



地址：浙江杭州浙大路 38 号
邮编：310027
电话：0571-87951772
网址：http://fit.zju.edu.cn
邮箱：fit@zju.edu.cn

Address: No.38 Zheda Road, Hangzhou Zhejiang
Zip: 310027
Tel: 0571-87951772
Wed site: http://fit.zju.edu.cn
E-mail: fit@zju.edu.cn



Annual Report 2021 年报

学部概况

Introduction to FIT

信息学部涵盖了光电科学与工程学院（光电学院）、信息与电子工程学院（信电学院）、控制科学与工程学院（控制学院）、计算机科学与技术学院（计算机学院）、网络空间安全学院（网安学院）、软件学院、生物医学工程与仪器科学学院（生仪学院）、微纳电子学院。学部共有15个本科专业，11个一级学科，其中光学工程、控制科学与工程、计算机科学与技术、软件工程入选国家“双一流”建设学科名单，这四个学科也被教育部评为A+学科。学部拥有3个国家重点实验室，1个国家工程实验室，3个国家工程（技术）研究中心，共有25个研究所，主要开展信息领域科学和工程技术问题的创新研究。

Faculty of Information Technology (FIT) of Zhejiang University (ZJU) comprised of seven colleges, namely College of Optical Science and Engineering (COSE), College of Information Science and Electronic Engineering (ISEE), College of Control Science and Engineering (CSE), College of Computer Science and Technology (CCST), including College of Cyber Science and Technology, College of Biomedical Engineering and Instrument Science (BME), College of Software Technology (CST) and College of Micro-Nano Electronics (CMNE). Currently, FIT has 15 undergraduate programs and 11 primary disciplines, in which there are 4 disciplines both assessed as A+ by MOE and constructed as National "Double First-Class" discipline, they are Optical Engineering, Control Science and Engineering, Computer Science and Technology, and Software Engineering. There are 3 State Key Laboratories, 1 National Engineering Laboratory, 3 National Engineering Research Centers, 25 research institutes, to devote to the innovation research on information science and technology.



主任：陈纯
Dean: Chen Chun



副主任：陈耀武
Vice-Dean: Chen Yaowu



副主任：陈积明
Vice-Dean: Chen Jiming

2021 Annual Report

Faculty of Information Technology
Zhejiang University

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学部机构

Organization



学术交流与合作专门委员会

●主任 陈积明 ●副主任 陈红胜 巫英才 许超
●委员 纪守领 许迎科 孙铭阳 杨青
吴仍茂 卓成 钟财军 徐杨

Academic Exchange and Cooperation Committee

●Director Chen Jiming
●Vice Director Chen Hongsheng Wu Yingcai Xu Chao
●Committee members
Ji Shouling Xu Yingke Sun Mingyang Yang Qing
Wu Rengmao Zhuo Cheng Zhong Caijun Xu Yang

学位评定委员会

●主任 陈积明 ●副主任 何钦铭
●委员 王小松 刘清君 许正平 孙守迁
李春光 吴飞 何湘宁 陈红胜
陈祥献 邵之江 林兰芬 郑臻荣
赵道木 黄志尧 童利民 虞小鹏

Academic Degrees Committee

●Director Chen Jiming Vice Director He Qinming
●Committee members
Wang Xiaosong Liu Qingjun Xu Zhengping Sun Shouqian
Li Chunguang Wu Fei He Xiangning Chen Hongsheng
Chen Xiangxian Shao Zhijiang Lin Lanfen Zheng Zhenrong
Zhao Daomu Huang Zhiyao Tong Limin Yu Xiaopeng

学部学院 COLLEGE OF



学术委员会

●主任 陈纯 ●副主任 陈耀武 刘旭
●委员 卜佳俊 尹建伟 任奎 庄越挺 刘向东
孙优贤 孙凌云 吴汉明 李尔平 杨建义
时尧成 余锋 张宏 张朝阳 陈刚
陈积明 邵之江 赵民建 俞滨 章献民
程鹏 鲍虎军 熊蓉 潘云鹤 戴道铨

Academic Committee

●Director Chen Chun Vice Director Chen Yaowu Liu Xu
●Committee members
Bu Jiajun Yin Jianwei Ren Kui Zhuang Yueting
Liu Xiangdong Sun Youxian Sun Lingyun Wu Hanming
Li Erping Yang Jianyi Shi Yaocheng Yu Feng
Zhang Hong Zhang Zhaoyang Chen Gang Chen Jiming
Shao Zhijiang Zhao Minjian Yu Bin Zhang Xianmin
Cheng Peng Bao Hujun Xiong Rong Pan Yunhe
Dai Daoxin

学术咨询评价专门委员会

●主任 刘旭 ●副主任 陈积明 李尔平
●委员 戴道铨 陈杭 张朝阳 余锋 苏宏业
孙凌云 刘东 任奎 尹建伟

Academic Advisory and Evaluation Committee

●Director Liu Xu Vice Director Chen Jiming Li Erping
●Committee members
Dai Daoxin Chen Hang Zhang Zhaoyang Yu Feng
Su Hongye Sun Lingyun Liu Dong Ren Kui
Yin Jianwei

师资队伍

Talent Team

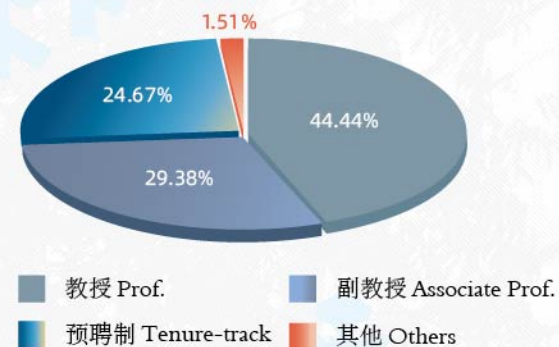
学部教职员792人，其中教学科研岗531人。现有中国工程院院士5人，中国科学院院士1人，国家百万人才工程入选9人，教育部高校教学名师1人，国家杰出青年基金获得者23人，优秀青年基金获得者19人，浙江省特级专家8人。国家自然科学基金创新群体2个，教育部创新团队2个。

2021年，10位教师入选国家级人才计划，其中国家杰出青年基金获得者3人，国家优秀青年基金获得者3人。10位教师晋升教授，6位教师晋升副教授。引进教师32人，其中百人计划研究员10人。

FIT has 792 full-time faculty and staff members, including 531 faculty members. There are five members of Chinese Academy of Engineering and one member of Chinese Academy of Sciences, nine professors of National Bai-Qian-Wan Talent Project, one Outstanding Teacher in Universities of MOE, 23 National Distinguished Youth Science Foundation Fellows, 19 National Excellent Youth Science Foundation Fellows, 8 Zhejiang Provincial Outstanding Experts, 2 Innovative Research Groups of NSFC and 2 Innovative Research Teams of Ministry of Education.

In 2021, 10 professors were selected into the national talent programs, including 3 winners of National Science Fund for Distinguished Young Scholars, and 3 winners of National Science Fund for Excellent Young Scholars. 10 teachers were promoted to full professors and 6 teachers were promoted to associate professors. 32 new faculty members joined FIT.

教学科研队伍职称结构
Professional Structure



2021年新增 Awarded in 2021

杰出青年基金获得者

National Distinguished Youth Science Foundation Fellow



匡翠方
Kuang Cuifang



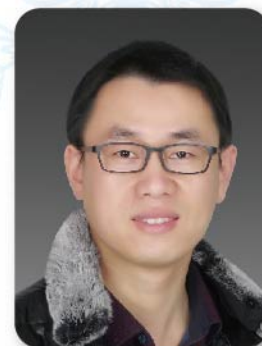
赵春晖
Zhao Chunhui



邓水光
Deng Shuguang

优秀青年基金获得者

National Excellent Youth Science Foundation Fellow



叶德信
Ye Dexin



吴丹
Wu Dan



王志波
Wang Zhibo

教授

Professors



李奇
Li Qi



张登伟
Zhang Dengwei



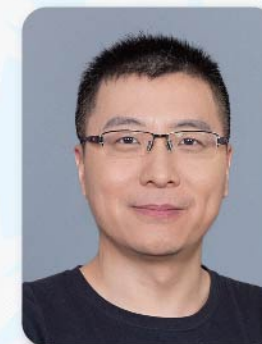
刘鹏
Liu Peng



汪涛
Wang Tao



刘之涛
Liu Zhitaoy



任沁源
Ren Qinyuan



汤斯亮
Tang Siliang



张睿
Zhang Rui



吴鸿智
Wu Hongzhi



张克俊
Zhang Kejun

副教授 Associate Professors



程潇羽
Cheng Xiaoyu



李楠
Li Nan



赵明敏
Zhao Mingmin



喻洁
Yu Jie



吴磊
Wu Lei



朱秋国
Zhu Qiuguo

引进教师 New Faculty Members

陈超超 Chen Chaochao	陈梦晓 Chen Mengxiao	陈一宁 Chen Yining	程磊 Cheng Lei	丁尧相 Ding Yaoxiang	高大为 Gao Dawei	顾超杰 Gu Chaojie	郭敬书 Guo Jingshu
郭芸帆 Guo Yunfan	回晓楠 Hui Xiaonan	霍宇驰 Huo Yuchi	廖依依 Liao Yiyi	李达 Li Da	李军伟 Li Junwei	林芃 Lin Peng	刘忠鑫 Liu Zhongxin
任堃 Ren Kun	沈春华 Shen Chunhua	王雷 Wang Lei	王志波 Wang Zhibo	薛国标 Xue Guobiao	张芬妮 Zhang Fenni	张磊 Zhang Lei	赵成成 Zhao Chengcheng
赵斐 Zhao Fei	赵莎 Zhao Sha	周海峰 Zhou Haifeng	朱强 Zhu Qiang	朱强远 Zhu Qiangyuan	朱阳 Zhu Yang	邹晨 Zou Chen	邹强 Zou Qiang

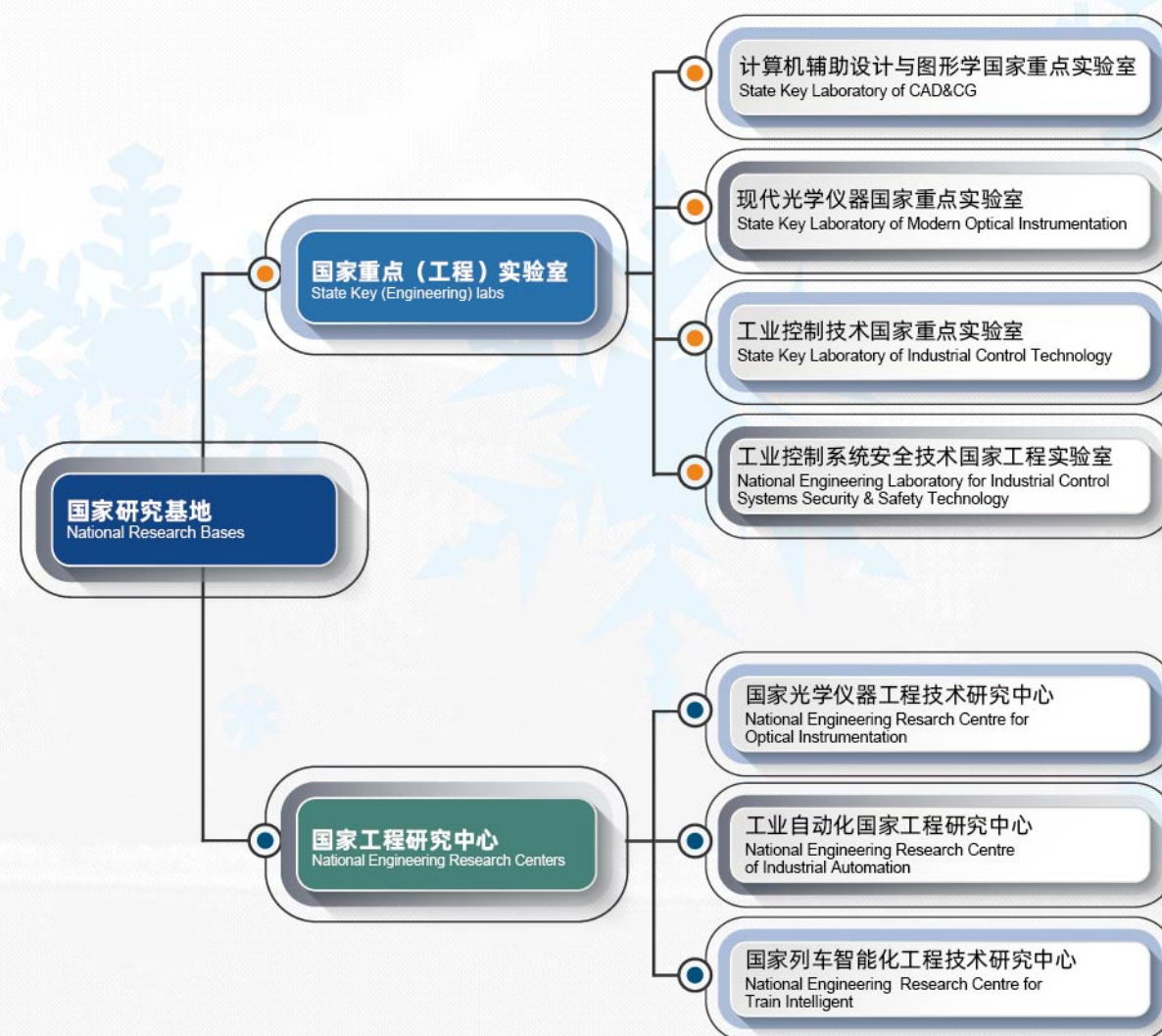
科学研究

Scientific Research

2021年度财务到校科研经费逾12亿，纵向占比58%（含军工），其中国家自然科学基金共获批114项，合计经费9256万元，包含杰青3项，优青3项，重大重点等共13项。被SCI收录论文逾900篇，其中高水平论文超60%，已获授权发明专利370项。获国家科技奖二等奖及省一等奖共6项。

In 2021, the total research funding of FIT reached over 1200 million RMB. 114 grants with the amount up to 92 million RMB were approved by the National Natural Science Foundation of China (NSFC), including 3 projects for distinguished young scholars, 3 projects for excellent young scholars and 13 vital important projects. 900+ papers were indexed by SCI and 370+ national patents have been approved this year. Several projects achieved significant progress such as the 2nd Prize of National Awards for Science & Technology Invention.

国家研究基地 National Research Bases



研究所 Institutes

学院 College of	研究所名称 Institute	所长 Director
光电科学与工程学院 Optical Science and Engineering	光学工程研究所 Inst. of Optical Engineering	白 剑 Prof. Bai Jian
	光学成像与检测技术研究所 Inst. of Optical Imaging and Detection Technology	徐之海 Prof. Xu Zhihai
	光学惯性技术工程中心 Center for Optical Inertial Technology	黄腾超 Prof. Huang Tengchao
	光电工程研究所 Inst. of Optical and Photonical Engineering	匡翠方 Prof. Kuang Cuifang
	激光生物医学研究所 Inst. of Laser Biomedicine	丁志华 Prof. Ding Zhihua
	光及电磁波研究中心 Center for Optical and Electromagnetic Research	何赛灵 Prof. He Sailing
	微纳光子学研究所 Inst. of Microphotonics and Nanophotonics	邱建荣 Prof. Qiu Jianrong
信息与电子工程学院 Information Science and Electronic Engineering	信息与通信网络工程研究所 Inst. of Information & Communication and Network Engineering	虞 露 Prof. Yu Lu
	智能通信网络与安全研究所 Inst. of Intelligent Communication Network and Security	赵民建 Prof. Zhao Minjian
	信号空间和信息系统研究所 Inst. of Signal Space and Information System	徐 文 Prof. Xu Wen
	微电子集成系统研究所 Inst. of Integrated Microelectronic Systems (IMS)	储 涛 Prof. Chu Tao
微纳电子学院 Micro-Nano Electronics	超大规模集成电路设计研究所 Inst. of VLSI Design	黄 凯 Prof. Huang Kai
控制科学与工程学院 Control Science and Engineering	工业控制研究所 Inst. of Industrial Process Control	陈积明 Prof. Chen Jiming
	智能感知与检测研究所 Inst. of Smart Sensing and Measurement	黄志尧 Prof. Huang Zhiyao
	智能系统与控制研究所 Inst. of Cyber-Systems and Control	苏宏业 Prof. Su Hongye
	工业智能与系统工程研究所 Inst. of Industry Intelligence and Systems Engineering	陈 曦 Prof. Chen Xi
	控制装备及综合安全研究所 Inst. of Control Equipment and Comprehensive Safety	王文海 Prof. Wang Wenhai
计算机科学与技术学院 Computer Science and Technology	人工智能研究所 Inst. of Artificial Intelligence	吴 飞 Prof. Wu Fei
	计算机软件研究所 Inst. of Computer Software	陈 刚 Prof. Chen Gang
	计算机系统结构与网络安全研究所 Inst. of Computer System and Security	潘 纲 Prof. Pan Gang
	现代工业设计研究所 Inst. of Modern Industrial Design	孙凌云 Prof. Sun Lingyun
生物医学工程与仪器 科学学院 Biomedical Engineering and Instrument Science	生物医学工程研究所 Inst. of Biomedical Engineering	刘清君 Prof. Liu Qingjun
	数字技术及仪器研究所 Inst. of Digital Technology and Instrument	周 凡 Prof. Zhou Fan
	医疗健康信息工程技术研究所 Inst. of Medical and Health Information Engineering	叶学松 Prof. Ye Xuesong
	生物医学影像研究所 Inst. of Biomedical Imaging	徐晓音 Prof. Xu Xiaoyin

科研亮点 Research Highlights

1. 学部个推青年创新奖 Youth Innovation Awards



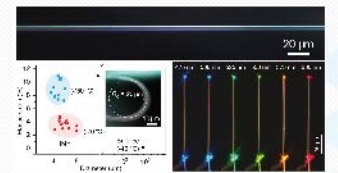
郭欣

研究方向：微纳光子结构与器件

简介：主要从事微纳光子结构与器件应用研究。在新型微纳光纤导波结构方面，首次获得接近理想质量的冰单晶微纳光纤，实现冰单晶微纳光纤在可见光波段的宽带低损耗光传输，首次实现冰的大幅度弹性弯曲并发现弯曲诱导相变新现象。在纳米线波导的激光应用方面，发展了纳米线激光器的波长快速调谐及片上单模集成等技术。以第一或通讯作者在Science、Light等重要学术期刊发表论文20余篇，研究成果被新华社、纽约时报等国内外知名媒体广泛报道，入选《科技日报》“2021年中国科技的重大突破”，获浙江省自然科学奖一等奖等。

Micro-/Nanophotonic Structures and Devices

The researcher focuses on micro-/nanophotonic structures and devices. In terms of the novel micro-/nanofibers, her team has successfully developed high quality single-crystal ice micro-/nanofiber, demonstrated broadband low-loss optical wave guiding within the visible spectral range, as well as discovered large elastic bending and bending-induced phase transition. In terms of the nanowire lasers, she has developed technologies such as fast wavelength tuning and on-chip single-mode integration of nanowire lasers. She has published more than 20 papers as first/corresponding author, including SCIENCE and LIGHT. The research work has been reported by Xinhua News, New York Times and so on, and selected as "China's Top 10 Scientific and Technological Breakthroughs 2021" by Science and Technology Daily. She has also won the first prize of Zhejiang Provincial Natural Science Award.



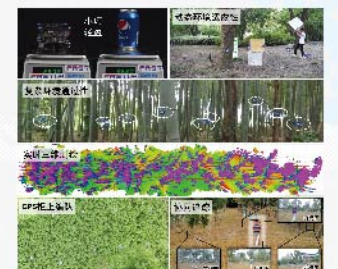
高飞

研究方向：集群机器人自主导航与多传感器融合

简介：主要从事空中机器人领域的相关研究。面向科学前沿问题和国家战略需求，针对无人机单机自主化、轻量化、鲁棒化，以及无人机集群协同化、智能化、规模化中存在的理论与技术难点，提出了复杂环境下无人机单机及集群自主导航与快速避障方法，同时推进了无人机的小型化、智能化。在Science Robotics, IEEE Transactions on Robotics等知名机器人期刊以第一/通讯作者发表论文14篇；在ICRA, IROS等知名机器人会议发表论文23篇。研究成果获Science首页报道，IEEE Spectrum多次报道；获IEEE-SSRR 2016 best paper award, IEEE/RSJ IROS 2021 best Application Paper Finalist, IEEE-TRO 2020 King-Sun Fu Best Paper Award Honorable Mention.

Swarm Robots Navigation and Multi-sensor Fusion

He Mainly engaged in research related to the field of aerial robots (UAVs). Aiming at the forefront of science issues and practical social development needs, he proposes theoretical and technical difficulties in the autonomy, light weight and robustness of UAV single aircraft, and the synergy, intelligence and scale of UAV swarm, and proposes methods for autonomous navigation and rapid obstacle avoidance of single aircraft and UAV swarm in complex environments, also promotes the miniaturization and intelligence of UAVs. He has published 14 papers as first/corresponding author in Science Robotics, IEEE Transactions on Robotics etc.; other 23 papers were published in ICRA, IROS etc. The research work was reported on the front page of Science and by IEEE Spectrum. He has received IEEE-SSRR 2016 best paper award, IEEE/RSJ IROS 2021 best Application Paper Finalist, IEEE-TRO 2020 King-Sun Fu Best Paper Award Honorable Mention.





林 晓

研究方向：自由电子辐射微纳光学

简介：主要从事自由电子辐射微纳光学研究工作，即探索自由电子与人工电磁材料的奇异作用及应用。近年主要学术贡献为揭示渡越辐射共振可产生界面切伦科夫辐射的新机理，完全不同于1958年诺贝尔物理学奖的体切伦科夫辐射机理；发现反常逆多普勒现象，颠覆了均匀正折射率系统中无逆多普勒频移的传统认知，成果入选Nature Physics 2005-2020年Optics领域最受欢迎论文。获首届海外优秀项目资助，世界顶尖科学家论坛青科委委员。以第一/通讯作者在Nature多个子刊、PRL、PNAS等期刊发表37篇论文；成果被Wikipedia、Nature Photonics、EurekAlert!、Phys.org等权威媒体报道。

Free-Electron Radiation Nanophotonics

Researcher Lin focuses on the realm of free-electron radiation nanophotonics. Recently, his group revealed the interface Cherenkov radiation induced by the resonance transition radiation, drastically different from the bulky Cherenkov radiation awarded as the Nobel prize in Physics in 1958. Moreover, his prediction of superlight inverse Doppler effect breaks the long-held tenet that the inverse Doppler frequency shift is impossible in a homogeneous positive-index system; correspondingly, his paper has been selected as the editors' favorite paper in the area of optics, from all papers published between 2005-2020 in Nature Physics. He is the recipient of the Excellent Young Scientists Fund Program (Overseas) of China in 2021 and a member of the Young Scientists Committee of the World Laureates Forum. Currently, he has published 37 papers as the first or corresponding author, including Nature Physics, Nature Materials, PRL, PNAS, Science Advances, and Nature Communications.

**2. 新增科研基地 | New Research Key Base****浙江-新加坡人工智能与创新设计联合实验室**

实验室2021年12月获批，是首个省级国际科技合作载体，由两校联合管理委员会（Collaboration Management Committee, CMC）负责联合实验室管理，浙江大学计算机学院孙凌云教授与新加坡科技设计大学Ang Lay Kee, Ricky教授共同担任实验室联合主任。实验室立足于人工智能与创新设计，围绕智能设计与数字创意、网络智能与通信计算及智能器件与智慧系统等特色方向开展研究。

Zhejiang - Singapore Innovation and AI Joint Research Lab

In December 2021, Zhejiang - Singapore Innovation and AI Joint Research Lab was selected as an International Joint Lab by Science Technology Department of Zhejiang Province. The joint lab is chaired by ZJU-SUTD CMC. The joint lab is co-directed by Prof. Sun Lingyun from ZJU and Prof. Ang Lay Kee, Ricky from SUTD. The joint lab conducts research around intelligent design and digital creativity, network intelligence and communication computing, and intelligent devices and intelligent systems.

**3. 重大科研成果及进展 | New Important Projects and Significant Progress****① 虚拟环境的高效高保真建模和视觉呈现技术**

计算机学院鲍虎军教授领衔的该项目获2020年浙江省技术发明奖一等奖。项目发明了基于影像的自动高效三维重建和模型优化、基于旋转-应变表示的复杂模型交互弹性形变模拟、基于光场稀疏表达的复杂场景高保真自适应绘制、虚拟现实绘制流水线自动优化和沉浸式优化呈现等技术，自主研发了虚拟现实支撑软件平台，实现TB级场景管理和限时高保真绘制能力，千万级面片的平均帧率大于30帧/秒。获授权中国发明专利41件，美国发明专利2件，其中40件转让或授权应用，获得学术界与产业界高度认可。该技术的重要突破有效提升了虚拟环境的创作效率和感知真实性，有力推动了虚拟现实技术的应用普及。

Efficient and High-Fidelity Modeling and Rendering Technology for Virtual Environments

This project, led by Prof. Bao Hujun from CCST, won the first prize of Zhejiang Provincial Technology Invention Award. The group present inventions of automatic and efficient image-based 3D model reconstruction and optimization, interactive elastic deformation simulation of complex models with rotation-strain constraints, high-fidelity adaptive rendering of light fields using sparse optimization, auto-tuning rendering pipeline, and automatic optimization of immersive rendering, etc. Aside from these techniques. The group independently developed a virtual reality support platform to achieve TB-level scene management and time-limited high-fidelity rendering (the average FPS of rendering a scene with tens of millions of triangles is more than 30). 41 Chinese invention patents and 2 American ones have been authorized. 40 of them have been transferred or licensed to many famous enterprises and research institutes, achieving good social and economic benefits and being highly praised in academia and industry.

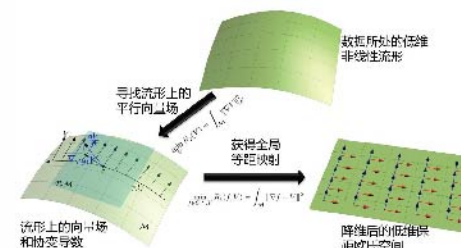
**② 基于流形学习的多媒体数据表达与理解**

计算机学院何晓飞教授领衔的该项目获2020年浙江省自然科学奖一等奖。项目围绕多媒体数据的维度高、理解难、规模大等挑战，从特征表达和语义理解两个多媒体计算的核心问题出发，在基于流形学习的多媒体表达、基于流形学习的多媒体理解、基于流形学习的海量多媒体计算等三个方面取得了新突破，解决了投影函数显式表达、底层特征与高层语义关联机制、线性复杂度流形学习等难题，形成了基于流形学习的多媒体高效表达与理解理论及方法。

Manifold Learning Based Multimedia Representation and Interpretation

The project, directed by Prof. He Xiaofei from CCST, won the first prize of Zhejiang Provincial Natural Science Award. In order to tackle the challenges of multimedia data such as high-dimensionality, semantic-gap and large-scale, the project focused on two key problems of multimedia computing, i.e., representation and interpretation. Funded by the National Natural Science

Foundation of China, this project has made breakthroughs in three aspects: manifold learning based multimedia representation, manifold learning based multimedia interpretation, and manifold learning based large-scale multimedia computing, addressing key issues such as explicitly expressing projection functions, connecting low-level features to high-level semantics and manifold learning with linear complexity. The project therefore provides theoretical basis and methods for efficient representation and interpretation of multimedia data based on manifold learning.

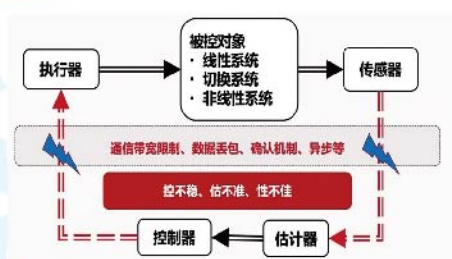


3 基于量化的网络化系统事件触发控制

控制学院苏宏业教授领衔的该项目获2020年浙江省自然科学一等奖。该项目围绕网络化系统需要兼顾通信负担与控制性能的科学难题，在网络化系统的量化与事件触发控制、最优状态评估和异步控制等方面取得了重大突破，揭示了通信资源-网络拓扑-控制性能之间的关联机理，首次得到了一般无确认机制系统的最优控制器解析解，首次提出模糊切换系统量化滤波算法、可靠控制策略和马尔科夫跳变系统无源控制方法，为提升网络化系统的控制性能奠定了坚实的理论基础。

Event-triggered Control for Networked Systems with Quantization

The project directed by Prof. Su Hongye from CSE won the first prize of Zhejiang Provincial Natural Science Award. Focusing on the challenge that the networked system needs to take into account the communication and control performance, the project has made major breakthroughs in the system quantification and event-triggered control, optimal estimation and asynchronous control of the networked system. It contains three aspects: finding the mechanism among the communication, the network topology and the control performance, designing optimal estimation and control for lossy network, and giving passivity-based asynchronous control for Markov Jump Systems. These results will make great contributions for improving the control performance of networked system.

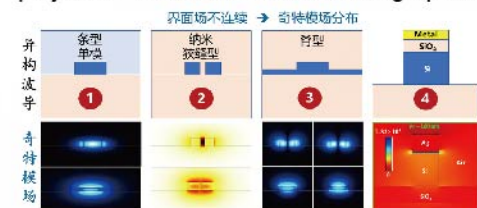


4 硅基特异结构光波导模场调控及功能器件研究

光电学院戴道铎教授负责的该项目获2020年浙江省自然科学一等奖。项目围绕高性能高集成硅光器件发展需求，聚焦于硅基特异结构光波导模场调控及功能器件这一核心问题，在异构波导模式高效耦合及转换、片上偏振模场调控方法及器件、亚波长尺度模场局域及器件等三方面取得了新突破，推动了硅光波导理论和器件机理研究发展，为实现高集成度大规模光子集成提供了重要基础。

Silicon Photonic Waveguides and Devices with Special Light Manipulation

The project led by Prof. Dai Daoxin from COSE won the first prize of the Zhejiang Provincial Natural Science Award. This project aims for the realization of high-performance and high-density silicon photonics. Particularly, the focus is silicon



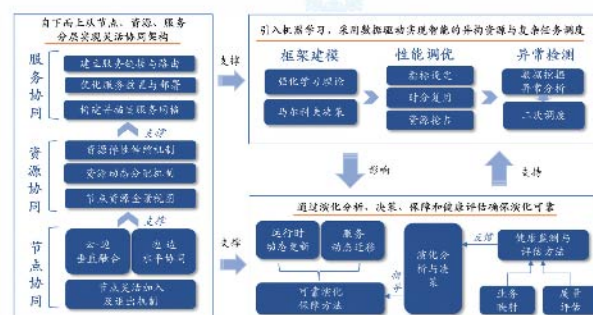
photonic waveguides and devices with special light manipulation. Great progress has been achieved in the past decade, including high-efficiency mode coupling and mode conversion, on-chip polarization-handling devices, and sub-wavelength photonic devices with mode localization. It contributes a lot to the theory of silicon photonics and the mechanisms for photonic devices, which is very beneficial to the development of large-scale photonic integrated circuits.

5 服务计算

由计算机学院邓水光教授负责的该项目获批2021年国家杰青基金资助。邓教授长期从事服务计算研究和应用，特别聚焦于复杂服务系统的构建和运行等关键技术研究。本项目拟重点研究云原生复杂系统的高效协同架构、智能调度模型和动态演化方法，致力于构建面向云原生新形态复杂系统的服务计算理论和方法体系。

Service Computing

The project, directed by Prof. Deng Shuiguang from CCST, was supported by NSFC for Distinguished Young Scholars in 2021. Prof. Deng has been devoting to the research of services computing for over a decade with the focuses on the efficient construction and reliable operation of large-scale service systems. This project will focus on three key issues of cloud-native complex service systems including efficient collaboration architecture, intelligent scheduling model and dynamic evolution. It aims to establish a theoretical and technical system for cloud-native oriented service computing.



6 光学超分辨显微成像

由光电学院匡翠芳教授负责的该项目获批2021年国家杰青基金资助。匡教授主要从事超分辨光学显微成像相关理论和技术的研究。本项目拟重点研究结构光照明调制下荧光分子发射模型、4pi结构光照明单分子显微系统开发及基于照明调制的新型单分子定位算法，实现三维亚五纳米分辨率、低损伤长时程的多色超分辨成像。



Optical Super-Resolution Microscopy Imaging

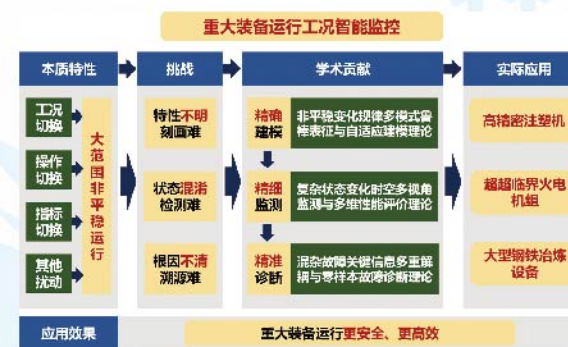
The project, directed by Prof. Kuang Cuifang from COSE, was supported by NSFC for Distinguished Young Scholars in 2021. Prof. Kuang's group is engaged in the research on the theory and technology of super-resolution microscopy. It will focus on the fluorescence emission model via structured illumination modulation, the instrument development of 4pi single-molecular localization microscopy with structured illumination, and the novel algorithm of single-molecular localization based on illumination modulation. It aims to realize three-dimensional sub-5-nanometer, multicolor super-resolution microscopy with low photodamage and long-term imaging.

7 重大装备运行工况智能监控

由控制学院赵春晖教授负责的该项目获批2021年国家杰青基金资助。赵教授主要从事重大装备运行工况智能监控的理论与方法研究。本项目拟重点研究多模式鲁棒表征与自适应建模、时空多视角监测与多维性能评价、关键信息多重解耦与零样本故障诊断、高端工业监控软件等，致力于建立大范围非平稳变化下运行工况监控的理论与技术体系。

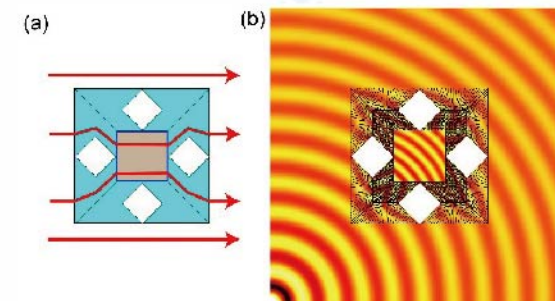
Intelligent Monitoring for Operating Conditions of Major Equipment

The project, directed by Prof. Zhao Chunhui from CSE, was supported by NSFC for Distinguished Young Scholars in 2021. Prof. Zhao's group has been mainly engaged in the research on the theory and method of intelligent monitoring of major equipment operating conditions. It will focus on the theoretical method that integrates multimode robust characterization and adaptive modelling, spatio-temporal multi-view monitoring and multi-dimensional performance evaluation, multiple decoupling diagnosis of critical fault information and zero-sample diagnosis. The object is to overcome the technical bottleneck that is difficult to accurately identify the operating conditions under a wide range of non-stationary changes.



8 空间匹配隐形材料

由信电学院叶德信副教授负责的该项目获批2021年国家优青基金资助。叶德信副教授主要从事人工电磁材料设计与应用、新体制天线射频系统等研究。本项目拟重点开展基于全向匹配透明人工电磁材料及非均匀法布里-珀罗谐振腔阵列的空间全向完美电磁隐身结构设计及实现研究，推进新体制隐身技术的实际应用。



Free-Space Matched Invisibility Structure

The project, directed by Associate Prof. Ye Dexin from ISEE, was supported by NSFC for Excellent Young Scholars in 2021. Associate Prof. Ye works on studying the design and application of metamaterials, and novel antenna RF systems. This project will focus on the design and realization of ideal omnidirectional invisibility cloak in free space based on the perfectly matched transparent metamaterials and inhomogeneous Fabry-Perot cavity array, promoting the practical applications of transformation cloaking technology.

9 物联网感知与安全

由计算机学院王志波教授负责的该项目获批2021年国家优青基金资助。王教授主要从事物联网感知与安全的理论与方法研究。本项目拟重点研究智能物联网系统的资源高效调度、数据安全保护、系统安全可用等问题，致力于建立面向大规模智能物联网系统的感知与安全理论体系。

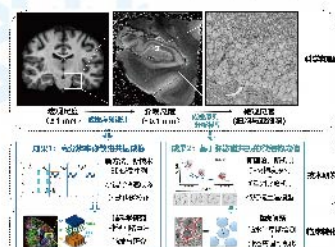
Sensing and Security of Internet of Things

The project, directed by Prof. Wang Zhibo from CCST, was supported by NSFC for Excellent Young Scholars in 2021. Prof. Wang focuses on developing theories and algorithms for the sensing and security of Internet of Things (IoT). This project will study the problems of efficient resource scheduling, data security and protection, and secure and robust system. The objective is to establish a novel sensing and secure framework for large-scale AIoT systems.



10 弥散磁共振成像技术

由生医学院吴丹百人计划研究员负责的该项目获批2021年国家优青基金资助。吴丹研究员长期从事前沿磁共振成像技术研发。本项目拟基于弥散磁共振的微结构成像技术，研发适用于临床脑肿瘤扫描的快速、准确、稳定的新型成像序列，并针对肿瘤细胞特征设计、优化和验证微结构模型与重建算法，实现无创的肿瘤病理可视化。



Diffusion Magnetic Resonance Imaging

The project, directed by Researcher Wu Dan from BME, was supported by NSFC for Excellent Young Scholars in 2021. Researcher Wu has been devoting to the research of advanced magnetic resonance imaging (MRI) techniques for the past 10 years. This project aims to develop new diffusion MRI-based techniques for fast, accurate and robust microstructural imaging of brain tumor; and design, optimize, and validate the microstructural models for noninvasive visualization of the tumor pathology.

11 单分子时空分辨光电纳米镜

由光电学院刘旭教授负责的该项目获批2021年基金委重大仪器专项资助。项目聚焦于单分子层次的精准测量，利用自主研制的隧穿结探针，融合单分子隧穿传感、超快激光调制电学测量、等离激元增强拉曼光谱等高敏光电表征技术，发展非真空、常温状态下单分子的超高时空分辨综合表征技术及仪器——单分子时空分辨光电纳米镜。这是对分子体系的高时空分辨表征技术的一次飞跃，将极大地推动单分子检测以及测序领域的发展。

Single-Molecule Time-Resolved Optic-Electric Nanoscopy (STRON)

The project, led by Prof. Xu Liu from COSE, was supported by the NSFC Major Instrument Program in 2021. This project aims to bring together for the first time state-of-the-art developments in the fields of ultrafast spectroscopy, plasmonic sensing, and single-molecule tunneling detection. A new experimental platform, named STRON, is designed for the characterization of molecular-scale objects, utilizing brand-new nanofluidic channel-integrated tunneling electrical probes in concert with ultrafast pump and probe tunnel sensing, and Raman fingerprint methods without vacuum and ultralow temperature conditions. The STRON has the potential to overcome the limitations of scanning probe methods and access the real-time dynamics of molecular-scale systems including biological macromolecules, quantum dots, and semiconductor devices. It will promote greatly the research in the area of nucleic acid, protein sequencing and the single.



12 基于复合微纳结构的多维光场调控芯片及应用研究

由光电学院戴道铎教授负责的该项目获批2021年基金委重大研究计划资助。项目聚焦于微纳尺度片上光场调控，探索其电光与全光调控速度及能耗物理极限，发展超快响应超低能耗的新一代片上光调控器件及技术，重点解决片上光场波矢及模场匹配、微纳尺度光场局域及高效多维调控、片上异质集成结构与工艺兼容性问题，实现超低能耗和超快响应片上调控，满足未来超大容量超低能耗光传输等重大应用发展需求。

Hybrid Micro-/Nano-Photonic Chips with Multi-Dimensional Light Manipulation and its Applications

This project, led by Prof. Dai Daoxin from COSE, was supported by the NSFC Major Research Program in 2021. It focuses on ultrafast and high-energy-efficiency on-chip light manipulation. This project will explore the physical limit of the operation speed and the energy efficiency for on-chip light manipulation, in order to realize silicon-based on-chip electro-optical and all-optical modulations with ultra-fast speed and ultra-low power consumption. The following issues are to be addressed: (1) Mod-mismatching and momentum-mismatch in the on-chip photonic systems; (2) Nano-scale light localization with efficient multi-dimensional light manipulation; (3) Compatibility of structures and fabrication processes. The project will pave the way for the applications of next-generation ultra-high-capacity and energy-efficient optical transmission and other systems in the future.

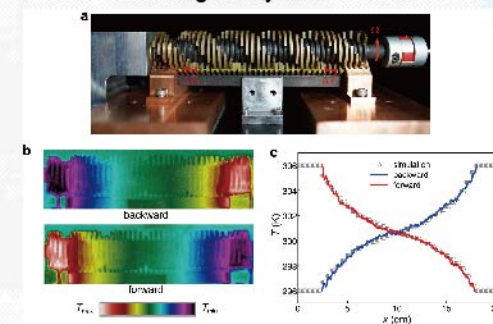


13 动态基元热超构材料的传热机理和非对称传热性能研究

由信电学院李鹰百人计划研究员负责的该项目获批2021年基金委重大研究计划资助。项目从单动态基元对时变温度场信号的散射理论及其谐振特性着手，建立从单基元到多基元、孤立系统到开放系统的理论分析方法，分析其非互易协同特性，进而探究动态基元阵列的热整流性质，阐明动态基元阵列等效参数的时变调制规律，实现对其非对称传热性能的优化调控，推动高性能可控非对称传热功能的新器件研发，以满足未来热超构材料在控温散热和热信息处理等技术中的应用需求。

The Mechanism and Asymmetric Property of Heat Transfer in Thermal Metamaterial with Dynamic Elements

The project, led by Researcher Li Ying from ISEE, was supported by the NSFC Major Research Program in 2021. Starting from the scattering theory and resonance characteristics of a single dynamic element to time-varying temperature field signals,



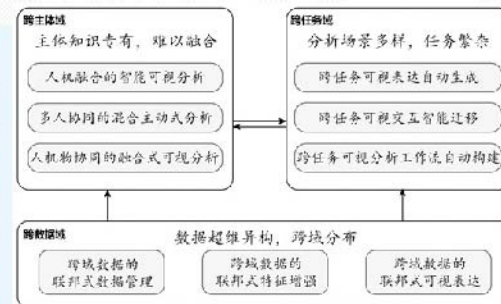
we establish the generalization from a single element to multiple elements and from isolated to open systems, revealing their non-reciprocal properties. And then we demonstrate the thermal rectification effect in lattices of dynamic elements to optimize and tune the asymmetric heat transfer property based on the time-modulated effective parameters. It will promote the research and development of new devices with high-performance controllable asymmetric heat transfer functions to meet the application needs of future thermal metamaterials in technologies such as temperature-controlled heat dissipation and thermal information processing.

14 三元空间大数据的跨域可视分析基础理论与方法

由计算机学院陈为教授负责的该项目获批2021年基金委重点项目资助。项目重点研究内容包括：1.探索支持可视分析的联邦式数据表征新机制。2.研究机器智能增强的可视分析新流程，探索新型跨主体可视交互理论，创新三元空间人机物协同智能体方法；3.研究跨任务的可视表达自动生成与可视交互智能迁移，构建支持可视分析的知识生成、推理和重用方法。项目将在省级医保大数据上验证有效性，预期在可视分析和三元空间大数据方面建立原创理论与方法。

Theories and Methods of Cross-domain Visual Analysis for CPS Big Data

This project led by Prof. Chen Wei from CCST was supported by the NSFC Key Program in 2021. First, we explore the new federated data representation for visual analysis. Second, we study new pipeline of machine intelligence-enhanced visual analysis, explore new theory of cross-subject visual interaction and innovate new method of CPS human-machine-object collaborative intelligence. Third, we study the across-task automatic generation of visual representation and intelligent transfer of visual interaction. We also construct methods of knowledge generation, reasoning and reuse. This project will verify the effectiveness of the method on the provincial health insurance big data. It is expected to establish original theories and methods in visual analysis and CPS big data, and produce a number of academic achievements with significant international influence.



15 基于薄膜铌酸锂的高速中红外光收发器件与集成研究

由光电学院时尧成教授负责的该项目获批2021年基金委重点项目资助。本项目将聚焦高速中红外光收发集成器件的研制。在发射端，利用周期性极化薄膜铌酸锂波导中的二阶参量差频效应实现跨波段、通信制式及调制格式透明的大范围波长变换，实现高速中红外信号发射；在接收端，利用周期性极化薄膜铌酸锂波导的非线性频率上转换，再将中红外信号转换至近红外波段，实现高速高灵敏度探测。高速中红外器件的集成化，将为大容量中红外高速空间光通信奠定坚实基础。

Photonic Integrated Devices Based on Lithium Niobate on Insulator for High Speed Mid-Infrared Optical Transceiver/Receiver



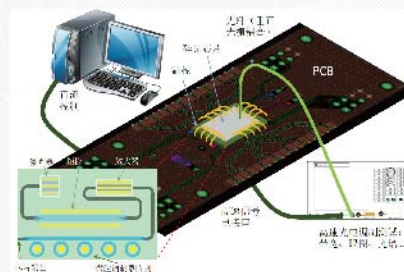
The project, led by Prof. Shi Yaocheng from COSE, was supported by the NSFC Key Program in 2021. It will use the second-order parametric difference frequency effect in the periodically polarized lithium niobate on insulator (PPLNOI) waveguide to achieve a wide range wavelength conversion across wavelength bands, communication standards and modulation formats. High-speed modulators, high-performance passive devices and also the nonlinear wavelength conversion devices will be integrated on the same LNOI platform, laying a solid foundation for large-capacity mid-infrared free space optical communications.

16 硅基多材料混合集成密集波分复用光发射和放大芯片研究

由光电学院刘柳百人计划研究员负责的该项目获批2021年基金委重点项目资助。本项目面向未来对低能耗、高速率的数据互连需求，围绕高速光互连中的光信号发射技术，研发基于多材料混合集成的多功能、高速、高集成度波分复用光信号发射和放大器件及芯片，以满足我国对于下一代数据中心和超级计算机建设的要求。

Wavelength Division Multiplexed Optical Transmission and Amplification Chip Based on Hybrid Integration on Silicon

The project, led by Researcher Liu Liu, was supported by the NSFC Key Program in 2021. This project focuses on high-speed optical transmissions. Innovative technologies in integration, multiplexing, optical emitter and amplification, modulation will be introduced. Multifunctional, high data-rate, high integration density optical transmitter chip will be demonstrated in this project, which will play a very important role for the realization of next-generation data center and super computer construction in China.



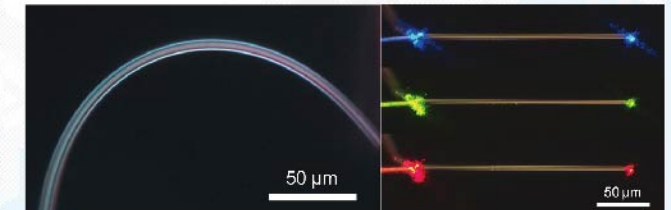
4. 年度代表性论文 | Recommended Papers

1 Elastic Ice Microfibers

作者: Peizhen Xu, Bowen Cui, Xin Guo; 等

来源: SCIENCE 卷: 373 期: 6551 页: 187-192 出版年: JUL 2021

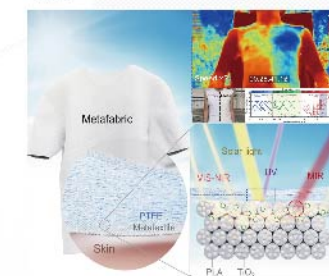
We demonstrate that ice grown as single-crystal ice microfibers (IMFs) with small diameter is highly elastic. We could reversibly bend the IMFs with a strain up to 10.9%, which approaches the theoretical elastic limit. We also observed a pressure-induced phase transition of ice on bent IMFs. The high optical quality allows for low-loss optical waveguiding in our IMFs. These discoveries may open opportunities for exploring ice physics and ice-related technology in various disciplines.



2 Hierarchical-Morphology Metafabric for Scalable Passive Daytime Radiative Cooling

作者: Shaoning Zeng, Sijie Pian, Yaoguang Ma; 等

来源: SCIENCE 卷: 373 期: 6555 页: 692-696 出版年: AUG 2021



Incorporating passive radiative cooling structures into personal thermal management technologies could effectively defend human against the intensifying global climate change. We show that large scale woven metafabrics can provide high emissivity (94.5%) in the atmospheric window and reflectivity (92.4%) in the solar spectrum because the hierarchical-morphology design of the randomly dispersed scatterers throughout the metafabric. Through scalable industrial textile manufacturing routes, the cost-effectiveness and high-performance of our metafabrics present great advantages for intelligent garments, smart textiles, and passive radiative cooling applications.

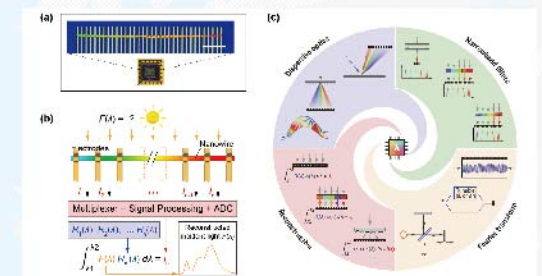
3 Miniaturization of Optical Spectrometers

作者: Zongyin Yang, Tom Albrow-Owen, Weiwei Cai; 等

来源: SCIENCE

卷: 371 期: 6528 页: eabe0722 出版年: JAN 2021

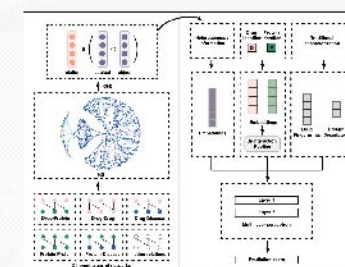
We wrote a review on microspectrometers for Science journal in 2021. This article standardized the terminology, reviewed the development, and proposed opportunities in microspectroscopy. This article has been one of the most important paper in the field of spectroscopy and attracted considerable attention from academia and industry.



4 A Unified Drug-Target Interaction Prediction Framework Based on Knowledge Graph and Recommendation System

作者: Qing Ye, Chang-Yu Hsieh, Shibo He; 等

来源: NATURE COMMUNICATIONS 卷: 12 期: 1 页: 1-12 出版年: DEC 2021

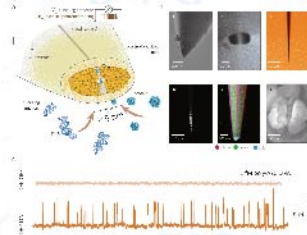


We develop KGE_NFM, a unified framework for DTI prediction by combining knowledge graph (KG) and recommendation system. This framework firstly learns a low-dimensional representation for various entities in the KG, and then integrates the multimodal information via neural factorization machine (NFM). KGE_NFM is evaluated under three realistic scenarios, and achieves accurate and robust predictions on four benchmark datasets, especially in the scenario of the cold start for proteins. Our results indicate that KGE_NFM provides valuable insight to integrate KG and recommendation system-based techniques into a unified framework for novel DTI discovery.

5 Combined Quantum Tunnelling and Dielectrophoretic Trapping for Molecular Analysis at Ultra-low Analyte Concentrations

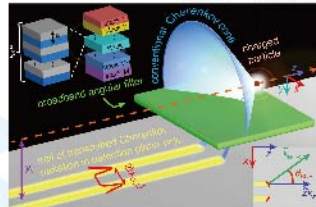
作者: Longhua Tang, Binoy Paulose Nadappuram, Paolo Cadinu; 等
来源: NATURE COMMUNICATIONS 卷: 12 期: 1 页: 1-8 出版年: FEB 2021

We report a standalone tunneling probe based on double-barreled capillary nanoelectrodes that do not require a conductive substrate to operate. These probes can detect single molecules in solution environments, including mononucleotides, oligonucleotides and proteins. The probes are simple to fabricate, exhibit remarkable stability, and can be combined with dielectrophoretic trapping to transport active analyte. The latter allows for up to 5-orders of magnitude increase in event detection rates and sub-femtomolar sensitivity.



6 A Brewster Route to Cherenkov Detectors

作者: Xiao Lin, Hao Hu, Hongsheng Chen; 等
来源: NATURE COMMUNICATIONS 卷: 12 页: 5554 出版年: SEP 2021

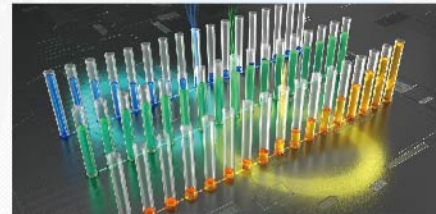


We propose a paradigm for Cherenkov detectors that utilizes the broadband angular filter. Due to the Brewster effect, such angular filtering effect enables the realization of a non-dispersive refractive index over the entire visible spectrum. Moreover, the refractive index can be designed to arbitrary values close to unity. Our angular-selective Brewster paradigm offers a feasible solution to implement compact and highly sensitive Cherenkov detectors using regular dielectrics.

7 Acoustic Non-Hermitian Skin Effect from Twisted Winding Topology

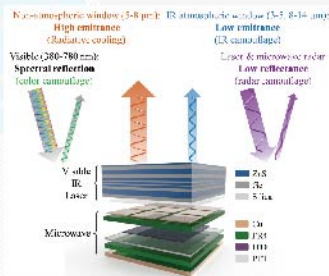
作者: Li Zhang, Yihao Yang, Hongsheng Chen; 等
来源: NATURE COMMUNICATIONS 卷: 12 文章号: 6297 出版年: NOV 2021

We demonstrate a bipolar non-Hermitian skin effect and a discrete Bloch wave-like extended mode from twisted winding topology. The experimental sample is a one-dimensional artificial crystal with non-reciprocal coupling realized with directional amplifiers. By controlling the non-reciprocal coupling between arbitrary two sites, different topological windings can be achieved in our platform. This work paves a way towards highly sensitive sensors, robust one-way waveguides, and novel amplifiers.



8 Multispectral Camouflage for Infrared, Visible, Lasers and Microwave with Radiative Cooling

作者: Huanzheng Zhu, Qiang Li, Chenning Tao; 等
来源: NATURE COMMUNICATIONS 卷: 12 期: 1 页: 1-8 出版年: MAR 2021



Interminable surveillance and reconnaissance through various sophisticated multispectral detectors present threats to military equipment and manpower. In this paper, multispectral camouflage is demonstrated for the visible, mid-infrared (MIR, 3-5 and 8-14 μm), lasers (1.55 and 10.6 μm) and microwave (8-12 GHz) bands with simultaneous efficient radiative cooling in the non-atmospheric window (5-8 μm). This work may introduce the opportunities for multispectral manipulation, infrared signal processing, thermal management, and energy-efficient applications.

9 Massive Access for 5G and Beyond

作者: Xiaoming Chen, Derrick Wing Kwan Ng, Wei Yu; 等
来源: IEEE JOURNAL ON SELECTED AREAS IN COMMUNICATIONS 卷: 39 期: 3 页: 615-637 出版年: MAR 2021

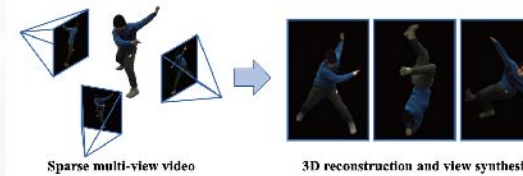
Massive access, also known as massive machine-type communication (mMTC), is one of the main use cases of 5G and B5G wireless networks. The main characteristics of massive access include low power, massive connectivity, and broad coverage, which require new concepts, theories, and paradigms for the design of next-generation cellular networks. This paper presents a comprehensive survey of massive access design for B5G wireless networks. Specifically, we provide a detailed review of massive access from the perspectives of theory, protocols, techniques, coverage, energy, and security. Furthermore, several future research directions and challenges are identified.



10 Neural body: Implicit Neural Representations with Structured Latent Codes for Novel View Synthesis of Dynamic Humans

作者: Sida Peng, Yuanqing Zhang, Xiaowei Zhou; 等
来源: CVPR 2021 Best Paper 会议时间: JUN 20-25 2021; 会议地点: Nashville, TN, USA

This paper addresses the challenge of synthesizing free-viewpoint videos of a human performer from a very sparse set of camera views. Some recent works, e.g., NeRF, have shown that learning implicit neural representations of 3D scenes achieves remarkable view synthesis quality given dense input views. However, the representation learning will be ill-posed if the views are highly sparse. To solve this problem, we propose Neural Body, a new human body representation which is able to integrate the observations across video frames and achieve much better results than NeRF.



11 V-Shuttle: Scalable and Semantics-Aware Hypervisor Virtual Device Fuzzing

作者: Gaoning Pan, Shouling Ji, Chunming Wu; 等
来源: ACM CCS 2021 Best Paper 会议时间: NOV 15-19, 2021; 会议地点: Virtual Event, Republic of Korea

We present a new hypervisor fuzzing framework called V-Shuttle, which performs scalable and semantics-aware hypervisor fuzzing. We firstly design a DMA redirection mechanism to significantly reduce the manual efforts to reconstruct virtual devices' protocol structures and make the fuzzing environment setup automated and scalable. Furthermore, we put forward a new fuzzing mutation scheduling mechanism called seedpool to make the virtual device fuzzing process semantics-aware and speed up the fuzzing process to achieve high coverage. We further carried out a long-term fuzzing campaign in QEMU/KVM and VirtualBox with V-Shuttle. In total, we discovered 35 new bugs with 17 CVEs assigned.



12 Teach-Repeat-Replan: A Complete and Robust System for Aggressive Flight in Complex Environments

作者: Fei Gao, Boyu Zhou, Xin Zhou; 等
来源: IEEE TRANSACTIONS ON ROBOTICS IEEE RAS2021 Best Paper 卷: 36 期: 5 页: 1526-1545 出版年: OCT. 2020



We propose a complete and robust system for the aggressive flight of autonomous quadrotors, built upon on the classical teach-and-repeat framework. Instead of commanding the drone to precisely follow a teaching trajectory, our method automatically converts a human-piloted trajectory, which can be arbitrarily jerky, to a topologically equivalent one. Also, to avoid unmapped or moving obstacles during flights, a fast local perception method and a sliding-windowed replanning method is integrated into our system, to generate safe and dynamically feasible local trajectories onboard. Our system achieves better flight performance when compared to a skilled human pilot.

人才培养

Education

学部共有11个一级学科博士学位授予点, 22个二级学科博士学位授予点, 15个本科专业。光电信息科学与工程、电子科学与技术、自动化、计算机科学与技术、软件工程、生物医学工程等6个本科专业入选国家级一流本科专业建设点。在校生(包含本科生和研究生)9787人, 在国内外各类学科竞赛中成绩优异, 本科生深造率接近60%。依托学部建设“信息+X”多学科交叉人才培养中心, 推进具有多学科交叉创新研究能力的拔尖人才培养。

There are totally 11 doctorate programs of primary discipline, 22 doctorate programs of secondary discipline, 15 undergraduate programs. 6 undergraduate programs were selected in the country's construction plan list of first-class undergraduate programs. About 9787 full-time undergraduate and graduate students are enrolled in the faculty. They have made outstanding achievements in various international and domestic disciplinary competitions. Nearly 60% undergraduate students continue their studies at home or abroad. The "Information + X" Multidisciplinary Talent Training Center is developed to promote the cross innovation capability of graduate student.

本科专业 UG Programs

学院 College of	本科专业 UG Program
光电科学与工程学院 Optical Science and Engineering	光电信息科学与工程 Optoelectronic Information Science and Engineering
信息与电子工程学院 Information Science and Electronic Engineering	信息工程 Information Engineering
	电子科学与技术 Electronic Science and Technology
	微电子科学与工程 Microelectronic Science and Engineering
控制科学与工程学院 Control Science and Engineering	自动化 Automation
	机器人工程★ Robot Engineering★
计算机科学与技术学院 Computer Science and Technology	计算机科学与技术 Computer Science and Technology
	数字媒体技术◇ Digital Media Technology◇
	软件工程 Software Engineering
	信息安全 Information Safety
	工业设计 Industrial Design
	产品设计△ Product Design△
	人工智能★ Artificial Intelligence★
生物医学工程与仪器科学学院 Biomedical Engineering and Instrument Science	生物医学工程 Biomedical Engineering
	测控技术与仪器◇ Measurement and Control Technology and Instrument◇

★ 仅在竺可桢学院招生 Enrolling in Chu Kochen Honors College

◇ 2019年取消招生 Cancelled in 2019

△ 2021年取消招生 Cancelled in 2021

学科 Disciplines

光学工程 Optical Engineering

光学工程 Optical Engineering

光通信技术 Optical Communication Technique

信息传感及仪器 Information Sensing and Instruments

电子科学与技术 Electronics Science and Technology

物理电子学 Physical Electronics

微电子学与固体电子学 Microelectronics and Solid State Electronics

电路与系统 Circuits and Systems

电磁场与微波技术 Electromagnetic Field and Microwave Technology

信息与通信工程 Information and Communication Engineering

通信与信息系统 Communication and Information Systems

信号与信息处理 Signal and Information Processing

控制科学与工程 Control Science and Engineering

控制理论与控制工程 Control Theory and Control Engineering

检测技术与自动化装置 Detection Technology and Automatic Equipment

系统工程 Systems Engineering

模式识别与智能系统 Pattern Recognition and Intelligent Systems

导航、制导与控制 Navigation, Guidance and Control

计算机科学与技术 Computer Science and Technology

计算机应用技术 Computer Applied Technology

计算机系统结构 Computer Systems Organization

数字化艺术与设计 Digital Art and Design

电子服务 Electronic Service

软件工程 Software Engineering

计算机软件与理论 Computer Software and Theory

生物医学工程 Biomedical Engineering

生物医学工程 Biomedical Engineering

电子信息技术及仪器 Electronic Information Technologies and Instruments

网络空间安全 Cyberspace Security

人工智能 Artificial Intelligence

集成电路科学与工程 Integrated Circuit Science and Engineering

设计学 Design

设计艺术学 Art of Design

学生 (人) Students

学 生 Students		学 院 College	光电 学院 COSE	信电 学院 ISEE	控制 学院 CSE	计算机 学院 CCST	软件 学院 CST	生仪 学院 BME	微纳电子 学院 MNE	合计 Total
在校生 Enrollments	博士生 Doctor		331	415	384	778	15	254	48	2225
	硕士生 Master		390	625	565	988	954	262	120	3904
	本科生 (二、三、四年级) Undergraduate		350	970	517	1475	/	346	/	3658
招生数 Freshmen	博士生 Doctor		88	104	85	209	15	47	30	578
	硕士生 Master		142	185	151	342	404	90	86	1400
	本科生 (一年级) Sophomore		96	248	154	430	/	110	/	1038
毕业生 Graduates	博士生 Doctor		57	42	39	78	/	29	/	245
	硕士生 Master		113	227	134	318	287	82	/	1161
	本科生 Undergraduate		102	280	189	448	/	108	/	1127
本科生深造 与对外交流 Further Study and International Exchange of Undergraduate	毕业生* Graduate*		102	279	167	384	/	108	/	1040
	出国 (境) 深造率 Ratio of Further Studies Aboard		13.73%	10.75%	7.19%	16.92%	/	3.7%	/	12.02%
	国内读研率 Ratio of Further Studies at Home		55.88%	58.42%	54.49%	34.90%	/	42.59%	/	47.21%
	对外交流人次 International Exchange		164	303	108	832	/	114	/	1521

*不包括竺可桢学院学生 Except the students belong to Chu Kochen Honors College

浙江省优秀博士学位论文 Zhejiang Provincial Excellent Doctoral Dissertation

作者姓名 Author	指导教师 Supervisor	一级学科 Discipline	论文题目 Title
陈 隆 Chen Long	肖 俊 Xiao Jun	计算机科学与技术 Computer Science and Technology	面向复杂场景理解的视觉内容识别、检测与推理方法研究 Visual Recognition, Detection, and Reasoning for Complex Visual Scene Understanding
纪岱宗 Ji Daizong	刘清君 余雄杰 Liu Qingjun Yu Xiongjie	生物医学工程 Biomedical Engineering	基于智能手机的电流型电化学学生化传感系统及其应用研究 Smartphone-based Amperometric Electrochemical Biosensing System and its Application
张治坤 Zhang Zhikun	陈积明 贺诗波 Chen Jiming He Shibo	控制科学与工程 Control Science and Engineering	面向本地差分隐私的数据可用性优化方法研究★ Data Utility Optimization for Local Differential Privacy★
景利乔 Jing Liqiao	陈红胜 Chen Hongsheng	电子科学与技术 Electronics Science and Technology	基于手性异向介质的圆极化波调控和史密斯-珀塞尔辐射★ Circular Polarized Wave Manipulation and Smith-Purcell Radiation Based on Chiral Metamaterials★

★浙江省优秀博士学位论文提名论文 Zhejiang Provincial Excellent Doctoral Dissertation Nomination Dissertation

专项奖 Special Awards

奖 项 Award	获奖学生 Winners	学 院 College of
2020-2021学年浙江大学 竺可桢奖学金 Chu Kochen Scholarship	屠锡涛 Tu Xitao	光电科学与工程学院 Optical Science and Engineering
	许培臻 Xu Peizhen	光电科学与工程学院 Optical Science and Engineering
	温晨怡 Wen Chenyi	信息与电子工程学院 Information Science and Electronic Engineering
	郑 航 Zheng Hang	信息与电子工程学院 Information Science and Electronic Engineering
	严子涵 Yan Zihan	计算机科学与技术学院 Computer Science and Technology

国际学科竞赛 International Disciplinary Competitions

竞赛名称 Competition	奖项 Award	获奖人员、队名/作品 Winners List	指导教师 Advisor
国际大学生机器人设计大赛 IDC Robocon	第二名 Second Place	郎奕霖	王 酉
	第三名 Third Place	朱天翊	
DEFCON CTF 2021	冠军 Champion	Katzebin联合战队: 武翰杰 马 麟 罗天翔 戴勤明 贾永康 雷 骁 谢天晰 康锦辉	白洪欢 周亚金 常 瑞
2021红点设计概念大奖 Reddot Award 2021	最佳设计奖 Best of Best	Infinity chair: 潘诚浩 裘 佶 雷子悦	徐雯洁
第44届国际大学生程序设计 竞赛世界总决赛邀请赛 ICPC 44 th World Finals Moscow Invitational Contest	铜牌 Bronze Medal	Runespoor: 吕耀维 李彦奎 赵广泽	王 灿
2021年国际大学生程序设计 竞赛亚洲区域赛 International Collegiate Programming Contest Asia Regional Contest (ICPC)	亚军 First Runner-up	Solitary Dream: 彭 博 褚写庭 陈 逸	王 灿
	金牌 Gold Medal	Phantom Ensemble: 唐嘉辰 黎伟诺 李昌栋	
		Solitary Dream: 彭 博 褚写庭 陈 逸	
		Heltion & l1l15 & SSerxhs: 赵广泽 凌子恒 吕耀维	
		Inception: 李奕致 张钰成 应子帆	
		Q.E.D Who Survives: 林响烨 叶佳昂 王海纳	
		The cell phone battery is dead: 沈哲贝 胡家齐 吴 迪	
		cybno2: 陈彦博 杨沛霖 刘静明	
	银牌 Silver Medal	Supersymmetry Quarkus: 徐琪杰 杨子晟 刘静明	
		Cjb is our quee: 龙香遇 陈思睿 王 熠	
	铜牌 Bronze Medal	Duckforces: 张志心 楼沁霏 郭一铭	

国内学科竞赛 Civil Disciplinary Competitions

竞赛名称 Competition	奖项 Award	获奖人员、队名/作品 Winners List	指导教师 Advisor
2021年第九届全国大学生光电 设计竞赛 The 9 th National University Students' Opt-Sci-Tech Competition	一等奖 First Place	基于智能手机的苹果糖度无损测量: 项千漪 赵慕茜 潘奕如	汪凯巍
		基于智能手机的苹果糖度无损测量: 朱荣轩 朱智豪 高宇斌	
		智能垃圾分类小车: 石则斌 罗雪峰 王 隐	王立强 袁 波
	二等奖 Second Place	基于智能手机的苹果糖度无损测量: 张希悦 王海威 刘新梓	袁 波
		智能垃圾分类小车: 吴祉乐 杨奕晨 邢光辉	汪凯巍
2021年全国大学生电子设计竞赛 2021 National Undergraduate Electronics Design Contest	一等奖 First Place	用电器分析识别装置: 李泳浩 朱志豪 陈凌云	阮秉涛
	二等奖 Second Place	用电器分析识别装置: 吴振冲 林雨洁 计满意	
2021 ROBOCUP机器人世界杯 中国赛 2021 Robocup China open	类人组冠军 First Place in Humanoid League	ZJUDancert: 戴 哲 刘将品 高一淳 焦笑然 吴恩泽 余丛杉 林焕彬 沈 凝 杜浩哲 韩陈睿 陈芷柯 王余峰 陈先玮 陈泽希 黄哲远	熊 蓉
	小型组冠军 First Place in Small Size League	ZJUNlic: 沈 凝 彭德尚 叶佳木 陈芷柯 杜浩哲 韩陈睿 杨嘉磊 李浩东 张嘉宁 马亦诚 王余峰 黄 挺 许腾叶 戴 哲 刘将品 焦笑然 黄哲远 陈泽希 陈先玮	
2021中国大学生程序设计竞赛 China Collegiate Programming Contest (CCPC)	亚军 First Runner-up	Heltion & l1l15 & SSerxhs: 赵广泽 凌子恒 吕耀维	王 灿
	金奖 Gold Medal	So Cute: 胡競文 王 伟 郑恬欣	
		Duckforces: 张志心 楼沁霏 郭一铭	
		Kswlkswl: 龙香遇 陈思睿 王 熠	
		Q.E.D Who Survives: 林响烨 叶佳昂 王海纳	
		The cell phone battery is dead: 沈哲贝 胡家齐 吴 迪	
		cybno2: 陈彦博 杨沛霖 刘静明	
		Inception: 李奕致 张钰成 应子帆	
	银奖 Silver Medal	Kswlkswl: 龙香遇 陈思睿 付冰洋	
		Solitary Dream: 彭 博 褚写庭 陈 逸	

国内学科竞赛 Civil Disciplinary Competitions

竞赛名称 Competition	奖项 Award	获奖人员、队名/作品 Winners List	指导教师 Advisor
2021中国高校计算机大赛—移动应用创新赛 2021 China Collegiate Computing Contest(C4)-Mobile Application Innovation Competition	一等奖 First Place	谓尔: 王振阳 李 想 徐瑞柏	张克俊
		ARCT——创造城市新视界: 章子颢 鲍 冲 李 海	章国锋 张克俊
	二等奖 Second Place	落音: 陆子仪 仲崇珺 俞佳兴	张克俊 章国锋
2021年全国大学生信息安全竞赛 2021 National College Student Information Security Contest	二等奖 Second Place	基于DVFS的FPGA神经网络安全性评估系统: 刘岸林 孙 墨 徐俊格	张 帆
		社交网络假流量产业链挖掘与分析系统: 何 平 吕雪妍 赵卿云	纪守领
第五届“强网杯”全国网络安全挑战赛 “QiangWang” National Cyber-security Competition	特等奖 Special Prize	AAA战队: 谢天晰 张智煊 贾永康 雷 骁	常 瑞
	一等奖 First Place	Sod_One战队: 卢昊洋 李婷婷 赵子鸣 宋卓学 蒋加伦 李兆轩	张 帆



海外交流

International Exchange and Cooperation

学部2021年教师合作学术交流约150人次(含在线), 主办国际会议9次, 以在线为主。学部各学院(系)与国外著名大学继续保持学生联合培养, 加强推进教师在线科研合作, 提升了科研与教学国际化水平。

In 2021, about 150 persons visited abroad or invited visited FIT for academic exchange and cooperation (including online). Meanwhile, we successfully hosted about 9 international conferences online. The colleges of FIT keep online to strengthen the international exchange and cooperation in order to enhance the level of teaching and scientific research.

序号 No.	会议名称 Conference	时间 Date
1	大数据分析、可视化及其在健康科学中的应用在线研讨会 Online Workshop of Big Data Analysis, Visualization and their Application to Health Science	1月14日-15日 Jan. 14-15
2	第三届中国国际硅光技术研讨会 3rd China-Europe International Silicon Photonics Symposium	8月29日 Aug. 29
3	2021科技设计国际会议 International Conference on Technology and Design (ICTD2021)	9月4日- 8日 Sep. 4-8
4	集成深度学习不确定性和形状先验用于心脏 MRI 分割(线上) Ensembling deep learning uncertainty and shape prior for cardiac MRI segmentation	10月9日 Oct. 9
5	第四届真空光镊国际研讨会 The 4th Conference on Optical Tweezers in Vacuum	10月15日-18日 Oct. 15-18
6	第43届光子与电磁学研究国际研讨会 The 43rd Photonics and Electromagnetics Research Symposium	11月22日 Nov. 22
7	2021年“一带一路”与“金砖五国”先进光子学研讨会 2021 Belt-Road & BRICS Forum for Advanced Photonics	12月9日 Dec. 9
8	2021年西湖国际光电子会议 The West-Lake Photonics Symposium 2021	12月10日 Dec. 10
9	求是之光国际青年学者论坛 “2nd Qiushi (Seeking-truth)” International Forum of Advanced Photonics	12月29日 Dec. 29

2021要闻

News 2021

1月14日，计算机学院任奎教授、周昆教授双双入选国际计算机学会2020 ACM Fellow，中国大陆仅4席！

On Jan. 14th, both Prof. Ren Kui and Prof. Zhou Kun from CCST were elected as 2020 ACM Fellows. Only four researchers in Chinese mainland are honored this year.



Frontiers of Information Technology & Electronic Engineering
信息与电子工程 (英文)

浙大7位教授入选中国工程院院刊FITEE首届优秀学者名单
FITEE 2020.9.18
CM 33-135-177

近日，中国工程院院刊FITEE发布首届优秀学者名单，信息学部7位教授上榜，他们是：
优秀专题奖：潘云鹤 (2017)、(2018)
杰出编委：曹东明 (2019)、张朝阳 (2019)
刘华峰 (2020)、姜飞 (2020)、庄越超 (2020)
杰出通讯专家：程波 (2020)

3月16日，学部共有7位教授入选中国工程院院刊FITEE首届优秀学者名单，包括优秀专题奖、杰出编委以及杰出通讯学者。

On Mar. 16th, seven professors were awarded by Frontiers of Information Technology & Electronic Engineering (FITEE), one of the transactions of the Chinese Academy of Engineering, including the Best Special Issue Award, Distinguished Editorial Board Member Award and Distinguished Corresponding Expert Award.

4月17日，光电学院戴道铎教授荣获第十七届王大珩光学奖中青年科技人员光学奖。

On April 17th, Prof. Dai Daoxin from COSE won the 17th Wang-Daheng Optics Award by Chinese Optical Society.



4月21日，生仪学院张宏教授团队研发的“分子影像探针微流控合成系统”获日内瓦国际发明金奖。

On April 21st, the project named "New Microfluidic Modular Integration Microfluidic Synthesis System for PET Molecular Imaging Probes" finished by Prof. Zhang Hong group from BME, won the Geneva International Gold Award for Invention.



4月23日，信息学部3项学术研究成果入选浙江大学2020年度十大学术进展(含提名)，负责人分别是信电学院陈红胜、史治国和卓成。

On April 23rd, three academic research achievements from FIT were selected as the 2021 top 10 Academic Progress of ZJU (including nomination).

8月17日，信电学院李尔平教授获IEEE EMC学会授予的2021年唯一的Laurence Cumming卓越贡献奖。

On Aug. 17th, Prof. Li Erping from ISEE was presented the one and only IEEE EMC Laurence Cumming award in 2021 to recognize his outstanding contributions to the development of EMC society and EMC related research.



9月13日，计算机学院周昆教授获第三届“科学探索奖”（2021年榜单）。

On Sep. 13th, Prof. Zhou Kun from CCST won XPLOER PRIZE by Tencent Charitable Foundation in 2021.



ASIAGRAPHICS 亚洲图形学学会



9月19日，CAD&CG国家重点实验室彭群生教授荣获亚洲图形学学会“终身成就奖”。

On Sep. 19th, Prof. Peng Qunsheng from the State Key Lab of CAD & CG won Life-Time Achievement Award by the Asian Graphical Society.

10月19日，控制学院张宏建等主编的《自动检测技术与装置（第3版）》和计算机学院何钦铭主编的《C语言程序设计（第4版）》荣获全国优秀教材（高等教育类）二等奖。

On Oct. 19th, Two textbooks were on the list of second prize of national excellent teaching materials (Higher Education), namely the Automatic detection technology and device (3rd Edition) edited by Prof. Zhang Hongjian et al from CSE and the C language programming (4th Edition) edited by Prof. He Qinming from CCST.



10月20日，信电学院百人计划研究员黄崇文荣获2021年第十六届IEEE通信学会亚太地区杰出青年学者。同年6月荣获2021年度IEEE马可尼论文奖。

On Oct. 20th, Researcher Huang Chongwen from ISEE won the 2021 IEEE ComSoc Asia-Pacific Outstanding Young Researcher Award. In June of the same year, he has won the 2021 IEEE Marconi prize Paper Award.



新增“集成电路科学与工程”一级学科博士学位授权点名单

- | | |
|------------|-------------|
| 1 北京大学 | 10 浙江大学 |
| 2 清华大学 | 11 杭州电子科技大学 |
| 3 北京航空航天大学 | 12 厦门大学 |
| 4 北京理工大学 | 13 华中科技大学 |
| 5 北京邮电大学 | 14 华南理工大学 |
| 6 上海交通大学 | 15 电子科技大学 |
| 7 南京大学 | 16 西北工业大学 |
| 8 东南大学 | 17 西安电子科技大学 |
| 9 南京邮电大学 | 18 中国科学院大学 |

10月26日，“集成电路科学与工程”一级学科博士学位授予点获批建设。

On Oct. 26th, Doctorate programs of primary discipline “Integrated Circuit Science and Engineering” was approved for construction.

11月15日，信息学部FIT论坛第10期在金溪山庄举行。会上，人事处人才办为青年学者解读政策，优秀青年学者及资深教授代表分享经验。

On Nov. 15th, the 10th FIT forum was successfully held with the talent policy interpreted by the Human Resources Department and scientific research experience shared by several distinguished young scholars and senior professors.



11月17日，“信息+X”多学科交叉人才培养中心召开政策说明会，2021级博士生及其导师共20多人参加了会议。

On Nov. 17th, the "Information+X" Multidisciplinary Talent Training Center held a meeting to brief PhD supervisors and students about the latest policies of process management.

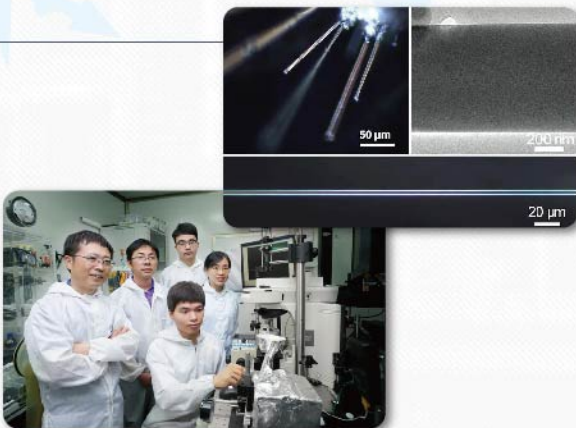


12月1日，浙江大学教育基金会潘云鹤人工智能科教基金在紫金港校区成立，同年6月潘云鹤院士获2020年度浙江科技大奖。

On Dec. 1st, the AI Science and Education Foundation of ZJU Education Foundation donated by Academician Pan Yunhe was established. In June of the same year, Academician Pan won the 2020 Zhejiang Provincial Sci. & Tech. Award.

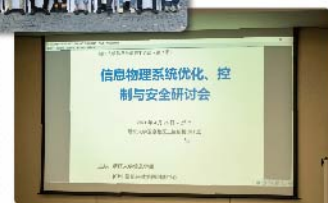
12月20日，光电学院童利民教授团队科研成果《Elastic ice microfibers》入选2021年中国科技十大突破。

On Dec. 20th, the research achievement on elastic ice microfibers by Prof. Tong Limin group from COSE was selected as one of Chinese Top Ten Sci. & Tech. Breakthroughs in 2021.



12月27日，信息学部在玉泉校区邵科馆举行2021年度个推青年创新奖评审会。9位40周岁以内的优秀青年学者参与奖项角逐，20余位优秀青年学者到场观摩学习。

On Dec. 27th, FIT held selection meeting for the 2021 Getui Youth Innovation Award. Nine excellent young scholars under the age of 40 participated in the competition, and more than 20 other excellent young scholars attended the meeting to learn from each other.



2021年信息学部学术交流支持计划共资助举办了4期FIT论坛（第6-9期），依次为医学影像技术高峰论坛，信息物理系统优化、控制与安全研讨会，智能信号处理研讨会，浙江省信号处理学会2021学术年会。

In 2021, the academic exchange support program funded by FIT supported four FIT forums (issues 6-9) to held with different topics, such on the medical imaging technology, the information physics system optimization, control and security seminar, the intelligent signal process.

“信息+X”多学科交叉人才培养中心联合“医学+X”、“工学+X”和“理学+X”中心举办多场博士生学术交流会。

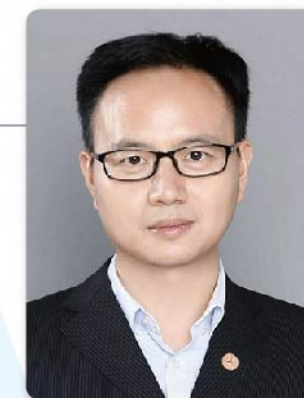
"Information+X" Multidisciplinary Talent Training Center jointly held doctoral student academic exchange meeting with "Medicine+X", "Engineering+X" and "Science+X".



光电学院刘旭教授荣获第四届“最美浙江人·最美科技人”。

Prof. Liu Xu from COSE was awarded Most Beautiful Scientific and Technology Person in Zhejiang Province.

信电学院陈红胜教授成功当选2022年IEEE Fellow。
Prof. Chen Hongsheng from ISEE was elected as 2022 IEEE Fellow.



生仪学院李炫祯研究员（韩国籍）成功入选2021年度《麻省理工科技评论》亚太地区“35岁以下科技创新35人”。

Researcher LEE Hyeon Jeong from BME was honored Innovators Under 35 Asia Pacific for 2021.

