
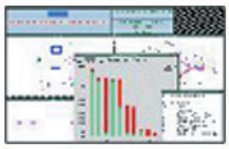
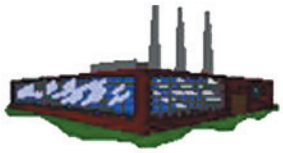
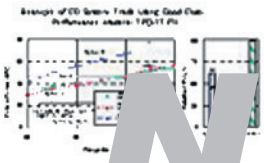

Computer Integrated Manufacturing Laboratory NEWS

FALL 2001

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Faculty Receive Awards and New Grants

CIM Lab faculty have recently received the following awards and grants:

On May 18, 2001, Assistant Professor Satyandra K. Gupta received the Institute for Systems Research Outstanding Faculty Award, which promotes cross-disciplinary research of the highest caliber. Criteria for selection include: closeness to the theme of ISR, creativity, innovativeness and excellence in research, and cross-disciplinary character and team research effort.

Professor Michael Fu and Professor Steven Marcus recently received three grants. The first is a $440,000 grant from the National Science Foundation entitled "New Simulation-Based Approaches to Solving Markov Decision Processes." The second (with Alan Willsky at MIT) is a $610,000 grant from the Air Force Office of Scientific Research entitled "Integrated Simulation-Based Methodologies for Planning and Estimation." The third (with Emanual Fernandez at the University of Cincinnati) is a $580,000 grant from the Semiconductor Research Corporation entitled "Preventive Maintenance Scheduling in Semiconductor Manufacturing Fabs."

Associate Professor Linda Schmidt, Anne Spence, and Dr. Janet Schmidt have received a $900,000 grant from the National Science Foundation entitled "Research Internships in Science and Engineering: Linking Undergraduate Female Students in SMET Fields and Female Faculty Mentors." This work encourages the participation and persistence of women students in engineering and the sciences.

Assistant Professor Satyandra K. Gupta and David Alan Bourne of Carnegie Mellon University were issued U.S. Patent 6,233,538 on May 15, 2001 for an Apparatus and Method for Multi-Purpose Setup Planning for Sheet Metal Bending Operations. This setup planning technique identifies a family of parts to be manufactured and determines setup constraints imposed by the various bending operations in the part family. For more information, see the ISR patents page at *http://www.isr.umd.edu/ISR/research/patents.html.*

Student News

The following students have recently completed their M.S. theses based on research done in the CIM Lab:

Malay Kumar: *Automated design of multi-stage molds for manufacturing multi-material objects.* Mr. Kumar has joined Solidworks (in Boston, Mass.). Dr. Gutpa was his thesis advisor.

Vidit Mathur: *Design and development of a web-based production scheduling system.* Mr. Mathur has joined Verizon (in Silver Spring, Md.). Dr. Herrmann was his thesis advisor.

Deepak Rajagopal: *Part family formation of sheet metal parts for generating shared press-brake setups.* Mr. Mathur has joined United Technologies Research Center (in Hartford, Conn.). Dr. Gutpa was his thesis advisor.

Yusheng Chen: *A system for generating process and material selection advice during embodiment design of mechanical components.* Mr. Chen has joined Unigraphics (in Los Angeles). Dr. Gutpa was his thesis advisor.

Dr. Guilherme E. Vieira (a CIM Lab alumnus) has started teaching at Catholic University of Parana, in Curitiba, Brazil. Dr. Vieira is an assistant professor in the Department of Control and Industrial Automation Engineering.

During the summer, three undergraduate students participating in the REU program worked in the CIM Lab. Ryan Shows, from the University of Wisconsin—Madison, designed and implemented an Internet-based scheduling server. Jason Hammer, from the University of Washington, and Alex Lo, from the Rose-Hulman Institute of Technology, developed an information extraction utility.

Project Helps Defense Contractor Design Radar

Dr. Mark Fleischer, a research associate in the CIM Lab, and Professor Michael Ball have developed a multidisciplinary design optimization tool to help Northrop Grumman Electronic Sensors and Systems Sector (ESSS) evaluate design alternatives for an advanced radar system. The decision support tool helps the program manager select the best alternative from all those considered in the presence of multiple objective functions, including life cycle cost and system performance in different operational scenarios.

Faculty and Students Attend ASME International 2001 DETC/CIE

CIM Lab faculty and students presented papers at the 2001 ASME International DETC/CIE, held September 9-12, 2001, in Pittsburgh, Pa. Dr. Linda Schmidt's paper was one of six

papers from the International Conference on Design Theory and Methodology nominated for that conference's Xerox Best Paper Award. The following papers appear in the conference proceedings:

Sashidhar Bellam, Satyandra K. Gupta, DETC2001/CIE-21302: *An Efficient Geometric Algorithm for Extracting Mechanical Elements: A Step Towards Developing an Automated Extraction Tool for MEMS.*

Mandar M. Chincholkar, Jeffrey W. Herrmann, DETC2001/DFM-21169: *Incorporating Manufacturing Cycle Time Cost In New Product Development.*

Satyandra K. Gupta, D. Rajagopal DETC2001/DFM-21203: *A Mixed Integer Programming Formulation for Generating Shared Press Brake Setups.*

Satyandra K. Gupta, Anoop K. Samuel, DETC2001/DFM-21202: *Integrating Market Research with the Product Development Process: A step towards Design for Profit.*

Satyandra K. Gupta, Sunil K. Saini, Zhiyang Yao, DETC2001/CIE-21303: *An Algorithm to Generate Efficient Cutter Path for Pocket Milling Operations using Modified Zigzag Strategy.*

Jeffrey W. Herrmann, Mark Fleischer, Edward Lin, Vidit Mathur, DETC2001/CIE-21281: *Affordable Space Systems Manufacturing: Intelligent Synthesis Technology, Process Planning, and Production Scheduling.*

Xin Li, Linda Schmidt, Weidong He, Lixing Li, Yuanmei Qian, DETC2001/DTM-21716: *Transformation of an EGT Grammar: New Grammar, New Designs.*

NSF Open Workshop on Decision-Based Design

At the 2001 ASME International DETC/CIE, Associate Professor Linda Schmidt helped lead the NSF Open Workshop on Decision-Based Design. This effort, now in its fifth year, is a collaboration between the University of Maryland, SUNY Buffalo, and University of Illinois at Chicago. It is the 12th in a series of meetings hosted at conferences, and can be found on the web at *http://dbd.eng.buffalo.edu.* More than 50 participants attended the workshop during this conference.

Other Recent Publications

U. Alva and S.K. Gupta, "Automated design of sheet metal punches for bending multiple parts in a single setup," *Robotics and Computer Integrated Manufacturing,* 17(1/2):33-47, 2001.

R.K. Arni and S.K. Gupta, "Manufacturability analysis of flatness tolerances in solid freeform fabrication," *ASME Journal of Mechanical Design,* 123(1):148-156, 2001.

S. Bhatnagar, and M.C. Fu, and S.I. Marcus, "Two Timescale Algorithms for Simulation Optimization of Hidden Markov Models," *IIE Transactions,* Vol.33, No.3, 245-258, 2001.

S. Bhatnagar, M.C. Fu, S.I. Marcus, and P.J.M. Fard, "An Optimal Structured Feedback Policy for ABR Flow Control Using Two Timescale SPSA," *IEEE/ACM Transactions on Networking,* Vol.9, No.4, 479-491, 2001.

M. Ciocoiu, G. M. and D. Nau. "Ontologies for integrating engineering applications," *Journal of Computing and Information Science in Engineering,* 2001. To appear.

M.C. Fu and X. Jin, "On the Convergence Rate of Ordinal Comparison of Random Variables," *IEEE Transactions on Automatic Control,* December 2001.

M.C. Fu, S.B. Laprise, D.B. Madan, Y. Su, and R. Wu, "Pricing American Options: A Comparison of Monte Carlo Simulation Approaches," *Journal of Computational Finance,* Vol.4, No.3, 39-88, Spring 2001.

M.C. Fu, "Perturbation Analysis," *Encyclopedia of Operations Research and Management Science,* 2nd ed., S. Gass and C. Harris, eds., Kluwer Academic Publishers, 608-611, 2001.

M.C. Fu, "Simulation Optimization," *Encyclopedia of Operations Research and Management Science,* 2nd ed., S. Gass and C. Harris, eds., Kluwer Academic Publishers, 756-759, 2001.

S. K. Gupta, C. J. Paredis, R. Sinha, and P. F. Brown, "Intelligent assembly modeling and simulation," *Assembly Automation,* 21(3):215-235, 2001. Special Issue on Productivity Improvements with Simulation.

J.W. Herrmann and M. Chincholkar, "Reducing Throughput Time during Product Design," *Journal of Manufacturing Systems,* Volume 20, Number 4, 2001.

J.W. Herrmann and D.R. Delalio, "Algorithms for sheet metal nesting," *IEEE Transactions on Robotics and Automation,* Vol. 17, No. 2, pp. 183-190, 2001.

D. Nau, M. Ball, J. Baras, A. Chowdhury, E. Lin, J. Meyer, R. Rajamani, J. Splain and V. Trichur. "Generating and Evaluating Designs and Plans for Microwave Modules," *AI in Engineering Design and Manufacturing,* 14:289-304, September 2001. To appear.

T. Vossen, M. Ball, A. Lotem and D. Nau, "Applying Integer Programming to AI Planning," *Knowledge Engineering Review,* 16:85-100, 2001. To appear.

Z. Yao, S.K. Gupta and D.S. Nau. "A geometric algorithm for finding the largest milling cutter," *SME Journal of Manufacturing Processes,* 3(1):1-16, 2001.

CIM Lab Research Areas

Research activities in the CIM Lab covers a wide variety of topics related to design and manufacturing:

- Product Development
- Process Planning and Manufacturability Analysis
- Production Planning and Scheduling
- Manufacturing System Design

For more complete information about research activities, please see the CIM Lab web site listed below.

Contact Information

The Computer Integrated Manufacturing Laboratory is a constituent research lab of the Institute for Systems Research at the University of Maryland. The CIM Lab also receives support from the Department of Mechanical Engineering. For more information about the CIM Lab, please contact one of the following researchers or visit our lab web site.

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Dr. Satyandra K. Gupta, Associate Director: skgupta@eng.umd.edu
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CIM Lab web site:
www.isr.umd.edu/Labs/CIM/cim.html