2024 第七届 IEEE 国际无人系统大会
特邀专题简介表

特邀专题名称

农业机器人图像处理及运动控制技术

组织者

1. 李杰浩，副教授，华南农业大学

2. 罗锡文，中国工程院院士/教授，华南农业大学

3. 杨辰光，教授，华南理工大学

个人简介

李杰浩，华南农业大学“突出人才”层次引进，丁颖人才，副教授/硕士生导师，罗锡文院士团队，教育部“黄大年式”教师团队青年骨干，农业装备技术全国重点实验室，南方农业机械与装备关键技术教育部重点实验室。中国指挥与控制学会青年工作委员会委员，广东省电子学会青年工作委员会秘书长。入选 2023 年 Elsevier 全球前 2%顶尖科学家。主要研究方向包括机器人运动驱动与控制，机器视觉及图像处理等。主持国家自然科学基金青年基金，先后参与国家重点研发计划、国防重点项目等科研工作。近三年以第一/通信作者发表 SCI 论文 30 余篇，其中 ESI 高被引论文 6 篇，热点论文 1 篇。曾获得北京市优秀博士学位论文，北京理工大学优秀博士学位论文，IEEE ICUS2023 无人系统国际会议最佳论文奖、ICBIR2023 仿生智能机器人国际会议最佳论文奖。担任 Remote Sensing, Frontiers in Neurorobotics, IET Control Theory & Applications 等期刊副主编。

罗锡文，中国工程院院士，现任华南农业大学教授、南方农业机械与装备关键技术教育部重点实验室主任，农业部水田农业机械装备重点实验室主任，兼任中国农业机械学会和中国农业工程学会名誉理事长、科技部中国农村技术开发中心总体专家组组长、农业部农作物生产全程机械化推进行动专家指导组组长、国家水稻机械化产业体系专家等。长期从事水稻生产机械化和农业装备机电一体化技术研究，首创同步开沟起垄施肥水稻精量穴直播技术体

系，国内首次研制成功无人驾驶水稻插秧机和拖拉机等技术居国际先进水平。在农业机械技术创新、农业工程学科建设、人才培养和科技发展战略研究等方面做出了重大贡献。曾被评为国家级教学名师、全国教育系统劳动模范、农业部中青年有突出贡献专家、广东省优秀共产党员、南粤教书育人优秀教师和全国优秀农业科技工作者。先后获得国家技术发明奖二等奖 1 项，国家科技进步二等奖 1 项，国家教学成果二等奖 1 项，教育部技术发明一等奖 1 项，教育部科技进步一等奖 1 项，国家科技成果鉴定 2 项，其它省部级奖项 15 余项。

杨辰光，华南理工大学教授、博导，广东省智能系统控制工程技术研究中心主任，IEEE Fellow。曾开创性的提出仿人机器人变阻抗控制方法以及仿人机器人学习控制算法，以第一作者发表的相关工作获得机器人领域顶级期刊 IEEE Transactions on Robotics 和计算智能领域顶级期刊 IEEE Transactions on Neural Networks and Learning Systems 最佳论文奖，入选科睿唯安全球高被引科学家。近年来，获得省部级自然科学一等奖两项，二等奖一项，作为指导教师带领学生团队获得第六届中国国际“互联网+”大学生创新创业大赛金奖（季军）。主要研究方向为人机交互、智能控制等。在清华大学出版社出版《机器人仿真与编程技术》和《机器人控制: 运动学、控制器设计、人机交互与应用实例》中文教材两部。

特邀专题简介

具有高运输能力和灵活机动性的农业机器人近年来在实际工程场景中引起了越来越多的研究兴趣，例如物料传送、农作物运输、太空探索、无人驾驶等领域。然而，在不确定环境下执行自主导航、探测、跟踪等复杂任务的适应性仍然是亟待解决的关键问题。此外，随着机器人技术的快速进步，农业自主机器人仍面临着机械结构设计、系统建模与优化、先进控制技术、人机交互、感知与运动规划等诸多挑战，这将使农业机器人在复杂的环境中有效地自主作业和运动。农业机器人系统的先进控制理论和传感技术是具有启发性和前景的研究。因此，本专题旨在让世界一流的研究人员介绍在控制理论、图像处理、环境感知和传感器融合方面为农业机器人做出贡献的最先进的研究成果和进展。

IEEE ICUS 2024
Invited Session Summary

Title of Session

Advanced image processing and control technology for agricultural robots

Organizers

1. Assoc. Prof. Jiehao Li

South China Agricultural University, China

2. Prof. Xiwen Luo

South China Agricultural University, China

3. Prof. Chenguang Yang

South China University of Technology, China

Biosketches

Jiehao Li received the M.Sc. degree in Control Engineering at South China University of Technology, Guangzhou, China, in 2017. He received the Ph.D. degree at the State Key Laboratory of Intelligent Control and Decision of Complex Systems, School of Automation, Beijing Institute of Technology, Beijing, China, in 2022. He is now an Associate Professor at College of Engineering, South China Agricultural University, Guangzhou, China. He is a Research Fellow at the School of Computer Science and Engineering, South China University of Technology, supervised by C. L. Philip Chen. His interests mainly include agricultural robotics, robot control and image processing. Prof. Li is the Academic Committee Member of CAAI and CICC. He has been awarded the Best Conference Paper Finalist of IEEE ARM2020, and the Outstanding Session Chair of IEEE ICUS2022.

Xiwen Luo received the B.E. degree in radio technology from the Huazhong University of Science and Technology, Hubei, China, in 1970, and the M.E. degree in agricultural electrification and automation from South China Agricultural University, Guangzhou, China, in 1982. He is now an Academician of the Chinese Academy of Engineering, and also a Professor at College of Engineering, South China Agricultural University, Guangzhou, China. His current research interests include agricultural aviation and intelligent detection and control.

Prof. Luo is the Director of the Key Laboratory of Key Technology on Agricultural Machine and Equipment, Ministry of Education, the Leader of the ``Huang Danian'' teachers team of the Ministry of Education, and the Director of the Key Laboratory of Paddy Field Agricultural Machinery and Equipment, Ministry of Agriculture. He is the Leader of the National key discipline of Agricultural Mechanization Engineering, and the Director of National Teaching Team of Agricultural Machinery. Prof. Luo has won the Second Prize of the National Technology Invention Award and National Science and Technology Progress Award, and the First Prize of the Ministry of Education Technology Invention Award and the Science and Technology Progress Award.

Chenguang Yang (IEEE Fellow) received the B.Eng. degree in measurement and control from Northwestern Polytechnical University, Xian, China, in 2005, the Ph.D. degree in control engineering from the National University of Singapore, Singapore, in 2010, and postdoctoral training in human robotics from the Imperial College London, London, U.K. Dr Yang was a Recipient of the IEEE Transactions on Robotics Best Paper Award (2012) and IEEE Transactions on Neural Networks and Learning Systems Outstanding Paper Award (2022) as the lead author. He is a Fellow of Institution of Mechanical Engineers (IMechE), a Fellow of Institute of Engineering and Technology (IET), and a Fellow of British Computer Society (BCS). His research interest lies in human robot interaction and intelligent system design.

Details of Session

Agricultural robots with high delivery and flexible maneuverability have recently attracted increasing research interest in practical engineering scenarios, such as material transfer, crop transportation, space exploration, unmanned driving and other fields. However, the adaptability to execute autonomous navigation, exploration, tracking and other complex tasks in uncertain environments is still a key issue to be solved urgently. Moreover, since the rapid advancement of robot techniques, autonomous robots still face several challenges, including mechanical structure design, system modelling and optimization, advanced control technology, human-computer interaction, and perception and motion planning, which will allow robots to operate autonomously and effectively in complex environments.

Therefore, advanced control theory and sensing technology for intelligent robot

systems are inspiring and promising topics. This special issue aims to bring world-class researchers to present state-of-the-art research achievements and advances that contribute to autonomous robots in terms of control theory, image processing, environment perception, and sensor fusion. Review articles are also encouraged.