, ACM ICPC World Finals, St Petersburg, Russia, July 2013.

[T25] “Civilingenjör Mjukvaruteknik – Att designa en utbildning utifrån ACM CS Curriculum”, Nätverksträff för Data-, IT-, och Medie-utbildningar, Växjö, Sweden, June 2013.

[T24] “Humanoida Robotar”, Dataföreningen och DataSaabs vänner, Linköping, Sweden, May 2013.

[T23] “Grounded Spatio-Temporal Stream Reasoning”, Malik Ghallab’s group at LAAS, Toulouse, France, April 2013.

[T22] “AI och Autonoma Farkoster”, Digital spaning i eRegionen, Norrköping, Sweden, November 2012.

[T21] “Grounded Spatio-Temporal Stream Reasoning”, SAAB AB Järfälla, Sweden, November 2012.

[T20] “Semantic Information Integration for Stream Reasoning”, CADICS Workshop, Norrköping, Sweden, October, 2012.

- [T19] “Vad är programmering? eller Vad alla programmerare (tror de) vet”, Skill AB, Linköping, Sweden, September 2012.
- [T18] “Examination av Projektkurser”, Nätverksträff för Data-, IT-, och Medie-utbildningar, Chalmers, Sweden, May 2012.
- [T17] “IMPA: A Challenge-Based University-Level Programming Competition”, Competitive Learning Initiative Symposium, ACM ICPC World Finals, Warsaw, Poland, May 2012.
- [T16] “Tävlingsprogrammering – Pedagogiska erfarenheter av tävlingsmoment i DALG-kursen”, IDAs grundutbildningsdag, Linköping, Sweden, March 2012.
- [T15] “Stream-Based Reasoning Grounded Through Sensing”, Scania AB, Södertälje, Sweden, August 2010.
- [T14] “A Stream-Based Approach to Bridging the Sense-Reasoning Gap in Autonomous UAV Applications”, Mani Chandy’s group at CalTech, USA, March 2010.
- [T13] “DyKnow: A Stream-Based Knowledge Processing Middleware Framework”, CADICS – NTU Workshop on Autonomous Vehicle, Linköping, November 2009.
- [T12] “DyKnow: A Stream-Based Knowledge Processing Middleware Framework – Bridging the Sense-Reasoning Gap in Autonomous UAV Applications”, Johan de Kleer’s group at PARC, USA, October 2009.
- [T11] “DyKnow: A Stream-Based Knowledge Processing Middleware Framework – Bridging the Sense-Reasoning Gap in Autonomous UAV Applications”, Bill Smart’s group at Washington University Saint Louis, USA, October 2009.
- [T10] “Bridging the Sense-Reasoning Gap in Autonomous UAV Applications”, Danica Kragic’s group at Center for Autonomous Systems, School of Computer Science and Communication, Royal Institute of Technology, Stockholm, Sweden, September 2009.
- [T9] “DyKnow: A Stream-Based Knowledge Processing Middleware Framework – Bridging the Sense-Reasoning Gap in Autonomous UAV Applications”, Michael Beetz’s group the Intelligent Autonomous Systems Group, Computer Science Department, Technical University of München, München, Germany, June 2009.
- [T8] “DyKnow: A Stream-Based Knowledge Processing Middleware Framework”, MOVIII Workshop, Linköping, Sweden, May 2009.
- [T7] “Autonomous Unmanned Aerial Vehicle (UAV) Research at Linköping University”, Dackeakademin, Mjölby, Sweden, April 2009.
- [T6] “DyKnow: A Stream-Based Knowledge Processing Middleware – Bridging the Sense-Reasoning Gap in Autonomous UAV Applications”, Nick Hawes’ group the Intelligent Robotics and Cognitive Architectures Lab, University of Birmingham, Birmingham, UK, February 2009.
- [T5] “Bridging the Sense-Reasoning Gap: DyKnow – A Middleware Framework for Knowledge Processing”, Intelligent Robots and Systems (IROS) Workshop on Current Software Frameworks in Cognitive Robotics Integrating Different Computational Paradigms, Nice, France, September 2008.

[T4] “Knowledge Processing Middleware Integrating Sensing and Reasoning”, Geert-Jan de Kruijff’s group the Language Technology Lab, The German Research Center for Artificial Intelligence (DFKI), Saarbrücken, Germany, April 2008.

[T3] “DyKnow – A Knowledge Processing Middleware Framework”, Swedish Defence Research Agency (FOI), Stockholm, Sweden, June 2007.

[T2] “Artificial Intelligence – Symbols and Search”, Lars Wadsö’s group at Division of Building Materials, Lund Institute of Technology, May 2006.

[T1] “Introduction to RoboCup at LiTH”, LiTH-dagen, Linköping, Sweden, November 2000.

## RESEARCH PROJECTS

NFFP6: Knowledge Intensive Mixed Initiative Mission Planning Technologies for Cooperative Autonomous Systems, 2013–present

- Funded by the National Aviation Engineering Research Programme (NFFP) in collaboration with SAAB AB, 2013–2016.
- I am responsible for the work package Ontology-based support for knowledge intensive mission planning.

FP7 SHERPA: Smart collaboration between Humans and ground-aerial Robots for improving rescuing activities in Alpine environments, 2013–present

- Funded by the European Union 7th Frame Programme, 2013–2017.
- I am responsible for the task Delegation Framework within our work package Mixed-Initiative Cooperative Systems.

CUAS: Collaborative Unmanned Aircraft Systems, 2011–present

- Funded by Vinnova, 2011–2016.
- I am responsible for the integration of the different components into a working system, as well as the work packages Grounded Distributed Situation Awareness and Temporal and Spatial Reasoning Techniques for Collaborative UAS’s.

ELLIIT: Excellence Center at Linköping-Lund in Information Technology, 2011–present

- Funded by the Swedish Ministry of Education, 2011–present.
- I am involved in the project Mixed Initiative Decision Support for Collaborative UAS Systems.

CENIIT: Stream-Based Reasoning Grounded Through Sensing, 2010–present

- Funded by the Center for Industrial Information Technology, 2010–2015.
- I am the **principle investigator**.

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

- Funded by the Swedish Research Council (VR) and 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.
- I am a member of the CADICS Junior Faculty and responsible for the Stream Based Reasoning project within CADICS.

NFFP5: Mixed-Initiative Decision Support for Collaborative Unmanned Aircraft Systems in Advanced collaborative UAS Scenarios, 2010–2013

- Funded by the National Aviation Engineering Research Programme (NFFP) in collaboration with SAAB AB, 2010–2013.
- The project resulted in theoretical results and live demonstrations of multiple UAV platforms working in a cooperative manner in search and rescue missions.



- My main contribution is developing the delegation framework together with Patrick Doherty, David Landén and Jonas Kvarnström.

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

- Funded by 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 is the flexible and reconfigurable diagnosis framework FlexDx.

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

- Funded by the National Aviation Engineering Research Programme (NFFP) in collaboration with 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).

MACS: FP6 004381 Multi-sensory Autonomous Cognitive Systems Interacting with Dynamic Environments for Perceiving and Using Affordances, 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 the National Aviation Engineering Research Programme (NFFP) in collaboration with 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.

WITAS: The Wallenberg laboratory for research on Information Technology and Autonomous Systems, 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 AND  
EDUCATION

Linköping University

Civilingenjör Mjukvaruteknik, Chairman of Programplanegruppen, 2012–present.

- Responsible for the design and realization of the program.

Professionalism for Engineers, Mentor, 2012–present.

- Part of the team developing the course.
- Mentor for two student groups using the dialogue seminar method developed by KTH and Combitech.

Functional and imperative programming in Python, Assistant, 2013–present.

- Assists the students during the laboratory exercises, corrects assignments and holds seminars.
- My motivation for doing this is to learn more about teaching introductory programming and also to get to know the Mjukvaruteknik students better.

Advanced Algorithmic Problem Solving, Course leader and Examiner, 2013–present.

- Developed a PhD course on advanced algorithms and methods for algorithmic problem solving.

Perspectives on Computer Science, Project supervisor, 2012–present.

- Developed two projects for the course. The first is on building web-based map applications using Django and the Google Maps API. The second is on programming humanoid robots to play soccer and included building up a humanoid lab with 7 humanoid robots and a large soccer field.

AI Programming, Course leader and Examiner, 2000–2012.

- 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.

Multi-Agent Systems, Course leader, 2010–2011.

- Lead a PhD course based on Michael Wooldridge book An Introduction to Multiagent Systems.

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

Co-supervised PhD Students

- Olov Andersson, expected to finish his licentiate 2014.
- David Landén, Licentiate Thesis Complex Task Allocation for Delegation: From Theory to Practice, Oct 2011.

## Master Students

- Mattias Tiger, expected to be finished in August 2014.
- Daniel de Leng, Semantic Information Integration with Transformations for Stream-Reasoning, December 2013.
- Christopher Bergdahl, Modeling Air Combat with Influence Diagrams, June 2013.
- Johan Fredborg, Spam Filter for SMS-traffic, May 2013.
- Anders Hongslö, Stream Processing in the Robot Operating System framework, June 2012.
- Viet Ha Nguyen, jointly supervised with Unmesh Bordoloi, Design Space Exploration of the Quality of Service for Stream Reasoning Applications, June 2012.
- Daniel Lazarovski, Extending the Stream Reasoning in DyKnow with Spatial Reasoning in RCC-8, March 2012.
- Zlatan Dragisic, Semantic Matching for Stream Reasoning, October 2011.
- Erik Lundqvist, Design Patterns for Service-Based Fault Tolerant Mechatronic Systems, September 2011.
- Mikael Rudner, Slung Load Control and User Interfaces for a Quadrotor Micro Air Vehicle, June 2011.
- Tommy Persson, Evaluating the Use of DyKnow in Multi-UAV Traffic Monitoring Applications, March 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.

## Bachelor Students

- Anders Skoglund, Comparing Asynchronous and Synchronous Approaches to Knowledge Processing, June 2011.
- Fredrik Åslin, Evaluation of Hierarchical Temporal Memory in Algorithmic Trading, February 2010.

## PROFESSIONAL SERVICE

### ACM International Collegiate Programming Contest (ICPC)

Contest Director for the North Western European Regional Contest (NWERC), 2014–2015.

Leader of the ICPC Analyst team at the ICPC World Finals, 2014–.

Leader of the analyst team for ICPC Live at the ICPC World Finals, 2009–2013.

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, 2000–present.

Coach Linköping University, 2000–present.

### Linköping University

Member of the Board of Didacticum, 2014–present.

Member of Programnämnd för Data- och Medieteknik, 2012–present.

Chairman of Programplanegruppen för Mjukvaruteknik, 2012–present.

Member of CADICS Junior Faculty, 2011–present.

Member of Programplanegruppen för C, D och CS, 2009–present.

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

Leader of IDA Computer Science Education group, 2013–present.

Leader of the group responsible for developing the IDA part of Mjukvaruteknik, 2012–present.

Leader for AIICS Humanoid Robotics activities, 2012–present.

Deputy member of the Board, 2012–present.

Leader for the Cognitive Robotics research group within the Knowledge Processing Lab, 2010–present.

Coordinator for the Computer Science program, 2009–2013.

#### Swedish AI Society (SAIS)

President, 2010–present.

Secretary, 2000–2010.

#### Organizing Committees

Program chair, IEEE Symposium on Safety, Security and Rescue Robotics (SSRR), 2013.

Workshop chair, IROS Workshop on From Remotely-controlled to Autonomous-collaborative Robots, 2013.

Demo chair, European Conference on Artificial Intelligence (ECAI), 2012.

Program chair, Scandinavian Conference on Artificial Intelligence (SCAI), 2011.

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

#### Reviewing (selection)

IEEE International Conference on Robotics and Automation (ICRA), 2013–present.

IEEE Symposium for Safety, Security and Rescue Robotics (SSRR), 2012–present.

International Conference on Intelligent Robots and Systems (IROS), 2012–present.

Autonomous Systems and Multiagent Systems (AAMAS), 2010–present.

International Conference on Information Fusion (Fusion), 2010–present.

Scandinavian AI Conference (SCAI), 2006–present.

Swedish AI Society Workshop (SAIS), 2001–present.

Association for the Advancement of Artificial Intelligence (AAAI), 2011.

International Joint Conference on Artificial Intelligence, (IJCAI), 2011.

International Conference on Artificial Intelligence Planning and Scheduling (ICAPS), 2009–2010.

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

Journals such as Advanced Engineering Informatics, Computational Intelligence, Robotics, Robotics and Autonomous Systems, IEEE Transactions on Systems, Man and Cybernetics: Systems, and Information Sciences.

### 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.

EXTRA CURRICULAR [Munskänkarna](#) (national wine tasting association)

#### ACTIVITIES

Treasurer Linköping section Bacchus, 2013–present.

Secretary Linköping section Bacchus, 2007–2013.

1st place in regional wine tasting competition, 2009.

1st place in local and 2nd place in regional wine tasting competition, 2008, 2013.

Lecturing on wine and wine tasting, 2007–present.

### [Kårrullen](#) (student cinema club)

President, 2001–2003.

Webmaster, 2000–2001.