

# Fuzzy Logic Based Control of Electromechanical Systems

## Jason Gu

Jason J. Gu, PhD, PEng., FEIC, FCAE

IEEE Canada President-elect, 2018-2019

IEEE Canada President, 2020-2021

Professor, Electrical and Computer Engineering

Dalhousie University

1360 Barrington Street, C367. Halifax, NS B3J 1Z1

Tel: (902) 494-3163, Fax: (902) 422-7535

Email: [jason.gu@dal.ca](mailto:jason.gu@dal.ca), Web: [www.jasongu.org](http://www.jasongu.org)

**Abstract:** In this talk I will present the application of ‘Takagi-Sugeno (TS) Fuzzy model-based scheme (TSFMBS)’ and ‘Fuzzy knowledge-based scheme (FKBS)’ for the control of various electromechanical systems with uncertain parameters. In case of TSFMBS, various controller structure are employed including Servo controller, Integral controller and Controller based on nonlinear regulation theory for which the control gains are found as solution of linear matrix inequalities (LMIs) thereby proving the stability of closed loop system. In case of FKBS, controller is designed based on the human experience about the plant to be controlled. Case studies of the control of ball and beam system, dc series motor, single link manipulator, and mobile robot will be included.



Dr. Jason Gu received the bachelor's degree in electrical engineering and information science from the University of Science and Technology of China, in 1992, the master's degree in biomedical engineering from Shanghai Jiao Tong University in 1995, and the Ph.D. degree from the University of Alberta, Canada, in 2001.

He is currently a Full Professor of Electrical and Computer Engineering with Dalhousie University, Canada. He is also a Cross-Appointed Professor with the School of Biomedical Engineering for his multidisciplinary research work. He has over 24 years of research and teaching experience and has authored over 350 conference papers and articles. His research areas include robotics, biomedical engineering, rehabilitation engineering, neural networks, and control. He is a fellow of the Engineering Institute of Canada and Canada Academy of Engineering.

He has been the Associate Editor of the Journal of Control and Intelligent Systems, Transactions of the Canadian Society for Mechanical Engineering, Canada, the IEEE Transactions on Mechatronics, the International Journal of Robotics and Automation, Unmanned Systems, the Journal of Engineering and Emerging Technologies, and the IEEE Access. Dr. Gu is currently IEEE Canada President for 2020-2021.