PROGRAMME

武漢理工大學

Wuhan University of Technology

The 17th International Conference on Bio-inspired Computing: Theories and Applications (BIC-TA 2022)

December 17, 2022, Wuhan, China

Green & Smart River-Sea-Going Ship Cruise and Yacht Research Center

Wuhan University of Technolog

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Schedule

December 17 (Tencent Meeting ID: 584-821-485)				
Time	**Content**	**Subject**	**Speaker**	**Chair**
8:30-8:50	Opening Ceremony	Welcome Speech	President Prof. Chaozhong Wu	Prof. Dongming Zhao
9:00-9:40	Keynote Speech 1	A Formal Look at Membrane Computing	Prof. Sergey Verlan	Prof. Gexiang Zhang
9:40-10:20	Keynote Speech 2	Evolutionary Computation for Feature Selection and Dimensionality Reduction	Prof. Mengjie Zhang	Prof. Cheng He
10:20-11:00	Keynote Speech 3	Information Storage in DNA	Prof. Junbiao Dai	Prof. Linqiang Pan
11:00-11:40	Keynote Speech 4	Nanopore Techniques for Single Biopolymer Sensing and Sequencing	Prof. Yi-Lun Ying	
11:40-12:20	Keynote Speech 5	DNA Data Storage and its Application	Prof. Di Liu	
Lunch				
Time		**Subject**	**Speaker**	**Chair**
14:00-14:15		Research on Multi-modal Multi-Objective Path Planning by Improved Ant Colony Algorithm	Chaonan Shen	Xuan Guo
14:15-14:30		Solving Constrained Multi-objective Optimization Problems with Passive Archiving Mechanism	Huijuan Jia	
14:30-14:45		A Comparison of Large-Scale MOEAs with Informed Initialization for Voltage Transformer Ratio Error Estimation	Lianghao Li	
14:45-15:00		A Self-Adaptive Single-objective Multitasking Optimization Algorithm	Lei Wang	
15:00-15:15		Multi-stage Objective Function Optimized Hand-Eye Self-calibration of Robot in Autonomous Environment	Kaibo Liu	
15:15-15:30	**Break**			

Time	Subject	Speaker	Chair
15:30-15:45	Research on Unmanned Ship Collision Avoidance Algorithm based on Improved Particle Swarm Optimization Algorithm	Xiaoyu Liu	Haiyu Zhang
15:45-16:00	A Review on Bio-inspired Fluid Mechanics Via Deep Reinforcement Learning	Zhangze Jiang	
16:00-16:15	Graph Contrastive Learning with Intrinsic Augmentations	Mingxin Cao	
16:15-16:30	Multi-UUV Cooperative Navigation and Positioning Algorithm under Communication Delay	Junjun Wang	
16:30-16:45	A Review of Longitudinal Vibration and Vibration Reduction Technology of Propulsion Shafting	Kangwei Zhu	
16:45-17:00	Integrated Design and Absorbing Performance Analysis for Periodic Wave Absorbing and Bearing Structures	Runxin Wu	
17:00-17:15	Reconfigurable Nanostructure Driven by Polymerase-triggered DNA Strand Displacement	Kuiting Chen	Fei Xu
17:15-17:30	Tuning Curved DNA Origami Structures through Mechanical Design and Chemical Adducts	Chun Xie	
17:30-17:45	Programmable Ultrasensitive DNA-based Thermometer	Zhekun Chen	

Keynote Speaker 1

Sergey Verlan
Professor
University of Paris Est Créteil

Title: A Formal Look at Membrane Computing

Biography: Dr. hab. Sergey Verlan received his PhD in Computer Science at the University of Metz, France (2004). He obtained a habilitation in Computer Science at the University of Paris Est Créteil (2010). Currently he is a full professor at the University of Paris Est Créteil (France). His research interests belong to the area of theoretical computer science and natural computing. He has expertise in the area of formal language theory, DNA computing, membrane computing, modeling of biological systems and hardware design. He is particularly interested in the universality problem and provided several universal constructions which are the smallest known for the corresponding classes. He also introduced the formal framework for P systems that allows to explain, compare and extend different variants of P systems. He has more than 100 articles published in scientific journals and international conference proceedings. He edited 6 special journal issues and contributed to 13 book chapters.

Keynote Speaker 2

Mengjie Zhang
Professor
Victoria University of Wellington

Title: Evolutionary Computation for Feature Selection and Dimensionality Reduction

Biography: Mengjie Zhang is a Fellow of Royal Society of New Zealand, a Fellow of Engineering New Zealand, a Fellow of IEEE, an IEEE Distinguished Lecturer, currently Professor of Computer Science at Victoria University of Wellington, where he heads the interdisciplinary Evolutionary Computation and Machine Learning Research Group. He is also the Associate Dean (Research and Innovation) in the Faculty of Engineering, and leads the Data Science and Artificial Intelligence Initiative at the University.

His research is mainly focused on artificial intelligence (AI), machine learning and big data, particularly in evolutionary computation and learning (using genetic programming, particle swarm optimisation and learning classifier systems), feature selection/construction and big dimensionality reduction, computer vision and image processing, job shop scheduling and resource allocation, multi-objective optimisation, classification with unbalanced data and missing data, and evolutionary

deep learning and transfer learning. Prof Zhang has published over 800 research papers in refereed international journals and conferences in these areas. He has been serving as an associated editor or editorial board member for over ten international journals, and as a reviewer of over 30 international journals. Since 2007, he has been listed as one of the top ten (currently No. 4) world genetic programming researchers by the GP bibliography.

Keynote Speaker 3

Junbiao Dai
Professor
Shenzhen Institute of Advanced Sciences,
Chinese Academy of Sciences

Title: Information Storage in DNA

Biography: Professor Junbiao Dai is currently the deputy director of Institute of Synthetic Biology (iSynBio), Shenzhen Institute of Advanced Sciences (SIAT), Chinese Academy of Sciences (CAS). He received his Bachelor degree from Nanjing University in 1997, Master of Science in Biology from Tsinghua University in 2000 and PhD in Molecular, Cellular and Developmental Biology from Iowa State University in 2006. He was a post-doctoral fellow at the Johns Hopkins University School of Medicine before joining the faculty in School of Life Sciences at Tsinghua University in 2011.

His research interests lie in synthetic biology using different model organisms, focusing on development of new technologies for genes synthesis, assembly and synthetic genomics. He's one of the key members in synthetic yeast consortium (Sc2.0) and has finished the synthesis of the largest yeast chromosome XII. Dr. Dai have published many peer-

reviewed articles in prestigious journals such as Cell, Nature, Science, Molecular Cell, PNAS and Nucleic Acids Res and hold eight patents. He is the winner of Albert Lehninger Research Award from Johns Hopkins University, Newton Advanced Fellowship and C.C. Tan Life Science Innovation Award. In 2017, He was awarded the National Science Fund for Distinguished Young Scholars.

Keynote Speaker 4

Yi-Lun Ying

Professor

Nanjing University

Title: Nanopore Techniques for Single Biopolymer Sensing and Sequencing

Biography: Dr. Yi-Lun Ying studied chemistry and obtained Ph.D in Analytical Chemistry from East China University of Science and Technology (ECUST). After a doctoral exchange study in the University of Birmingham (2014), Dr. Ying carried out her postdoctoral research on nanopore electrochemical biosensors at ECUST. Since 2016, she has started her independent work. In 2019, she was promoted to professor at Nanjing University. Prof. Ying's team is currently developing advanced nanopore instrumentations for single protein sequencing and data storage. She has been recognized by several awards and honors, including the L'Oreal-UNESCO International Rising Talents (2016), RSC Analyst Emerging Investigator Lectureship (2020) and Young Chemists Awards of Chinese Chemical Society (2020). She currently serves as an Editor for Results in Chemistry, Editorial Board Member for ACS Measurement Science Au and ChemElectroChem, and Advisory Board Member for Analyst.

Keynote Speaker 5

Di Liu
Professor
Wuhan Institute of Virology
Chinese Academy of Sciences

Title: DNA Data Storage and its Application

Biography: Di Liu received his Doctoral's degrees of bioinformatics from Peking University. Currrently, he is a professor and principle investigator of Wuhan Institute of Virology, Chinese Academy of Sciences. His research area includes virus genomics & evolution, and bioinformatics. Since 2018, his group began the study of DNA data storage and was supported by the National Key R&D Program. Dr. Liu has published a series of papers on Nature, Lancet, New England Journal of Medicine, Cell Metabolisms, etc.

Introduction to Wuhan University of Technology

武汉理工大学简介

武汉理工大学是教育部直属全国重点大学，是首批列入国家“211 工程”和“双一流”建设高校，是教育部和交通运输部等部委共建高校。学校办学历史起源于 1898 年建立的湖北工艺学堂，办学 124 年特别是近 70 年来，学校共培养了 60 余万名高级专门人才，是教育部直属高校中为建材建工、交通、汽车三大行业培养人才规模最大的学校，已成为我国“三大行业”高层次人才培养和科技创新的重要基地。目前学校在校普通本科生 36000 余人，博士、硕士生 20000 余人，留学生 900 余人。

学校经过长期的育人实践，形成了特色鲜明的办学思想体系：构筑了“建设让人民满意、让世人仰慕的优秀大学”的大学理想，铸就了“厚德博学、追求卓越”的大学精神，确立了“育人为本、学术至上”的办学理念，树立了“实施卓越教育、培养卓越人才、创造卓越人生”的卓越教育观。学校致力于为社会培养一代又一代以智慧引领人生、具有卓越追求和卓越能力的卓越人才。

学校现有马房山校区、余家头校区和南湖校区，占地 4000 余亩，校舍总建筑面积 195.3 万平方米，4 座现代化图书馆藏书 378 万余册。设有 24 个学院（部），建有 6 个独立建制的科研院所。现有教职工 5340 人，其中中国科学院院士 1 人，中国工程院院士 5 人，比利时皇家科学院院士 1 人，澳大利亚工程院院士 1 人，欧洲科学院院士 3 人，俄罗斯工程院外籍院士 4 人，世界陶瓷科学院院士 1 人；获中组部、科技部、国家自然科学基金委员会、教育部和湖北省政府人才计划支持的高端人才 161 人。

学校已形成以工学为主，理、工、经、管、艺术、文、法等多学科相互渗透、协调发展的学科专业体系。现有一级学科博士学位授权点 22 个，一级学科硕士学位授权点 45 个，博士后科研流动站 17 个；有博士专业学位授权类别 3 个，硕士专业学位授权类别 24 个。在国家第四轮学科评估中，材料科学与工程获 A+，机械工程、交通运输工程、设计学、马克思主义理论等学科获 B+。现有本科专业 100 个，其中国家一流本科专业建设点 54 个、国家特色专业 15 个、卓越工程师教育培养计划试点专业 28 个、国家综合改革试点专业 4 个、国家战略性新兴产业专业 2 个。现有国家级一流本科课程 40 门、国家级精品资源共享课 17 门、国家级精品视频公开课 8 门、国家级课程思政示范课程 3 门。拥有国家级教学团队 5 个、教育部人才培养模式实验区 4 个、国家级实验教学示范中心 5 个、国家级虚拟仿真实验教学中心 1 个、国家级工程实践教育中心 13 个、国际化示

范学院 1 个、全国高校实践育人创新创业基地、全国创业孵化示范基地与全国高校毕业生就业能力培训基地各 1 个、5 个国家虚拟教研室建设试点。

近 10 年，学校培养了一批全国优秀大学生代表，1 人获“全国最美大学生”，2 人获“中国青年五四奖章”，4 人获“中国大学生年度人物”称号，4 人获“中国大学生自强之星标兵”称号，19 人获“中国大学生自强之星”称号，6 人获“中国青年志愿者优秀个人奖”，5 人获“中国青少年科技创新奖”，2 人获“全国优秀共青团员”。在 2022 年中国高等教育学会发布的全国普通高校大学生竞赛榜单（本科）中，学校位列 2017－2021 年全国普通高校大学生竞赛榜单（本科）第 12，位列 2021 年全国普通高校大学生竞赛榜单（本科）第 6。学校毕业生就业率近十年持续保持在 95%以上，其中到世界 500 强企业和战略性新兴产业领域就业人数占总就业人数比例超过 50%。

学校建有材料复合新技术国家重点实验室、硅酸盐建筑材料国家重点实验室、光纤传感技术与网络国家工程研究中心、国家水运安全工程技术研究中心等 41 个国家级和省部级科研基地，建有内河智能航运交通运输部协同创新中心、汽车零部件技术湖北省协同创新中心、安全预警与应急联动技术湖北省协同创新中心 3 个省部级协同创新中心。学校获批交通强国建设试点单位，入选首批国家知识产权示范高校、第二批高等学校科技成果转化和技术转移基地，与地方政府和行业企业共建产教融合示范区、工业技术研究院、校企联合创新中心等科教合作与成果转化机构 116 个。2010 年以来，学校以第一完成单位获国家自然科学奖 2 项、技术发明奖和科技进步奖 17 项、省部级一等奖及以上奖励 74 项；作为参加单位获国家科技进步特等奖 1 项、一等奖 2 项；获授权发明专利 6947 项；在世界顶尖学术期刊 Science 发表论文 3 篇、Nature 发表论文 5 篇。

学校与美国、英国、日本、法国、加拿大、澳大利亚、俄罗斯、荷兰等国家的 190 多所大学和科研机构建立了人才培养、学术交流及科研合作等关系，聘请了 200 余名国外著名学者担任学校战略科学家、客座教授和名誉教授等。此外，与国外著名高校及研究机构建立了 17 个高水平国际研究合作平台。学校先后建立了材料复合新技术国际联合实验室、环境友好建筑材料国际科技合作基地、智能航运与海事安全国际科技合作基地等 11 个国家级国际科技合作基地。2016 年，学校与英国威尔士三一圣大卫大学合作建立的首个海外校区正式运行。2018 年，学校与法国艾克斯-马赛大学合作设立武汉理工大学艾克斯马赛学院。

百廿余年，风雨兼程，武汉理工大学将以习近平新时代中国特色社会主义思想为指导，以立德树人为根本，围绕建设“让人民满意、让世人仰慕的优秀大学”的崇高大学理想，坚持以特色创优势的发展道路，努力建设成为特色鲜明的世界一流大学。

Green & Smart River-Sea-Going Ship Cruise and Yacht Research Center

绿色智能江海直达船舶与邮轮游艇研究中心

武汉理工大学为进一步提高服务“海洋强国”、“一带一路”、“长江经济带”等国家战略的能力，决定组建绿色智能江海直达船舶与邮轮游艇研究中心（以下简称“船舶邮轮中心”），以促进船舶与海洋学科与设计艺术、材料、信息、自动化等学科深度交叉融合，跨学科组织实施重大科技项目，为相关学科建设与人才培养提供重要支撑。

船舶邮轮中心以服务国家战略需求为目标，依托船舶与海洋工程国家一级重点学科，充分发挥行业特色与优势，构建多学科交叉融合的知识创新体系和人才培养体系，形成了若干支跨学科的研究团队，深入开展学科协同、行业协同、创新协同，联合攻关绿色船舶、智能船舶、邮轮游艇、新型海洋装备、舰船舰艇等领域基础共性科学问题和关键技术。中心下设四个研究所（绿色智能船舶研究所、邮轮游艇研究所、新型海洋装备研究所、舰船力学研究所）和一个大学生创新创业平台（“大型邮轮游艇”梦工场），同时参与组建了平台公司（武汉理航智能船舶科技有限公司）持续推进科技成果转化落地和实现产业化。

中心承接并完成了国家大型邮轮工程专项、高技术船舶专项、国防基础科研等重大项目，主持或主要参与亿级项目 1 项，千万级项目 6 项。在此基础上构建了船型研发设计与仿真平台，设计建造了多种系列船舶并投入运营，研究成果达到国际领先水平。中心开发了游船艇、邮轮系列设计辅助软件和数据库系统，大幅提升了邮轮游艇设计效率，设计出系列以奢华、动感、舒适为特征的豪华游船艇，出口意大利等海外游艇市场，设计的仿古特色游船艇深受市场青睐。中心积极开展新型海洋牧场装备研发与产业化、深远海综合保障基地平台关键技术、无码头卸载技术与装备关键技术、深海平台关键技术等研发，承担了浮式消波装置模型试验及工程应用、多功能自升平台研发、大型升降式网箱关键技术研究等课题，取得了一大批先进实用的成果。中心积极进行舰船力学新理论、新方法研究，参与了多项舰船舰艇项目，解决装备研制过程中的关键技术问题，保障舰船结构的安全可靠。

中心在宽扁肥大型江海直达船舶设计建造技术、绿色能源动力技术、船舶智能安全技术等方面取得了重大突破，成功研发 1140TEU 江海直达集装箱示范船，破解了江船难出海、海船难进江的难题，实现了大型船舶通江达海，开启了长江中游航运“千箱时代”。首条示范船“汉海 1 号”，被行业和媒体誉为“长江上的

复兴号”，被国际船舶协会评为“2018 全球明星船舶”。“宽扁型江海直达船开发”获 2019 年湖北省技术发明一等奖。

中心始终坚持解决科学问题与实现工程应用相结合，致力于培养多学科交叉的创新创业高层次人才，同时打造绿色智能船舶龙头企业，形成万亿产业集群，创建绿色智能船舶国家产业创新中心，成为世界一流的科学研究、工程示范、高层次人才培养及行业标准制定的重要基地。