Xian Du

Assistant Professor at UMass Amherst

LSL – S421, 240 Thatcher Road 617-817-1724
Amherst, MA 01002 xiandu@umass.edu

EDUCATION

Massachusetts Institute of Technology (MIT) Cambridge, MA
National Science Foundation Postdoctoral Associate, Department of Mechanical Engineering January 2011-2014
Research focuses on machine vision technology for large-area and high-precision roll-to-roll flexible electronics printing process control and computational imaging for medical devices

Singapore-MIT Alliance Singapore and Cambridge, MA
Ph.D. Innovation in Manufacturing Systems and Technology March 2007
Thesis: Optimization of Color Print Process Control

M.S. Innovation in Manufacturing Systems and Technology July 2002
Thesis for the attached project in National Semiconductor Ltd: Building an Intelligent E-diagnostics System for Reducing Mean Time to Repair of Wire Bond Machines

Shanghai Jiaotong University (SJTU) Shanghai, China
M.S. Mechatronics Engineering March 2001
Thesis: Variation Analysis of Non-Rigid assemblies

Tianjin University (TJU) Tianjin, China
B.S. Department of Mechanical Engineering July 1994

RESEARCH EXPERIENCE

MIT Cambridge, MA
Laboratory for Manufacturing and Productivity January 2011- January 2018

- Invented high-resolution, large-area and fast-speed machine vision techniques for the inspection and feedback control of micro- or nano-scale roll-to-roll printing process over meter-scale web
- Invented a grid-based tracking system for the inspection of distortion and pattern fidelity on the web of roll-to-roll printing process
- Invented multimodal inspection techniques using optical and ultrasound imaging for roll-to-roll web control

MIT HST/IMES and Massachusetts General Hospital (MGH) October 2014-January 2018

- Proposed and designed a bedside molecular imaging system, including optical, NIR, and ultrasound techniques, to enhance the accuracy of tissue targeted liver biopsies
- Developed registration and matching algorithms for longitudinal study of skin microrelief

Media Lab October 2004-January 2005

- Developed a speaking-pattern influence model for group-debate winner recognition

Singapore-MIT Alliance November 2002-March 2007

- Invented an intelligent optical imaging system for the optimization of color print process control

Louisiana Tech University Ruston, LA
Department of Computer Science February 2009-August 2010

- Developed machine learning and data mining techniques for interdisciplinary applications including biomedical decision-support systems, target tracking, cyber security, and etc. for CyberTools on the Louisiana Optical Network Initiative

Centre National de la Recherche Scientifique (CNRS) Lyon, France
CREATIS Laboratory December 2006-November 2007
Developed a 3-D segmentation algorithm using adaptive active surface for quantification of guinea pig knee cartilage in high resolution MRI

SJTU Shanghai, China
Research Institute of Robotics September 1999-May 2001

- Designed and evaluated a robotic assembly line for the redirector of review mirror to increase productivity and assembly robustness via variation and tolerance analysis. It was an 863 national hi-tech flexible assembly system and was the first successful precision robotic assembly line for non-rigid parts in China.

TEACHING EXPERIENCE

Louisiana Tech University Ruston, LA

- Advanced Data Mining and Applications, Teaching Assistant Spring 2010
  Developed new materials for the course including PPT slides, problem sets and exams; lectured students and guided them in course projects. It was the first time this class was taught at the university.

Singapore-MIT Alliance Singapore

- Analysis, Design and Control of Automated Equipment, Teaching Assistant Spring 2003
- Control of Manufacturing Processes, Teaching Assistant Spring 2004
  Instructed recitation, and assisted students in Singapore in learning MIT lecture material and solving homework problems; graded homework assignments and exams; facilitated students in Singapore to attend MIT class through advanced distance learning facilities.

HONORS AND AWARDS

- **National Science Foundation** Postdoctoral Fellowship 2009-date
- Centre National de la Recherche Scientifique (**CNRS**) Postdoctoral Fellowship 2007
- **Singapore-MIT Alliance** Research Scholarship 2001-2006
- **Guanghua** Scholarship 2000
- **Outstanding** Student Leader 1991, 1993

PATENTS

1. Brian W. Anthony, **Xian Du**, “Concentric scanning technique for large area inspection,” U.S. Application No.: 62/102784 and App. 15/540169, 2017.

2. Brian W. Anthony, **Xian Du**, “Full-field large-area deformation measurement for low cost roll-roll manufacturing of flexible electronics,” U.S. Application No.: 62/061215, patent disclosure: MIT 17260, 2014.

SELECTED PEER-REVIEWED JOURNAL PAPERS

1. Ian Lee, **Xian Du**, and Brian Anthony, "Hair segmentation using adaptive threshold from edge and branch length measures." Computers in biology and medicine, vol. 89, pp. 314-324, 2017.

2. Chao Yang, Liang Li, Sixiong You, Bingjie Yan, and **Xian Du**, "Cloud computing-based energy optimization control framework for plug-in hybrid electric bus," Energy, vol. 125, pp. 11-26, 2017.

3. **Xian Du**, Brian W. Anthony, “Controlled angular and radial scanning for super resolution concentric circular imaging,” Optics Express, vol. 24, no. 20, pp. 22581-22595, 2016 (U.S. Patent Application No. 62/397067).

4. **Xian Du**, Nigel C. Kojimoto, and Brian W. Anthony, “Concentric Circular Trajectory Sampling for Super-Resolution and Image Mosaicing,” Journal of the Optics Society of America A, vol. 32, no. 3, pp. 293-304, 2015 (U.S. Patent Application No. 62/397067).

5. **Xian Du**, Brian, W. Anthony, “A concentric circle scanning system for large-area and high-precision imaging,” Optics Express, vol. 23, no. 15, pp. 20014-20029, 2015 (U.S. Patent Application No. 62/397067).

6. **Xian Du**, Brian W. Anthony, and Nigel C. Kojimoto, “Grid-Based Matching for Full-Field Large-Area Deformation Measurement,” Optics and Lasers in Engineering, vol. 66, pp. 307-309, 2014 (U.S. Patent Application No. 62/061215).

7. **Xian Du**, Sumeet Dua, Rajendra U. Acharya, and Chu Kuang Chua, “Classification of Epilepsy Using High-Order Spectra Features and Principle Component Analysis,” Journal of Medical Systems, vol. 36, no. 3, pp. 1731-1743, 2012.

8. Rajendra U. Acharya, Sumeet Dua, **Xian Du**, Vinitha Sree S, and Chu Kuang Chua, “Automated Diagnosis of Glaucoma Using Texture and Higher Order Spectra Features,” IEEE Transactions on Information Technology in Biomedicine, vol. 15, no. 03, pp. 449-455, 2011.

9. **Xian Du**, Sumeet Dua, “Cancer Prognosis Using Support Vector Regression in Imaging Modality,” World Journal of Clinical Oncology, vol. 2, no. 1, pp. 44-49, 2011.

10. Sumeet Dua, **Xian Du**, Vinitha Sree., and Thajudin Ahamed V.I, “Novel Classification of Coronary Artery Disease Using Heart Rate Variability Analysis,” Journal of Mechanics in Medicine and Biology, vol. 12, no. 04, 2012.

11. **Xian Du**, Sumeet Dua, “Segmentation of Fluorescence Microscopy Cell Images Using Unsupervised Mining,” The Open Medical Informatics Journal, vol. 4, pp. 41- 49, 2010.

12. **Xian Du**, “The Application and Analysis of New Laser Sensors for Arc Welding Robot,” Mechatronics, vol. 1, pp. 38-39, 2000 (in Chinese).

13. **Xian Du**, BaoSen Liu, and XiFang Zhao, “A Practical Technique and Method for Robotic Assembly,” Modular Machine Tool & Automatic Manufacturing Technique, vol. 2, pp. 4-6, 2000 (in Chinese).

14. GuangTao Feng, YanQiong Fei, XiFeng Zhao, and **Xian Du**, “A Practical Scheme on Automatic Assembly Line for the Redirector of Rearview mirror,” Modular Machine Tool & Automatic Manufacturing Technique, vol. 10, pp. 6-9, 1999 (in Chinese).

SELECTED CONFERENCE PAPERS AND PRESENTATIONS

1. (Speaker) **Xian Du**, 'Intelligent Sensing for Large Area, Micro- and Nano-Scale Pattern, High Speed Flexible Electronics Manufacturing', International Conference and Exhibition on Nanotechnology, Nano USA 2018, San Diego, CA, Feb. 7-9, 2018.

2. (Speaker) **Xian Du**, 'Registration and Analysis of Skin Microrelief Structure,' 7th Annual MEDRC Workshop: Clinical Needs & System Solutions, MIT, Cambridge, MA, May 5, 2017.

3. **Xian Du**, T. Hess, B. Anthony, 'A 3D Volumetric NIR Fluorescence and Broadly-Spectrum Color Imager for Quantitative Assessment of Tissue Biopsy,' 7th Annual MEDRC Workshop: Clinical Needs & System Solutions, Cambridge, MA, May 7-8, 2015.

4. Ina Kundu, **Xian Du**, B. Anthony, 'Skin Health Monitoring,' 7th Annual MEDRC Workshop: Clinical Needs & System Solutions, Cambridge, MA, May 7-8, 2015.

5. C. Merian, **X. Du**, D. Hardt, H. AlQahtani, 'Roll-to-Roll Micro-Contact Printing of Flexible Aluminum Substrates Using Octadecylphosphonic Acid (ODPA),' Proceedings of International Mechanical Engineering Congress and Exposition (IMECE), Nov. 13-19, Houston, Texas, 2015.

6. **Xian Du**, "Metrology and Inspection for Process Control for R2R and Flexible Substrates," NSF-CHM All Investigators Review, Amherst, MA, 2013 and 2014.

7. Dean Ljubicic, **Xian Du**, and Brian Anthony, "Metrology and Inspection for Process Control for R2R and Flexible Substrates," NSF Site Visit, Amherst, MA, 2012.

8. **Xian Du**, Dean Ljubicic, and Brian Anthony, "Metrology and inspection for process control for roll-to-roll and transparent substrates," Workshop on NanofabricationTechnologies for Roll-to-Roll Processing, An academic-Industry Workshop on Technologies for American Competitiveness, Boston, MA, September 27-28, 2011.

9. **Xian Du** and Sumeet Dua, "Salient Frame Extraction Using Support Vector Regression and Motion Features," National Aerospace and Electronics Conference, Fairborn, OH, July 14-16, 2010.

10. **Xian Du**, Jerome Velut, and et al. "3-D knee cartilage segmentation using a smoothing B-Spline active surface," International Conference of Image Processing (ICIP), San Diego, CA, 2008.

11. **Xian Du**, Michael Dessauer, Sumeet Dua, and Hilary W. Thompson, "Time Series Discord Detection for Time-biased Reduction Framework," NSF EPSCoR Research Infrastructure Improvement Annual Meeting, August 15-16, 2010.

12. **Xian Du**, Sumeet Dua, and Hilary W. Thompson, "A Segmentation Framework for Rule-based Algorithmic Image Classification System," NSF EPSCoR Research Infrastructure Improvement Annual Meeting, August 15-16, 2010.

13. **Xian Du**, Sumeet Dua, and Mark DeCoster, "Salient Frame Selection-based Feature extraction for AIMS," NSF EPSCoR Research Infrastructure Improvement Annual Meeting, August 15-16, 2010.

14. **Xian Du**, Raghava Alapati, Sumeet Dua, Ram Devireddy, and Dorel Moldovan, "Dimensionality Reduction Techniques to Improve Real-Time Analysis of Molecular Dynamics Simulations," NSF EPSCoR Research Infrastructure Improvement Annual Meeting, May 11, 2009.

15. **Xian Du**, Senaka Kanakamedala, Sumeet Dua, Ji Fang, and Mark A. DeCoster, "Quantitative Performance Evaluation of Micromixers," NSF EPSCoR Research Infrastructure Improvement Annual Meeting, May 11, 2009.

16. **Xian Du**, Sumeet Dua, and Mark A. DeCoster, "Quantitative Characterization of Brain Tumor Growth Using Geometric Analysis," NSF EPSCoR Research Infrastructure Improvement Annual Meeting, May 11, 2009.

17. **Xian Du**, Vinay Amatya, Manish M. Patil, Bipin Thomas, Shobhit Shakya, Rajesh V. Singaravelu, Gopal R. Kondam, Sumeet Dua, and Gabrielle Allen, "Performance Evaluation Measures for Unsupervised Clustering," NSF EPSCoR Research Infrastructure Improvement Annual Meeting, May 11, 2009.

BOOK & BOOK CHAPTERS

1. Sumeet Dua and **Xian Du**, (book) "Data Mining and Machine Learning in Cybersecurity," CRC, 2011, ISBN 9781439839423.

2. **Xian Du** and Sumeet Dua, "Chapter 1. Feature Extraction Methods in Biomedical Signaling and Imaging," "Data Mining in Biomedical Imaging, Signalling and Systems," Edited by Rajendra U. Acharya, CRC Press, 2011, ISBN 978-1-4398-3938-6.

3. **Xian Du** and Sumeet Dua, "Chapter 2. Supervised and Unsupervised Learning Methods in Biomedical Signalling and Imaging," "Data Mining in Biomedical Imaging, Signalling and Systems," Edited by Rajendra U. Acharya, CRC Press, 2011, ISBN 978-1-4398-3938-6.

4. **Xian Du**, "Chapter 11. Mining of Imaging Biomarkers for Quantitative Evaluation of Osteoarthritis," "Data Mining in Biomedical Imaging, Signalling and Systems," Edited by R. Acharya U., CRC Press, 2011, ISBN 978-1-4398-3938-6.

SERVICE

- Organizing Committee Member for Nano USA 2018 2018
- Reviewer for Chinese Government Award for Outstanding Self-Financed Student Abroad, Education office, the Embassy of the People's Republic of china in the United States of America, 2017
- Reviewer for IEEE/ASME Mechatronics 2009-date
- Reviewer for Transactions on Nanotechnology 2009-date
- Reviewer for Biomedical Signal Processing and Control 2011-date
- Reviewer for IEEE Transactions on Knowledge and Data Engineering 2010-date
- Reviewer for Optics and Lasers in Engineering 2015-date
- Reviewer for the Optics Society of American 2015
- Member of Technical Programme Committee, the 3rd International Conference of Contemporary Computing 2010
- Reviewer for 1st First International Conference on Optics, Photonics and Lasers (OPAL), Castelldefels, Spain 9-11, May 2 0 1 8