

KAAN EGILMEZ

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SUMMARY

Dr. Egilmez is a mechanical/electrical engineer with more than 15 years of experience in operations research, artificial intelligence, and computer aided decision support systems. Prior to joining Cambridge Energy Solutions, Dr. Egilmez was a Senior Associate at CRA International, Inc. where he was responsible for developing multiple modeling and analysis tools for electric power system simulation, asset valuation, and trading analysis for deregulated electricity markets. In particular, he developed the GE MAPS Analysis Workbench application used by the power system modeling group for post processing and visualization of GE MAPS simulation results. This application while initially targeted for GE MAPS was developed so as to support general purpose specification and evaluation of econometric models driven by multi-year simulation results presented to the system in the form of multivariate time series data.

At Tabors Caramanis & Associates, Dr. Egilmez was the software architect responsible for the CIMPLEST framework for agile manufacturing system design and analysis. He was also responsible for various software implementations of TCA proprietary electric market design and analysis algorithms.

From 1992 to 1997, Dr. Egilmez was associated with the Production Control of Manufacturing Systems Laboratory at Boston University, where he developed Flow Nets as an object oriented extension to Continuous Petri Nets. Flow Nets have been shown to be effective in rapid modeling of scheduling problems associated with large-scale manufacturing systems with complex material flows and operational constraints.

While at MIT, Dr. Egilmez developed the Modal State Logic formalism for the coordination of teams of intelligent software agents to control manufacturing systems such as robotic cells and transfer lines.

Dr. Egilmez has published in ASME's *Journal of Dynamic Systems, Measurement, and Control* as well as *Robotics and Computer-Integrated Manufacturing*, *Journal of Intelligent Manufacturing*, *Journal of Systems Engineering*, *AI EDAM*, and *Applied Artificial Intelligence*. He is also the first author of a chapter in the book *Artificial Intelligence Applications in Manufacturing* from AAAI Press.

Dr. Egilmez earned BS degrees in Mechanical and Electrical Engineering from the University of Wisconsin, Milwaukee in 1988; the Master of Science degree in Mechanical Engineering from the Massachusetts Institute of Technology in 1990; and the Mechanical Engineers degree from MIT in 1992. Dr. Egilmez earned a Doctor of Philosophy degree in Manufacturing Engineering from Boston University in 1997. His doctoral thesis is entitled "Continuous Approximation Models for Production Control of Manufacturing Systems."

EDUCATION

Ph.D., Manufacturing Engineering, Boston University, 1997.

Mechanical Engineer, Massachusetts Institute of Technology, 1992.

M.S., Mechanical Engineering, Massachusetts Institute of Technology, 1990.

B.S., Mechanical and Electrical Engineering, University of Wisconsin, Milwaukee, 1988.

EXPERIENCE HIGHLIGHTS

Cambridge Energy Solutions, Cambridge, MA, 2006 - current, **Project Manager**. Developing new software tools and algorithms to extend existing CES capabilities for the analysis of electricity markets on a locational basis, to forecast and value transmission congestion, and to understand the fundamental drivers of short and long term prices.

CRA International, Cambridge, MA, 2004 – 2006, **Senior Associate**. Developed TRANZER, GTEDIT, and BusMap tools for transmission system analysis and modeling with support for GE MAPS input data preparation and cleansing. TRANZER and BusMap were developed for and in collaboration with CES under contract. Developed GE MAPS Analysis Workbench application for post GE MAPS output analysis and visualization. Developed tools and conducted statistical analysis of locational marginal prices (LMP).

Tabors Caramanis & Associates, Cambridge, MA, 1997 – 2004, **Senior Analyst**. Principal software architect and developer for the TCA day ahead auction clearing engine for the Italian whole sale electricity markets. Developed an efficient implementation of the uniform purchase price auction algorithm stipulated by the Italian market rules. Implemented various TCA algorithms, in software, for power flow analysis and market design for various electricity markets within the United States. Developed tools and conducted statistical analysis of TCCs in New York. Principal software architect and developer of CIMPLEST, a product of TCA for agile manufacturing design and performance analysis. Implemented and deployed CIMPLEST applications at Pratt & Whitney, North Berwick Plant, Maine.

Executive Master of Science in Manufacturing Program, Boston University, 1997 – 2003, **Lecturer**. Developed and taught several courses in computational problem solving and software applications for manufacturing. Course material emphasized hands-on training and relevance to current trends in the application of information technology to manufacturing problems such as Enterprise Resource Planning and Supply Chain Management.

Production Control of Manufacturing Systems Laboratory, Boston University, 1992 – 1997, **Research Assistant**. Developed advanced production scheduling algorithms and information systems for manufacturing decision support in collaboration with industry partners, including Analog Devices, Lucent Technologies, Pratt & Whitney, and others. Conducted research on continuous approximations for production dynamics in discrete part manufacturing systems. Joint research conducted with Prof. M. Caramanis and others led to a commercial contract with Pratt & Whitney to develop a software system for the design and analysis of agile manufacturing cells. This work led to the formation of the Cimplest group at TCA.

MIT Lab for Manufacturing and Productivity, 1988 – 1992, **Research Assistant**. Developed Modal State Logic for coordination of teams of intelligent software agents for industrial control of production systems. This work was applied to transfer line systems as part of industry collaboration with Septor Electronics of El Paso, Texas.

FIELDS OF EXPERTISE

- Object oriented software design and development
- Distributed information systems architecture for model-based optimal decision support
- Software applications of operations research models
- Manufacturing systems design, performance analysis, production scheduling
- Discrete event stochastic systems simulation
- Artificial intelligence applications to manufacturing

PAPERS AND PUBLICATIONS

Book Chapter

“Teamwork among Intelligent Agents: Framework and Case Study in Robotic Service.”, with S.H. Kim. in *Artificial Intelligence Applications in Manufacturing*, A. Famili, D.S. Nau, and S.H. Kim, eds., AAAI Press/The MIT Press, 1992.

Journal Articles

“Design and Control of Manufacturing Systems: An Integrated Approach Based on Modal Logic and Zonecharts.”, with S.H. Kim, *Robotics and Computer-Integrated Manufacturing*, Vol. 6, No. 3, pp. 209–228, 1989.

“A Logical Approach to Knowledge-Based Control.”, with S.H. Kim, *Journal of Intelligent Manufacturing*, I, pp. 59–76, 1990.

“Coordination of Multiple Agents Through Modal State Logic and Influence Specifications. Part I: Models.”, with S.H. Kim, *Journal of Systems Engineering*, v.1(1), pp. 2-12, 1991.

“Coordination of Multiple Agents Through Modal State Logic and Influence Specifications. Part II: Applications.”, with S.H. Kim, *Journal of Systems Engineering*, v.1(2), pp. 77–93, 1991.

“An Information Processing Model of Knowledge Systems.”, with S.H. Kim, *Applied Artificial Intelligence*, 5, pp. 353-392, 1991.

“Deployment of Robotic Agents in Uncertain Environments: Game Theoretic Rules and Simulation Studies.”, with S.H. Kim, *AI EDAM*, v.6(1), pp. 1–17, 1992.

“Control Under Uncertainty Through Zone Logic.”, with S.H. Kim, *ASME Journal of Dynamic Systems, Measurement, and Control*, v.114, n.3, pp. 375-389, Sept. 1992.

Conference Papers and Presentations

“Zone Logic for Knowledge-Based Control: Formalization and Applications”, with S.H. Kim, *Proc. IEEE Symposium on Intelligent Control*, pp. 607-613, Albany, NY, Sept. 1989.

“Hybrid Knowledge Representation for Control Under Uncertainty”, with S.H. Kim, *Proc. SIGMAN Workshop on Intelligent Manufacturing Architectures*, pp. 47-61, Boston, MA, August 1990.

“Optimal Control of a Manufacturing System Based on a Novel Continuous-Flow Model with Minimal WIP Requirement.”, with A. Sharifnia, *Fourth International Conference on Computer Integrated Manufacturing and Automation*, Rensselaer Polytechnic Institute, October 10–12, 1994.

“Distributed Control of Manufacturing Systems based on Continuous-Flow Models.”, with A. Sharifnia and E. Lehrer, *Proceedings of the NSF Grantees Conference*, San Diego, January 1995.

“Hierarchical Scheduling of Production Systems: Industrial Case Study Experience.”, with M. Caramanis and C. Kaskavelis, *INFORMS*, New Orleans, 1995.

“Scheduling of a Circuit Pack Testing Facility with Complex Constraints: An Enhanced Fluid Model Approximation with Flow Nets.”, with A. Sharifnia and M. Caramanis, *1996 Japan-USA Symposium on Flexible Automation*, June 1996.

“Identification and Congestion Analysis of Transmission Corridors of the Eastern Interconnection”, with A. Rudkevich, M. Liu, P. Murti, P. Visudhipan, R. Tabors, and T.J. Overbye, *Proceedings of the 40th Hawaiian International Conference on System Sciences*, January 2007.

Reports

“Technical and Economic Aspects of Fault Management in Manufacturing Systems using Modal State Logic”, Mechanical Engineers Degree Thesis. MIT, June, 1992.

“Market Restructuring Cost-Benefit Analysis Final Report”, with E. Wolfe, A. Rudkevich, P. Murti, E. Hausman, B. Tsuchida, C. Imparato, F. Pickel, November 2004. Report prepared for the Electric Reliability Council of Texas (ERCOT) by Tabors Caramanis & Associates and KEMA Consulting Inc.

“Cost-Benefit Analysis Performed for the SPP Regional State Committee Final Report”, with E. Wolfe, A. Rudkevich, S. Henderson, R. Luciani, E. Hausman, P. Murti, P. Visudhipan, April 2005. Report prepared for Southwest Power Pool (SPP) by Charles River Associates (CRA).