

Evolutionary Mobile Robots Using Computational Intelligence

Techniques

Chia-Feng Juang, IEEE DL

(for The Computational Intelligence Society (CIS) Chapter of IEEE Xiamen Section,
Xiamen University, Xiamen, China, 30 November 2021)

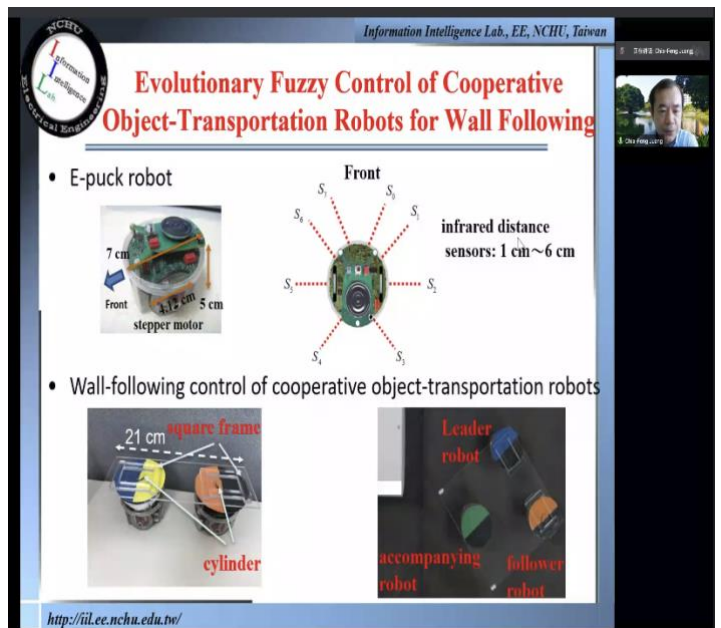
Report: On 30 November 2021, at 10:30-11:30 am, Chia-Feng Juang delivered an online DL talk for The Computational Intelligence Society (CIS) Chapter of IEEE Xiamen Section, chaired by Professor Min Jiang. Prof. Juang presents the method of navigating a single mobile robot in unknown environments using the learned wall-following behavior. 735 IEEE members and non-members attended the talk and discussions.

Abstract: Evolutionary robots, like autonomous artificial organisms, automatically develop their own skills by interaction with the environment. This talk will focus on evolutionary locomotion control of mobile robots using computational intelligence techniques, including fuzzy systems and evolutionary computation. First, I will introduce the basic concept of evolutionary fuzzy systems (EFSs) that learn fuzzy systems through evolutionary computation algorithms. The advantage of using a fuzzy system as an interpretable AI model will also be introduced. Next, learning control of a wheeled/hexapod robot through multiobjective EFSs for wall following will be introduced. To boost the learning efficiency of multiobjective EFSs in this application, the technique of reinforcement neural fuzzy surrogate-assisted learning will be given. Then, I will present the method of navigating a single mobile robot in unknown environments using the learned wall-following behavior. Finally, learning control of multiple wheeled robots cooperatively carrying an object through multiobjective EFSs for wall following and its navigation application will be presented.



会议已结束

(a) The Participant list



(b) Prof. Juang is giving the DL talk



(c) Welcoming Screen

Biography



Chia-Feng Juang received the B. S. and Ph. D. degrees in Control Engineering from the National Chiao-Tung University, Hsinchu, Taiwan, in 1993 and 1997, respectively. Since 2001, he has been with the Department of Electrical Engineering, National Chung Hsing University (NCHU), Taichung, Taiwan, where he became a Full Professor in 2007 and has been a Distinguished Professor since 2009. He served as the Chapter Chair of IEEE Computational Intelligence, Taipei Chapter, in 2017–2018, during which the chapter won the Outstanding Chapter Award from IEEE Taipei Section. He has authored or coauthored 10 book chapters, over 110 journal papers (including over 60 IEEE journal papers), and over 130 conference papers. Five of his highly cited papers have collected over 3300 citations in Google Scholar. His current research interests include computational intelligence, intelligent control, computer vision, and evolutionary robots.

Dr. Juang received the Outstanding Automatic Control Engineering Award from Chinese Automatic Control Society (CACS), Taiwan, in 2014; the Outstanding Electrical Engineering Professor Award from Chinese Institute of Electrical Engineering, Taiwan, in 2019; and the Outstanding Research Award from Ministry of Science and Technology, Taiwan, in 2021. He was elevated to CACS Fellow in 2016 and IEEE Fellow in 2019. He is a Distinguished Lecture of IEEE Computational Intelligence Society. He was an Associate Editor of the IEEE TRANSACTIONS ON FUZZY SYSTEMS and is the Associate Editor of the IEEE TRANSACTIONS ON CYBERNETICS, the Asian Journal of Control, and the Journal of Information Science and Engineering and an Area Editor of the International Journal of Fuzzy Systems.