

Cognitive Computing for Collaborative Robotics

1. Background and Motivation

Cognitive Computing breaks the boundary between two separate fields, neuroscience and computer science. It paves the way for machines to have reasoning abilities which is analogous to human. The research field of cognitive computing is interdisciplinary, and uses knowledge and methods from many areas such as psychology, biology, signal processing, physics, information theory, mathematics, and statistics. The development of cognitive computing will keep cross-fertilizing these research areas. However, in collaborative robotics applications there still remain many open problems for using cognitive computing theories. Technologies like Computational Cognition and Perception (CCP) and Computational Neuroscience (CN) are driving as the best tools for upgrading the robots with near human intelligence, which can be intended to physically interact with humans in a shared workspace.

The overall aim of this special issue is to collect the state-of-the-art contributions on the Computational Neuroscience, Computational Cognition and Perception, Computer Vision, Natural Language Processing, Human Action Analysis, and related applications in robotics.

The journal invites submissions for a special issue on “Cognitive Computing for Collaborative Robotics” that aims to attract high-quality papers that describe state-of-the-art technologies and new findings both in soft computing and robotics research fields.

2. Technical Scope of the Proposal

2.1. New Theories and Methods of Cognitive Computing

- Human Brain Mapping Approaches
- Magnetoencephalography
- Computational Modelling (CNN, RNN, ANN etc)
- Sensory Perception Methods
- Memory and Imagination Models
- Action Prediction Approaches
- Soft Computing Models
- Cognitive-level Algorithms
- Brain-inspired Systems
- Swarm-based Algorithms

2.2. Applications of Cognitive Computing in Robotics

- Cognitive Mixed Reality
- Human-Inspired Robotics

- Brain-Computer/Robot Interface
- Neuroscience and Behavior Analysis in Robotics
- Cognitive Imaging and Processing
- Electro-Encephalography (EEG) Analysis
- Transcranial Magnetic Stimulation (TMS) Analysis
- Bayesian Program Learning

3. Significance and Relevance to this Journal

This special issue aims to explore recent advances and disseminate state-of-the-art research related to robotics on designing, building, and deploying novel cognitive computing, services and technologies, to enable smart robot services and applications. Both hardware and software (i.e., application level) solutions are solicited within the scope of call. Original, unpublished technical papers with novel and important contributions will be considered for the special issue; submitted papers must not be published, accepted or under review by another journal, and extended version of a journal paper must be so indicated and the extension must include a substantial improvement to the technical content of the paper.

4. Significance and Relevance to this Journal

The list of authors will be finalized after receiving responses. The broad extent of the Call for Papers (CFP) Announcement should provide room for a wide range of submissions in this very exciting new field. The prominence and the wide field of personal contacts of the guest editors should stimulate the submission of good quality papers from other excellent researchers. The IEEE Special Technical Communities (STC) on Big Data may provide another opportunity for distribution of the CFP. Finally, the special issue will be announced to the 15,000 sensor practitioners on the IEEE Sensor Council's e-mail distribution list.

Specifically, the potential authors may include:

Biao Song, King Saud University, Saudi Arabia

Athanasios Vasilakos, Lulea University of Technology, Sweden

Chin Feng Lai, National Chung Cheng University, Taiwan

Yujie Li, Fukuoka University, Japan

Shiwen Mao, Auburn University, USA

Manu Malek, Elsevier, USA

Dijiang Huang, Arizona State University, USA

Luis Magdalena, Technical University of Madrid, Spain

Nikhil R. Pal, Indian Statistical Institute, India

Haibo He, University of Rhode Island, USA

Pau-Choo Chung, National Cheng Kung University, Taiwan

5. Important Dates:

Manuscript submission: October 15th, 2020

Notification to authors: December 15th, 2020

Revised manuscripts due: February 15th, 2021

Final editorial decision: March 15th, 2021

Final papers due: April 15th, 2021

6. Potential Overlapping with Published Issues

To the best of our knowledge, this topic hasn't been published in any journals.

7. Guest Editors

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Huimin Lu received double M.S. degrees in Electrical Engineering from Kyushu Institute of Technology and Yangzhou University in 2011, respectively. He received a Ph.D. degree in Electrical Engineering from Kyushu Institute of Technology in 2014. From 2013 to 2016, he was a JSPS research fellow (DC2, PD, and FPD) at Kyushu Institute of Technology. Currently, he is an associate professor in Kyushu Institute of Technology and an Excellent Young Researcher of Ministry of Education, Culture, Sports, Science and Technology-Japan. He serves as editor or associate editor for IEEE Access Journal, Computers & Electrical Engineering, Wireless Networks, etc. He is the Leading Guest Editor for ACM/Springer Mobile Networks and Applications, Optics & Laser Technology, Multimedia Tools and Applications, Applied Soft Computing, etc. His research interests include artificial intelligence, machine vision, deep-sea observing, internet of things and robotics. He has authored or co-authored 100+ papers in peer-reviewed journals and conferences, which have received 3000+ citations, 9 ESI highly cited papers and 2 ESI hot papers. As the lead editor, he has edited 3 books and have 80K+ downloads. He has received 20+ awards and 20+ funds from the governments and associations. He is elected as the Fellow of European Alliance for Innovation (EAI) and Senior Member of The Institute of Electrical and Electronics Engineers (IEEE) in 2019.

Dongpu Cao, University of Waterloo, Canada (dongpu@uwaterloo.ca)

Dongpu Cao is the Canada Research Chair in Driver Cognition and Automated Driving, and Director of Waterloo Cognitive Autonomous Driving (CogDrive) Lab at the University of Waterloo. He is an Associate Professor in the Department of Mechanical and Mechatronics Engineering. Before joining

Waterloo in Jan, 2018, Prof. Cao was a full-time faculty member at the Cranfield University (2014-2017) and the Lancaster University (2011-2014) in the UK. Prof. Cao serves as an Associate Editor for IEEE Transactions on Vehicular Technology, IEEE Transactions on Intelligent Transportation Systems, IEEE/ASME Transactions on Mechatronics, IEEE Transactions on Industrial Electronics, IEEE/CAA Journal of Automatica Sinica, ASME Journal of Dynamic Systems, Measurement and Control, and International Journal of Vehicle Design. Prof. Cao has been a member of SAE Vehicle Dynamics International Standards Committee and Co-Chair of IEEE ITSS Technical Committee on Cooperative Driving. Prof. Cao was a Program Co-Chair for IEEE IV 2018.

Dacheng Tao, The University of Sydney, Australia (dacheng.tao@sydney.edu.au)

Dacheng Tao is a Professor of Computer Science in the School of Computer Science at The University of Sydney. Professor Tao's research interests include artificial intelligence (AI), computer vision, deep learning, statistical learning and their applications to neuroscience, robotics, video surveillance and medical informatics. His research is at the forefront of heralding the next generation of autonomous machines, which will have a monumental impact on key aspects of industry and the economy, including driverless cars, automated manufacturing and environmental change monitoring/emergency detection. Professor Tao received the 2015 Australian Scopus-Eureka Prize and the ACS Gold Disruptor Award. He is a Fellow of the IEEE, Fellow of the American Association for the Advancement of Science (AAAS), Optical Society of America, International Association of Pattern Recognition and SPIE (the international society for optics and photonics).

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Schahram Dustdar is Full Professor of Computer Science (Informatics) with a focus on Internet Technologies heading the Distributed Systems Group at the Vienna University of Technology (TU Vienna). From 2004-2010 he was Honorary Professor of Information Systems at the Department of Computing Science at the University of Groningen (RuG), The Netherlands. He is a member of the Academia Europaea: The Academy of Europe, Informatics Section (since 2013), an IEEE Fellow, and ACM Distinguished Scientist. He is recipient of the ACM Distinguished Scientist award (2009), the IBM Faculty Award (2012), the IEEE TCSVC Outstanding Leadership Award (June 2018), the IEEE TCSC Award for Excellence in Scalable Computing (June 2019). He is an Associate Editor of IEEE Transactions on Services Computing, ACM Transactions on the Web, and ACM Transactions on Internet Technology and on the editorial board of IEEE Internet Computing. He is the Editor-in-Chief of Computing (an SCI-ranked journal of Springer).