John Benjamin Cassel

Current Direction

Discovery-driven domain design and software development
of systems engineering, operational planning, and experimental design platforms
to support agro-ecological engineering and multifunctional landscape design.

Work experience

◇ **Principal Software Engineer**, Indigo Agriculture, Charleston, MA (Summer-2022-Present)
- Navigating sensemaking and discovery activities that solve integration questions.
- Developing processes and software architectural concepts to allow new initiatives to thrive.
- Coleading a company-scale initiative on reconciling data models across digital products.

◇ **Staff Software Engineer**, Indigo Agriculture, Charlestown, MA (Spring 2022-Summer 2022)
- Sensemaking and software system design to expand data models and architecture.

◇ **Research Programmer**, Wolfram|Alpha LLC, Champaign, IL (Spring 2018-Spring 2022)
- Formulated and undertook biology content gathering to address partner needs.
- Developed biomolecular sequence functionality for the Wolfram Language.

◇ **Systems Engineer; Tech lead**, Agrible, Champaign, IL (Summer 2015-Winter 2017)
- Co-created the main task processing system of the analysis backend.
- Codeveloped the primary representation and interface for farm activities.

◇ **Research Programmer**, Wolfram Research, Champaign, IL (Spring 2014-Summer 2015)
- Created an engineering design framework supporting agent-based exploration.
- Assisted in the development of user-visible Mathematica functionality.
- Supported Wolfram|Alpha database applications.

◇ **Software Engineer**, Wolfram|Alpha LLC, Champaign, IL (Fall 2009-Winter 2013)
- Enhanced an internal object-relational toolkit with inheritance and geo-temporal support.
- Developed and maintained W|A database release infrastructure.
- Advised multiple object-relational schema designs.

◇ **Member of the Technical Staff**, Wolfram Research, Champaign, IL (Summer 2008-Fall 2009)
- Engineered a database deployment system.
- Wrote a novel version control system for data.
- Designed machine learning tools for anticipating user behavior.

◇ **Research Engineer**, Riverglass Incorporated, Champaign, IL (Fall 2005 – Summer 2008)
- Devised a domain-specific knowledge resource editor with rich constraint checking.
- Invented a new probabilistic network technique for modeling intelligence scanning tasks.

◇ **Research Consultant**, Riverglass Incorporated (Spring 2005 – Fall 2005)
- Constructed a knowledge-base with probabilistic inference rules.
- Built a planning system for evaluating the importance of analytics tasks.

◇ **Research Assistant**, Automated Learning Group, NCSA (2004)

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United States of America

- Invented a visualization for the comparison of event sequences.
- Discovered new algorithms for learning and planning over streams of event sequences.

◇ **Research Assistant**, Depend Research Group, CRHC (Summer 2003 – Fall 2003)

- Engineered an environment for mining patterns of faults to aid in error detection and recovery.
- Formulated a transparent method for annotating compiler-generated dependency/dominator graphs with runtime-collected information.

◇ **Research Programmer**, Department of Physics, (Summer 2002 – Winter 2002)

- Designed, implemented, optimized, and assessed an iteratively scanning muon tracking algorithm for the RTES subsystem of the BTeV particle detector.

◇ **Research Programmer**, Department of Aviation, (Spring 2001 – Summer 2001)

- Modeled the behavior of the crew of a Navy destroyer in the context of training simulations and onboard electronic assistant as used by the chief damage control officer.

Education

◇ **OCAD University**, Toronto, ON, Canada
M.Des. in Strategic Foresight and Innovation, May 2011
Major Project: *Addressing Risk Governance Deficits through Scenario Modeling Practices.*
Advisers: Peter Jones with Walter Derzko
Committee review: John's work as demonstrated in the MRP can be recognized as an important contribution to systemic foresight theory and practice. ...It has a serious moral thrust in its ability to deal effectively with problems of significant scale and complexity. Because of this temper, this methodology can ... facilitate breakthroughs of understanding, consensus for action, and the coordination of social power.

◇ **University of Illinois**, Champaign-Urbana, IL
B.Sc. in Computer Science with Honors, May 2002.
Application Sequence: *Manufacturing Engineering.*

Publications

◇ **2014** Cassel, J. Probabilistic Programming with Stochastic Memoization: Implementing non-parametric bayesian inference. *Mathematica Journal*, 16:1.

◇ **2014** Cassel, J. Non-parametric stakeholder discovery: A process for mitigating risk governance deficits through open-ended protocols. In Hsu, W. H. (editor) *Emerging Methods in Predictive Analytics: Risk Management and Decision-Making*, pages 97-126. IGI Global, Hershey, PA.

◇ **2014** Cassel, J. The Methodological Unboundedness of Limited Discovery Processes. *FORMacademisk, 7:4.*

◇ **2016** Cassel, J. Wolfram|Alpha: A Computational Knowledge "Search" Engine. In Lee, N. (editor) *Google It: Total Information Awareness*, pages 267-299. Springer, New York, NY.

◇ **2018** Cassel J.B., Cousineau S.V. Permaculture as a Systemic Design Practice. In: Jones P., Kijima K. (editors) *Systemic Design. Translational Systems Sciences, vol 8., pages 293-318. Springer, Tokyo.*

Skills

◇ **Programming Languages** Professional experience in Java, Python, SQL, Common Lisp, and Wolfram Language (Mathematica). Projects and brief experience in many others.

◇ **Specialized Domain Toolkits** Development within Django/PostgreSQL, AWS, Docker, Wolfram SystemModeler, ArcMap (including ArcObjects), D2K, RubyOnRails, and others.

◇ **Processes and Domains** Experience with discovery-based design processes, geographic information systems, text-processing pipelines, agile software engineering, the data science process, test-driven development, and strategic foresight. Familiarity with agricultural operations, factory simulation, reliability and quality control, and basic bioinformatics.

◇ **Analytical Techniques** Stakeholder analysis, non-parametric Bayesian inference, decision-theoretic planning, simulation, optimization, knowledge representation and reasoning, reinforcement learning, recurrent neural networks, and domain-specific languages.

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