

# 宋超阳 博士 | 助理教授 | 南方科技大学

## 联系方式

仿生设计与学习实验室 | 负责人 | <https://bionicsdl.ancoraSIR.com>  
机器人智能设计与学习虚拟教研室 | 负责人  
机械与能源工程系 | 助理教授  
计算机科学与工程系 | 客座助理教授  
广东省深圳市南山区 | 学苑大道 1088 号 | 南方科技大学 | 工学院北楼 517 室 (518055)  
+86 (0)755 8801 5361 | +86 132 6068 5102  
songcy@sustech.edu.cn | songcy@ieee.org

## 个人简介

博士生导师、副研究员、深圳市海外高层次人才、IEEE 高级会员、《机器人》期刊青年编委、第八届中国自动化学会机器人专业委员会委员 (2024 年-2029 年)。目前指导博士研究生 3 人、硕士研究生 4 人，在南科大任职期间，已毕业博士研究生 4 人，硕士研究生 7 人。本科毕业于同济大学、博士毕业于新加坡南洋理工大学，曾任美国麻省理工学院博士后、新加坡科技与设计大学博士后、澳大利亚莫纳什大学助理教授，2018 年全职加入南方科技大学机械与能源工程系担任助理教授、兼任计算机科学与工程系客座助理教授、鹏程实验室博士研究生导师。

发明了视触融合全方向自适应柔性精细力触觉感知与交互技术，首次实现过约束机器人肢体设计并证明其显著优于常规平面肢体机构的运动性能。已授权国家发明、实用新型专利 16 项、美国专利 1 项。近五年主持国自然面上项目 1 项、国自然青年项目 1 项、主持慧眼行动项目 1 项、主持或参与国家、省部级及其他项目 10 项；在 Science Robotics、Int. J. Robotics Research、Adv. Int. Sys.、Mech. Mach. Theory、CoRL、WAFR 等机器人领域高水平期刊与国际会议发表论文 70 余篇。

在南方科技大学负责机械设计、协作机器人学习等课程，主持 2 项教改项目并与麻省理工学院开展国际教育合作、主持虚拟教研室 1 项。担任 ICRA2023、ICRA2024、ICRA2025 副编委，获 CASE2024 康复自动化最佳论文奖、联合国教科文组织 2024 年高等教育先锋案例奖等多个奖项。

## 教育经历

南洋理工大学 新加坡  
博士 | 机构学与机器人 | 机械与宇航工程系 (*Ph.D.*) 2009 年 08 月 - 2014 年 02 月

- “Kinematic Study of Overconstrained Linkages and Design of Reconfigurable Mechanisms”
- 导师：陈焱教授 (杰青)、陈义明教授 (新加坡工程院院士)

同济大学 上海  
工学本科 | 机械设计制造及其自动化 | 机械工程学院 (*B.Eng.*) 2005 年 09 月 - 2009 年 06 月

- 导师：王安麟教授

## 学术任职

南方科技大学 深圳  
助理教授 | 机械与能源工程系 2018 年 06 月 - 至今  
客座助理教授 | 计算机科学与工程系 2018 年 10 月 - 至今

莫那什大学 (Monash University) 克莱顿, 维多利亚州, 澳大利亚  
讲师 (助理教授) | 机械与宇航工程系 2015 年 11 月 - 2017 年 11 月

麻省理工学院 剑桥, 马萨诸塞州, 美国  
博士后 | 机械工程系 2014 年 03 月 - 2014 年 10 月  
导师: Prof. Kevin Otto, Prof. Katja Hölttä-Otto, Prof. Jianxi Luo

新加坡科技与设计大学 新加坡  
博士后 | 工程产品开发系 2013 年 04 月 - 2015 年 10 月  
导师: Prof. Warren Seering

荣誉获奖	<b>UNESCO-ICHEI Higher Education Digitalization Pioneer Case Award</b> <span style="float: right;"><b>2023</b></span>
	The International Centre for Higher Education Innovation under UNESCO (UNESCO-ICHEI) <i>DeepClaw: Design and Learn Robotics through a Soft, Digital Touch</i>
	<b>Best Healthcare Automation Paper Award</b> <span style="float: right;"><b>2023</b></span>
	IEEE International Conference on Automation Science & Engineering (CASE) <i>Underwater Intention Recognition using Head Motion and Throat Vibration for Supernumerary Robotic Assistance</i>
	<b>Best Conference Paper Finalist</b> <span style="float: right;"><b>2023</b></span>
	IEEE/RAS/TMC International Conference on Advanced Robotics & Mechatronics (ICARM) <i>Jigsaw-based Benchmarking for Learning Robotic Manipulation</i>
<b>Honorable Award</b> <span style="float: right;"><b>2018</b></span>	
Jingdong-TEDA 2018 Robotics Challenge <i>Team Nanyang</i>	
<b>Best Paper Award Finalist</b> <span style="float: right;"><b>2016</b></span>	
IEEE/RAS International Conference on Real-time Computing and Robotics (RCAR) <i>A Soft Robotic Glove for Hand Motion Assistance</i>	
<b>Reviewer's Favorite Paper Award</b> <span style="float: right;"><b>2013</b></span>	
The International Conference on Engineering Design (ICED) <i>Risk and Innovation Balance in Crowdfunding New Products</i>	
<b>Young Delegate Travel Grant</b> <span style="float: right;"><b>2012</b></span>	
International Federation for the Promotion of Mechanism and Machine Science (IFTToMM) <i>A Special Wohlhart's Double-Goldberg 6R Linkage and Its Multiple Operation Forms among 4R and 6R Linkages</i>	
职业协会	青年编委   《机器人》期刊 <span style="float: right;"><b>2024 - 至今</b></span>
	委员   第八届中国自动化学会机器人专业委员会 <span style="float: right;"><b>2024 - 2029</b></span>
	高级会员   电气和电子工程师协会 (Institute of Electrical & Electronics Engineers) <span style="float: right;"><b>2019 - 至今</b></span>
	会员   设计学会 (Design Society) <span style="float: right;"><b>2021 - 至今</b></span>
同行审稿	<b>副编委</b>
	<ul style="list-style-type: none"> <li>• <b>IEEE ICRA2025:</b> Visual Perception and Learning</li> <li>• <b>IEEE ICRA2024:</b> Vision and Sensor Based Control</li> <li>• <b>IEEE ICRA2023:</b> Visual Perception and Learning</li> </ul>
	<b>客座编委</b>
	<ul style="list-style-type: none"> <li>• <b>Frontiers in Robotics and AI:</b> The Design and Mechanoreception of Hybrid Actuators</li> </ul>
<b>审稿人</b>	
<ul style="list-style-type: none"> <li>• Science Robotics   IEEE Transactions on Robotics</li> <li>• Journal of Field Robotics   Soft Robotics   Advanced Intelligent Systems</li> <li>• Mechanism and Machine Theory   IEEE Robotics and Automation Letters</li> <li>• RSS 2024   ISRR 2024   CoRL 2023   CoRL 2022   CoRL 2021</li> <li>• ICRA 2024   ICRA 2023   ICRA 2021   CASE 2023   IROS 2023   IROS 2022   IROS 2021</li> </ul>	

## 学术指导

### 研究助理教授

(2023 - 2024) Dr. Yi Juan Ph.D. from The University of Hong Kong

### 博士后

(2023 - 2025) Dr. Xie Kege Ph.D. from University of Nottingham, Ningbo  
(Co-supervised with Prof. Deng Hui @ SUSTech)

### 访问学者

(2020 - 2022) Dr. Tian Hao Post-Doc visiting from HKU. Joined Huawei  
(2020 - 2022) Dr. Yan Youcan Doctoral Student visiting from CityU@HK  
Joined CERN as a Post-Doc  
(2021 - 2026) Zhong Shuqiao Doctoral Student visiting from Prof. Lin Jian

### 博士研究生

(2014 - 2014) Timothy Li Singapore University of Technology and Design  
(Co-supervised with Prof. Kevin Otto)  
(2015 - 2017) Dr. Chen Yaohui Monash University  
(Transferred to Dr. Hoam Chung)  
(2015 - 2017) Dr. Zhang Dongyu Monash University  
(Co-supervised with Dr. Hoam Chung)  
(2019 - 2024) Dr. Liu Xiaobo 南方科技大学 | 学术博士研究生  
(2019 - 2024) Dr. Guo Ning 南方科技大学 | 学术博士研究生  
(2019 - 2024) Dr. Yang Linhan 南方科大-香港大学联合培养 | 博士研究生  
(2020 - 2024) Dr. Gu Yuping 南方科大-香港大学联合培养 | 博士研究生  
(2021 - 2025) Sun Haoran 南方科大-香港大学联合培养 | 博士研究生  
(2022 - 2027) Han Xudong 南方科技大学 | 学术博士研究生  
(2023 - 2028) Wu Tianyu 南方科技大学 | 学术博士研究生

与香港大学副教授潘佳博士联合指导博士研究生 Yang Linhan, Gu Yuping, Sun Haoran 和 Wu Tianyu。

### 硕士研究生

(2013 - 2014) Yin Bangqi Singapore University of Technology and Design & MIT  
(2013 - 2014) Aditya Ranjan Singapore University of Technology and Design & MIT  
(2016 - 2017) Wu Tong Monash University  
(2018 - 2020) Liu Sheng Joined Electronics Design Institute  
(2018 - 2020) He Yang Joined Harmen Karden  
(2019 - 2022) Wang Zhenhong Joined Shaoyin Tech.  
(2020 - 2023) Feng Shihao Joined RVbust Tech.  
(2020 - 2023) Guo Yuqin Joined Hong Kong Public Service Department  
(2021 - 2024) Jie Yu Master Class of 2024  
(2021 - 2024) Jiang Bingfa Master Class of 2024  
(2021 - 2025) Ge Sheng Master Class of 2025  
(2022 - 2025) Dong Yujian Master Class of 2025 (Intern at Tencent Robotics X)  
(2022 - 2025) Xu Ronghan Master Class of 2025 (Team lead of RoboCon SUSTech)  
(2023 - 2026) Huang Bangchao Master Class of 2026

### 本科生

(2015 - 2025) Supervised 41 SUSTech Undergrads and 21 Undergrads before Joining SUSTech  
(2023 - 2024) Supervised SUSTech Robotics Club (40+) and won 2nd Prize in RoboCon2024  
(2019 - 2021) Supervised SUSTech RoboMaster Team and won National 3rd Prize

## 科研经费

**国家级** 主持: 237 万 (元) / 参与: 236.4 万 (元) / 总计: 473.4 万 (元)

**面上项目** 主持  
(经费编号: 62473189) 2025.01 - 2028.12  
国家自然科学基金委员会 50 万  
《过约束机器肢的“鳍-肢-指”机器物理学模型及其新质机器人学习技术》

**青年基金项目** 主持  
(经费编号: 51905252) 2020.01 - 2022.12  
国家自然科学基金委员会 28 万  
《面向非结构环境的软体机器人仿龙虾外骨骼机构学原理研究》

**国家级项目** (2024 年变更项目负责人为南方科技大学付成龙教授) 主持  
(经费编号: \*\*\*\*) 2022.01 - 2024.12  
\*\*\*\* 159 万  
《\*\*\* 的智能控制》

**重点项目** (负责人: 南方科技大学戴建生院士) 南科大子课题负责人 | 总项目第 3 参与人  
(经费编号: 52335003) 2024.01 - 2028.12  
国家自然科学基金委员会 115 万/230 万  
《融合多态进化和力流演变的高适应多元变胞机构设计理论与方法》

**国家重点研发计划 | 智能机器人专项** (负责人: 哈尔滨工业大学朱延河教授) 参与  
(经费编号: 2018YFB1305403) 2019.03 - 2022.02  
中华人民共和国科学技术部 121.4 万/376 万  
《外肢体智能反馈与智能操控技术研究》

**省市级** 主持: 390 万 (元) / 参与: 440 万 (元) / 总计: 830 万 (元)

**技术攻关重点项目** (负责人: 中建钢构股份有限公司陈振明教授级高工) 联合实验室负责人  
(经费编号: JSGG20220831110002004) 2022.11 - 2025.10  
深圳市科技创新委员会 150 万/800 万  
《重 2022N055 面向建筑钢结构制造的视觉智能焊接机器人研发》

**高等院校稳定支持计划面上项目** 主持  
(经费编号: K21336307) 2020.01 - 2022.12  
深圳市科技创新委员会 50 万  
《基于环境智能的仿生柔性协作机器人学习与灵巧操控原理研究》

**开放课题 (探索项目)** 主持  
(经费编号: K21335401) 2020.01 - 2022.12  
深圳市人工智能与机器人研究院 40 万  
《面向垃圾分拣全向自适应交互与超分辨率感知的柔性差分刚度网络机器人》

**孔雀人才计划启动经费** 主持  
(经费编号: Y01336113) 2018.07 - 2023.07  
深圳市科技创新委员会 300 万  
《非结构环境人机交互机理的机器智能》

**深港澳科技计划** (负责人: 香港大学助理教授王春锦博士) 参与  
(经费编号: SGDX20220530110804030) 2023.08 - 2026.08  
深圳市科技创新委员会 90 万/300 万  
《面向复杂曲面超精制造的多模式水射流机器人抛光技术》

<b>基础研究重点项目</b> (负责人: 南方科技大学戴建生院士) (经费编号: JCYJ20220818100417038) 深圳市科技创新委员会 《刚柔耦合可重构机器人设计与柔顺操控研究》	<b>参与</b> 2022.10 - 2025.10 <b>200 万</b>
<b>基础研究 (自由探索)</b> (负责人: 深圳大学助理教授胡新尧博士) (经费编号: JCYJ20160422145322758) 深圳市科技创新委员会 《可穿戴下肢软体矫正器对老年人步态和平衡的主动干预研究》	<b>参与</b> 2016.07 - 2018.08 <b>30 万</b>
<b>深圳市仿生与智能机器人重点实验室</b> (负责人: 南方科技大学付成龙教授) (经费编号: ZDSYS20200811143601004) 深圳市科技创新委员会 《复杂场景下的多足机器人机构拓扑设计技术》	<b>参与</b> 2021.04 - 2023.03 <b>无</b>
<b>广东省人体增强与康复机器人重点实验室</b> (负责人: 南方科技大学付成龙教授) (经费编号: 无) 广东省教育厅 《仿生软体机器人触觉传感器研究》	<b>参与</b> 2018.12 - 2023.12 <b>无</b>
<b>企业级</b>	
<b>主持: 510 万 (元) / 参与: 0 万 (元) / 总计: 510 万 (元)</b>	
<b>南方科技大学-熵智科技物流机器人联合实验室</b> (经费编号: K19331007) 熵智科技 (深圳) 有限公司	<b>主持</b> 2018.01 - 2023.12 <b>500 万</b>
<b>Software Development for Flexible Robotic Automation</b> (经费编号: K19331007) 深圳宁泉科技有限公司	<b>主持</b> 2020.01 - 2023.12 <b>5 万</b>
<b>CCF-Tencent Joint Program for Exploratory Research</b> (经费编号: K19331007) 腾讯科技	<b>主持</b> 2019.01 - 2019.12 <b>5 万</b>
<b>高校级</b>	
<b>南方科大期间主持: 48 万 (元) / 莫纳什大学期间负责: 10.23 万 (澳元)</b>	
<b>教育教学研究和改革项目</b> (经费编号: XJZLGC202241) 南方科技大学 《机器智能设计与学习虚拟教研室》	<b>主持</b> 2023.01 - 2024.12 <b>10 万</b>
<b>教育教学研究和改革项目</b> (经费编号: Y01331824) 南方科技大学 《跨课程连贯式大团队实验项目新工科教改》	<b>主持</b> 2021.01 - 2021.12 <b>8 万</b>
<b>工学院教学创新项目</b> (经费编号: 34/K18341702) 南方科技大学 《协作机器人用于新工科互动教学》	<b>主持</b> 2019.01 - 2019.12 <b>30 万</b>
<b>Monash Institute of Medical Engineering Grant</b> (经费编号: K21336307) 莫纳什大学 (Monash University)	<b>主持</b> 2017.01 - 2017.12 <b>4.73 万 (澳元)</b>

*Enhancing Colonoscopic Visualization and Control*

**Monash Arts-Engineering Grant**

(经费编号: K21335401)

莫纳什大学 (Monash University)

*Safety Issues in Emerging Human-Robot Interactions*

主持

2017.01 - 2017.12

2.5 万 (澳元)

**Mechanical and Aerospace Engineering**

(经费编号: Y01336113)

莫纳什大学 (Monash University)

*A Bio-inspired Soft Robotic Glove*

主持

2016.01 - 2016.12

3 万 (澳元)

**国际合作**

(SUSTech PI: Prof. Fu Chenglong & MIT PI: Prof. Harry Asada)

**南方科技大学-麻省理工学院机械工程教育与研究联合中心**

(经费编号: Y01346002)

深圳市科技创新委员会

*Interactive Human-Robot System for Robotics Education and Research*

参与

2018.12 - 2023.12

**会务组织**

**Conference Organizing Committee**

Conference on the Fundamental Theory and Key Technologies of Soft Robotics

2023

Conference on Guangdong Graduate Students on Intelligent Manufacturing and Robotics

2023

Conference on Guangdong Graduate Students on Intelligent Manufacturing and Robotics

2022

**Conference Technical Committee**

International Conference on Control Theory and Applications (ICoCTA2023), Hangzhou

2023

**Workshop and Tutorial Organizer**

Workshop on Soft Devices for Humanoid and Wearable Applications

2023

IEEE International Conference on Humanoid Robots (Humanoids2018)

Organizing Committee: Pan Jia (HKU), Wang Zheng (HKU), **Song Chaoyang (SUSTech)**

## 论文稿件

3. Victor-Louis De Gusseme, Remko Proesmans, Thomas Lips, Julius Hietala, Giwan Lee, Jiyoung Choi, Jeongil Choi, Geon Kim, Phayuth Yonrith, Domen Tabernik, Andrej Gams, Peter Nimac, Matej Urbas, Jon Muhovic, Danijel Skocaj, Matija Mavsar, Hyojeong Yu, Minseo Kwon Yang Cong, Ronghan Chen, Yu Ren, Supeng Diao, Jiawei Weng, Jiayue Liu, Haoran Sun, Linhan Yang, Zeqing Zhang, Ning Guo, Lei Yang, Fang Wan, **Chaoyang Song**, Jia Pan, Yixiang Jin, Yong A, Jun Shi, Dingzhe Li, Yong Yang, Kakeru Yamasaki, Takumi Kajiwara, Yuki Nakadera, Krati Saxena, Tomohiro Shibata, Chongkun Xia, Kai Mo, Yanzhao Yu, Qihao Lin, Binqiang Ma, Uihun Sagong, JungHyun Choi, JeongHyun Park, Dongwoo Lee, Yeongmin Kim, Myun Joong Hwang, Yusuke Kuribayashi, Naoki Hiratsuka, Daisuke Tanaka, Solvi Arnold, Kimitoshi Yamazaki, Carlos Mateo-Agullo, and Andreas Verleysen Francis Wyffels. “Benchmarking Grasp Selection for Robotic Cloth Unfolding: The ICRA 2024 Cloth Competition”. (**A Working Paper to be submitted to the IEEE Transactions on Robotics**), 2024
2. Fang Wan, Zheng Wang, Wei Zhang, and **Chaoyang Song\***. “SeeThruFinger: See and Grasp Anything with a Multi-Modal Soft Touch”. (**A Working Paper to be submitted to the IEEE Transactions on Robotics**), 2024
1. He Wang, Xiaobo Liu, **Chaoyang Song**, and Fang Wan\*. “ADAP: Adaptive & Dynamic Arc Padding for Predicting Seam Profiles in Multi-Layer-Multi-Pass Robotic Welding”. (**A Working Paper to be submitted to the Journal of Central South University**), 2024

## 在审论文

5. Haoran Sun, Bangchao Huang, Zishang Zhang, Ronghan Xu, Guojing Huang, Guangyi Huang, Jiayi Yin, Nuofan Qiu, Hua Chen, Wei Zhang, Jia Pan, Fang Wan\*, and **Chaoyang Song\***. “Overconstrained Locomotion”. **International Symposium of Robotics Research (ISRR) (Under Review)**, 2024
4. Yuping Gu, Bangchao Huang, Haoran Sun, Ronghan Xu, Jiayi Yin, Fang Wan\*, Jia Pan\*, and **Chaoyang Song\***. “One-DoF Robotic Design of Overconstrained Limbs with Energy-Efficient, Self-Collision-Free Motion”. **IEEE Transactions on Robotics (Under Review)**, 2024
3. Rongzheng Zhang#, Wanghongjie Qiu#, Jianuo Qiu, Yuqin Guo, Chengxiao Dong, Tuo Zhang, Yuan Yi, **Chaoyang Song**, Harry Asada, and Fang Wan\*. “Multi-Modal Intention Recognition Combining Head Motion and Throat Vibration for Underwater Superlimbs”. **IEEE Transactions on Automation Science and Engineering (Under Review)**, 2024
2. Chengxiao Dong#, Yu Pan#, Xuanyi Dai, Edmond Pow, Fang Wan\*, and **Chaoyang Song\***. “An Automated Post-Processing Workflow for Improving the Full-arch Intraoral Measurement of Implants”. **Journal of Bionic Engineering (Under Review)**, 2024
1. Yujian Dong, Tianyu Wu, and **Chaoyang Song\***. “Optimizing Robotic Manipulation with Decision-RWKV: A Recurrent Sequence Modeling Approach for Lifelong Learning”. **Journal of Computing and Information Science in Engineering (Under Review)** (Special Issue on Large Language Models In Design And Manufacturing), 2024

## 预印论文

3. Ronghan Xu#, Jiayi Yin#, Shihao Feng#, Bangchao Huang, Haoran Sun, Jia Pan, Fang Wan\*, and **Chaoyang Song\***. “Overconstrained Robotic Limb with Energy-Efficient, Omnidirectional Locomotion”. **arXiv:2310.09824 [cs.RO]**, 2023
2. Bingchen Jin, Yueheng Zhou, Ye Zhao, Ming Liu, **Chaoyang Song**, and Jianwen Luo. “An Adaptive Control Algorithm for Quadruped Locomotion with Proprioceptive Linear Legs”. **arXiv:2107.12482 [cs.RO]**, 2021
1. Jianwen Luo, Sicong Liu, Chengyu Lin, Yong Zhou, Zixuan Fan, Zheng Wang, **Chaoyang Song**, H. Harry Asada, and Chenglong Fu. “Mapping Human Muscle Force to Supernumerary Robotics Device for Overhead Task Assistance”. **arXiv:2107.13799 [cs.RO]**, 2020

## 代表研究

1. Xiaobo Liu#, Xudong Han#, Wei Hong, Fang Wan\*, and **Chaoyang Song\***. “Proprioceptive Learning with Soft Polyhedral Networks”. *The International Journal of Robotics Research*, 2024. OnlineFirst
  - 发明并率先提出视触融合柔性本体感知机器人操控学习技术；机器人学习领域顶刊，1982 年创刊以来「第 22 篇」完全由内地高校独立发表的研究论文；年均发文量约 70 篇，多为机器人领域海外资深研究团队；通讯作者论文
  - IF = 7.5 | SCIE | JCR Q1 in Robotics
  - 相关成果：
    - CoRL2021: 提出柔性超材料网络结构的视触融合力触觉感知技术；机器人学习领域顶会，南方科大首篇、也是目前唯一一篇发表在 CoRL 的独立研究成果；通讯作者论文
    - TRO2024: 提出可以直接用于水陆两栖环境的柔性多面体网络结构的实时形貌重建技术；机器人学领域顶刊，以南方科大为署名单位发表的第三篇 TRO；通讯作者论文
    - AIS2024: 发明并提出水下指内视觉柔性力感知技术，实现行业领先 (SOTA) 高精度、跨场景、全方向精细力触觉；通讯作者论文
2. Yuping Gu, Shihao Feng, Yuqin Guo, Fang Wan, Jiansheng Dai, Jia Pan, and **Chaoyang Song\***. “Overconstrained Coaxial Design of Robotic Legs with Omni-directional Locomotion”. *Mechanism and Machine Theory*, 176:105018, 2022
  - 提出过约束机器人学理论，发明并实现过约束机器人肢体设计，机构学顶刊；通讯作者论文
  - IF = 4.5 | SCIE | JCR Q1 in Engineering, Mechanical
  - 相关成果：
    - JCDE2023: 入选 JCDE 代表性论文集；通讯作者论文
    - ICRA2021: 机器人与自动化领域顶会；通讯作者论文
3. Youcan Yan, Zhe Hu, Zhengbao Yang, Wenzhen Yuan, **Chaoyang Song**, Jia Pan\*, and Yajing Shen\*. “Soft Magnetic Skin for Super-Resolution Tactile Sensing with Force Self-Decoupling”. *Science Robotics*, 6:eabc8801, 2021
  - 机器人学顶刊，南方科大首篇、也是目前唯一一篇发表在 Science Robotics 的署名研究论文。该论文的所有制备、实验、撰写及修改均为第一作者南方科大担任访问学者期间完成
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5. Yuqin Guo#, Rongzheng Zhang#, Wanghongjie Qiu, Harry Asada, Fang Wan\*, and **Chaoyang Song\***. “Underwater Intention Recognition using Head Motion and Throat Vibration for Super-numerary Robotic Assistance”. In *IEEE International Conference on Automation Science and Engineering (CASE)*, Auckland, New Zealand, August 26-30 2023
  - CASE2023 康复自动化最佳论文奖，南方科大唯一获得 IEEE/RAS 三大旗舰会议最佳论文奖成果，受邀提交期刊全文至 IEEE Transactions on Automation Science and Engineering
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19. Linhan Yang, Xudong Han, Weijie Guo, Fang Wan, Jia Pan, and **Chaoyang Song\***. “Learning-based Optoelectronically Innervated Tactile Finger for Rigid- Soft Interactive Grasping”. In *IEEE International Conference on Robotics and Automation (ICRA)*, Xi’an, China, May 30 - June 05 2021. Dual-track Submission with RAL: <https://doi.org/10.1109/LRA.2021.3065186>
18. Linhan Yang, Fang Wan, Haokun Wang, Xiaobo Liu, Yujia Liu, Jia Pan, and **Chaoyang Song\***. “Rigid-Soft Interactive Learning for Robust Grasping”. In *IEEE International Conference on Robotics and Automation (ICRA)*, Paris, France, May 31 - August 31 2020. Dual-track Submission with RAL: <https://doi.org/10.1109/lra.2020.2969932>
17. Zeyi Yang, Sheng Ge, Fang Wan, Yujia Liu, and **Chaoyang Song\***. “Scalable Tactile Sensing for an Omni-adaptive Soft Robot Finger”. In *IEEE International Conference on Soft Robotics (RoboSoft)*, New Haven, CT, USA, May 15 - July 15 2020
16. Xia Wu, Haiyuan Liu, Ziqi Liu, Mingdong Chen, Fang Wan, Chenglong Fu, Harry Asada, Zheng Wang, and **Chaoyang Song\***. “Robotic Cane as a Soft SuperLimb for Elderly Sit-to-Stand Assistance”. In *IEEE International Conference on Soft Robotics (RoboSoft)*, New Haven, CT, USA, May 15 - July 15 2020
15. Fang Wan, Haokun Wang, Xiaobo Liu, Linhan Yang, and **Chaoyang Song\***. “DeepClaw: A Robotic Hardware Benchmarking Platform for Learning Object Manipulation”. In *IEEE/ASME International Conference on Advanced Intelligent Mechatronics (AIM)*, Boston, MA, USA, July 06-10 2020
14. Fang Wan, Haokun Wang, Jiyuan Wu, Yujia Liu, Sheng Ge, and **Chaoyang Song\***. “Reconfigurable Design for Omni-adaptive Grasp Learning”. In *IEEE International Conference on Soft Robotics (RoboSoft)*, New Haven, CT, USA, May 15 - July 15 2020. Dual-track Submission with RAL: <https://doi.org/10.1109/lra.2020.2982059>
13. Xinyao Hu\*, Chuang Luo, Hao Li, Liyao Jia, **Chaoyang Song**, Zheng Wang, and Xingda Qu. “An Ankle Based Soft Active Orthotic Device Powered by Pneumatic Artificial Muscle”. In *IEEE International Conference on Real-time Computing and Robotics (RCAR)*, Irkutsk, Russia, August 04-09 2019
12. Xiaojiao Chen, Tommy Hu, **Chaoyang Song**, and Zheng Wang\*. “Analytical Solution to Global Dynamic Balance Control of the Acrobot”. In *IEEE International Conference on Real-time Computing and Robotics (RCAR)*, Kandima, Maldives, August 01-05 2018
11. Yaohui Chen, Sing Le, Qiao Chu Tan, Oscar Lau, Fang Wan, and **Chaoyang Song\***. “A Reconfigurable Hybrid Actuator with Rigid and Soft Components”. In *IEEE International Conference on Robotics and Automation (ICRA)*, Marina Bay Sands, Singapore, May 29 - June 03 2017

10. Yaohui Chen, Sing Le, Qiao Chu Tan, Oscar Lau, Fang Wan, and **Chaoyang Song\***. “A Lobster-inspired Robotic Glove for Hand Rehabilitation”. In *IEEE International Conference on Robotics and Automation (ICRA)*, Marina Bay Sands, Singapore, May 29 - June 03 2017
9. Fang Wan, Zheng Wang, Brooke Franchuk, Xinyao Hu, Zhenglong Sun, and **Chaoyang Song\***. “Hybrid Actuator Design for a Gait Augmentation Wearable”. In *IEEE International Conference on Robotics and Biomimetics (ROBIO)*, Macau, December 05-08 2017
8. Yaohui Chen, Sing Le, Qiao Chu Tan, Oscar Lau, and **Chaoyang Song\***. “A Lobster-Inspired Hybrid Actuator with Rigid and Soft Components”. In *ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (DETC/CIE)*, Cleveland, Ohio, USA, August 06-09 2017
7. Juan Yi, Zhong Shen, **Chaoyang Song**, and Zheng Wang\*. “A Soft Robotic Glove for Hand Motion Assistance”. In *IEEE International Conference on Real-time Computing and Robotics (RCAR)*, Angkor Wat, Cambodia, June 06-10 2016
6. **Chaoyang Song\***, Jianxi Luo, Katja Hölttä-Otto, Kevin Otto, and Warren Seering. “The Design of Crowd-Funded Products”. In *ASME International Design Engineering Technical Conferences and Computers and Information in Engineering Conference (DETC/CIE)*, Boston, Massachusetts, USA, August 02-05 2015
5. **Chaoyang Song\***, Jianxi Luo, Katja Hölttä-Otto, Kevin Otto, and Warren Seering. “Risk and Innovation Balance in Crowdfunding New Products”. In *International Conference on Engineering Design (ICED)*, Milan, Italy, July 27-30 2015
4. **Chaoyang Song\***, Jianxi Luo, Katja Hölttä-Otto, and Kevin Otto. “Product Innovation Differences between New Ventures and Incumbent Firms”. In *Annual Meeting of the Academy of Management (AoM)*, Philadelphia, PA, USA, August 01-05 2014
3. **Chaoyang Song**, Yan Chen\*, and I-Ming Chen. “Bifurcation Behavior of the Line-Symmetric Bricard Linkage without Offsets”. In *IFTOMM International Symposium on Robotics and Mechatronics (ISRMM)*, Singapore, October 02-04 2013
2. **Chaoyang Song** and Yan Chen\*. “A Special Wohlharts Double-Goldberg 6R Linkage and Its Multiple Operation Forms among 4R and 6R Linkages”. In *ASME/IEEE International Conference on Reconfigurable Mechanisms and Robots (ReMAR)*, Tianjin, China, July 09-11 2012
1. **Chaoyang Song** and Yan Chen\*. “The Original Double-Goldberg 6R Linkage and its Bifurcation Analysis”. In *IFTOMM International Symposium on Multibody Systems and Mechatronics (MuSME)*, Valencia, Spain, October 25-28 2011

## 拓展摘要

2. Haoran Sun, Linhan Yang, Zeqing Zhang, Ning Guo, Lei Yang, Fang Wan, **Chaoyang Song\***, and Jia Pan\*. “CopGNN: Learning End-to-End Cloth Coverage Prediction via Graph Neural Networks”. In *IROS Workshop on Benchmarking via Competitions in Robotic Grasping and Manipulation*, Abu Dhabi, UAE, October 14-18 2024. Accepted
1. **Chaoyang Song\***. “The Design and Learning of Overconstrained Mechanisms towards Overconstrained Robotics”. In *Mechanism and Machine Theory Symposium*, Guimarães, Portugal, June 26-28 2024. Accepted

**Granted in the United States**

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1. **Chaoyang Song**, Fang Wan, US11467594B2, United States, Robotic Network Structure and Sensing System Suitable for Unstructured Environment.

**Granted in China**

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1. **Chaoyang Song**, Fang Wan, CN110171014B, China, End Effector Suitable for Carrying Out Physical Interaction Under Unstructured Environment.
2. **Chaoyang Song**, Fang Wan, CN110170979B, China, Wheeled Robot Suitable for Carry Out Physical Interaction Under Unstructured Environment.
3. **Chaoyang Song**, Fang Wan, CN110228055B, China, Multi-Joint Mechanical Arm Suitable for Physical Interaction in Unstructured Environment.
4. **Chaoyang Song**, Fang Wan, CN110239643B, China, Multi-Legged Robot Suitable for Physical Interaction Under Unstructured Environment.
5. **Chaoyang Song**, Fang Wan, CN109737871B, China, Calibration Method for Relative Position of Three-Dimensional Sensor and Mechanical Arm.
6. **Chaoyang Song**, Fang Wan, CN110174071B, China, Robot Network's Structure and Sensor-Based System Suitable for Unstructured Moving Grids.
7. **Chaoyang Song**, Shihao Feng, Yuping Gu, Yuqin Guo, Mingdong Chen, CN113001517B, China, Overconstrained Motion Device and Robot.
8. **Chaoyang Song**, Shihao Feng, Yuping Gu, Yuqin Guo, Mingdong Chen, CN113022822B, China, Underwater Outer Limb and Application Thereof.
9. **Chaoyang Song**, Fang Wan, Yang He, CN109936252B, China, Linear Motion Module and Multi-Shaft Series and Parallel Motion Device.
10. **Chaoyang Song**, Shihao Feng, Yuping Gu, Yuqin Guo, Mingdong Chen, CN113001516B, China, Over-Constrained Amphibious Robot.
11. **Chaoyang Song**, Fang Wan, CN110174069B, China, Robot Network's Structure and Sensor-Based System Suitable for Unstructured Moving Grids.
12. **Chaoyang Song**, Fang Wan, CN110174070B, China, Robot Network's Structure and Sensor-Based System Suitable for Unstructured Moving Grids.
13. **Chaoyang Song**, Fang Wan, Sheng Liu, CN215471116U, China, Omnidirectional Self-Adaptive Touch Finger Capable of Realizing Video Fusion.
14. **Chaoyang Song**, Fang Wan, Linhan Yang, Xudong Han, CN215471206U, China, Photoelectric Touch Sensing Flexible Robot Finger.
15. **Chaoyang Song**, Fang Wan, Yang He, CN216719002U, China, Software Rocker Device of Omnidirectional Self-Adaptability.
16. **Chaoyang Song**, Fang Wan, Xudong Han, Ning Guo, Xiaobo Liu, Feng Tian, CN114043507B, China, Force Sensor, Robot and Application Method of Force Sensor.

**Granted with Priority Claims WIPO (PCT)**

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1. **Chaoyang Song**, Fang Wan, WO2020238337A1, WIPO (PCT), Robotic Network Structure and Sensing System Suitable for Unstructured Environment.
2. **Chaoyang Song**, Fang Wan, WO2020238332A1, WIPO (PCT), End Effector Suitable for Physical Interaction in Unstructured Environments.
3. **Chaoyang Song**, Fang Wan, WO2020238331A1, WIPO (PCT), Wheeled Robot for Physical Interaction Applicable to Unstructured Environment.
4. **Chaoyang Song**, Fang Wan, WO2020238333A1, WIPO (PCT), Multi-Joint Mechanical Arm Applicable to Physical Interaction in Unstructured Environment.

5. **Chaoyang Song**, Fang Wan, WO2020238334A1, WIPO (PCT), Multi-Legged Robot Capable of Physical Interaction in Unstructured Environment.
6. **Chaoyang Song**, Fang Wan, WO2020238336A1, WIPO (PCT), Robot Network Structure and Sensing System Suitable for Unstructured Environment.
7. **Chaoyang Song**, Fang Wan, WO2020238335A1, WIPO (PCT), Robot Network Structure Suitable for Unstructured Environment and Sensing System.

### **Pending**

1. **Chaoyang Song**, Fang Wan, Linhan Yang, Xudong Han, CN113334414A, China, Photoelectric Touch Sensing Flexible Robot Finger and Using Method Thereof.
2. **Chaoyang Song**, Xia Wu, Haiyuan Liu, Ziqi Liu, Mingdong Chen, CN111700756A, China, Auxiliary System Stands.
3. **Chaoyang Song**, Yujian Dong, Jinqi Wei, Yang Xiao, Fang Wan, Teng Wang, CN115640820A, China, Human-Computer Interaction Method Based on Machine Vision, Computer Equipment and Storage Medium.
4. **Chaoyang Song**, Zheng Wang, Sicong Liu, CN113515050A, China, Equipment Control Method and Device and Computer Readable Storage Medium.
5. **Chaoyang Song**, Fang Wan, Sheng Liu, CN113370184A, China, Omnidirectional Self-Adaptive Touch Finger Based on Visual Touch Fusion and Use Method Thereof.
6. **Chaoyang Song**, Fang Wan, Yang He, CN113311904A, China, Omnidirectional Adaptive Soft Rocker Device and Control Method.

## 课程教学

### **Southern University of Science and Technology**

**(All taught in English)**

#### **ME303 Introduction to Mechanical Design (Lead Instructor)**

- Autumn 2024, Enrollment: 55 (Coded ME311, 16 Weeks, 48 Lecture Hours, 3 Credit Units)
- Autumn 2023, Enrollment: 55 (Coded ME311, 16 Weeks, 48 Lecture Hours, 3 Credit Units)
- Autumn 2022, Enrollment: 27 (16 Weeks, 64 Lecture Hours, 3 Credit Units)
- Autumn 2021, Enrollment: 28 (16 Weeks, 64 Lecture Hours, 3 Credit Units)
- Autumn 2020, Enrollment: 68 (16 Weeks, 96 Lecture Hours, 3 Credit Units)
- Autumn 2019, Enrollment: 38 (16 Weeks, 64 Lecture Hours, 3 Credit Units)
- Autumn 2018, Enrollment: 22 (16 Weeks, 48 Lecture Hours, 3 Credit Units)

#### **ME336 Collaborative Robot Learning (Lead Instructor)**

- Spring 2024, Enrollment: 57 (16 Weeks, 60 Lecture Hours, 3 Credit Units)
- Spring 2023, Enrollment: 44 (16 Weeks, 60 Lecture Hours, 3 Credit Units)
- Spring 2022, Enrollment: 35 (16 Weeks, 60 Lecture Hours, 3 Credit Units)
- Spring 2021, Enrollment: 34 (16 Weeks, 60 Lecture Hours, 3 Credit Units)
- Spring 2020, Enrollment: 8 (16 Weeks, 64 Lecture Hours, 3 Credit Units)
- Spring 2019, Enrollment: 9 (16 Weeks, 60 Lecture Hours, 3 Credit Units)

#### **ME491 Engineering Practice (Lead Instructor)**

- Spring 2023, Enrollment: 6 (ME492), 6 (ME495), 6 (ME494), 4 (ME493), 1 (ME491)
- Spring 2022, Enrollment: 6 (ME495), 4 (ME493), 1 (ME491), 6 (ME494), 8 (ME492)
- Autumn 2021, Enrollment: 1 (ME492)
- Spring 2021, Enrollment: 1 (Industrial), 3 (ME494), 6 (ME495), 1 (Social), 5 (ME493), 1 (ME492)

- Autumn 2020, Enrollment: 10 (ME492)
- Summer 2020, Enrollment: 2 (ME494)
- Summer 2019, Enrollment: 1

**Innovation Project for Undergraduate Students:**

- Spring 2020, Enrollment: 8

**COE492 Capstone Project (Equivalent to Undergraduate Thesis)**

- Autumn 2023, Enrollment: 3 (Two Semesters at Year 4)
- Autumn 2022, Enrollment: 5 (Two Semesters at Year 4)
- Autumn 2021, Enrollment: 5 (Two Semesters at Year 4)
- Autumn 2020, Enrollment: 6 (Two Semesters at Year 4)
- Autumn 2019, Enrollment: 5 (Two Semesters at Year 4)

**COE100 Introduction to Engineering:**

- Spring 2023, Enrollment: 38 (1 Lecture)

**Monash University**

**(All taught in English)**

**ENG5002/6002 Engineering Entrepreneurship (Lead Instructor)**

- Autumn 2017, Enrollment: 330 (12 Weeks, 36 Lecture Hours, 3 Credit Units)
- Autumn 2016, Enrollment: 120 (12 Weeks, 36 Lecture Hours, 3 Credit Units)

**MEC3458 Experimental Project: Autumn 2016**

**MEC5882 Instrumentation, Sensing and Monitoring: Spring 2016**

**客座报告  
(部份)**

- (2024) Super-Aligned Machine Intelligence via a Soft Touch, Abu Dhabi, UAE.
- (2022) Robot Learning and Design Intelligence, Shenzhen, Huawei.
- (2021) On Teaching Design Courses, Shenzhen, SUSTech.
- (2021) Robot Learning and Design Intelligence, Shenzhen, SAIIA.
- (2019) Robotic Cane as an Ambient Super-Limb for Assistive Elderly Motion Transition, 2019 IROS Workshop on Supernumerary Robotic Limb.
- (2019) Design Science for Advanced Robotics, Public Presentation at the Wisdom Park.
- (2019) Collaborative Robot Learning, National Conference on University Teaching in Artificial Intelligence and Intelligent Manufacturing
- (2019) Jigsaw-based Benchmarking for Learning Robotic Manipulation, 2019 ICRA Workshop on Benchmarks for Robotic Manipulation.
- (2015) From Linkage Kinematics to Crowdfunding Entrepreneurship-Perfect Designs in an Imperfect World, Monash University, June 11.
- (2014) How to Get Crowdfunded, Design Seminar at the Department of Mechanical Engineering, Massachusetts Institute of Technology, September 24.
- (2013) Successful Balance of Innovation and Risk in New Ventures and Mature Companies, Research Meeting for the International Design Center, Singapore University of Technology and Design, October 16.