Proposal for a Special Issue/Section on
Advances in Automation Science and Engineering for Automotive Manufacturing
for the
IEEE Transactions on Automation Science and Engineering

1. Background and Motivation

Automation is important for automotive manufacturing. It has attracted substantial research efforts from both academic and industrial communities. In recent years, significant advancements in technology and engineering and the rapidly changing market have generated numerous opportunities for innovation in automation for automotive manufacturing. In addition, many new challenges have emerged in order to apply and implement these innovations. Such opportunities and challenges have significantly expanded the scopes of traditional automation science and engineering for automotive manufacturing. The goal of this special issue on recent advances in automation science and engineering for automotive manufacturing is to bring together researchers and practitioners from both academia and industry into a forum, to show the state-of-the-art research and applications in the general area of automation in automotive manufacturing, by presenting efficient scientific and engineering solutions, addressing the needs and challenges for integration with new technologies, and providing visions for future research and development. The central theme of the proposed special issue is on *emerging technologies and future directions in automation for automotive manufacturing*, where information technology based modeling, analysis, control and optimization are the focus areas, and broad aspects and issues will be well discussed. A special issue devoted to it will be rewarding for scientific and engineering communities and is a timely opportunity for the IEEE T-ASE.

As a highly interdisciplinary field and we are targeting at both theoretical soundness and practical importance of the papers, this special issue may risk not receiving enough high quality papers. If that is the case, the proposed special issue will be reduced to a special section.

2. Central Theme of the Special Issue

The central theme of the Special Issue will be ***emerging technologies and future directions in automation science and engineering for automotive manufacturing,*** where information technology based modeling, analysis, control and optimization are the focus areas.. The goals of the special issue are (1) to present the state-of-the-art research in science, engineering and methodologies for automation in automotive manufacturing, and (2) to provide a forum for experts to disseminate their recent advances and views on future perspectives in the field.

The special issue aims to publish original, significant and visionary automation papers describing scientific methods and technologies that improve process, efficiency, productivity, quality and reliability of automotive manufacturing.

Submissions of scientific results from experts in academia and industry worldwide are strongly encouraged. Topics to be covered include, but are not limited to,

- *Manufacturing process and control*: virtual validation and integration, digital assembly, machine learning, diagnostic and prognostics, process automation, manipulation and grasping, part feeding and fixturing, motion system design and analysis, virtual reality and simulation.

- *Robotics and vision systems*: mobile and network robots in automotive manufacturing, control, coordination and scheduling, robot vision, vision application systems, factory automation.

- *Production, maintenance, planning and scheduling*: real-time optimized system design and analysis, distributed control, multi-agent planning, integrated operation, scheduling and control algorithms, integrated productivity and quality analysis, discrete-event system, intelligent maintenance scheduling, material handling optimization.

- *Sensor networks and RFID applications*: modelling, characterization, monitoring, detection, diagnosis and prognosis, data mining, autonomous or agent-based methods, system integration of RFID, sensors using RFID tags.

- *Supply chain and logistics*: design and analysis, planning, coordination and collaboration, reversed/closed supply chain, production/inventory control, transportation and logistics, e-business, risk management, internet analytics for forecasting and planning, demand sensing, procurement auctions, service oriented architectures, outsourcing.

3. Potential Contributors and Guest Editors

Potential contributors include researchers in the fields of process control, supply chain, robotics, production systems, quality and reliability, etc. The Call for Papers of the Special Issue will be sent to them and also advertised broadly in professional journals and magazines (see Section 4 below). The potential contributors include: researchers in academic institutions working on practical problems in automotive manufacturing automation; and researchers/engineers in automotive related companies. All proposed guest editors have extensive experience in conducting research in automotive industry. These include

Dr. Jingshan Li is an assistant professor in Department of Electrical and Computer Engineering and Center for Manufacturing in University of Kentucky. He worked in General Motors Research and Development Center before this position. His research area is in system and control with applications to manufacturing systems modeling and analysis, production control, lean production systems, and supply chain management, etc.

Dr. Masaru Nakano is a principal researcher at Toyota Central Research and Development Laboratories in Japan. He is specialized in the field of robotics, manufacturing systems design, marketing research and, corporate risk management. He will be a professor in Keio University from April 2008.

Dr. Wayne Cai is a Staff Research Engineer at the Manufacturing Systems Research Laboratory of General Motors Research & Development Center in Warren, Michigan. His research expertise is in virtual manufacturing, agile/flexible/e- manufacturing, especially in automotive body joining/assembly, forming, and processing.

Dr. Kai Furmans is a Professor of logistics in University of Karlsruhe, Germany, and heads the Institute for Conveying Technology and Logistics. He worked in Robert Bosch from 1996-2003.

Dr. Alain Patchong is the Regional Industrial Engineering Manager for Europe Middle East and Africa at Goodyear in Luxembourg. Before joining Goodyear in 2007, he worked with PSA Peugeot Citroen for 12 years where he developed and implemented methods for manufacturing system engineering and production line improvement. He also led lean implementation within PSA body weld plants.

4. Paper Selection and Special Advertisement

High quality paper selection criteria and a prompt review process will be ensured. The review will follow the standard IEEE T-ASE review process with all rules applied. The guest editors will be responsible for getting the reviews, and submitting their recommendations along with the reviews to the handling Editor of the Transactions, and the handling Editor will then make final acceptance or rejection decisions and communicate with authors. To avoid conflicts of interest, the following rules will be emphasized:

- A guest editor should not appear as author/co-author for more than two submissions to the Special Issue.

- The editor appointed by the editorial board will assign T-ASE Associate Editors to handle papers submitted by the guest editors.

We will advertise the Call for Papers for the Special Issue in the following professional journals and magazines:

- IEEE Transactions on Automation Science and Engineering.
- IEEE Transactions on Robotics.
- IEEE Robotics and Automation Magazine.
- IEEE Transactions on Automatic Control
- IIE Transactions
- IEEE Control Systems Magazine
- International Journal of Production Research
- International Journal of Intelligent Manufacturing
- ASME Transactions on Manufacturing Science and Engineering
- Journal of Manufacturing Processes and Journal of Manufacturing Systems
- European Journal of Operational Research
- European Journal of Industrial Engineering

The Call for Papers will also be advertised at key international conferences, including

- IEEE ICRA (May 2008)
- ACC (June 2008)
- IEEE CASE (Aug. 2008)
- IIE Annual Conference (May 2008)
- SAE (April 2008)
- IFAC World Congress (July 2008)
- North American Manufacturing Research Conference (May 2008)

5. Potential Impact and Significance

This in-depth special issue on automation engineering in automotive manufacturing will be significant for not only showcase of advanced applications of automotive manufacturing for automation professionals, but also for automotive industry professionals to utilize advanced automation techniques for manufacturing. As a leading journal in automation science and engineering, it is our responsibility to bring attention to a broad range of automation professionals and contribute to this broad and growing field. We strive to make a strong impact to:

- Present important problems and potential automation solutions that will advance the state-of-the-art in automotive manufacturing.
- Share state-of-the-art research results in automotive manufacturing automation.
- Expose the unsolved challenges to implement automation in automotive manufacturing.
- Discuss future directions of research in automation engineering for automotive manufacturing.

The potential audiences of the special issues are: researchers in academic institutions and professionals in industry research and applications.

6. Industries that May Have Interests in the Special Issue

It is our hope to attract more industrial contributors and draw industrial researchers' contributions. The Call for Papers will be distributed to the following companies.

- Automotive OEMs (e.g., GM, Toyota, PSA, Ford, DaimlerChrysler, Honda, etc.)
- Automotive suppliers (e.g., Bosch, Delphi, Visteon, Denzo, TRW, etc.)

- Consulting and service companies
- Research institutes

7. Competing Journals for the Special Issue

There are no single journal could cover such a wide spectrum of topics related to automation science and engineering for automotive manufacturing. The following are possible competing journals for the Special Issue which could cover part of the topics.

- *International Journal of Production Research*. Topics covered in the journal include manufacturing system, supply chain, and manufacturing process, etc., however, the focus is more on applications.
- *ASME Transactions*. Areas covered in the journal include manufacturing processes.
- *IIE Transactions.* Areas covered in the journal include production planning and operations, supply chain management, etc., and focus is more theoretical.
- *Journal of Manufacturing Processes* and *Journal of Manufacturing Systems*. Areas covered in these journals include manufacturing process and very limited system analysis.
- *International Journal of Intelligent Manufacturing*. In general, manufacturing process technologies and limited system level analysis are covered.
- *European Journal of Operations Research*. Research in production planning, scheduling, supply chain management is typically included.

No journal in the open literature focuses on automation aspects for automotive manufacturing. The need for the special issue remains solid.

8. Planned Publication Schedule

- March, 2008: announcement of special issue.
- October 1, 2008: paper submission deadline.
- February 1, 2009: completion of the first round review.
- June 1, 2009: completion of the second round review.
- August 1, 2009: final manuscripts due.
- January 2010: tentative publication date.

9. Short Biographies of the Proposed Guest Editors

The guest editors consist of both academic faculties and industrial professionals. All academic faculties have experiences in automotive industry before taking their academic jobs. The areas of their researches cover almost all aspects of automation engineering in automotive manufacturing.

Dr. Jingshan Li (University of Kentucky, USA, http://www.engr.uky.edu/~jingshan) is an assistant professor of Electrical Engineering and the UK Center for Manufacturing. He received his BS and MS in automatic control from Tsinghua University and Chinese Academy of Sciences, Beijing, China, respectively, and PhD from Department of Electrical Engineering and Computer Science, University of Michigan in Ann Arbor, MI, in 2000. He worked in GM R&D Center, Warren, MI from 2000-2006. He has more than 50 referred journal and conference publications. He is currently Associate Editor of IEEE T-ASE and several other journals and conferences. He received 2005 IEEE T-ASE Best Paper Award, and 2006 IEEE Early Industry/Government Career Award in Robotics and Automation.

Dr. Masaru Nakano (Toyota Central Research & Development Lab, Japan) is a principal researcher at Toyota Central Research and Development Laboratories (TCRDL) in Japan. He joined TCRDL in 1980. He is research leader and manager of the Digital Engineering Laboratory. He received BS and MS in operations research from Kyoto University, Japan, and his Dr. Engineering in manufacturing systems from the Nagoya Institute of

Technology, Japan. He is specialized in the field of robotics, manufacturing systems design, marketing research and, corporate risk management. He will be a professor in Keio University, Japan, from April 2008.

Dr. Wayne Cai (General Motors Research & Development Center, USA) is a Staff Research Engineer at the Manufacturing Systems Research Laboratory of General Motors Research & Development Center in Warren, Michigan. He received his B.S. from The University of Science & Technology of China, M.S. from The University of Iowa and Ph.D. from The University of Michigan, all in Mechanical Engineering. His research expertise is in virtual manufacturing, agile/flexible/e- manufacturing, especially in automotive body joining/assembly, forming, and processing. He has over a dozen archived journal publications and numerous conference presentations. He also holds four US patents, and a number of GM internal inventions.

Dr. Kai Furmans (University of Karlsruhe, Germany, http://www.ifl.uni-karlsruhe.de/english/155.php) is a full professor of Mechanical Engineering at the University of Karlsruhe and the head of the Institute for Material Handling and Logistics Systems. He received his Diploma in Wirtschaftsingenieurwesen (similar to Industrial Engineering), a PhD in Mechanical Engineeering and his habilitation in 2000, all from Karlsuhe University. From 1996-2003, he worked for Robert Bosch in several fields, being responsible for logistrics for the division Thermotechnology before joining the Department of Mechanical Engineering of the Karlsruhe University in 2003 as a professor.

Dr. Alain Patchong (Goodyear, Luxembourg) is the Manager of Regional Industrial Engineering for Europe Middle East and Africa at Goodyear in Luxembourg. He holds an MS in Robotics from Ecole des Mines Douai, France (1993) and a Ph.D in Industrial and System Engineering from Université de Valenciennes, France (1997). Before joining Goodyear in 2007, he worked with PSA Peugeot Citroen for 12 years where he developed and implemented methods for manufacturing system engineering and production line improvement. He also led lean implementation within PSA body weld plants. He teaches at Ecole Centrale de Paris and Ecole Supérieure d'Electricité (two French Grandes Ecoles). His primary researches include manufacturing systems engineering, efficient manufacturing operation and lean manufacturing. He was a finalist of the INFORMS' Edelman Competition in 2002 and a Visiting Scholar at MIT in 2004.

10. Draft of Call for Papers

CALL FOR PAPERS

IEEE TRANSACTIONS ON AUTOMATION SCIENCE AND ENGINEERING

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Guest Editors

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(Formerly, Peugeot Citroen)

Paper Submission

All papers are to be submitted through the IEEE's **Manuscript Central** for Transactions on Automation Science and Engineering http://mc.manuscriptcentral.com/t-ase. Please select "Special Issue" under Manuscript Category of your submission. All manuscripts must be prepared according to the IEEE Transactions on Automation Science and Engineering publication guidelines http://www.engr.uconn.edu/~ieeetase/. Please address inquiries to jingshan@engr.uky.edu.