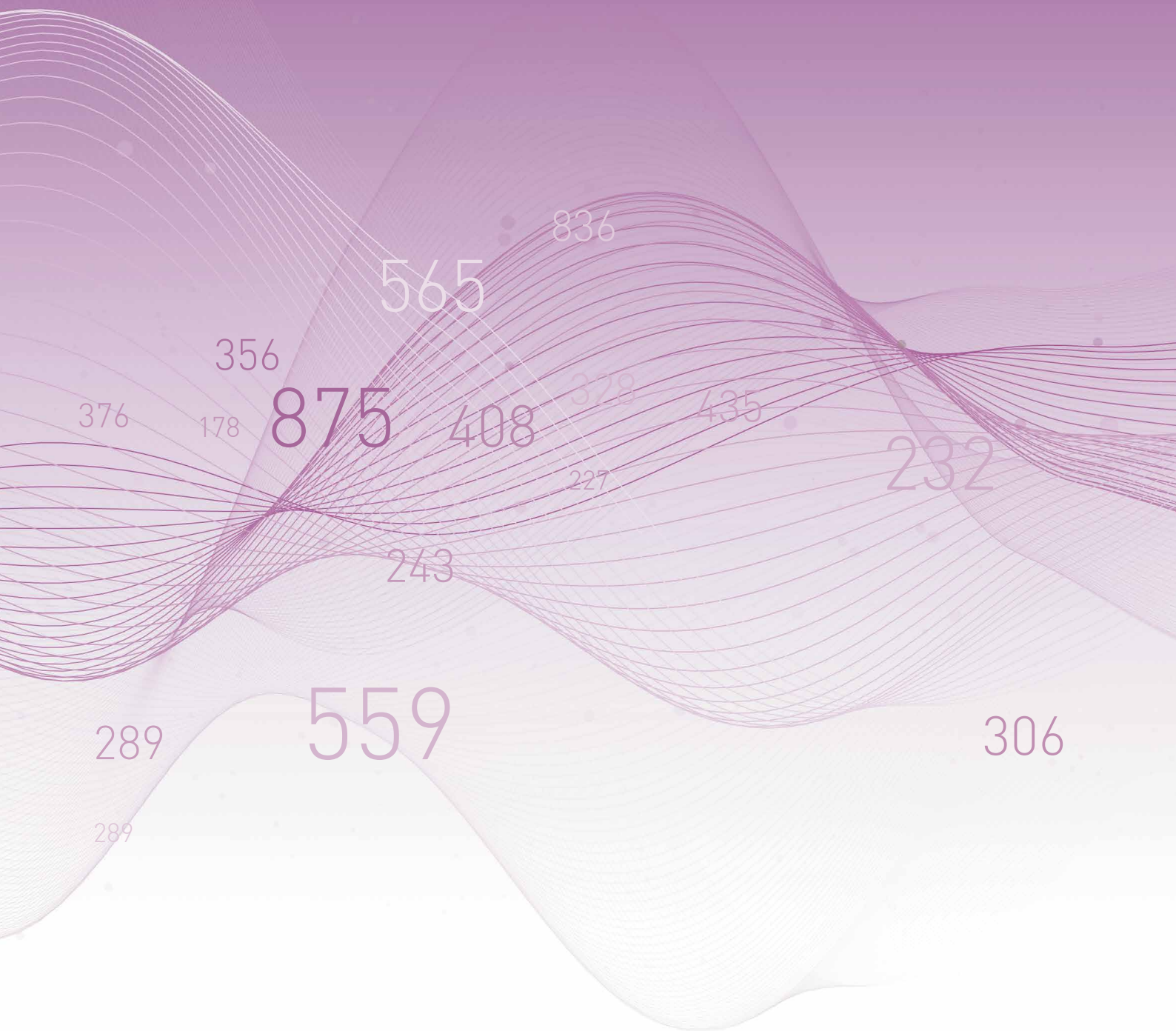


SRI BD

2024

深圳市大数据研究院年刊

2024 SRI BD Annual Report



深圳市大数据研究院
Shenzhen Research Institute of Big Data

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院长寄语

Director's Message

01

日月其迈，时盛岁新。

作为深圳市基础研究机构之一，SRIBD 始终坚持“四个面向”，致力于做有目的、有组织的科研攻关，在高科技的主战场上深耕细作，为粤港澳大湾区乃至全国形成和发展新质生产力提供有力支撑，助力经济社会高质量发展。

2023 年，是研究院持续快速增长的一年。

这一年，我们惟实励新，攻坚克难，迎来了 57 位新面孔，总人数超 450 人；获得 45 项来自国家、省和市各级政府机构以及头部企业的纵向和横向项目；与中国科学院数学与系统科学研究院、沙特阿卜杜拉国王科技大学等合作伙伴成立了 6 家联合实验室；三大创新平台建设取得里程碑式的进展。此外，我们还成功获得第一个广东省旗舰项目，实现第一份知识产权转让，成立第一家合资商业公司。

2023 年，也是研究院落实改革发展的一年。

这一年，我们不忘初心，凝心聚力，系统性推进改革，持续推动科研方向的凝聚，将研究院有限的人力、物力、财力汇聚到发展主航道，在网络优化、大模型、求解器三大方向取得突破性进展。SRCON 技术再次助力华为和韩国 LG U+ 获得网络评测全球第一；XOPT 优化求解器性能逼近国际最先进的商业化优化软件；华佗 GPT 成为国内公开的首个通过 2023 年国家执业药师考试的大模型，并在龙岗区人民医院实现导诊应用。

守正创新，奋进有为。在新的一年里，我们将一如既往，以坚定不移的奉献精神继续前进，持续加强基础研究和原创性科技创新，推动科研成果走出实验室转化落地，扩大全球学术交流和国际影响力，为打造世界级的大数据研究机构和协同研发平台奋楫前行！

Time flies, all things thrive.

As one of the fundamental research institutions in Shenzhen, SRIBD has always adhered to the "four orientations," committed to purposeful and organized scientific research. We are deeply committed to advancing high technology, which serves as a cornerstone for the formation and development of new productive forces in the Greater Bay Area and across the nation. Our efforts contribute significantly to fostering high-quality economic and social development.

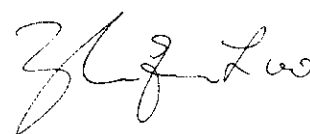
In 2023, SRIBD continued to experience rapid growth.

We remain dedicated to innovation and overcoming challenges. In 2023, we welcomed 57 new team members, bringing our total workforce to over 450 employees. We obtained 45 projects from national, provincial, and municipal government agencies, as well as leading enterprises, covering both vertical and horizontal sectors. We established six joint laboratories with partners such as Academy of Mathematics and Systems Science, Chinese Academy of Sciences and King Abdullah University of Science and Technology. Our three major innovation platforms made significant milestone achievements. Additionally, we successfully obtained our first Flagship Project in Guangdong Province, completed our first intellectual property transfer, and established our first joint venture commercial company.

In 2023, SRIBD continued to implement reforms and development initiatives.

We systematically promote reform and continuously consolidate the direction of scientific research. We also direct SRIBD's resources towards its primary development direction. Breakthrough progress was made in three major directions: network optimization, large language models, and solvers. SRCON technology once again helped Huawei and South Korea's LG U+ achieve the top global rankings in network evaluations. The Xianpeng Solver (XOPT) performance approached that of the most advanced commercial optimization software. The HuatuoGPT became the first publicly available LLM to pass the 2023 National Pharmacist Examination in China, and it was successfully applied in triage at the Longgang District People's Hospital.

In the coming year, we will continue our journey with unwavering dedication, focusing on strengthening foundational research and fostering original technological innovations. Our aim is to propel scientific achievements beyond the confines of the laboratory, expanding our global academic exchanges and international influence. We are committed to advancing towards our goal of establishing a world-class institution for big data research and a collaborative platform for research and development!



关于研究院

About SRIBD

02

深圳市大数据研究院，是在深圳市委、市政府的支持下于2016年3月组建成立的市属二类事业单位，其前身是香港中文大学（深圳）副校长罗智泉教授领衔的大数据信息处理及应用创新团队。2019年研究院被正式授牌成为深圳市基础研究机构之一。

研究院以数学为基础，以数据为驱动，以重大应用为导向，聚焦大数据基础理论与核心算法、大数据通用软件与技术、大数据驱动的智能应用技术三大方向进行理论研究和攻关，打造世界级的大数据研究机构和协同研发平台，服务于国家大数据发展战略，推动整合深圳市、粤港澳大湾区大数据科研和产业。

Shenzhen Research Institute of Big Data (SRIBD) was established in March 2016, initially by the team on information processing and application in big data related fields, led by Prof. Luo Zhi-Quan, Vice President of the Chinese University of Hong Kong, Shenzhen. In 2019, SRIBD became a Shenzhen City Institute for Fundamental Research.

Focusing on Mathematics and Applications of data science, SRIBD devotes its efforts in three major research directions: theories and algorithms, common software and technologies, and applications of big data. SRIBD strives to be a world-class research institute and a platform for international collaboration, to contribute to the development of the China big data industry, to advance big data research and development, and to create social and commercial impact in Shenzhen and the Greater Bay Area.





我们的团队

Our Team

03



管理团队

Leadership



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Foreign Member of the Chinese
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Massachusetts Institute of
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Executive Director

Dr. LEE Ping

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Cornell University



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(按姓氏首字母排序)
(Sort by the first letter of the last name)

数读2023

Review of 2023

04

三大创新平台

2023 年，研究院进一步依托自身资源优势，围绕重点产业领域，打造高能级创新平台体系，三大平台建设取得里程碑式发展，为当地科技创新及产业转化注入澎湃动力。

► 国家健康医疗大数据研究院（深圳）

3 月，在国家卫健委的见证下，研究院和宁夏、山东、天津国家健康医疗大数据研究院成立四方联盟，并同深圳市大数据研究院与两家知名企业成立两家联合实验室；成功举办数字健康与智慧医疗高峰论坛，逾 2.2 万人次线上观看，在大湾区的智慧医疗与数字健康领域产生了深远影响。



► 深圳市大数据研究院无锡创新中心

6 月，深圳市大数据研究院无锡创新中心正式落地无锡经开区，并与无锡市卫健委、江南大学附属医院、浪潮卓数、绿叶诊断、国家健康医疗大数据（东部）中心等机构签订战略合作协议，构建创新链到产业链的发展生态。



► 深圳国际工业与应用数学中心

11 月，深圳国际工业与应用数学中心顺利通过深圳市福田区国际化基础研究和应用基础研究机构项目答辩。中心与业内龙头企业签订多项合作项目，并协办第二届全国信息通信数学及应用大会等多场全国性学术会议。



人才团队

2023 年，研究院持续推动大数据领域高端人才资源加速集聚，新引进各类人才 53 人，其中博士 20 人，打造了一支高素质、专业化、国际化的人才团队。

新引进各类人才	博士	累计博士	全职人员（全职 + 双聘）
53 人	20 人	66 人	152 人

累计博士占比

43.4%



院士

6 人



国家杰出青年科学基金获得者

2 人



深圳市高层次人才

24 人



入选世界 2% 顶尖科学家

11 人

科研进展

2023 年，研究院创新机制体制，聚焦深圳市战略性新兴产业和未来产业，开展科学研究和技术攻关，承担 20 多项国家、省市科研项目，持续推进科研创新，知识产权积累。

► 科研实力



新增论文发表

171 篇

（期刊论文 117 篇，会议论文 54 篇）



累计论文发表

800⁺ 篇

（期刊论文 500+ 篇，会议论文 300+ 篇）



新增专利申请

100 项



新增专利授权

27 项



累计专利

申请 226 项、授权 53 项



新增专著发表

2 部



累计标准、专著发表

6 个 / 部



累计软著发表

14 项

► 纵向项目

获批 1 项“旗舰”项目

2023 年 12 月，由罗智泉院士牵头，深圳市大数据研究院、香港中文大学（深圳）、北京邮电大学三家单位联合申报的“基于环境增强的 6G 网络关键技术研究”获得立项资助，这是我院在承担广东省基础与应用基础研究重大项目方面的新突破。

新增纵向项目

24 项

(国家: 8 项; 省: 3 项; 市: 12 项; 其他: 1 项)

累计纵向项目

68 项

新增纵向项目金额

2702 万元

累计纵向项目金额

超 1.2 亿元 (12249.17 万元)

产学研合作

2023 年, 研究院持续深化产教协同合作, 加强“教育链协同融合”、“产业链协同融合”, 在科技自立自强的浪潮中不断探索符合自身特色的产业化路径。

► 横向项目

新增横向项目

21 项

新增横向项目金额

1463 万元

累计横向项目

85 项

累计横向项目金额

7331.4 万元

典型项目:

- ICT 服务领域大模型关键技术课题高校合作项目 (合作单位: 华为技术有限公司)
- 协同感知理论方法与体系架构模型研究 (合作单位: 中国电子科技集团公司第三十六研究所)
- 面向肺结核患者健康管理服药视频的隐私保护和巩膜黄染评估研发项目 (合作单位: 深圳市南山区慢性病防治院)

► 成果转化

1 个

新增合资公司



中深汇能 (江苏) 科技有限公司, 聚焦数字能源场景, 致力于成为行业领先的以算法为核心驱动的数字能源场景服务商, 推动碳达峰与碳中和在数字能源及相关领域内的落地应用。

1 项

新增专利转让



2023 年 3 月, 杨升浩教授团队成果“分布式存储方法和传输译码方法” (专利号: ZL2020101619457) 实现许可转化。这是我院成功转让的首项专利。



► 合作拓展

6个

新增联合实验室



深圳市大数据研究院 - 香港中文大学（深圳） - 中国科学院数学与系统科学研究院 刘徽实验室



深圳市大数据研究院 - 国家健康医疗大数据研究院（深圳） - 卫宁健康 智慧临床联合实验室



SRIBD-KAUST 科学计算与机器学习 联合实验室 (SCML)



深圳市大数据研究院 - 江西移动 联合创新实验室

► 学生培养



新增联合培养学生

71人



累计联合培养学生

266人



新增博士生奖学金获得者

20人



累计博士生奖学金获得者

77人



学术交流

2023年，研究院广泛开展国际学术交流活动，主办或承办了多项国际会议及系列论坛，探讨信息科学和大数据领域的新思想、新理论、新技术以及新应用，推动数据科学理论和产业应用的高质量发展。



国际会议

4场



workshops

8场



seminars

56场



奖项荣誉

2023 年，研究院全体成员坚定信心、砥砺前行，获得了多项国际性、全国性的荣誉奖项，有力提升了研究院的全球影响力与美誉度。全院员工获得各类荣誉数量共 44 项（以下仅展示 10 项）。

奖项名称	获奖人
浙江省自然科学二等奖，2023	朱光旭
中国铁路广州局集团科技进步二等奖	蔡小强教授团队
2023 IEEE ComSoc Asia-Pacific Best Young Researcher Award	Zhu Guangxu
2023 IEEE ComSoc Asia-Pacific Outstanding Paper Award	Zhu Guangxu
Huawei Outstanding Technical Collaboration Award	张纵辉、史清江
当选 IEEE 信号处理学会副会长（Vice President - Conferences of the IEEE SPS）任期：2024-2026 年	李海洲
2023 年中国物流与采购联合会科技进步奖二等奖	何彦东
第六届智慧医疗创新大赛全国总决赛“最具发展潜力奖”、应用创新赛道二等奖	万翔、何利文
第一届能源电子产业创新大赛关键信息技术赛道八强团队	罗效东教授团队
Auditory EEG Challenge - IEEE ICASSP 2023 获得二等奖	蔡思棋

党群文化

2023 年，研究院以“创新、求实、协作、奉献”的核心价值观推动文化建设，组织近 20 场党群文化活动，凝聚共识、汇聚力量。

15 场
文化活动

4 场
科普活动



科研突破

Research Breakthrough

05

网络优化 Network Optimization

现实网络模拟建模

SRCON: Simulated Reality of Communication Networks

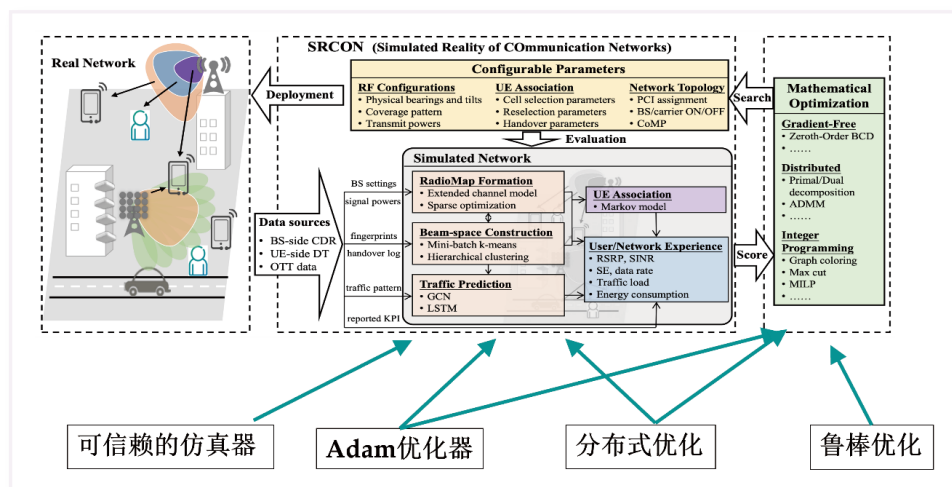
项目简介 Project Overview

传统的网络参数寻优方法是通过大量的信号强度的路测数据，通过线性回归、散点图来进行多轮的寻优，这种寻优方法在 5G 时代由于天线数据和基站的密度大幅度增加，已不再适用。

The traditional method for optimizing network parameters relies on a large amount of signal strength road test data, using techniques like linear regression and scatter plots for multiple rounds of optimization. However, this approach is no longer suitable in the 5G era due to the significantly increased density of antennas and base stations.

现实网络模拟建模（SRCON）技术利用基于数据和模型双驱动的灰盒建模技术来准确再现真实 4G/5G 移动网络业务行为及性能，利用基于分布式 ADMM 的算法框架，快速求解大规模网络的最优网络参数组合，并进行相应调整，提供最好的网络质量。

SRCON utilizes a gray-box modeling technique based on both data and models, which can accurately reproduce the real behaviors and performance of 4G/5G mobile networks. It uses an algorithm framework based on distributed ADMM to quickly find the optimal network parameter combinations for large-scale networks and make corresponding adjustments, providing the best network quality.



该技术涵盖了 SIAM/IEEE/NIPS 等国际顶级期刊和会议的 10+ 篇论文，同时形成了多份专利。项目成果已在中国、荷兰、瑞士、德国等全球 5G 网络中规模应用，支撑多个运营商达到 5G 网络性能水平领先。

This technology results from over 10 papers in top international journals and conferences such as SIAM, IEEE and NIPS. Multiple patents have been filed. The technology has been deployed on a large scale in 5G networks worldwide, including China, the Netherlands, Switzerland, Germany, and others, supporting several operators to lead in 5G network performance.

关键挑战 Key Challenges

在设计 SRCON 时，面临的两大关键挑战为：
When designing SRCON, two major challenges are faced:

建模 Modeling



如何在仅有一组参数的情况下预测其他组参数下的网络性能，尤其是预测已有数据中未观测到过的参数对应的网络性能。

How to predict the network performance of other sets of parameters when only one set of parameters is available, especially when the performance of these other sets of parameters have not been observed in the existing data.

寻优 Optimization



如何在庞大的解空间中选择最佳的网络参数组合。一个典型的都市级别的 5G 网络，通常包括 100,000 多个小区，每个小区均需要配置 20 多个参数，参数组合的数量可能达到 $10^{2,000,000}$ 次方。

How to select the best network parameter combination from a huge solution space. Considering a typical urban 5G network, which includes over 100,000 cells and requires more than 20 parameters to be configured for each cell, the number of parameter combinations may reach $10^{2,000,000}$.

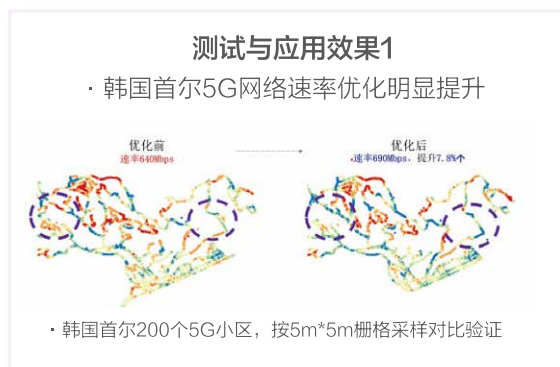
应用成果 Application Results

SRCON 解决了 5G 网络性能优化难题，建立了大规模 4/5G 异构网络参数最优化模型，突破了求解超大规模混合整数优化模型的算法瓶颈，从无到有建立了网络性能的数学模型和算法框架，部分模块已逐步应用于全球关键 5G 网络的优化。2022 年、2023 年，根据全球权威网络评测机构 Umlaut 发布的韩国 5G 评测报告，SRCON 技术赋能 LG U+，分别以总分 981、986 遥遥领先，均创造有史以来评测最高分，提供了最佳 5G 用户体验。除韩国外，SRCON 技术已在瑞士六大城市、成都、深圳等全球领先网络规模应用，提升网络速率 10%-15%，帮助华为网络在全球建立卓越品牌。

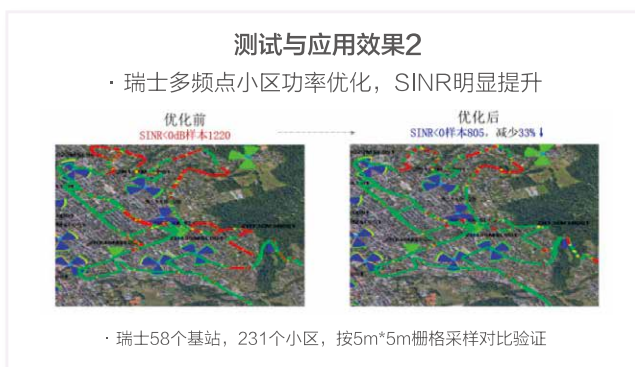
SRCON has solved the optimization challenges of 5G network performance by establishing a large-scale optimization model for 4/5G heterogeneous networks. It has overcome algorithm bottlenecks in solving large-scale mixed-integer optimization models and has established mathematical models and algorithm frameworks for network performance from scratch. Some modules have gradually been applied to optimize key 5G networks worldwide.

In 2022 and 2023, according to the 5G evaluation reports released by the global authoritative network evaluation agency Umlaut in South Korea, SRCON technology empowered LG U+, leading by a wide margin with scores of 981 and 986 respectively, both of which are the highest scores ever achieved in evaluations, providing the best 5G user experience. In addition to South Korea, SRCON technology has been applied in six major cities in Switzerland, Chengdu, Shenzhen, and other leading global network scales, improving network speeds by 10%-15% and helping Huawei Networks establish an outstanding global brand.

Testing and Applying Efforts



Seoul, South Korea



Switzerland



成果证明

Certificate of Achievement



华为公司为 SRCON 团队出具的成果证明

Certificate of Achievement issued by Huawei for the SRCON team

生成式人工智能 Generative AI

中文医疗大语言模型 华佗GPT

HuatuoGPT: Chinese Medicial Large Language Model

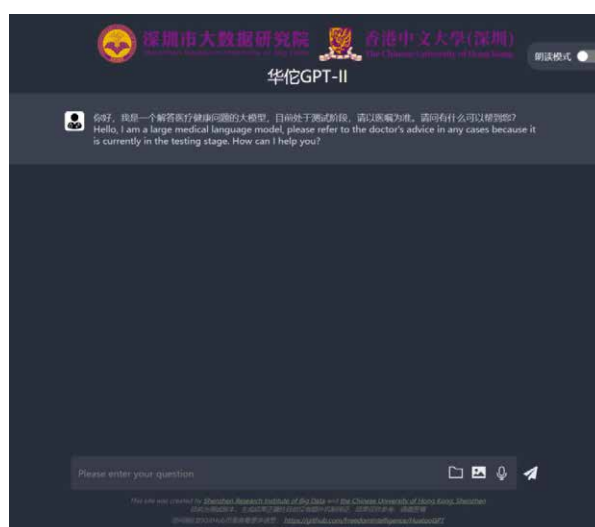


项目简介

Project Overview

华佗 GPT 是研究院基于“医疗咨询”前瞻性布局且自主研发的 AI 模型，涉及约 TB 级别的医疗文本，堪称国内最大、来源最丰富的中文医疗数据。作为国内首个可在学术界和产业界应用的中文医学基础大模型，其参数规模接近到百亿级别。该模型将在医疗咨询（包括病人培训、健康建议、初步治疗建议、分诊、心理诊断与治疗等）以及情感陪伴等领域，提供线上交互性对话服务。

The HuatuoGPT represents an independently developed AI model architected with a strategic vision in the domain of "medical consultation." Marking a pioneering advancement in China, this foundational model is distinguished by its applicability across both academic research and industrial applications. With its parameter count nearing the ten-billion mark, it stands as a testament to the scale and complexity inherent in its design. The HuatuoGPT is poised to provide online interactive dialogue services that span a broad range of medical consultation activities. These include patient education, health advisement, initial treatment recommendations, triage processes, and psychological diagnostics and interventions. Additionally, the model is equipped to facilitate emotional support, further enhancing its utility in delivering comprehensive patient care.



华佗 GPT 测试阶段
HuatuoGPT Testing Phase

主要进展 Key Progress

2023 年 2 月

罗智泉院士在中华医院信息网络大会（CHINC）发表主旨论坛报告，通过视频演示的方式介绍了华佗 GPT，这是首个中文医疗领域的大规模 AI 模型。

In February, 2023

Academician Luo Zhi-Quan delivered a keynote speech at the Chinese Hospital Information Network Conference (CHINC), where he showcased the HuatuoGPT through a video demonstration. This model represents the first large-scale AI tailored for the Chinese medical sector.

2023 年 6 月

华佗 GPT 在深圳市卫健委公测，迄今已经服务用户数十万次。

In June, 2023

HuatuoGPT underwent public testing by the Shenzhen Municipal Health Commission and has since served hundreds of thousands of users.

2023 年 11 月

二代华佗 GPT 是首个通过 2023 年国家药剂师资格考试的医疗大模型，经医生专家评估其在中文医疗场景的表现优于 GPT-4 和文心一言。

In November, 2023

HuatuoGPT 2.0 became the first such model to clear the National Pharmacist Qualification Exam for that year, with medical professionals rating its performance in Chinese medical scenario superior to GPT-4 and ERNIE Bot.

2023 年 5 月

华佗 GPT 在临床医生专家的评估中表现出色，其功能已超越了 ChatGPT 3.5 版本。

In May, 2023

HuatuoGPT had surpassed the capabilities of ChatGPT version 3.5, according to assessments by clinical medical specialists.

2023 年 10 月

华佗 GPT 是首个全面通过药剂师、执业医师等多个医疗资格考试的大模型。

In October, 2023

HuatuoGPT distinguished itself as the first LLM to pass several medical qualification exams, including those for pharmacists and practicing physicians.



Model	Pharmacist Licensure Examination (Pharmacy)					Pharmacist Licensure Examination (TCM)					AVG
	Optimal Choice	Matched Selection	Integrated Analysis	Multiple Choice	Total Score	Optimal Choice	Matched Selection	Integrated Analysis	Multiple Choice	Total Score	
DSC-MedLLM	22.2	26.8	23.3	0.0	22.6	24.4	32.3	15.0	0.0	24.9	23.8
HuatuoGPT	25.6	25.5	23.3	2.6	23.4	24.1	26.8	31.6	7.5	24.9	24.2
ChatGLM2-6B	37.0	36.8	25.0	31.7	35.3	33.1	37.3	35.0	37.3	33.7	34.5
ChatGLM2-6B	38.5	39.1	10.5	0.2	34.6	31.8	38.2	25.0	20.0	32.9	33.8
Qwen-7B-chat	43.8	46.8	33.3	18.4	41.9	40.0	43.2	33.3	17.5	38.8	40.4
Qwen-1.8B-chat	56.2	38.6	41.7	21.1	52.7	51.3	51.0	27.5	41.7	47.9	50.3
Baihuo-2-7B-Chat	51.2	50.9	30.0	2.6	44.6	48.1	46.0	35.0	7.5	42.1	43.4
Baihuo-2-13B-Chat	43.8	52.7	36.7	7.9	44.2	41.3	46.4	43.3	15.0	41.7	43.0
文心一言	45.0	60.9	36.7	23.7	49.6	53.8	59.1	38.3	20.0	51.5	50.6
ChatGPT (API)	45.6	44.1	36.7	13.2	41.2	34.4	32.3	30.0	15.0	31.2	36.2
GPT-4 (API)	65.1	59.6	46.7	15.8	57.3	40.6	42.7	33.3	17.5	38.8	48.1
HuatuoGPT-11 (7B)	41.9	61.0	35.0	15.7	47.7	52.5	51.4	41.7	15.0	47.5	47.6
HuatuoGPT-11 (13B)	47.5	64.1	45.0	23.7	52.9	48.8	61.8	45.0	17.5	51.6	52.3
HuatuoGPT-11 (34B)	66.3	75.0	48.3	34.2	65.5	63.6	71.4	50.0	27.5	62.5	64.0

Table 9: Results of the 2023 Chinese National Pharmacist Licensure Examination. It consists of two separate Examinations including Pharmacy track and Traditional Chinese Medicine (TCM) Pharmacy track.

更多信息可在华佗 GPT 的官网 [<https://www.huatuoogpt.cn/>] 上查阅。

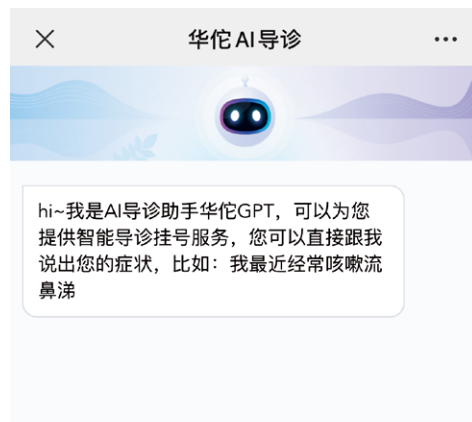
You can find more information on the official website of HuatuoGPT at <https://www.huatuoogpt.cn/>.

2024 年 3 月

华佗 GPT 有超过 30 万访问量 (<https://www.huatuogpt.cn>), 2024 年 3 月, 华佗 GPT 在龙岗区人民医院部署分诊, 在分诊场景准确率达 89%, 远远超过之前腾讯的预分诊系统。2024 年计划推出多模态版本的华佗 GPT, 将进一步扩展华佗 GPT 在细分领域的应用。

In March, 2024

HuatuoGPT has amassed over 300,000 visits (<https://www.huatuogpt.cn>). In March 2024, it was deployed at the Longgang District People's Hospital for triage purposes, achieving an accuracy rate of 89% in triage scenarios, significantly outperforming the previous pre-triage system developed by Tencent. In 2024, HuatuoGPT will launch a multimodal version, which will further expand its applications in segmented fields.



龙岗区人民医院华佗 GPT 在线导诊
District People's Hospital HuatuoGPT Online Consultation

团队荣誉 Honors

2023 年华为火花奖 王本友

王本友教授在华为云难题第二期 - 难题 3 “领域知识融合及推理技术”, 提出基于“知识图谱文本化 + 检索增强的预训练及推理”的解决方案, 具有较高价值, 被授予华为公司火花奖。

In the Huawei Spark Awards of 2023, Professor Wang Benyou was recognized for his significant contribution to the Huawei Cloud Challenges, Season 2 - Challenge 3, titled "Domain Knowledge Fusion and Reasoning Technology." Professor Wang proposed a solution based on "Knowledge Graph Textualization and Retrieval-Enhanced Pretraining and Reasoning." His innovative approach was deemed to have considerable value, earning him the prestigious Spark Award from Huawei.



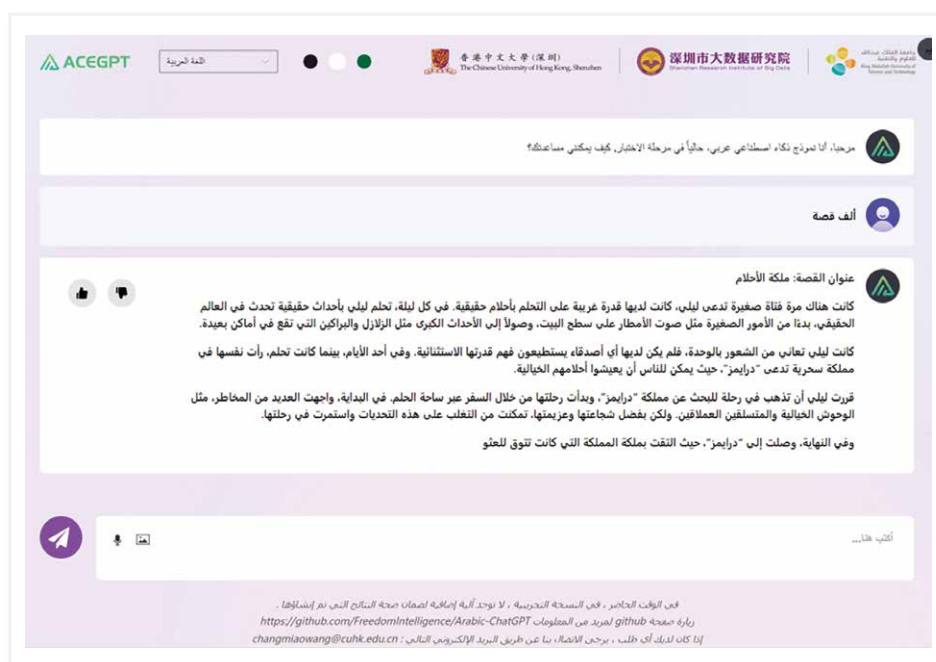
阿拉伯文 - 中文 - 英文大语言模型 AceGPT

AceGPT: Arabic-Chinese-English Large Language Model

项目简介 Project Overview

AceGPT 以打造最好的开源阿拉伯文 - 中文 - 英文大语言模型为目标，基于 200G 阿拉伯语数据进行训练。目前 AceGPT 在各项基准评估中表现优秀，超越了 Inception 和 Mohamed bin Zayed University of Artificial Intelligence（2023 年）八月份发布的 Jais 模型。这些评估包括了 Vicuna-80、AlpacaEval 指令执行基准、阿拉伯语 MMLU、EXAMs 知识基准以及最新的阿拉伯文化和价值观一致性基准，并且 AceGPT 在 Vicuna-80 这一流行基准上的表现超越了 ChatGPT 3.5 turbo。

AceGPT aims to create the best open-source Arabic-Chinese-English large language model, trained on 200GB of Arabic data. Currently, AceGPT performs excellently in various benchmark evaluations, surpassing the Jais model released by Inception and the Mohamed bin Zayed University of Artificial Intelligence in August. These evaluations include Vicuna-80, AlpacaEval instruction execution benchmarks, Arabic MMLU, EXAMs knowledge benchmarks, and the latest Arabic cultural and values consistency benchmarks. AceGPT's performance on the popular Vicuna-80 benchmark exceeds that of ChatGPT 3.5 turbo.



2023 年 9 月，AceGPT 在沙特举行的特别招待会上进行展示。该招待会由沙特研究发展和创新局（RDIA）主席顾问 H.E Dr. Munir M. Eldesouki 和 KAUST 校长 Tony Chan 教授共同组织，以欢迎由深圳市市长覃伟中率领的深圳代表团，此次活动吸引了大约 200 名来自沙特阿拉伯和中国的政府官员、大学教授和企业代表。

In September 2023, AceGPT was showcased at a special reception held in Saudi Arabia. The event was organized by H.E. Dr. Munir M. Eldesouki, Advisor to the President of the Saudi Research, Development, and Innovation Authority (RDIA), and Professor Tony Chan, President of KAUST, to welcome a delegation from Shenzhen led by Mayor Qin Weizhong. The event attracted approximately 200 government officials, university professors, and business representatives from Saudi Arabia and China.

求解器 Solver

通用线性、混合整数规划求解器软件 仙鹏求解器

Xianpeng Solver (XOPT): General Linear and Mixed-Integer Programming Solver Software

应用场景区景 Application Scenarios

为国防物资库存优化、列车调度、电网调度、通信网络优化等重大应用提供强大的技术支持。

To provide strong technical support for major applications such as national defense material inventory optimization, train scheduling, power grid dispatching, and communication network optimization.



国防物资库存优化



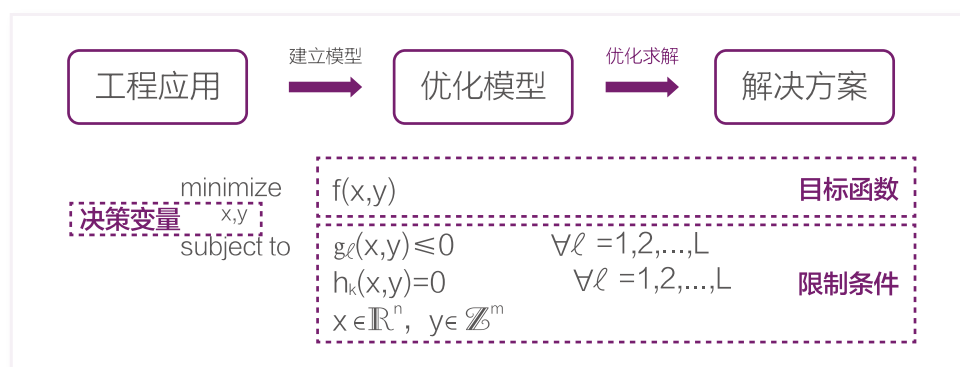
列车调度



电网调度



通信网络优化



能源 Energy



物流 Logistics



交通 Transportation



医疗 Healthcare



通信网络 Communication Network



制造 Manufacturing



主要进展 Key Progress

建立了集成预处理技术、启发式算法等多种计算加速技术的分支定界算法框架；

Established a branch-and-bound algorithm framework integrating preprocessing techniques, heuristic algorithms, and other computational acceleration technologies.

混合整数规划求解能力与最先进非商业软件齐平，正在追赶商业软件；

The mixed-integer programming solving capability is on par with the state-of-the-art non-commercial software and is catching up with commercial software.

该软件缓解了我国在通用混合整数线性规划求解器这一“卡脖子”技术面临的压力。





This software alleviates the pressure faced by China in the field of general mixed-integer linear programming solvers, a “bottleneck” technology.

- 评测标准: 240 公开测试问题
- 机器配置: Intel i9-12900k 3.2GHz 128GB / Linux
- 求解器: CPLEX 22.1, Gurobi 11.0.0, XPRESS 9.2.2, **XOPT 0.0.6**
- 时间限制: 7,200 seconds

	求解器	# opt.	SGM	Scale
	CPLEX	187	288.3	2.0
	Gurobi	221	143.8	1.0
	XPRESS	185	278.6	1.9
	XOPT	190	426.3	3.0

混合整数线性规划求解器性能对比
Performance Comparison for MILP Solver

- 评测标准: 单纯形法: 40个公开测试问题; 内点法: 51个公开测试问题
- 机器配置: Intel i9-12900k 3.2GHz 128GB / Linux
- 求解器: CPLEX 22.1, Gurobi 11.0.0, XPRESS 9.2.2, **XOPT 0.0.6**
- 时间限制: 15,000 seconds

求解器	单纯形法			内点法			
	# opt.	SGM	Scale	# opt.	SGM	Scale	
	CPLEX	36	167.0	3.7	47	97.5	2.1
	Gurobi	40	45.0	1.0	50	45.7	1.0
	XPRESS	38	140.0	3.1	46	89.6	2.0
	XOPT	39	127.2	2.8	49	103.3	2.3

线性规划求解器性能对比
Performance Comparison for LP Solver

本团队积极参与国家级、省部级以及市级科研项目，同时与国内头部企业紧密合作，获得横向、纵向、内部经费总计约 2000 万元，推动仙鹏求解器在通信、物流、航空等领域的应用落地。

This team actively participates in national, provincial, and municipal research projects and collaborates closely with top domestic enterprises. They have secured approximately 20 million RMB in total from horizontal, vertical, and internal funds, driving the application of the Xianpeng Solver in fields such as communication, logistics, and aviation.

许可申请 License Application

为推动自研的求解器应用于更多场景，促进求解器技术的进一步发展，仙鹏求解器 XOPT 0.0.6 版本已开放给个人用户试用，用户可访问链接 www.xopt.sribd.cn 获得仙鹏求解器与许可文件。

To promote the application of the self-developed solver in more scenarios and advance the further development of solver technology, the Xianpeng Solver (XOPT) 0.0.6 version has been made available for individual users to try. Users can access the link www.xopt.sribd.cn to obtain the XOPT and the license file.

仙鹏求解器许可申请页面
XOPT License Application Page

 **深圳市大数据研究院**
Shenzhen Research Institute of Big Data

XOPT仙鹏求解器

Xianpeng OPTimizer

XOPT（仙鹏求解器）是由深圳市大数据研究院自主研发，用于求解包括线性规划和混合整数线性规划问题的高性能软件。该优化求解器目前支持Linux/Windows/MacOS操作系统，且提供了命令行和python编程接口。

免费试用

XOPT 0.0.6可以免费下载，用于公测和评估。用户需要填写申请表。我们在收到邮件后，一般会在3个工作日内向您发送XOPT安装包和许可证。我们会给所有用户提供180天免费试用。我们后续会继续发布新的试用版本，敬请关注！

团队荣誉 Honors



实验室参赛团队荣获工信部产业发展促进中心组织的“电力用国产求解器”比赛八强团队

The laboratory's team achieved the top eight in the "Domestic Solver for Power Use" competition organized by the Ministry of Industry and Information Technology's Industrial Development Promotion Center.

新一代工业软件开源项目 OpenCAXPlus

OpenCAXPlus: New Generation Industrial Software Open Source Project



项目简介

Project Overview

聚焦面向制造过程与制造工艺的研发类工业软件及其核心算法工具，为计算机辅助设计、工程、制造、检测和人工智能提供统一软件开发工具和架构（SDK），让算法和工业机理更快融入工业软件形成产品；构建工业软件开发者和使用者双生态，形成开源闭源相结合的工业软件平台，以开源开发者生态为根，支撑各行业闭源商用使用者生态。该项目目前已受到多个科研机构支持。

The OpenCAX+ project focuses on the development of industrial software and its core algorithmic toolboxes (SDKs), tailored for computer-aided design, engineering, and manufacturing. These SDKs enable the rapid integration of algorithms and industrial mechanisms into software and simulation, facilitating robust design, engineering and manufacturing. Additionally, the project aims to establish a dual ecosystem for industrial software developers and users by offering a platform that accommodates both open-source and proprietary software and packages. At the heart of this initiative is the unified open-source developer ecosystem, which forms the basis for various industries' proprietary commercial user ecosystems. The OpenCAX+ project has received support from multiple research institutions.



项目亮点

Project Highlights



·关注统一开发工具、开发流程

Focusing on unified development tools and processes



·CAX 技术和人工智能的深度融合

Integrating CAX technology and artificial intelligence



·工业机理和软件算法的深度融合

Combining industrial mechanisms and software algorithms



·面向智能制造行业重大应用提供系统性解决方案

Providing systematic solutions for major applications in the intelligent manufacturing industry

实验室介绍

Laboratory Introduction

06



深圳市大数据研究院
Shenzhen Research Institute of Big Data



香港中文大学(深圳)
The Chinese University of Hong Kong, Shenzhen

信息系统大数据实验室

Data-driven Intelligent Information System Laboratory



研究方向

Research Directions

针对 5G 通信网络设备众多、控制参数繁多问题，进行大规模网络参数优化，以提升网络整体性能

Large-scale network modeling and optimization have played a crucial role in helping Huawei maintain global leadership in 5G performance.

通过优化感知网络部署、分布式检测融合和直接定位技术等创新理论与算法，对电磁信号进行多维协同增益接收处理

By optimizing the deployment of perception networks, integrating distributed detection, and employing innovative theories and algorithms for direct positioning technology, the project conducts multi-dimensional collaborative high-gain reception processing of electromagnetic signals.

在大数据分析与应用方向中，主要围绕从通信设备、网络、物联网设备等采集或获取的数据，进行应用开发，包括底层算法技术和软硬件的系统开发

In the field of big data analysis and applications, the focus is primarily on developing applications based on data collected or acquired from communication devices, networks, IoT devices, etc. This includes the development of underlying algorithmic technologies and the system development of both software and hardware.



主要成果

Major Achievement

2023 年，实验室已开展国家重点研发计划 2 项（主持 1 项、参与 1 项），承担 1 项 广东省旗舰项目，通信领域在研横向项目 12 项、纵向项目 20 项。

全年共申请专利 51 项、获授权专利 14 项，授权软著 3 项，制定行业标准 4 个，发表 77 篇期刊及会议论文。

In 2023, Data-driven Intelligent Information System Laboratory initiated 2 National Key R&D Project (1 as the lead and 1 as a participant), undertook 1 Flagship Project in Guangdong Province, and conducted research on 12 horizontal projects and 20 vertical projects in the communications field.

Throughout the year, a total of 51 patents were applied for, 14 patents were granted, 3 software copyrights were authorized, 4 industry standards were formulated, and 77 journal and conference papers were published.

申请专利

51 项

Patents Applied

授权专利

14 项

Patents Granted

授权软著

3 项

Software Copyright Authorizations Received

制定行业标准

4 个

Industry Standards Formulated

发表期刊及会议论文

77 篇

Journal and Conference Papers Published



实验室团队 Lab Team



重要奖项

Significant Awards



IEEE 通信学会亚太区最杰出青年学者和最佳论文奖

2023 Best Young Researcher Award and Outstanding Paper Award of IEEE Communications Society Asia-Pacific Region



浙江省自然科学二等奖

Second Prize for Natural Science of Zhejiang Province



华为无线产品线 - 优秀技术合作奖

Huawei Wireless Product Line - Outstanding Technical Cooperation Award



IEEE 最杰出青年学者奖
2023 Best Young Researcher Award



国际电信联盟 (ITU) "AI in 5G" 挑战赛全球亚军
Second place in the ITU-T AI/ML in 5G Competition

医疗大数据实验室

Medical Big Data Laboratory

研究方向

Research Directions

医疗大数据的标准化及医疗文本的结构化，彻底解决医疗数据信息孤岛问题

The standardization of medical big data and the structuring of medical texts aim to completely address the issue of information silos in healthcare data.

大数据驱动的智能医疗辅助技术，涵盖以疾病为中心的影像智能分析

Big data-driven intelligent medical assistance technology encompasses disease-centered image intelligence analysis.

华佗 GPT：国内首个可在学术界和产业界应用的中文医学基础大模型

HuatuoGPT: The first Chinese Medical Large Language Model that can be applied in both academia and industry domestically.

主要成果

Major Achievement

2023 年，实验室开展主持国家自然科学基金青年基金项目 1 项，广东省面上项目 1 项，广东省青年基金 1 项，开展智慧医疗领域横向项目 15 项、纵向项目 7 项。

全年共申请专利 14 项、获授权专利 13 项，授权软著 1 项，发表 52 篇期刊及会议论文。

In 2023, the Medical Big Data Laboratory initiated 1 National Natural Science Foundation Youth Fund Project, 1 Guangdong Provincial General Project, and 1 Guangdong Provincial Youth Fund Project. The laboratory conducted 15 horizontal projects and 7 vertical projects in the field of smart healthcare.

Throughout the year, a total of 14 patents were applied for, 13 patents were granted, 1 software copyright was authorized, and 52 journal and conference papers were published.

申请专利

14 项

Patents Applied

授权专利

13 项

Patents Granted

授权软著

1 项

Software Copyright
Authorizations Received

发表期刊及会议论文

52 篇

Journal and Conference
Papers Published

重要奖项

Significant Awards

第六届智慧医疗创新大赛全国总决赛：
最具发展潜力奖

The 6th National Finals of the Smart
Healthcare Innovation Competition - Most
Promising Development Potential Award



2023-MICCAI Workshop -
CMMCA2023 最佳论文奖
2023 - MICCAI Workshop - CMMCA 2023 Best
Paper Award



第六届智慧医疗创新大赛全国总决赛：应用创新赛道二等奖
The 6th National Finals of the Smart Healthcare Innovation Competition -
Second Prize in the Application Innovation Track



实验室团队 Lab Team

通用求解器实验室

Optimization Solver Development Laboratory

研究方向 Research Directions

多种数值、优化算法的应用程序库
和应用程序的研发

Development of application libraries and
applications for various numerical and
optimization algorithms.

机器学习、人工智能与传统优化算
法相结合新的优化技术

New optimization techniques that combine
machine learning, artificial intelligence,
and traditional optimization algorithms.

基于分布式和并行框架的数值、优
化算法软件开发

Software development for numerical
and optimization algorithms based on
distributed and parallel frameworks.

主要成果 Major Achievement

2023 年，实验室获得科技部国家重点研发项目 1 项，国家自然科学基金青年基金 1 项，广东省基础与应用基础研究面上项目 1 项等 5 项纵向课题。获得华为公司 GTS 领域大规模优化问题求解技术横向课题 1 项，合计获得横向课题 4 项。全年申请专利 3 项，申请软著 1 项，发表论文 5 篇。

The Optimization Solver Development Laboratory obtained 1 National Key R&D Project from the Ministry of Science and Technology, 1 Young Scientist Fund from the National Natural Science Foundation, and 1 general research project on Basic and Applied Basic Research from Guangdong Province, totaling 5 longitudinal projects. Additionally, the laboratory acquired 1 horizontal project in the field of large-scale optimization problem-solving technology from Huawei's GTS domain, bringing the total number of horizontal projects to 4. Furthermore, the laboratory applied for 3 patents and 1 software copyright throughout the year, and published 5 papers.

申请专利

3 项

Patents Applied

申请软著

1 项

Software Copyright Authorizations Received

发表期刊及会议论文

5 篇

Journal and Conference Papers Published



实验室团队 Lab Team

语音语义大数据实验室

Human Language Technology Laboratory

研究方向

Research Directions

类脑听觉注意力平台

采用了多模态交互的方式，结合视觉信号、环境语音信号、脑电信号和眼动信号各种模态的信息，实现了声源实时分离。该平台的实现主要包括了两个重要的组成部分：听觉注意力选择机制和利用多线索的语音信号提取。The Brain-Inspired Auditory Attention Platform adopts a multimodal interaction approach, combining various modalities such as visual signals, environmental speech signals, electroencephalogram (EEG) signals, and eye movement signals to achieve real-time source separation. The implementation of this platform mainly includes two important components: auditory attention selection mechanism and multi-cue speech signal extraction.

声纹识别中物理攻击检测方案

目前声纹识别系统易受攻击，其中“物理攻击”，也称为“回放攻击”，是目前最具威胁的攻击方法。为此，团队提出了基于机器学习算法的真声与假声识别技术，以有效增强基于声纹的身份认证系统的安全性。Currently, ASV (Automatic Speaker Verification) systems are vulnerable to attacks, with physical attacks, also known as spoof attacks, being the most threatening method. In response to this issue, the team has proposed a machine learning-based technique for distinguishing bona fide voices from spoofed voices, aiming to effectively enhance the security of voice-based authentication systems.

主要成果

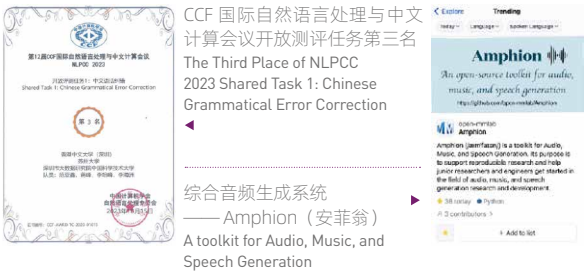
Major Achievement

2023 年，实验室主要围绕类脑听觉与伪造语音检测展开工作，与华为、字节跳动合作共 2 个横向项目。全年共申请专利 6 项，授权软著 1 项，发表 31 篇期刊及会议论文，开源 2 个数据库及 2 个框架，举办 2 场学术讲座。

In 2023, Human Language Technology Laboratory mainly focused on neuromorphic auditory processing and counterfeit speech detection. The lab collaborated with Huawei and ByteDance on two industry-funded projects. Throughout the year, they applied for a total of 6 patents, obtained 1 software copyright, published 31 journal and conference papers, open-sourced 2 databases and 2 frameworks, and hosted 2 academic workshops.



实验室团队 Lab Team



申请专利

6 项
Patents Applied

授权软著

1 项
Software Copyright
Authorizations Received

开源框架

2 个
Open-source Frameworks

开源数据库

2 个
Open-source Databases

发表期刊及会议论文

31 篇
Journal and Conference
Papers Published

举办学术讲座

2 场
Academic Workshops Hosted

智慧城市 / 交通 / 物流大数据实验室

Data-driven Smart City, Transportation, and Logistics Laboratory



研究方向

Research Directions

数据驱动的城市交通智慧规划与管理：基于智能感知、人工智能、大数据等新兴技术，在城市交通、航空交通、轨道交通领域开展大数据技术的应用研究。

Data-Driven Urban Transportation Intelligent Planning and Management: Conducting applied research on big data technology in the fields of urban transportation, air transportation, and rail transportation, based on emerging technologies such as intelligent sensing, artificial intelligence, and big data.

数据驱动的智慧物流运营管理：利用运筹优化、机器学习等理论与技术开展物流供应链优化模型、理论算法及在物流供应链行业应用研究。

Data-Driven Smart Logistics Operations Management: Utilizing theories and technologies such as operations research and machine learning to conduct research on logistics and supply chain optimization models, theoretical algorithms, and their applications in the logistics and supply chain industry.



主要成果

Major Achievement

2023 年，实验室共发表论文 27 篇，专利申请 12 项，新增纵向项目 5 项，横向项目 2 项。

In 2023, Data-driven Smart City, Transportation, and Logistics Laboratory published 27 papers, applied for 12 patents, and added 5 new vertical projects and 2 horizontal projects.

发表期刊及会议论文

27 篇

Journal and Conference Papers Published

申请专利

12 项

Patents Applied



重要奖项

Significant Awards



蔡小强教授获 2023 年全球 top2 顶尖科学家
“终身科学影响力排行榜”

Professor Cai Xiaoqiang was selected for the World's
2% Scientists Career-long impact in 2023.



数智物流与供应链管理论文一等奖

First Prize for Paper at the Annual International
Conference for Digital Intelligence Logistics and
Supply Chain Management (DILSCM 2023).



2023 中国物流学会论文三等奖（2 篇）

Third Prize for two papers in 2023 from the China
Logistics Society.



2023 年中国物流与采购联合会科技进步奖二等奖

Second Prize for Technological Progress in 2023 from
the China Federation of Logistics and Purchasing.



实验室团队 Lab Team

政务与法治大数据实验室

Public and Legal Big Data Laboratory

研究方向 Research Directions

政务与法治大数据实验室致力于通过经济、统计、人工智能等研究方法进行深度挖掘和分析，充分发挥大数据的驱动作用，通过数据流带动技术流、资金流、人才流、物资流，为政策制定、法治建设、企业发展等领域提供应用场景建设、智能化决策辅助、智能化动态评估，赋能法治政府建设和企业建设。

Public and Legal Big Data Laboratory is committed to conducting in-depth mining and analysis through economics, statistics, artificial intelligence and other research methods, and giving full play to the drive of big data. It drives technology flow, capital flow, talent flow, and material flow through data flow, providing application scenario construction and development for policy formulation, legal construction, enterprise development and other fields. Providing application scenario construction, intelligent decision-making assistance and intelligent dynamic evaluation for policy formulation, legal construction, enterprise development and other fields, empowering the legal, governmental and enterprise construction.

主要成果 Major Achievement

2023 年，实验室已开展国家重点研发计划 1 项，参与 1 项国家自然科学基金面上项目，开展政务、法治领域横向项目 5 项、纵向项目 3 项。

全年共申请专利 7 项、获授权专利 5 项，授权软著 1 项，发表 5 篇期刊及会议论文，专著 2 本。

In 2023, the Public and legal Big Data Laboratory initiated one National Key R&D Project, participated in 1 National Natural Science Foundation Project, and carried out 5 horizontal and 3 vertical projects in the fields of government affairs and legal matters. Throughout the year, the laboratory applied for 7 patents, was granted 5 patents, received 1 software copyright authorization, published 5 journal and conference papers, and authored 2 monographs.



实验室团队 Lab Team

申请专利

7 项

Patents Applied

授权专利

5 项

Patents Granted

发表专著

2 本

Monographs Authored

发表期刊及会议论文

5 篇

Journal and Conference Papers Published

授权软著

1 项

Software Copyright Authorizations Received



深圳市政务服务数据管理局“一网统管”法治城市建设专题大屏展示
Shenzhen Municipal Administration and Statistics Bureau's "Integrated Management Network" Special Big Screen Display for Rule of Law City Construction



深圳市人才资讯大模型“阿深”成功发布
Shenzhen Talent Information LLM successfully Launched



2023 年中国公募基金研究报告
2023 China Public Fund Research Report



2022 年深圳法治建设数据分析报告
Shenzhen Rule of Law Construction Data Analysis Report 2022

大数据基础理论与算法研究所

Division of Fundamental Research

研究方向 Research Directions

大数据基础理论与算法研究所主要聚焦于优化理论、机器学习与统计等领域的前沿研究，致力于解决大数据科学发展中的核心基础理论问题，研发适用于不同场景下的高效优化算法并应用于无线通信、信号与图像处理等实际问题，为研究院的全面快速发展提供理论和技术支撑。主要研究方向包括三大方面：大数据收集理论与算法；大数据数学模型、理论与分析；大规模稀疏与离散优化理论与算法。

The Division of Fundamental Research (DFR) focuses on cutting-edge research topics in optimization theory, machine learning, statistics, and related fields. It is dedicated to addressing the fundamental scientific problems arising from data science and engineering in the era of big data, developing efficient optimization algorithms applicable to various scenarios, and applying them to applications in wireless communication, signal processing, and image denoising, etc. DFR also provides theoretical and technical support for the comprehensive and rapid development of SRIBD. The main research areas at the current stage of development of DFR are mainly focused on three aspects: theory and algorithms for big data collection; models, theory, and analysis for big data; and theory and algorithms for large-scale sparse and discrete optimization.

主要成果 Major Achievement

2023 年，研究所已开展国家重点研发计划、国家自然科学基金项目、广东省基础与应用科学基金项目，以及深圳市优秀科技创新人才培养项目等 4 项。全年共申请专利 6 项，获授权专利 1 项，发表 23 篇期刊及会议论文。

In 2023, the Division of Fundamental Research initiated 1 National Key R&D Project, 1 National Natural Science Foundation Project, 1 Guangdong Provincial Basic and Applied Science Foundation Project, and 1 Shenzhen Science and Technology Project. Throughout the year, a total of 6 patents were applied for, 1 patent was granted, and 23 papers were published on prestigious journals and conferences.

申请专利

6 项

Patents Applied

授权专利

1 项

Patents Granted

发表期刊及会议论文

23 篇

Journal and Conference Papers Published



实验室团队 Lab Team

溢出机构 / 创新平台 Extended Agency / Innovation Platform

深圳国际工业与应用数学中心

Shenzhen International Center for Industrial and Applied Mathematics (SICIAM)

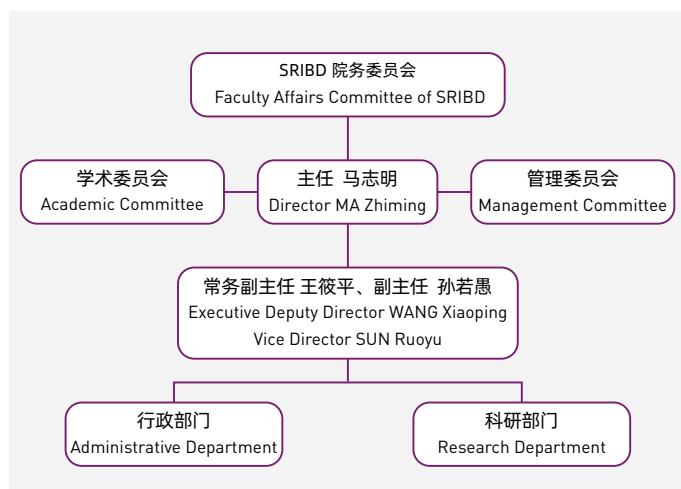
中心介绍 Introduction

深圳国际工业与应用数学中心于 2021 年 9 月正式启动，2022 年 12 月正式注册成为深圳市大数据研究院福田分院，由中国科学院院士马志明教授担任主任，香港中文大学（深圳）校长讲座教授王筱平教授担任常务副主任，中心现已聚集多位国际一流的工业与应用数学人才。中心将瞄准粤港澳大湾区数字经济行业创新的关键问题，围绕人工智能理论、方法及应用智能工业软件核心求解器开发，科学计算与应用数学的理论及应用三大重点研究领域开展科学研究和技术攻关。中心致力于吸引和聚集国际顶尖人才和团队，打造国际学术品牌，促进应用数学国际合作，并协同工业界面向国家战略解决一些系列核心技术问题。



The Shenzhen International Center for Industrial and Applied Mathematics (SICIAM) was established in September 2021 as a research institution focusing on the core issues of digital economy industry innovation in the Guangdong-Hong Kong-Macao Greater Bay Area. SICIAM is registered as the Futian Branch of Shenzhen Research Institute of Big Data (SRIBD), and is led by Professor Ma Zhiming, an academican of the Chinese Academy of Sciences, as Director, and Professor Wang Xiaoping, Presidential Chair Professor of the Chinese University of Hong Kong, Shenzhen, as Executive Deputy Director. The center has already gathered a number of internationally renowned talents in the field of industrial and applied mathematics.

SICIAM conducts research in following three areas: theoretical foundation, models, and applications of artificial intelligence, CAX (computer-aided design/engineering/manufacturing) and core solvers, and theory and applications of applied mathematics and scientific computing.



实验室团队 Lab Team



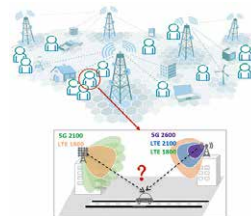
研究方向 Research Directions

人工智能理论、方法及应用

中心将从基础大模型的数学理论、机器学习的优化算法分析和设计、机器学习辅助算法设计、人工智能在通信网络中的应用等四个方面，展开人工智能基础和应用的研究。通过深化对人工智能的理解，为实际应用提供有力支持，推动人工智能领域的持续创新。

Artificial Intelligence

SICIAM will delve into AI research from four aspects: mathematical theories of large language models, analysis and design of optimization algorithms in machine learning, algorithm design assisted by machine learning, and the application of AI in communication networks. Through SICIAM's research, we aspire to deepen understanding of artificial intelligence, provide robust support for practical applications, and promote continuous innovation in the field of artificial intelligence.



智能工业软件核心求解器开发

在智能工业软件领域，研发两类基于数学算法的工业软件：通用数学优化软件和多物理场耦合模拟软件。针对线性规划、混合整数规划等优化问题，开发了高性能的数学优化算法与软件；针对多物理场耦合问题及其相关应用，如油气藏开发和流固耦合等，通过探索高效的求解算法与软件，以满足复杂工业场景的需求。

Solver Development

In the field of intelligent industrial software, the development involves two types of industrial software based on mathematical algorithms: general mathematical optimization software and multi-physics coupling simulation software. Develop high-performance mathematical optimization algorithms and software for optimization problems such as linear programming, mixed integer programming, etc.; explore efficient solving algorithms and software for multi-physics coupling problems and related applications, such as oil and gas reservoir development, fluid-structure coupling, etc., to meet the demands of complex industrial scenarios.

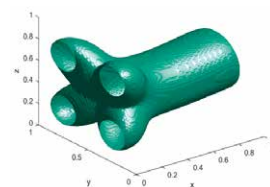


科学计算与应用数学理论及应用

如何设计高效、无条件稳定、保结构的数值算法以及如何与机器学习实现深度融合，已成为科学计算与应用数学领域的研究热点。中心将围绕以下几个核心场景进行创新应用探索：计算流体力学应用、拓扑优化应用、计算固体力学应用、科学计算核心算法及理论、科学计算与深度学习的交叉研究。

Scientific Computing

How to design efficient, unconditionally stable, and structure-preserving numerical algorithms, as well as how to achieve deep integration with machine learning, have become research hotspots in the field of scientific computing and applied mathematics. SICIAM will focus on innovative application exploration in the following core scenarios: computational fluid dynamics applications, topological optimization applications, computational solid mechanics applications, core algorithms and theories of scientific computing, and cross-research between scientific computing and deep learning.



主要成果 Major Achievement

2023 年，中心开展河套国际化基础研究和应用基础研究项目 1 项，参与 1 项国家重点研发计划申请和 1 项全国重点实验室申请，参与建设科学计算与机器学习联合实验室、刘徽实验室，开展人工智能、工业软件方面的横向项目合作 2 项。申请专利 4 项，发表论文 18 篇，举办学术会议 9 场。

Shenzhen International Center for Industrial and Applied Mathematics launched Hetao International Basic Research and Applied Basic Research Institutions Program, participated 1 National Key R&D Project, 1 National Key Laboratory Project, partly constructed the Joint Laboratory of Scientific Computing and Machine Learning and Liu Hui Laboratory, and conducted 2 horizontal projects in the fields of Artificial Intelligence and intelligent industrial software. The center applied for 4 patents, published 18 journal and conference papers, and hosted 9 academic conferences.

学术交流和人才培养

Academic Exchange and Talent Cultivation

07

学术交流 Academic Exchange

► 2023 年数据科学国际研讨会

12 月 17—18 日，由深圳市大数据研究院主办的 2023 年数据科学国际研讨会（MIIS 2023）在香港中文大学（深圳）举办。这一为期两天的年度盛会旨在集结全球数据科学领域的杰出科学家、研究人员和工程师，共同探讨信息科学和大数据领域的新思想、新理论、新技术以及新应用，推动数据科学理论和产业应用的高质量发展。

International Workshop on Mathematical Issues in Information Sciences (MIIS 2023)

On December 17-18, 2023, the International Workshop on Mathematical Issues in Information Sciences (MIIS 2023), hosted by the SRIBD, was held at CUHK-Shenzhen. This two-day annual event aimed to bring together outstanding scientists, researchers, and engineers in the field of data science from around the world to explore new ideas, theories, technologies, and applications in information science and big data, promote the high-quality development of data science theories and industrial applications.



200 名

科学家、研究人员、工程师和学生的参与
Scientists, Researchers, Engineers, and Students Participated.

► 第二届全国信息通信数学及应用大会

11 月 11 日，由中国工业与应用数学学会 (CSIAM)、中国科学院数学与系统科学研究院、深圳市大数据研究院、华为技术有限公司联合主办的第二届全国信息通信数学及应用大会在广东深圳开幕。

The Second National Conference on Information and Communication Mathematics and Applications

On November 11, the Second National Conference on Information and Communication Mathematics and Applications, jointly organized by the China Society for Industrial and Applied Mathematics (CSIAM), Academy of Mathematics and Systems Science, Chinese Academy of Sciences; SRIBD, and Huawei Technologies Co., Ltd., was held in Shenzhen, Guangdong Province.



300 人

出席大会
People Attended the Conference.

► 第三届道远学术论坛

1月13日，第三届道远学术论坛在香港中文大学（深圳）圆满举行。此次论坛由深圳市大数据研究院、香港中文大学（深圳）联合主办，自2023年11月启动征稿，得到了香港中文大学（深圳）数据科学学院、理工学院、医学院等各学院以及深圳市大数据研究院博士生和博士后的热情参与和支持。在论坛当天，共有十四位同学进行了口头报告、十位同学展示了学术海报。

The Third Daoyuan Academic Forum

On January 13, the 3rd Daoyuan Academic Forum was successfully held at CUHK-Shenzhen. The forum was jointly organized by SRIBD and CUHK-Shenzhen. It started collecting submissions in November 2023 and received enthusiastic participation and support from the School of Data Science, School of Science and Engineering, School of Medicine of CUHK-Shenzhen, as well as doctoral students and postdoctoral fellows from SRIBD. There were 14 students who gave oral presentations, and 10 students who presented academic posters at the forum.



现场出席人数

80⁺ 人

People Attended the Event.

B 站线上直播累计观看

1000⁺ 人次

Viewers on the Bilibili Livestream.

► “智汇湾区，数创未来”——2023 大湾区智慧医疗与数字健康创新高峰论坛

7月2日，由国家健康医疗大数据研究院（深圳）、深圳市大数据研究院、香港中文大学（深圳）联合主办的“智汇湾区，数创未来”——2023 大湾区智慧医疗与数字健康创新高峰论坛，在香港中文大学（深圳）隆重举行。此次论坛在大湾区的智慧医疗与数字健康领域产生了深远影响。

"Smart Bay Area, Creating the Future of Digital Health" - 2023 Greater Bay Area Smart Healthcare and Digital Health Innovation Summit

On July 2, the "Smart Bay Area, Creating the Future of Digital Health" - 2023 Greater Bay Area Smart Healthcare and Digital Health Innovation Summit, jointly organized by National Health Data Institute (Shenzhen), SRIBD, and CUHK-Shenzhen, was grandly held at CUHK-Shenzhen. created a profound impact on smart healthcare and digital health in the Greater Bay Area.



300 位

嘉宾线下参会

Guests Attended the Conference in Person.

22000 人次

线上观看

People Watched Online.

► 零阶优化研讨会

5月24日，深圳国际工业与应用数学中心举办零阶优化研讨会，邀请罗智泉院士、叶荫宇教授为此次研讨会报告。

Zero-Order Optimization Seminar

On May 24, SICIAM held the Zero-Order Optimization Seminar, inviting Academician Luo Zhi-Quan and Professor Ye Yinyu to present at the seminar.



► 深圳随机矩阵理论与应用会议

6月26日—30日，深圳国际工业与应用数学中心协办深圳随机矩阵理论与应用会议，会议邀请世界30多名专家做专题报告，120多名国内外相关专家学者参会。

Shenzhen Conference on Random Matrix Theory and Applications

From June 26 to 30, SICIAM co-hosted the Shenzhen Conference on Random Matrix Theory and Applications. The conference invited over 30 world-renowned experts to give keynote speeches, and more than 120 domestic and international experts and scholars attended the conference.



30⁺ 名

专家做专题报告
Experts Give Reports.

120⁺ 名

国内外相关专家学者参会
Domestic and International Experts and Scholars
Attending.

► 快速算法研讨会

8月2日，深圳国际工业与应用数学中心举办快速算法研讨会，邀请10多位来自国内外相关专家参会，讨论快速算法相关领域的最新进展。

Fast Algorithm Seminar

On August 2, SICIAM hosted the Fast Algorithms Seminar. The seminar invited over 10 experts from both domestic and international fields to discuss the latest advancements in fast algorithm research.



10⁺ 名

来自国内外相关专家参会
Domestic and International Experts Attending.



学生培养项目

Student Training Programs

联合培养学生项目

CUHK-Shenzhen - SRIBD Joint PhD Program

2020年8月，香港中文大学（深圳）与深圳市大数据研究院签署了《香港中文大学（深圳）- 深圳市大数据研究院联合培养博士生 / 博士后协议》，经过三年多的实践，联合培养博士生 / 博士后项目本着互惠互利、资源共享的原则，共同发展建立全面的人才培养和科学研究合作，扎扎实实地推进了博士生、博士后的联合培养工作，建成了良好的机制，取得了丰硕的成果。

2023年度，总计录取75人次进入联合培养博士生 / 博士后项目，其中包括4位联培博士后。

In August 2020, The Chinese University of Hong Kong, Shenzhen (CUHK-Shenzhen), signed the "CUHK-Shenzhen - SRIBD Joint PhD/Postdoctoral Agreement" with the Shenzhen Research Institute of Big Data (SRIBD). After more than three years of practice, the joint PhD/Postdoctoral training program has been established based on the principles of mutual benefit and resource sharing, promoting comprehensive talent cultivation and scientific research cooperation. It has made progress in the joint training of PhD/Postdoctoral students, established a good mechanism, and achieved fruitful results.

In the academic year 2023, a total of 75 candidates were admitted to the joint PhD/Postdoctoral training program, including 4 joint Postdoctoral researchers.

奖学金项目

Scholarship Program

2020年6月，深圳市大数据研究院通过《深圳市大数据研究院博士生奖学金管理办法》，支持香港中文大学（深圳）及深圳市大数据研究院在读博士生，设立研究院博士生奖学金。本年度总计资助20人次。

In June 2020, SRIBD, in accordance with the "Management Measures for Doctoral Scholarships of SRIBD," established SRIBD's Doctoral Scholarship to support doctoral students from CUHK-Shenzhen, and SRIBD. This year, a total of 20 students were awarded scholarships.

总计录取

75 人次

进入联合培养博士生
博士后项目

A Total of 75 Candidates were
Admitted to the Joint
PhD/ Postdoctoral Training
Program.

4 位

联培博士后

Joint Postdoctoral Researchers.

本年度总计资助

20 人次

博士生奖学金获得者

A Total of 20 Doctoral Students
Received Scholarship Funding.

教授寄语 Professors' Message



罗智泉教授
Prof. LUO Zhi-Quan

热烈祝贺各位同学入选香港中文大学（深圳）和深圳市大数据研究院的联合培养项目。这个项目是院校双方加强培养青年科技人才的创新举措。在这里，同学们可以和全世界的顶级教授一起进行科学研究，加入研究院承担的国家、省市重点科研项目，也有机会参与研究院和国内头部企业技术难点的联合攻关，进而获得解决复杂的实际问题的能力，提升自身综合科研素养。衷心希望这个项目能为各位同学在数据科学领域潜心耕耘、奋发有为提供动力。

Congratulations to all students who have been selected for CUHK-ShenZhen - SRIBD Joint PhD Program. This program is an innovative initiative for both institutions to strengthen the cultivation of young scientific and technological talents. In this program, students can conduct scientific research with top professors from around the world, participate in national, provincial, and municipal key research projects undertaken by SRIBD, and also have the opportunity to participate in joint research with domestic leading companies to tackle technical challenges. This will enhance your ability to solve complex practical problems and improve your overall scientific research literacy. I sincerely hope that this program will provide you with the motivation to work diligently in the field of data science.



蔡小强教授
Prof. CAI Xiaoqiang

联合培养项目旨在发挥香港中文大学（深圳）与深圳市大数据研究院的各自优势，通过人才培养、联合研究等多种形式开展全面合作。这个项目从2020年8月份开始，现在已经是第四年了。为学校的学生培养和研究院的项目研究提供了强有力的支持，也受到了同学们的广泛参与和赞誉。我相信，作为大学学术培养的一个重要补充，该项目将有效促进高等教育高质量发展。

The Joint PhD Program aims to leverage the respective strengths of CUHK-Shenzhen and SRIBD through comprehensive cooperation in talent cultivation, joint research, and other forms. The program started in August 2020 and is now in its fourth year. It has provided strong support for student cultivation at the university and project research at the SRIBD, and has also received widespread participation and praise from students. I believe that as an important supplement to university academic cultivation, this program will effectively promote the high-quality development of higher education.



对我们大学来说，联合培养项目是对我们通常的博士生培养机制的一个重要补充，也是我们学校学术成果转化的重要窗口之一。那么在参加项目的过程中，同学们可以与工业界、学术界的专家展开多方面的交流，为你的科研打开新的视角。这个联合培养项目是目前多个类似的联培项目中规模最大的、最活跃的，我代表学校感谢研究院对这个项目的大力支持，也祝愿这个项目越来越好。

For CUHK-Shenzhen, the Joint PhD Program is a significant addition to our overall PhD training mechanism and serves as a crucial avenue for the transformation of our academic accomplishments. In the process of participating in the program, students can engage in multifaceted exchanges with experts from the industry and academia, opening up new perspectives for your research. The program is currently the largest and most active among several similar joint training projects. On behalf of CUHK-Shenzhen, I thank SRIBD for its strong support for the program and wish this program continued success.



随着数据科学的快速发展，数学作为提供基础理论和基础算法研究的重要工具，越来越引起广泛关注。在联合培养项目中，你将学习到科学计算和应用数学理论及其应用，更有机会参与智能工业软件核心求解器的开发，参与国际性的学术讲座和论坛，拓宽个人实践的视野和领域。

With the rapid development of data science, mathematics, as an important tool for providing foundational theory and basic algorithm research, is attracting more and more attention. In the Joint PhD Program, you will learn scientific computing and the theory and application of applied mathematics, and have more opportunities to participate in the development of core intelligent industrial software solvers, participate in international academic lectures and forums, and broaden your personal practice and field of view.

颁奖 Award Ceremony

2024年1月13日，第三届道远学术论坛暨2023-2024学年深圳市大数据研究院博士生奖学金颁奖典礼在香港中文大学（深圳）圆满举行。

On January 13, the Third Daoyuan Academic Forum and the award ceremony for SRIBD Doctoral Scholarship for the 2023-2024 academic year were successfully held at CUHK-Shenzhen.





研究科学家
朱光旭博士

科研之路道阻且长， 唯行则将至

“科研过程不总是有鲜花和掌声，在攀登高峰的过程要耐得住寂寞。”在研究和工作中，朱光旭博士有自己的坚持。他认为科研是未知道路的探索，如果方向没走对可能会竹篮打水一场空。因此要沉下心、耐住寂寞，当找对了方向，攀爬上科研高峰，收获总会到来。

朱光旭博士现任深圳市大数据研究院信息系统大数据实验室研究科学家，主要从事 6G 边缘智能、通信感知一体化网络方向的科研工作。目前在相关领域共发表 50 余篇国际权威期刊论文和 40 余篇旗舰级会议，多篇论文入选 ESI 高被引论文，谷歌总引用 3600 余次，单篇最高引用 600 余次。朱光旭博士目前受邀担任主流国际期刊 IEEE Transactions on Wireless Communications 以及 IEEE Wireless Communications Letters 编委，并于多个主流国际会议上担任分论坛 / 研讨会联席主席。

“研究不能只知道埋头苦干，很多时候需要一些灵感。而灵感可以从不同的地方汲取。”朱光旭说科研工作不是一成不变的、机械性的工作，也需要活跃思维，找到技术性突破。他提到，人工智能刚开始兴起时，自己就摸索着将其引入到无线通信领域中。由于当时能够借鉴的信息极少，他几乎是从零开始学习人工智能，这个过程需要长续坚持、反复试错、灵感汲取。“做科研好比探索未知的道路，方向和路径都得靠自己规划，因此沉下心、耐住寂寞，才能更加精准地找到突破口。”在耐

Research Scientist
Dr. Zhu Guangxu

The path of scientific research is fraught with obstacles and is long, but by persisting in it, one will eventually arrive

“The process of scientific research is not always filled with flowers and applause.” Dr. Zhu Guangxu views scientific research as an exploration of the unknown path, where failure is possible if the direction is not correct. Therefore, patience is key. When the right direction is found, success will eventually come.

Dr. Zhu Guangxu currently serves as a research scientist at the Data-driven Intelligent Information System Laboratory of SRIBD, focusing primarily on research in 6G edge intelligence and communication-aware integrated networks. He has published over 50 papers in top international journals and more than 40 papers in flagship conferences in the field. Several of his papers have been selected as Highly Cited Papers in the Essential Science Indicators (ESI), with over 3,600 citations on Google Scholar and a single paper cited over 600 times. Zhu Guangxu is currently invited to serve as an editor for prestigious international journals such as IEEE Transactions on Wireless Communications and IEEE Wireless Communications Letters. He has also been appointed as a co-chair for several sub-forums/seminars at major international conferences.

“Research cannot solely rely on diligence; inspiration is often crucial. Inspiration can be drawn from different sources,” Zhu Guangxu said. He believes that research is not a stagnant, mechanical job, it requires active thinking to find technological breakthroughs. He mentioned that when artificial intelligence (AI) was just emerging, he began exploring its application in wireless communication. Due to the scarcity of information available at the time, he had to learn AI almost from scratch. This process required perseverance, trial and error, and drawing inspiration. “Engaging in research is like exploring an unknown path. The direction and path must be planned by oneself, so one must focus to find breakthroughs more accurately.” Through the collision of patience and inspiration, Zhu Guangxu published a review paper titled “Toward an Intelligent Edge: Wireless Communication Meets



心和灵感的碰撞下，朱光旭在其博士期间在领域内权威杂志 IEEE Communication Magazine（影响因子：9.03）发表了题为《Toward an Intelligent Edge: Wireless Communication Meets Machine Learning》的综述论文，该论文入选了 ESI 高被引论文（全球引用前 1%）和 ESI 热点论文（全球引用前 1‰），被认为是目前最为火热的研究领域——边缘智能领域的奠基作之一。

朱光旭现主持包括国家自然科学基金面上和青年基金、广东省自然科学基金面上基金、广东省旗舰项目课题等多个国家级、省级项目以及华为、中国移动、中国信通院等知名企事业单位的产学研合作课题，并作为子课题负责人参与国家重点研发计划课题研究。朱光旭曾获荣誉包括 IEEE 通信学会亚太区最佳青年学者奖和杰出论文奖、浙江省自然科学二等奖、全球前 2% 顶尖科学家、UCOM 2023 青年学者奖。

深圳市大数据研究院研究科学家是朱光旭的第一份工作，他也是在研究院成立早期加入的研究科学家之一，研究院伴随着他一起成长。朱光旭希望“研究能落地，真正为业界所用，而不停留在空想阶段。”研究院给了他实现目标的沃土，这里不仅有良好的研究环境，还开辟了广阔的应用落地渠道，鼓励研究科学家转型。2022 年 9 月，朱光旭代表研究院牵头联合深圳联通及其他单位组队参赛的“5G+AI 赋能安全智能驾驶应用”项目在 810 个参赛项目中脱颖而出，斩获专题赛一等奖。

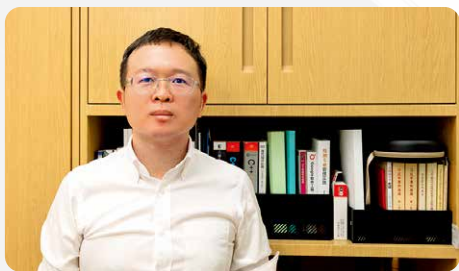
工作之余，朱光旭的兴趣爱好是体育运动，他说运动是他获取灵感的途径之一。他擅长乒乓球、篮球、羽毛球等，有时候也会参与到香港中文大学（深圳）举办的一些体育比赛当中。在他看来，科研任务有时也会面临难度大、时间紧、任务重等困难，运动能使人拥有一个健康的体魄，让他更好地胜任繁重的科研任务。

Machine Learning” in the prestigious journal IEEE Communication Magazine (impact factor: 9.03) during his doctoral studies. This paper was selected as a Highly Cited Paper in the Essential Science Indicators (ESI) (top 1% of global citations) and as an ESI Hot Paper (top 1‰ of global citations). It is considered one of the foundational works in the field of edge intelligence, one of the most dynamic research areas currently. Zhu Guangxu currently leads several national and provincial projects, including the National Natural Science Foundation's general and youth funds, the Guangdong Provincial Natural Science Foundation's general fund, and the Guangdong Provincial Flagship Project. He also collaborates on industry-academia-research projects with well-known enterprises and institutions such as Huawei, China Mobile, and the China Academy of Information and Communications Technology. Additionally, he is involved in National Key R&D Projects as a sub-project leader.

Zhu Guangxu has been honored with several awards, including the IEEE Communications Society Asia-Pacific Best Young Scholar Award and Outstanding Paper Award, the second prize in Natural Science of Zhejiang Province, recognition as one of the top 2% of global scientists and Ucom Young Scientist Award.

Zhu Guangxu's first job is as a research scientist at SRIBD. He has grown alongside the SRIBD, which he joined in its early days. Zhu Guangxu hopes that “research can be grounded and truly useful to the industry, rather than staying in the realm of fantasy.” SRIBD has provided him with fertile ground to achieve his goals, offering not only a good research environment but also opening up broad channels for application and commercialization, encouraging research scientists to transform their work. In September 2022, Zhu Guangxu led a team representing the institute to compete in the “5G+AI Empowering Safe Intelligent Driving Applications” project, winning the first prize in the special competition out of 810 entries.

In his spare time, Zhu Guangxu enjoys sports, which he considers one of his sources of inspiration. He excels in sports such as table tennis, basketball, and badminton, and occasionally participates in sports competitions organized by CUHK-Shenzhen. He considers research tasks to be challenging, time-consuming, and demanding. Engaging in sports helps him maintain a healthy body, enabling him to better handle the demanding workload of research.



2023 年度 SRIBD 杰出贡献奖
王龙飞工程师

奔赴热爱，踏歌而行

王龙飞，通用求解器实验室高级工程师，主要负责求解器相关的研发工作。2021 年入职深圳市大数据研究院，2024 年获杰出贡献奖。王龙飞老师加入 SRIBD 3 年，凭借坚定的职业精神、高效务实的工作态度以及严谨细致的工作作风，赢得了 SRIBD 同事们的普遍认可与高度评价。

2020 年，通用求解器实验室成立，王龙飞通过项目契请与实验室进行了第一次合作，并在这个过程中接触了求解器的研发工作。“对于学习运筹优化的人来说，参与开发求解器不仅是一项极具挑战性技术性工作，更是一个梦想。我们读书的时候都用过求解器软件，但是关于它的底层算法和具体实现，其实大家都很少有机会能够接触到。”王龙飞深刻意识到，若能有机会从事与求解器研发领域先驱者相同的工作，将是他的荣幸和对其职业生涯的高度认可。从使用者转变为研发者，对王龙飞而言，既充满了挑战性，也带来了令人振奋的机遇。

在全球范围内，求解器市场呈现出垄断状态，多数商业公司因资源限制，更倾向于将求解器作为底层核心工具应用于具体项目的求解阶段，目前国内许多企业尚未充分认识到求解器市场的广阔前景。“求解器在多个关键领域都扮演着举足轻重的角色，是人工智能发展中的重要组成部分。研究院有深远的前瞻性视野、战略眼光和国家大局意识，在面对技术瓶颈及国内市场空白时，就积极展开战略布局。”这也是王龙飞选择加入这个团队的重要原因。

2023 SRIBD Outstanding Contribution Award Engineer Wang Longfei

Stay Passionate and Pursue Your Dreams

Wang Longfei, a senior engineer at the Optimization Solver Development Laboratory, is mainly responsible for the development of solvers. He joined SRIBD in 2021 and was awarded the Outstanding Contribution Award in 2023. With three years of experience at SRIBD, Mr. Wang has garnered universal recognition and high praise from his colleagues at SRIBD for his steadfast professional spirit, efficient and pragmatic work attitude, as well as his rigorous and meticulous work style.

In 2020, the Optimization Solver Development Laboratory was established, marking the beginning of Wang Longfei's collaboration with the laboratory through a project. It was during this collaboration that he was introduced to the development of solvers. "For those learning operations research and optimization, participating in the development of solvers is not only a challenging technical task but also a dream. We have all used solver software when studying, but very few of us have the opportunity to understand its underlying algorithms and specific implementations." Wang Longfei deeply appreciates that having the opportunity to engage in the same work as the pioneers in the field of solver development would be an honor and a high recognition of his career. Transitioning from a user to a developer is both challenging and exciting for him, presenting opportunities for growth and achievement.

In the global market, the solver market is monopolized, with most commercial companies tending to use solvers as core tools at the lower level of specific project solving stages due to resource constraints. Currently, many domestic enterprises have not fully recognized the broad prospects of the solver market. "Solvers play a crucial role in several key areas and are an important part of the development of artificial intelligence. SRIBD has a far-sighted vision, strategic insight, and a sense of the overall national situation. When faced with technological bottlenecks and gaps in the domestic market, it actively develops strategic layouts." This is also a key reason why Wang Longfei chose to join this team.

However, developing solver software is a complex and challenging task that involves core algorithm confidentiality. Researchers can usually only explore based on publicly available algorithm frameworks. For Wang Longfei, he needed to design and develop

然而，开发求解器软件是一项复杂且充满挑战的任务，涉及核心算法保密性，研发人员通常只能依据公开的算法框架进行探索。对王龙飞来说， he 需要和团队一起从头设计并开发这个求解器。这一过程需要耐心、智慧和勇气，为此他们投入了大量心血和努力，历经 3 年时间开发出了通用优化软件“仙鹏求解器”。

王龙飞深知，要使这个求解器在速度和准确性上达到国际领先水平，必须全面考虑多个因素，包括算法设计、代码实现、性能调优等。在这个过程中，他不断产生新的想法，比如特殊决策变量的处理、不同算法逻辑的选择策略等。但每一种想法适用与否，需要一次次反复尝试和大量计算实验来验证。为了应对这些挑战，他始终保持开放的心态和灵活的思维方式，勇于尝试新的想法，敢于面对失败和挫折。当某个想法被证明不可行时，他能及时调整方向，寻找新的思路。这种严谨、稳重和理性的态度，使他在求解器开发的道路上不断前进。

“研究院提供了一个非常好的平台，这里有顶尖的教授学者和相关领域最前沿的科研成果。院里还给了我们充分的硬件和计算资源的支持，以及自由的研发氛围，让大家能够专注、安心地投入到软件研发工作，使我们攻克了大量技术难关。”他提到，求解器开发的实践还需要大量、持续的资源支持，研究院的支持对项目进展起到了重要的推动作用，以使通用求解器实验室在团队规模较小且成员没有任何求解器研发经验的基础上，从零开始，用三年多的时间走过了国外一流求解器二三十年的发展道路，仙鹏求解器在部分关键指标上已经赶超某些知名求解器。除此之外，实验室还承担了多项国家研究项目，并与国内头部企业建立了深入的合作。

“我希望能把求解器做成让大家觉得这是好用、有价值的东西，也许需要用很多年，甚至一辈子去做这个事情。”王龙飞怀揣着纯粹的信念，致力于研发一流的求解器软件。他深知，这一追求或许将历经漫长岁月，但对他来说已是毕生的事业和追求。王龙飞坚信，通过锲而不舍的努力和持续不断的创新，终能打造出属于国人自研的高效的求解器。

步履不停，只赴热爱，属于王龙飞工程师的山海彼岸定闪烁着朗朗前光！

this solver from scratch with his team. This process required patience, intelligence, and courage. They invested a great deal of effort and dedication, and after three years of hard work, they successfully developed the general optimization software "Xianpeng Solver."

Wang Longfei is well aware that to make this solver achieve international leading levels in speed and accuracy, multiple factors must be comprehensively considered, including algorithm design, code implementation, and performance tuning. During this process, he constantly generates new ideas, such as handling special decision variables and selecting strategies for different algorithm logics. However, the applicability of each idea requires repeated trials and a large number of computational experiments to verify. To tackle these difficulties, he embraces an open mindset and adaptable thinking, courageously experimenting with new ideas and confronting failures and setbacks. When an idea proves unfeasible, he promptly adjusts direction and seeks new approaches. This rigorous, steady, and rational attitude enables him to continuously advance on the path of solver development.

"SRIBD provides an excellent platform with top professors, scholars, and cutting-edge research achievements in relevant fields. It also provides us with full support in terms of hardware and computing resources, as well as a free research atmosphere, allowing everyone to focus and dedicate themselves to software development work. This has enabled us to overcome many technical challenges." He mentioned that the practice of solver development requires a large and sustained amount of resources. The support from SRIBD has played a crucial role in the project's progress, allowing the Optimization Solver Development Laboratory to start from scratch with a small team and members without any solver development experience. During a period of over three years, they have covered the development path of top solvers abroad over two to three decades. Xianpeng Solver has already surpassed some well-known solvers in certain key indicators. Additionally, the laboratory has undertaken multiple national research projects and established deep cooperation with leading domestic enterprises.

"I hope to develop the solver that everyone finds practical and valuable. It may take many years, or even a lifetime, to achieve this goal." With a steadfast belief, Wang Longfei is dedicated to developing top-notch solver software. He deeply understands that this pursuit may take a long time, but for him, it is a lifelong career and pursuit. Wang Longfei firmly believes that through persistent efforts and continuous innovation, he can eventually create a more efficient solver developed by Chinese.

Persistently pursuing his passion, Engineer Wang Longfei will eventually achieve the success he dreams of.

产学研合作

Industry-University-Research Collaboration

08

联合实验室 Joint Laboratories

深圳市大数据研究院与江西移动共建联合创新实验室 SRIBD - Jiangxi Mobile Joint Innovation Laboratory

10月31日，深圳市大数据研究院与江西移动联合创新实验室揭牌仪式暨现场交流会在南昌举行。香港中文大学（深圳）副校长、深圳市大数据研究院院长罗智泉院士，江西移动党委书记、董事长、总经理杨洋出席仪式并致辞。研究院及江西移动相关部门负责人、员工代表共50余人参加活动。

On October 31, the unveiling ceremony and on-site exchange meeting of the Joint Innovation Laboratory between the SRIBD and Jiangxi Mobile were held in Nanchang. Academician Luo Zhi-Quan, Vice President of CUHK-Shenzhen and Director of SRIBD, and Yang Yang, Secretary of the Party Committee, Chairman, and General Manager of Jiangxi Mobile, attended the ceremony and delivered speeches. More than 50 people, including leaders and representatives from SRIBD and Jiangxi Mobile, participated in the event.



深圳市大数据研究院与沙特阿卜杜拉国王科技大学共建科学计算与机器学习联合实验室 SRIBD-KAUST Scientific Computing and Machine Learning Joint Laboratory (SCML)

9月14日，深圳市大数据研究院与沙特阿卜杜拉国王科技大学在沙特阿拉伯王国吉达市签署建设科学计算与机器学习联合实验室（SCML）合作备忘录。深圳市长覃伟中、阿卜杜拉国王科技大学校长陈繁昌教授见证签约，并为实验室揭牌。香港中文大学（深圳）副校长、深圳市大数据研究院院长罗智泉院士，阿卜杜拉国王科技大学科研副校长 Pierre J. Magistretti 教授代表双方签约。

On September 14, SRIBD and King Abdullah University of Science and Technology (KAUST), signed a memorandum of cooperation to establish the SRIBD-KAUST Scientific Computing and Machine Learning Joint Laboratory (SCML). The signing ceremony was witnessed by Qian Weizhong, Mayor of Shenzhen, and Professor Chen Fanchang, President of KAUST, who also unveiled the laboratory. Professor Luo Zhi-Quan, Vice President of CUHK-Shenzhen and Director of SRIBD, and Professor Pierre J. Magistretti, Vice President for Research at KAUST, signed the agreement on behalf of their respective institutions.



香港中文大学（深圳）、深圳市大数据研究院、中国科学院数学与系统科学研究院三方共建刘徽实验室 SRIBD - CUHK-ShenZhen - AMSS Liu Hui Laboratory

10月30日，刘徽实验室揭牌仪式暨首届数学与应用研讨会在香港中文大学（深圳）成功举行。中国科学院数学与系统科学研究院院长张平院士，香港中文大学（深圳）副校长、深圳市大数据研究院院长罗智泉院士，刘徽实验室主任袁亚湘院士，刘徽实验室学术委员会主任、深圳国际工业与应用数学中心主任马志明院士等大学主管人员和嘉宾出席本次活动，共济一堂见证了这一学术盛事。

On October 30, the unveiling ceremony of the Liu Hui Laboratory and the First Seminar on Mathematics and Its Applications were successfully held at CUHK-Shenzhen. Academician Zhang Ping, President of the Academy of Mathematics and Systems Science of the Chinese Academy of Sciences (AMSS, CAS), Academician Luo Zhi-Quan, Vice President of CUHK-Shenzhen and Director of SRIBD, Academician Yuan Yaxiang, Director of the Liu Hui Laboratory, and Academician Ma Zhiming, Director of the Academic Committee of the Liu Hui Laboratory and Director of SICIAM, attended the event along with university administrators and guests, witnessing this academic event together.



深圳市大数据研究院与深圳市医友天下科技有限公司共建 Ebody 智慧听诊联合创新实验室 SRIBD - Yiyo Healthcare Ebody Smart Auscultation Joint Innovation Laboratory

Ebody 智慧听诊联合创新实验室以开发临床级 AI 心肺听诊医疗器械产品为核心，重点建设基于诊察大数据的智慧化医疗大数据平台，为广大用户提供便捷、可靠的个性化医疗服务。

The Ebody Smart Auscultation Joint Innovation Laboratory focuses on developing clinical-grade AI heart and lung auscultation medical device products. It aims to build a smart medical big data platform based on diagnostic data to provide convenient and reliable personalized medical services for users.

成果转化 Technology Transfers

2023年8月，与中企筑链科技有限公司合作成立中深汇能（江苏）科技有限公司，研究院以知识产权作价310万元入股，通过全资子公司持股51%。

In August 2023, SRIBD collaborated with China Enterprise Build-Link Technology Co., Ltd. to establish Zonson Synthetic Energy Technology co., Ltd. SRIBD contributed intellectual property valued at 3.1 million yuan to obtain a 51% stake through a wholly-owned subsidiary.

2023年3月，研究院发明专利“ZL2020101619457 分布式存储方法和传输译码方法”通过独占许可的方式向圣牒（北京）科技有限公司实施许可，专利许可费200万元。首次实施许可即实现百万收入，是研究院产业化的重大突破。

In March 2023, SRIBD licensed the patented invention “ZL2020101619457 Distributed Storage Method and Transmission Decoding Method” exclusively to Shengdie (Beijing) Technology Co., Ltd. The patent licensing fee amounted to 2 million yuan. The first implementation of the license immediately generated a million yuan in revenue, marking a significant breakthrough in the transformation of SRIBD achievements.

研究院以知识产权作价

310 万元入股

SRIBD invested
3.1 million yuan in shares using intellectual
property as valuation.

全资子公司持股

51%

The wholly-owned subsidiary holds
51% of the shares.

专利许可费

200 万元

Patent Licensing Fee:
2 million yuan.



合作单位 Partnerships

 中华人民共和国科学技术部 高技术研究中心 (基础研究管理中心)	 1986	 广东省科学技术厅 Department of Science and Technology of Guangdong Province	 深圳市科技创新委员会 深圳市国家自主创新示范区管理委员会 深圳市高新技术产业园区管理委员会 深圳市外国专家局
 深圳市司法局 Justice Bureau of Shenzhen Municipality	深圳市龙岗区科技创新局	 深圳市龙华区司法局	 深圳市南山区慢性病防治院 SHENZHEN NANSHAN CENTER FOR CHRONIC DISEASE CONTROL
 中国科学院数学与系统科学研究院 Academy of Mathematics and Systems Science Chinese Academy of Sciences	 CAICT 中国信通院	 HUAWEI	 CEIC 中国电科
 中国移动 China Mobile	 中国联通 China unicom	 中国南方航空 CHINA SOUTHERN	 中国南方电网 CHINA SOUTHERN POWER GRID 南方电网数字电网研究院有限公司
 Tencent 腾讯	 阿里巴巴 Alibaba.com	 TMALL 天猫	 Purcotton 全棉时代

活动集锦

Events

09



高交会参展与成果发布

Participation and Achievement Presentation at the China Hi-Tech Fair

11月15日至19日，第二十五届中国国际高新技术成果交易会（简称“高交会”）在深圳会展中心（福田展区）和深圳国际会展中心（宝安展区）两馆同时举办，为历届规模最大、国际化最浓的一届高交会。深圳市大数据研究院第二次设展，展览结合实物展示、视频讲解、海报背景板等多种形式，展示了研究院前沿科学技术和硬核创新产品，受到业界和媒体的高度关注。

From November 15 to 19, 2023, the 25th China International High-tech Achievement Fair (referred to as "China Hi-Tech Fair") was held simultaneously at the Shenzhen Convention and Exhibition Center (Futian Exhibition Area) and the Shenzhen International Convention and Exhibition Center (Bao'an Exhibition Area). It was the largest and most internationalized fair in its history. SRIBD participated for the second time, showcasing cutting-edge scientific technology and innovative products through physical displays, video explanations, poster backgrounds, and other forms. The exhibition received widespread attention from the industry and media.



科学普及

Science Popularization

研究院作为新型科研机构，主动承担科普社会责任，发挥自身优势和专长提升深圳青少年科学素质，先后在罗湖区、龙岗区知名中小学开展《什么是大数据》、《从“小”到“大”：生活中的数据、模型和决策》等四期“博士课堂”大数据公益科普讲座，受到青少年学生的热烈欢迎。

SRIBD, as a new type of research institution, actively undertakes the social responsibility of science popularization, leveraging its advantages and expertise to enhance the scientific literacy of teenagers in Shenzhen. It has conducted four sessions of "Doctoral Lecture" on big data science popularization lectures in well-known primary and secondary schools in Luohu and Longgang districts, including topics such as "What is Big Data" and "From 'Small' to 'Big': Data, Models, and Decision-making". These lectures, both online and offline, have been warmly welcomed by teenagers.

线上线下宣发观看量超

10000⁺人

Watched Online and Offline Simultaneously.

第一期:

李平博士《什么是大数据》

香港中文大学（深圳）附属礼文学校

Dr. Lee Ping,

"What is Big Data," Liwen School, affiliated with CUHK-Shenzhen



第二期:

王昌淼博士《走进智慧医疗的新时代》

香港中文大学（深圳）附属知新学校

Dr. Wang Changmiao,

"Entering a New Era of Smart Healthcare," Zhixin School, affiliated with CUHK-Shenzhen



第三期:

彭洋洋博士《从“小”到“大”：生活中的数据、模型和决策》

龙城高级中学（教育集团）平安里学校

Dr. Peng Yangyang,

"From 'Small' to 'Big': Data, Models, and Decisions in Life," Longcheng High School (Education Group), Ping'anli School



第四期:

李航博士《我要学好什么，是为了什么而学习》

龙岗外国语学校

Dr. Li Hang,

"What Should I Learn and Why Should I Study," Longgang Foreign Language School



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