
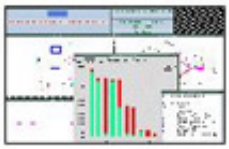
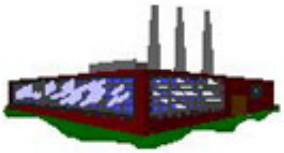
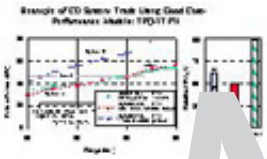

Computer Integrated Manufacturing Laboratory NEWS

Spring 2001

Contents

Faculty Receive Awards and New Grants

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

Assistant Professor Satyandra K. Gupta is one of nine 2001 recipients of the Society of Manufacturing Engineers' Robert W. Galvin Outstanding Young Manufacturing Engineer Award. The international award recognizes Dr. Gupta's significant achievements and leadership in manufacturing engineering as a young engineer.

Dr. Gupta has received a Young Investigator award from the Office of Naval Research. Dr. Gupta will investigate ways to make casting and molding ceramic parts a more affordable fabrication process by combining machining and layered manufacturing to create complex parts of large size with very small features.

Also, Dr. Gupta has won a National Science Foundation Faculty Early Career Development (CAREER) Award. Dr. Gupta's research is entitled "Automated Design of Multi-Piece Molds: A Step towards Manufacturing of Geometrically Complex Heterogeneous Objects." The five-year award begins July 1, 2001, and is worth $375,000.

ISR has received a three-year, $500,000 National Science Foundation grant for Combined Research and Curriculum Development in Systems Engineering. The ISR faculty team includes Professor John S. Baras, Associate Professor Mark Austin, Professor Michael O. Ball, Assistant Professor Jeffrey W. Herrmann, and Assistant Professor Linda C. Schmidt.

Professor Dana S. Nau, Dr. Gupta, and Dr. Herrmann have received a $38,445 National Science Foundation instrumentation grant for a specialized computing environment for distributed and virtual design and manufacturing.

Assistant Professor Linda C. Schmidt, Professor David Bigio, Dr. Janet Schmidt, and Professor Robert W. Lent have been awarded a three-year, $400,000 grant from the National Science Foundation to create a developmental curriculum in team training for engineering project teams.

Student News

On October 18, 2000, Guilherme E. Vieira, a graduate student in mechanical engineering, successfully defended his Ph.D. dissertation, which was titled "Analytical models to estimate the performance of dynamic manufacturing systems operating under frequent rescheduling." His advisor was Dr. Herrmann. Dr. Vieira is currently working at Adaptasolutions as a product development manager.

Sara Hewitt is the latest recipient of the ISR/Northrop Grumman Fellowship. Hewitt is a Mechanical Engineering student developing simulation models of manufacturing systems with Dr. Herrmann. She is also a Gemstone student in the Nuclear Waste Disposal Research Group, which is researching the many issues involved in the disposal of nuclear wastes.

Projects Help Local Industry

Two groups of undergraduate students recently completed projects with local firms. The first group developed a scheduling application for the oil distribution facility operated by Castrol Heavy Duty Lubricants Inc. in Baltimore, Maryland. The second group suggested improvements to the flow of components for the surface mount facility at Northrop Grumman Electronic Sensors and Systems Sector in Linthicum, Maryland. Both groups performed these projects under the direction of Dr. Herrmann as part of the course ENME 489J, Production Management.

Dr. Herrmann, Sean Gahagan, and Sara Hewitt have developed simulation models of a manufacturing cell for Egide USA in Cambridge, Maryland. The models helped Egide USA evaluate a new cell layout under different staffing levels. The team also included Dave Rizzardo and Barry Frey, analysts with the University of Maryland Technology Extension Service.

Papers Appear at ASME International 2000 DETC/CIE

The following papers by CIM Lab faculty were presented at the 2000 ASME International DETC/CIE, held September 10-13, 2000, in Baltimore, Maryland. These papers appear in the conference proceedings:

R.K. Arni, Satyandra K. Gupta, and Malay Kumar, "A Web-Based Tolerance Analysis Service for Solid Freeform Fabrication," DETC2000/DFM-14035.

Savinder Dhaliwal, Satyandra K. Gupta, and Jun Huang, "Computing Exact Global Accessibility Cones for Polyhedral Objects," DETC2000/DFM-14034.

Jeffrey W. Herrmann and Mandar Chincholkar, "Design for

Production: A Tool for Reducing Manufacturing Cycle Time," DETC2000/DFM-14002.

X. Li and Linda C. Schmidt, "Grammar-Based Designer Assistance Tool for Epicyclic Gear Trains," DETC2000/DTM-14574.

Hai Shi and Linda C. Schmidt, "Comparing HTN Planning Method with Grammar-Based Approach in Generative Design," DETC2000/DAC-14287.

Z. Yao, Satyandra K. Gupta, "Finding the Maximal Cutter for 2-D Milling Operations," DETC2000/CIE-14630.

Faculty Present Research at NSF Conference in Tampa

CIM Lab faculty presented posters at the 2001 National Science Foundation's Design, Service & Manufacturing Grantees & Research Conference, held January 7-10 in Tampa, Florida. In addition, they had the following papers published in the conference proceedings:

Michael O. Ball, *Scalable Supply Chain Infrastructures and Their Impact on Organizations.*

Mandar M. Chincholkar, Jeffrey W. Herrmann, and Dana S. Nau (University of Maryland); and William C. Regli (Drexel University), *Facilitating Design for Manufacture and Production through Design Classification, Optimal Tool Selection and Design Choice.*

Michael C. Fu, Jeffrey W. Herrmann, Steven I. Marcus, and Gary W. Rubloff, *Operational Methods in Semiconductor Manufacturing: Integrating Product Dynamics and Process Models.*

Satyandra K. Gupta, *Forming Part Families for Generating Shared Press-Brake Setups.*

Wei Chen, (University of Illinois at Chicago), Kemper Lewis, (University at Buffalo), and Linda C. Schmidt, (University of Maryland), *Open Workshop on Decision-Based Design: New Tactics for Our New Century*

Linda C. Schmidt, *Strategies for Generating Feasible Conceptual Designs: Comparing HTN Planning with Grammar-based Design.*

Other Recent Publications

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, "Perturbation Analysis" and "Simulation Optimization," in *Encyclopedia of Operations Research and Management Science,* 2nd edition, S. Gass and C. Harris, eds., Kluwer Academic Publishers, 2000.

S.K. Gupta, "Sheet metal bending operation planning: Using virtual node generation to improve search efficiency," *Journal of Manufacturing Systems,* Vol. 18, No. 2, pp. 127-139, 1999.

S.K. Gupta and D.A. Bourne, "Sheet metal bending: Generating shared setups," *ASME Journal of Manufacturing Science and Engineering,* Vol. 121, pp. 689-694, 1999.

Y. He, M.C. Fu, and S.I. Marcus, "A Simulation-Based Policy Iteration Algorithm for Average Cost Unichain Markov Decision Processes," *Computing Tools for Modeling, Optimization, and Simulation: Interfaces in Computer Science and Operations Research,* Manuel Laguna and Jose Luis Gonzalez Velarde, editors, Kluwer Academic Publishers, pp. 161-182, 2000.

J.W. Herrmann, S. Balasubramanian, and G. Singh, "Defining specialized design similarity measures," *International Journal of Production Research,* Vol. 38, No. 15, pp. 3603-3621, 2000.

J.W. Herrmann, N. Chandrasekaran, B.F. Conaghan, M.-Q. Nguyen, G.W. Rubloff, R.Z. Shi, "Evaluating the impact of process changes on cluster tool performance," *IEEE Transactions on Semiconductor Manufacturing,* Vol. 13, No. 2, pp. 181-192, 2000.

L. Last, M. Deeds, D. Garvick, B. Kavetsky, P. Sandborn, E.B. Magrab, and S.K. Gupta, "Nano-to-millimeter scale integrated systems," *IEEE Transactions on Components and Packaging Technologies,* Vol. 22, No. 2, pp. 338-343, 1999.

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.

L.C. Schmidt, H. Shetty, and S.C. Chase, "A graph grammar approach for structure synthesis of mechanisms," *Journal of Mechanical Design,* Vol. 122, No. 4, pp. 371-376, 2000.

G.E. Vieira, J.W. Herrmann, and E. Lin, "Analytical models to predict the performance of a single-machine system under periodic and event-driven rescheduling strategies," *International Journal of Production Research,* Vol. 38, No. 8, pp. 1899-1915, 2000.

G.E. Vieira, J.W. Herrmann, and E. Lin, "Predicting the performance of rescheduling strategies for parallel machine systems," *Journal of Manufacturing Systems,* Vol. 19, No. 4, pp. 256-266, 2000.

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

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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CIM Lab web site:
www.isr.umd.edu/Labs/CIM/cim.html