The 2nd International Conference on Ubiquitous Security (UbiSec 2022)

December 28 - 31, 2022

Zhangjiajie, China

http://ubisecurity.org/2022/

Advance Program

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UbiSec 2022

Program at a Glance (Day 1-2)

December 28 (Wednesday)
On-Site Registration (First Floor Hall)

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08:00-08:45	**Invited Talk 1:** New Insights on Cryptographic Hierarchical Access Control: Models, Schemes, and Analysis **Speaker: Prof. Arcangelo Castiglione**, University of Salerno
08:45-09:30	**Invited Talk 2:** Optimizing Industrial IoT HVAC using Machine Learning **Speaker: Prof. Scott Fowler**, Linköping University
09:30-10:15	**Invited Talk 3:** Online User Analysis and Learning Optimization **Speaker: Prof. Wenjun Jiang**, Hunan University
10:15-10:30	**Coffee/Tea Break**
10:30-11:15	**Invited Talk 4:** Operational Technology (OT) and Supply Chain Cyber Security: The Storm Approaching US **Speaker: Prof. Ryan Ko**, University of Queensland
11:15-12:00	**Invited Talk 5:** Secure Search in Cloud Computing and Emerging Applications **Speaker: Prof. Qin Liu**, Hunan University
12:00-14:30	**Lunch @ Hotel**
14:30-15:15	**Invited Talk 6:** Green Offloading: from "Eastern Data, Western Computing" to Edge Computing **Speaker: Prof. Tian Wang**, Beijing Normal University
15:15-16:00	**Invited Talk 7:** Mutual Authentication with Multi-factor and Hybrid Approach to Intrusion Detection in IoT-Fog-Cloud Environment **Speaker: Prof. Carlos Becker Westphall**, Federal University of Santa Catarina
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16:20-17:05	**Invited Talk 8:** Trustworthiness of Anomaly Detection for IIoT **Speaker: Prof. Yulei Wu**, University of Exeter
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December 29 (Thursday)		
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08:50-09:35	**Keynote 1:** Next Generation Security for Cyber Physical Systems **Speaker: Prof. Richard Hill**, University of Huddersfield, UK **Chair:** Prof. Qin Liu, Hunan University, China	
09:35-10:20	**Keynote 2:** Security-Aware Task Execution across the Edge-Cloud Continuum **Speaker: Prof. Omer Rana**, Cardiff University, UK **Chair:** Prof. Qin Liu, Hunan University, China	
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11:20-12:05	**Keynote 4:** Achieving Scalability and Interpretability Simultaneously in Detecting Multi-granularity Vulnerabilities **Speaker: Prof. Deqing Zou**, Huazhong University of Science and Technology, China **Chair:** Dr. Xiangyong Liu, Guangzhou University, China	
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UbiSec 2022
Program at a Glance (Day 3-4)

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	Room 2	Room 3
	Room 2	**Room 3**
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December 31 (Saturday)	
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	Conference Closing

Quick Guide to Meeting Rooms

Room Number	Room Name	Floor
Room 1	Conference Room (会议室)	Room #7701, College of Compuer Science and Engineering, Jishou University
Room 2	Meeting Room (会议室)	Room #7702, College of Compuer Science and Engineering, Jishou University
Room 3	Seminar Room (研讨室)	Room #7703, College of Compuer Science and Engineering, Jishou University

`UbiSec 2022 Program Preview

Keynotes

Keynote 1: Prof. Richard Hill, University of Huddersfield, UK

    Title: Next Generation Security for Cyber Physical Systems

Keynote 2: Prof. Omer Rana, Cardiff University, UK

    Title: Security-Aware Task Execution across the Edge-Cloud Continuum

Keynote 3: Prof. Kouichi Sakurai, Kyushu University, Japan

    Title: State and Issues of Non-Fungible Token from Technical Point of View

Keynote 4: Prof. Deqing Zou, Huazhong University of Science and Technology, China

    Title: Achieving Scalability and Interpretability Simultaneously in Detecting Multi-granularity Vulnerabilities

Keynote 5: Prof. Tien N. Nguyen, The University of Texas at Dallas, USA

    Title: Intelligent Software Vulnerability Detection

Invited Talks

08:00-10:15, December 28 (Wednesday)

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Session Invited Talks -2, Room 1, Chair: Prof. Shuhong Chen, Guangzhou University, China

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Session Invited Talks -3, Room 1, Chair: Prof. Tao Peng, Guangzhou University, China

16:20-17:50, December 28 (Wednesday)

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Paper Sessions

UbiSec-1 ~ UbiSec-6

The 2nd International Conference on Ubiquitous Security (UbiSec 2022)

Keynote 1: Next Generation Security for Cyber Physical Systems

Speaker: Prof. Richard Hill, University of Huddersfield, UK

Chair: Prof. Qin Liu, Hunan University, China

About the Keynote Speaker

Professor Richard Hill is Head of the Department of Computer Science, and Director of the Centre for Industrial Analytics, at the University of Huddersfield, UK. Professor Hill has published over 200 peer-reviewed articles and has been the recipient of several best paper awards, having been recognised by the IEEE for outstanding research leadership in the areas of Big Data, predictive analytics, the Internet of Things, Cyber Physical Systems security and Industry 4.0, and has specific interests in digital manufacturing.

Abstract:

Driven by the Industry 4.0 movement, businesses are innovating rapidly and applying accessible technologies to accelerate wealth creation and societal development. Decades of robotics research is now becoming easier to implement as enterprises start to exploit the potential benefits of Cyber Physical Systems (CPS). The interconnected nature of CPS thus presents significant challenges for the secure distribution of data, especially since it is essential that physical actuation must be safe and cause no harm to humans. This talk explores the landscape of security issues from the context of CPS, considers emerging approaches to privacy preservation, and novel approaches for distributed ledger technologies, and identifies pertinent opportunities for research and industrial communities to investigate.

Keynote 2: Security-Aware Task Execution across the Edge-Cloud Continuum

Speaker: Prof. Omer Rana, Cardiff University, UK

Chair: Prof. Qin Liu, Hunan University, China

About the Keynote Speaker

Omer Rana is a Professor of Performance Engineering and the Dean of International for the Physical Sciences and Engineering College at Cardiff University. He has research interests in high performance distributed computing (particularly cloud and edge computing) and intelligent systems. He is a visitor professor at the Department of Computer Science and Engineering at Shanghai Jiao Tong University (China) and was previously a visiting professor at Princess Noura University in Riyadh (Saudi Arabia). He contributed to the UK eScience programme as deputy director of the Welsh eScience Centre. Rana has contributed to specification and standardisation activities via the Open Grid Forum and worked as a software developer with London-based Marshall Bio-Technology Limited prior to joining Cardiff University, where he developed specialist software to support biotech instrumentation. He contributed to public understanding of science, via the Wellcome Trust funded "Science Line", in collaboration with BBC and Channel 4. Rana holds a PhD in "Neural Computing and Parallel Architectures" from Imperial College (London University, UK), an MSc in Microelectronics (University of Southampton, UK) and a BEng in Information Systems Eng. from Imperial College (London University, UK).

Abstract:

Fog computing brings the cloud closer to a user with the help of micro data centers, leading to lower response times for delay sensitive applications. This talk describes a mechanism for executing tasks on micro data centres based on their credentials and properties, supporting both batch and interactive applications whilst also taking account of deadline constraints. Task execution and application orchestration is supported across a micro data centre and a cloud data centre taking account of network delay and security tags. Jobs submitted by a user are tagged as: private, semi-private and public, and data centres classified as: trusted, semi-trusted and untrusted. Tasks can also be executed as private jobs on a user's local micro data centre or pre-trusted cloud data centre. A security and performance-aware distributed orchestration architecture and protocol is described that can also be used to support dynamic deployment of tasks on mobile devices using similar security mechanisms, e.g. over the air updates on mobile devices.

Keynote 3: State and Issues of Non-Fungible Token from Technical Point of View

Speaker: Prof. Kouichi Sakurai, Kyushu University, Japan

Chair: Dr. Xiangyong Liu, Guangzhou University, China

About the Keynote Speaker

Dr. Kouichi Sakurai is a Full Professor in the Department of Informatics at Kyushu University. Dr. Sakurai directs the Laboratory for Information Technology and Multimedia Security and he is working also with CyberSecurity Center. He had been working also with the Institute of Systems & Information Technologies and Nanotechnologies, as the chief of Information Security laboratory, for promoting research co-operations among the industry, university and government under the theme "Enhancing IT-security in social systems". He has been successful in generating such co-operation between Japan, China and Korea for security technologies as the leader of a Cooperative International Research Project supported by the National Institute of Information and Communications Technology (NICT) during 2005-2006. Moreover, in March 2006, he established research co-operations under a Memorandum of Understanding in the field of information security with Professor Bimal Kumar Roy, the first time Japan has partnered with The Cryptology Research Society of India (CRSI). He is working also with Department of Advanced security of Advanced Telecommunications Research Institute International and was involved in a NEDO-SIP-project on supply chain security. Professor Sakurai has published more than 400 academic papers around cryptography and cybersecurity (See http://dblp.uni-trier.de/db/indices/a-tree/s/Sakurai:Kouichi.html)

Abstract:

We survey recent development of NFTs (Non Fungible Tokens), which is a non-fungible digital token that records ownership certificates on the blockchain on unique and irreplaceable digital assets such as art, music, and collector's items, and gives them unique value. Now NFT is attracting attention as a technology that creates new trading markets and businesses. Note that, in contrast to NFT, digital tokens of substitutable assets such as virtual currencies and security tokens are called FTs (Fungible Tokens). This talk discusses technical issues of NFT, especially on its trust and security. The speaker has studied e-provenance from the last 20 years, which was before blockchain, and reports what is new of NFT comparing to e-provenance from technical perspective.

Keynote 4: Achieving Scalability and Interpretability Simultaneously in Detecting Multi-granularity Vulnerabilities

Speaker: Prof. Deqing Zou, Huazhong University of Science and Technology, China

Chair: Dr. Xiangyong Liu, Guangzhou University, China

About the Keynote Speaker

Deqing Zou received the Ph.D. degree at Huazhong University of Science and Technology (HUST), in 2004. He is currently the executive dean of School of Cyber Science and Engineering, Huazhong University of Science and Technology (HUST), Wuhan, China. His main research interests include system security, trusted computing, virtualization and cloud security. He has published many papers on prestigious conferences/ journals including NDSS, ASE, ICSE, TDSC, TIFS and so on. He is on the editorial boards of four international journals, and has served as PC chair/PC member of more than 40 international conferences.

Abstract:

Since deep learning (DL) can automatically learn features from source code, it has been widely used to detect source code vulnerability. To achieve scalable vulnerability scanning, some prior studies intend to process the source code directly by treating them as text. To achieve accurate vulnerability detection , other approaches consider distilling the program semantics into graph representations and using them to detect vulnerability. In practice, text-based techniques are scalable but not accurate due to the lack of program semantics. Graph-based methods are accurate but not scalable since graph analysis is typically time-consuming. Inspired by existing DL-based image classification which has the ability to analyze millions of images accurately, we prefer to use these techniques to achieve both scalability and accuracy on scanning large-scale source code vulnerabilities. Specifically, we propose a novel idea that can efficiently convert the source code of a function into an image while preserving the program details. In this way, heavyweight function-level graph analysis is transformed into succinct image classification. In practice, since our analysis objects are images, we can leverage some deep visualization techniques such as Class Activation Map to interpret our detection results. However, function-level vulnerability detection may contain many vulnerability-unrelated statements which can confuse the interpretation. To make our interpretation more precise, we apply slice-level vulnerability analysis to filter vulnerability-unrelated statements as much as possible and employ an attention mechanism to obtain the weight of each remained slice. The combination of slice-level with function-level vulnerability analysis can improve our detection and interpretation.

Keynote 5: Intelligent Software Vulnerability Detection

Speaker: Prof. Tien N. Nguyen, The University of Texas at Dallas, USA

Chair: Prof. Xiaofei Xing, Guangzhou University, China

About the Keynote Speaker

Dr. Tien N. Nguyen is a Professor in the Computer Science Department at the University of Texas at Dallas. His research interests include program analysis, software security, machine learning for software engineering, and software mining. In the past ten years, he has been awarded 4 ACM SIGSOFT Distinguished Paper Awards, one IEEE Technical Committee on Software Engineering (TCSE) Distinguished Paper Award, and one Most Impact Paper Award at the top-tier, international software engineering conferences including ICSE, FSE, and ASE. He is ranked 3rd by csrankings.org among the researchers that have published the most at the top-tier software engineering conferences. Since 2007, his research has been supported by 16 external grants including 9 NSF grants from US National Science Foundation, one National Security Agency (NSA) grant, and several grants from industry including ABB Software Research Grant Program, Litton Industry, IBM research, Amazon, and Agile Alliance Academic Program. He has served as the Program Chair of the 32nd ACM/IEEE International Conference on Automated Software Engineering (ASE 2017), and 4 times as the Chair of the Formal Demonstration Tracks at ICSE and FSE. He has served on Program Committees and Program Boards of top-tier software engineering conferences including ICSE, FSE, ASE, OOPSLA, and ECOOP. He has received several awards for excellence in research including the Litton Professorship Medallion Award (Iowa State University), Graduate of the Last Decade (University of Wisconsin), etc.

Abstract:

Attacks toward software infrastructures have caused substantial damage to our modern society and economy. New software security vulnerabilities are discovered on an almost daily basis. It is important to detect software vulnerabilities early because late corrections of errors could cost up to 200 times as much more or even cause more severe damage. In this talk, I will present the latest advances in intelligent software vulnerability detection. Specifically, I will present a study on recurring software vulnerabilities and the techniques to detect and prevent prior-known software vulnerabilities. Moreover, the advances of Artificial Intelligence and Machine Learning have opened up the new chapter of software vulnerability detection. Along with the topic of AI/ML-powered security vulnerability detection, I will also present how the explainable AI (XAI) can improve the usability of such detection. Finally, I will explain the automated techniques in assessing the impact of potential software vulnerabilities and the human-in-the-loop XAI vulnerability detection framework that leverages the explainable AI to combine Artificial Intelligence (AI) and Intelligence Assistant (IA) in amplifying human intelligence in the vulnerability detection process.

Invited Speaker 1: Prof. Arcangelo Castiglione, University of Salerno, Italy

Title: New Insights on Cryptographic Hierarchical Access Control: Models, Schemes, and Analysis

Chair: Prof. Xiaofei Xing, Guangzhou University, China

Abstract: Users are typically organized into hierarchies according to their respective roles and responsibilities. Key management for such hierarchies consists of assigning a key to each class of the hierarchy so that the keys for descendant classes can be efficiently obtained from users belonging to classes at a higher level.

This talk analyzes the security of hierarchical key assignment schemes according to different notions. Then, we explore the relations between all security notions and prove that security with respect to strong key indistinguishability is not stronger than the one with respect to key indistinguishability. Moreover, we define the concept of hierarchical key assignment schemes supporting dynamic updates. Finally, we propose a novel model that generalizes the conventional hierarchical access control paradigm by extending it to certain additional sets of qualified users.

Short-Bio: Arcangelo Castiglione received a Ph.D. in Computer Science from the University of Salerno, Italy. He is an Associate Professor at the Department of Computer Science, University of Salerno (Italy). He was a Visiting Researcher at the Laboratory of Cryptography and Cognitive Informatics, AGH University of Science and Technology (Poland), and at the Computer Science and Engineering Department, University Politehnica of Bucharest (Romania). His research mainly focuses on cyber-physical systems security, automotive security, network security, data security, watermarking, and cryptography. He is an Associate Editor for several Scopus-Indexed journals, such as Soft Computing (Springer), Connection Science (Taylor & Francis), International Journal of Embedded Systems (Inderscience Publishers), Journal of High-Speed Networks (IOS Press), and IET Cyber-Physical Systems: Theory & Applications (IET). He has been Guest Editor for several Special Issues and Volume Editor for Lecture Notes in Computer Science (Springer). He has been involved in several organizational roles (steering committee member, program chair, and publicity chair) for many international conferences. He has been a reviewer for several top-ranked scientific journals and conferences. He serves as the IEEE Technical Committee on Scalable Computing (TCSC) secretary. He is a founding member of the IEEE Technology and Engineering Management Society (TEMS)'s Technical Committee (TC) on Blockchain and Distributed Ledger Technologies (DLT). He has been appointed as a member of the IEEE Technical Committee on Secure and Dependable Measurement.

Invited Speaker 2: Prof. Scott Fowler, Linköping University, Sweden

Title: Optimizing Industrial IoT HVAC using Machine Learning

Chair: Prof. Xiaofei Xing, Guangzhou University, China

Abstract: Researchers have developed many state-of-the-art techniques that link thermal comfort, productivity, and health over the last 50 years. These techniques are commonly applied to heating, ventilation, and air conditioning (HVAC), With the development of the Industrial Internet of Things (IIoT) technologies, and the use of intelligent data analysis known as Machine Learning (ML), there is a renewed interest in techniques for HVAC, especially in saving energy and cutting emissions while maintaining thermal levels. However, due to the high uncertainty of the environment that IIoT HVAC needs to work in, actors' demands, and extremely nonlinear building thermal characteristics, developing effective energy management is a great challenge. The talk will present a high overview of the use of ML for HVAC and its possible challenges.

Short-Bio: Dr. Scott Fowler received his Ph.D. from Wayne State University, the USA in 2006. From 2006 to 2010, he was a Research Fellow at Aston University, UK, and Sony Ericsson R&D lab, UK, where the research focused on multiple services in Next Generation Networks (NGNs) in both wireless and wired. Since 2010, he has been an universitetslektor (Associate Professor (US)) at Linköping University (LiU), Sweden, as a member of Communications and Transport Systems (KTS) a division at the Department of Science and Technology (ITN) at LiU. Dr. Fowler's research interests include NGN, Cloud Computing, Internet of Things, Optimization, Machine Learning, Analytics of Systems, and Security. Agencies and industries that have been funding and/or supporting his research are European Union, Smart Built Environment, Cementa, PEAD, Swerock, and Ericsson. Dr. Fowler is a Senior Member of IEEE, Senior Member of ACM, and has served on several IEEE conferences/workshops as TPC to Chair, including Symposium Chair for ICC.

Invited Speaker 3: Prof. Wenjun Jiang, Hunan University, China

Title: Online User Analysis and Learning Optimization

Chair: Prof. Xiaofei Xing, Guangzhou University, China

Abstract: Online learning platforms provides an open and flexible learning opportunity for many learners. However, there are usually high dropout rate and poor learning effect in online learning. In this talk, I will share our recent works on online user analysis and learning optimization for smart learning, including the method of learning pattern recognition and performance prediction based on learners' behavior evolution, learning task allocation with bipartite graph, fine-grained learning partner recommendation, and course recommendation considering user suitability and course matching degree. I would also like to discuss some future directions on learning optimization and lifelong learning.

Short-Bio: Wenjun Jiang received her Bachelor's degree in Computer Science from Hunan University, P. R. China, in 2004, Master's degree in Computer Software and Theory from Huazhong University of Science and Technology, P. R. China, in 2007, and Doctor's degree in Computer Software and Theory from Central South University, P. R. China, in 2014. She has been a visiting Ph. D student at Temple University for two years. After graduation, she was an assistant professor in Hunan University. Since January 2017, she was an associate professor and a Doctoral Supervisor in Hunan University. Since January 2022, she is a professor and a Doctoral Supervisor in Hunan University. Her research interests include social network analysis, recommendation systems, and smart education and learning optimization. She has published more than 40 technical papers in the above areas, including top international journals like ACM CSUR, IEEE TC, IEEE TPDS, ACM TKDD, ACM TOIT, ACM TWeb and top international conferences like WWW, INFOCOM, AAAI, CIKM. Her research is supported by Key Project of the National Natural Science Foundation of China, National Natural Science Foundation of China, National Natural Science Foundation of Hunan Province, Open project of Zhejiang Lab, and Science and technology program of Changsha city. Dr. Jiang is a Senior Member of CCF, and Member of the IEEE and ACM.

Invited Speaker 4: Prof. Ryan Ko, University of Queensland, Australia

Title: Operational Technology (OT) and Supply Chain Cyber Security: The Storm Approaching US

Chair: Prof. Shuhong Chen, Guangzhou University, China

Abstract: Operational Technology (OT) automates several processes in our critical infrastructure and economy. This talk will discuss current OT security situation and challenges, and some recent approaches and demos by UQ Cyber's Industry 4.0 Energy TestLab. We will also discuss another related challenge: supply chain security. We will cover the current supply chain security situation and hot topics which researchers can work towards, in tandem with approaches in industry.

Short-Bio: Professor Ryan Ko is Chair and Director of Cyber Security at the University of Queensland (UQ), Australia. At UQ, he established UQ Cyber - UQ's interdisciplinary cyber security education programme and research centre. Professor Ko has held scientific leadership roles at Hewlett-Packard Labs and academia, and technical advisory roles for ministers, listed companies and the INTERPOL. His OT security research helped to spin off First Watch Ltd, which is helping agricultural and utilities sectors to actively protect their assets from cyber attacks. His cyber security research has also been commercialised into security products of HP, ArcSight, Kali Linux (world's most popular security testing distro) and OpenStack. An expert in the ISO/IEC JTC 1/SC 27 (the premier global standards body of cybersecurity), he edited ISO/IEC 21878 and other national standards, and drafted the NZ national Level-6 cybersecurity curriculum for the Department of Prime Minister and Cabinet.

Invited Speaker 5: Prof. Qin Liu, Hunan University, China

Title: Secure Search in Cloud Computing and Emerging Applications

Chair: Prof. Shuhong Chen, Guangzhou University, China

Abstract: Cloud computing centralizes storage and computation resources and offers pay-as-you-use services over the Internet. Because cloud computing provides overwhelming benefits to consumers, such as elasticity and scalability, sensitive data ranging from personal health records to emails are increasingly outsourced to the cloud. To protect user privacy from the cloud service provider (CSP), existing research suggests encrypting data before outsourcing. This makes traditional data services like keyword-based searches very challenging. The simple solution of downloading all the encrypted data and decrypting them locally is extremely expensive. Therefore, investigating an efficient search service over ciphertexts becomes a paramount urgency. This talk will investigate security and privacy issues in cloud computing, and attempt to identify possible solutions to achieve secure search services in cloud computing.

Short-Bio: Qin Liu received her B.S. in Computer Science in 2004 from Hunan Normal University, China, received her M.S. in Computer Science in 2007, and received her Ph.D. in Computer Science in 2012 from Central South University, China. She has been a Visiting Student at Temple University, USA. Now, she is an Associate Professor in the College of Computer Science and Electronic Engineering at Hunan University, China. Her research interests include security and privacy issues in cloud computing and social networks, and big data security. She has published more than 60 technical papers and books/chapters in the above areas, including top international journals and conferences like IEEE TPDS, IEEE TSC, ACM CCS, IEEE INFOCOM, and so on. She has been serving as a Guest Editor, Conference vice Co-chair, Workshop Co-Chair, Publicity Chair/Co-Chiar, TPC, and reviewer for international journal/conference proceedings.

Invited Speaker 6: Prof. Tian Wang, Beijing Normal University, China

Title: Green Offloading: from "Eastern Data, Western Computing" to Edge Computing

Chair: Prof. Tao Peng, Guangzhou University, China

Abstract: Data processing depends on computing power. In this talk, we will introduce the three laws of computing power, especially the relationship between computing power and economics. However, computing also consumes a lot of electricity resources. From 2017 to 2022, the data center racks have grown to 6.7 million, leading to a large amount of energy consumption. To this end, we should take measures from two levels in China. The first is called Eastern Data Western Computing, initiated by the government, which is a kind of offloading from east to west physically. The second is edge computing, another kind of offloading from cloud to edge logically. At last, we will introduce some ongoing work by our group.

Short-Bio: Prof. Wang received his BEng and MEng degrees in computer science and technology from Central South University and his Ph.D. degree in Computer Science from the City University of Hong Kong. He is currently a full professor at Beijing Normal University. Prof. Wang is the top 2% scientist according to "World's Top 2% Scientists 2021," published by Stanford University. He was supported by the "Hundred-Thousand-Ten Talent Project" and the Science Fund for Distinguished Young Scholars of Fujian Province. His research covers a wide range of topics, including the Internet of Things, Edge Computing, Mobile Computing. He has published over 200 papers in reputed high-level journals and conferences, including 30 IEEE/ACM Transactions papers. He has more than 11000 citations (H-Index is 59), according to Google Scholar.

## Invited Speaker 7: Prof. Carlos Becker Westphall, Federal University of Santa Catarina, Brazil

Title: Mutual Authentication with Multi-factor and Hybrid Approach to Intrusion Detection in IoT-Fog-Cloud Environment

Chair: Prof. Tao Peng, Guangzhou University, China

Abstract: Authentication of restricted memory devices presents significant problems since memory consumption is high in mutual authentication using cryptographic protocols in IoT environments. The development of a multi-factor mutual authentication method that can be used in fog and cloud computing remains a challenge, according to previous studies. The present work aims to improve a method of mutual authentication with multi-factor using an adjustable variable response time, challenge-response function, and nonce. So, with these factors, the same method can be regulated for both the Fog and Cloud Computing contexts. In the Internet of Things (IoT) systems, information of various kinds is continuously captured, processed, and transmitted by systems generally interconnected by the Internet and distributed solutions. Attacks to capture information and overload services are common. This fact makes security techniques indispensable in IoT environments. Intrusion detection is one of the vital security points, aimed at identifying attempted attacks. We present an intrusion detection architecture that operates in the fog computing layer. It has two steps and aims to classify events into specific types of attacks or non-attacks, for the execution of countermeasures. Our work presents a relevant contribution to the state of the art in this aspect. We propose a hybrid binary classification method called DNN-kNN. The approach is based on Deep Neural Networks (DNN) and the k-Nearest Neighbor (kNN) algorithm.

Short-Bio: Carlos Becker Westphall is Full Professor (since 1993) in the Department of Informatics and Statistics at the Federal University of Santa Catarina - Brazil, where he acts as the leader of the Network and Management Laboratory and also coordinates some projects funded by the Brazilian National Research Council (CNPq). Obtained a degree in Electrical Engineering in 1985 and a M.Sc. degree in Computer Science in 1988, both at the Federal University of Rio Grande do Sul, Brazil. Obtained a D.Sc. degree in Computer Science (Network Management) at the Université Paul Sabatier, France, in 1991. He is the author and/or co-author of more than 500 publications. He is (and was) a member of the Editorial Board of more than a dozen journals. Serves (and has served) as a member of the organizing and/or program committee for hundreds of conferences. Has experience in Computer Science and Telecommunications, with emphasis on Administration and Management of Networks and Services, acting mainly on the following themes: security, autonomic computing, cloud computing and Internet of Things. He founded the LANOMS conference (Latin American Network Operations and Management Sym- posium). He also provided services: for IEEE acting on CNOM (Committee on Network Operation and Management); for IFIP acting in "WG6.6 - Management of Networks and Distributed Systems"; to Elsevier as editor of COMNET (Computer Networks Journal); and to Springer as senior editor at JNSM (Journal of Network and Systems Management).
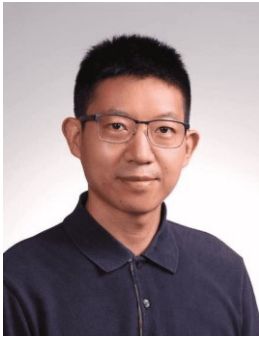
Invited Speaker 8: Prof. Yulei Wu, University of Exeter, UK

Title: Trustworthiness of Anomaly Detection for IIoT

Chair: Prof. Guojun Wang, Guangzhou University, China

Abstract: With fast development and growth of IIoT, Industry 4.0 brings increasing automation, self-monitoring and diagnosing abilities than traditional manufacturing and industrial practices. However, a small number of anomalies during any stages of Industry 4.0 can make a huge impact on the IIoT infrastructure. Effective anomaly detection has become a crucial process for the success of Industry 4.0 and has been studied for several years. Many anomaly detection schemes adopted advanced machine learning techniques and have achieved excellent performance results. However, they are still facing some burning issues on trustworthiness of detection results, due to lack of explainability and instability of the explanation. In this talk, I will first have a brief review about the current literature on anomaly detection in IIoT, identifying some challenges and issues in relation to trustworthiness of anomaly detection. Then, I will introduce our recent work that addresses some of the challenges and issues, making trustworthy anomaly detection for IIoT.

Short-Bio: Yulei Wu is a Senior Lecturer with the Department of Computer Science, College of Engineering, Mathematics and Physical Sciences, University of Exeter, United Kingdom. He received the B.Sc. degree (First Class Honours) in Computer Science and the Ph.D. degree in Computing and Mathematics from the University of Bradford, United Kingdom, in 2006 and 2010, respectively. His research interests include networking, Internet of Things, edge intelligence, privacy and trust, and AI and ethics. He is an Associate Editor of IEEE Transactions on Network and Service Management and IEEE Transactions on Network Science and Engineering, as well as an Editorial Board Member of Computer Networks and Future Generation Computer Systems. He is a Senior Member of the IEEE and the ACM, and a Fellow of the HEA (Higher Education Academy).

Invited Speaker 9: Prof. Yang Xu, Hunan University, China

Title: Blockchain-enabled Cloud Security: Frameworks and Solutions

Chair: Prof. Guojun Wang, Guangzhou University, China

Abstract: Cloud computing is a flexible network-based service provisioning scheme, which enables users to acquire abundant on-demand services from distributed servers through various terminals anytime anywhere conveniently. However, this service-provisioning paradigm is confronted with severe security challenges because there exist dishonest entries that will violate the service agreements for their own interests. Many traditional security solutions fail in practice because centralized trusted third parties they need are hard to achieve in such decentralized scenarios. Fortunately, the emergence of blockchain technology provides a new way to solve these problems. In this talk, we present a series of blockchain-enabled security schemes to improve the trustworthiness of cloud computing from multiple layers, including data tier, service tier and middle platform tier. In our approaches, the dependable blockchain network is introduced as an interaction platform with self-recording features for users, service providers and even cloud organizers. And with the aid of homomorphic cryptography techniques, a series of security protocols are designed respectively to ensure that the blockchain can collect adequate evidence about service disputes. Moreover, triggerable smart contracts are implemented as impartial decentralized arbitrators that can render fair and credible verdicts based on mere lightweight on-chain evidence when resolving service disputes. We believe that our blockchain-empowered security mechanisms will help to protect cloud computing systems and will certainly play a more important role in promoting its further development and application.

Short-Bio: Yang Xu received the Ph.D. degree in Computer Science and Technology from Central South University, China. From 2012 to 2013, he was a Software Engineer in Intel Cooperation (Asia Pacific R&D Center). From 2015 to 2017, he was a Visiting Scholar in the Department of Computer Science and Engineering at Texas A&M University, USA. He is currently an Associate Professor and Deputy Director of the Department of Cyberspace Security at the College of Computer Science and Electronic Engineering, Hunan University, China. His research interests include cloud computing, blockchain, data security and privacy, and artificial intelligence security. His research is supported by the National Natural Science Foundation of China, the Natural Science Foundation of Hunan Province, etc. He has published over 50 articles in international journals and conferences, including IEEE TSC, TCC, TETC, TCBB, TNSE, TII, etc. He was the awardee of the Best Paper Award of IEEE International Conference on Internet of People (IoP 2018). He serves/has served as a Program Committee Chair for UbiSec 2021 and IWCSS 2022, and a reviewer for over 20 international journal/conference proceedings. He is a Senior Member of CCF, a Member of Blockchain Technical Committee of CCF and CSIAM.

SESSIONS AND PAPERS IN UbiSec 2022

The 2nd International Conference on Ubiquitous Security (UbiSec 2022)

Session UbiSec-1: 14:00-17:40, December 29 (Thursday), Room 1
Chair: Wei Yang, Guangzhou University, China

CATS: A Serious Game in Industry towards Stronger Cloud Security
Tiange Zhao, Ulrike Lechner, Maria Pinto-Albuquerque, Tiago Gasiba and Ece Ata
USE-CVSS: Assessing CVSS from Descriptions
Zijing Zhang, Vimal Kumar, Michael Mayo and Albert Bifet
Automated Vulnerability Detection in Source Code Using Quantum Natural Language Processing
Mst Shapna Akter, Hossain Shahriar and Zakirul Alam Bhuiyan
Support Tool Selection in Digital Forensics Training
Sabrina Friedl, Ludwig Englbrecht, Fabian Boehm and Günther Pernul
Detecting Unknown Vulnerabilities in Smart Contracts with Multi-Label Classification Model using CNN-BiLSTM
Wanyi Gu, Guojun Wang, Peiqiang Li, Xubin Li, Guangxin Zhai, Xiangbin Li and Mingfei Chen
High-speed Anonymous Device Authentication without Asymmetric Cryptography in the Internet-of-Things
Li Duan and Yong Li
Encryption Proxies in a Confidential Computing Environment
Mohamad Jamil Al Bouhairi, Mostakim Mullick, Marvin Wolf, Ivan Gudymenko and Sebastian Clauß
A Thermal-Aware Scheduling Algorithm for Reducing Thermal Risks in DAG-based Applications in Cyber-Physical Systems
Irfan Ali, M Naeem Shehzad, Qaisar Bashir, Haroon Elahi, M Naeem Awais, Oana Geman and Pin Liu

Session UbiSec-2: 14:00-17:15, December 29 (Thursday), Room 2
Chair: Guanghui Feng, Guangzhou University, China

Hierarchical Policies of Subgoals for Safe Deep Reinforcement Learning
Fumin Yu, Feng Gao, Yao Yuan, Xiaofei Xing and Yinglong Dai
Listen to the Music: Evaluating the Use of Music in Audio based Authentication
Michael Tsai and Vimal Kumarr
System Call Processing Using Lightweight NLP for IoT Behavioral Malware Detection
John Carter, Spiros Mancoridis, Malvin Nkomo, Steven Weber and Kapil Dandekar
An Aspect-Based Semi-Supervised Generative Model for Online Review Spam Detection
Shitao Wang, Wenjun Jiang and Shuhong Chen
Impact of Reenactment Programs on Young Generation
Anam Fatima, Muhammad Waseem Iqbal, Muhammad Aqeel, Toqir A. Rana, Guojun Wang and Muhammad Arif
A Hybrid Secure Two-party Protocol for Vertical Federated Learning
Wenti Yang, Zhaoyang He, Yalei Li, Haiyan Zhang and Zhitao Guan
Zero-Day Attacks (ZDA): Detection and Removal Techniques
Khalid Hamid, Muhammad Waseem Iqbal, Muhammad Aqeel, Toqir A. Rana, Xiangyong Liu and Muhammad Arif

Session UbiSec-3: 9:25-11:45, December 30 (Friday), Room 2
Chair: Mingfei Chen, Guangzhou University, China

An Interactive Query Differential Privacy Protection Model Based on Big Data Analysis
Guanghui Feng, Wenyin Yang, Tao Peng, Xiaofei Xing, Shuhong Chen and Yuting Li
Differentially Private Clustering Algorithm for Mixed Data
Huifeng Yang, Liandong Chen, Kai Cheng, Dan Luo, Shuai Yuan and Zhitao Guan
Decentralized Collaborative Filtering Algorithm with Privacy Preserving for Recommendation in Mobile Edge Computing
Xiangyong Liu, Pengfei Yin, Pin Liu and Shuhong Chen
Privacy-Preserving Federated Learning with 1-Bit Compression and Adaptive Optimizer
Yuting Li, Guojun Wang and Guanghui Feng
Sensor Cloud Data Privacy Protection Model Based On Collaborative Deep Learning
Yufeng Zhuang and Xiaoqian Ran

Session UbiSec-4: 14:00-17:15, December 30 (Friday), Room 2
Chair: Peiqiang Li, Guangzhou University, China

Using Opcode Sequences to Detect Unknown Vulnerability in Smart Contracts Based on Machine Learning
Xiangbin Li, Xiaofei Xing, Guojun Wang, Peiqiang Li and Xiangyong Liu
Malware Traffic Classification based on GAN and BP Neural Network
Yun Duan, Laifu Wang, Dongxin Liu, Boren Deng and Yunfan Tian
Prototyping the IDS Security Components in the Context of Industry 4.0 - A Textile and Clothing Industry Case Study
Nuno Torres, Ana Chaves, César Toscano and Pedro Pinto
Improved DeepLabV3+ based Railway track extraction to Enhance Railway Transportation Safety
Yanbin Weng, Zuochuang Li, Xiaobin Huang and Xiahu Chen
A New Signal Packing Algorithm for CAN-FD with Security Consideration

Bo Zheng and Yong Xie

Android Malware Detection And Analysis - Literature Review
Ahmed Sabbah and Adel Taweel

Empirical Likelihood for Partially Linear Single-Index Models with Missing Response Variables and Error-prone Covariates
Xin Qi, Hongling Chen and Qin Liu

Session UbiSec-5: 14:00-17:15, December 30 (Friday), Room 3
Chair: Tao Peng, Guangzhou University, China

An Improved Cuckoo Search Algorithm and Its Application in Function Optimization
Songlv Feng, Cuina Cheng and Liping Mo

Source Code Vulnerability Detection using Deep Learning Algorithms for Industrial Applications
Akram Louati and Tiago Gasiba

BlockLearning: A Modular Framework for Blockchain-based Vertical Federated Learning
Henrique Dias and Nirvana Meratnia

An Adversarial Sample Defense Method based on Saliency Information
Shuqi Liu, Yufeng Zhuang and Ying Zhao

A-VMD: Adaptive Variational Mode Decomposition Scheme for Noise Reduction in Sensor-Cloud
Zhenru Huo, Guoqing Jia, Weidong Fang, Wei Chen and Wuxiong Zhang

Threat Modeling in Cloud Computing - A literature review
Mohammed Kharma and Adel Taweel

Session UbiSec-6: 8:30-10:30, December 31 (Saturday), Room 2
Chair: Xiangyong Liu, Guangzhou University, China

Vulnerability Detection with Representation Learning
Zhiqiang Wang, Sulong Meng and Ying Chen

Garbage Recognition Algorithm based on Self-Attention Mechanism and Deep Sorting
Haiyang Huang, Falong Xiao, Xiaofang Zhang, Wanting Yan, Fumin Liu and Yuezhong Wu

Multi-Mobile Agent Security by Design Itinerary Planning Approach in Wireless Sensor Network
Saad Khan, Tariq Alsboui, Richard Hill and Hussain Al-Aqrabi

On The Variability in The Application and Measurement of Supervised Machine Learning in Cyber Security
Omar Alshaikh, Simon Parkinson and Saad Khan

Approaches for Zero Trust Adoption Based Upon Organization Security Level
Muntaha Alawneh and Imad Abbadi

Online Conferencing

We will use Tencent Meeting & VooV Meeting (https://voovmeeting.com/) for online conferencing. Please download and install Tencent Meeting & VooV Meeting (Client) in advance.

Table. 1 Information of online conferencing

Time (BJT)	Conference	Tencent Meeting Links	#Tencent Meeting
Dec. 29 08:30 - 12:05	UbiSec 2022 Opening Ceremony and Keynote Speeches (1-4)	https://meeting.tencent.com/dm/6rd2CQZP7UNW	#VooVMeeting: 519-826-102 Password:202212
Dec. 29 14:00 - 17:40	UbiSec-1, UbiSec-2	https://meeting.tencent.com/dm/rIXlJUagsdH4	#VooVMeeting: 309-411-405 Password:202212
Dec. 30 8:30 - 11:45	UbiSec 2022 Keynote Speech (5), UbiSec-3	https://meeting.tencent.com/dm/AqRuKSX5ntCL	#VooVMeeting: 148-463-519 Password:202212

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Conference Venue

ZhangJiaJie International Hotel, Zhangjiajie, China

（张家界国际大酒店）

http://www.zjjihotel.com/

Address: 145 Sanjiao Ping, Zhangjiajie, Hunan, China

Public Transportation

(1) From Zhangjiajie Hehua Airport (also called Dayong Airport, IATA code: DYG) to Zhangjiajie International Hotel: Take a taxi (around RMB 30); or first take a bus #4, transfer to bus #1 at LVCHENG XIAOQU station, and get off at OLD CAMPUS of JISHOU UNIVERSITY station, then walk around 600m to the hotel; Similar for the return trip.

张家界荷花国际机场到张家界国际大酒店：大约 5 公里，乘坐 4 路公交车到绿城小区，再转乘 1 路公交车到吉大老校区站，再步行 600 米到酒店，或乘坐的士（约 30 元）；返程类似。

(2) From Zhangjiajiexi Railway Station to Zhangjiajie International Hotel: Take a taxi (around RMB 30-35); or take a bus #16/#17 and get off at OLD CAMPUS of JISHOU UNIVERSITY station, then walk around 600m to the hotel; Similar for the return trip.

张家界西站到张家界国际大酒店：大约 7 公里，乘坐 16 路或 17 路公交车到吉大老校区站，再步行约 600 米到酒店，或乘坐的士（约 30-35 元）；返程类似。

(3) From Zhangjiajie Railway Station to Zhangjiajie International Hotel: Take a taxi (around RMB 25-30); or take a bus #1/#17/#102/#101 and get off at OLD CAMPUS of JISHOU UNIVERSITY station, then walk around 600m to the hotel; Similar for the return trip.

张家界火车站到张家界国际大酒店：大约 5 公里，乘坐 1 路、17 路、102 路或 101 路公交车到吉大老校区站，再步行约 600 米到酒店，或乘坐的士（约 25-30 元）；返程类似。

Introduction to Jishou University

Founded in September 1958, Jishou University is a public university in the western part of Hunan Province and the only comprehensive university in the border area of Hunan, Hubei, Chongqing and Guizhou provinces. The University is composed of two campuses in Jishou and Zhangjiajie cities, with the main campus in Jishou City, the capital city of Xiangxi Autonomous Prefecture.

In 2003, the university was entitled the right to confer master's degrees. In October 2006, the university successfully passed the undergraduate education evaluation regular institutions of higher learning organized by the Ministry of Education with a comment of "Excellent". The year of 2012 saw the university rank among "universities of capacity construction project in mid-west. At the same year, the university was approved to carry out "Ph. D program catering for special demands of our country".

The university covers an area of 1.6 million square meters with the total building area of 600,000 square meters. Presently, the university has been equipped with various teaching and scientific researching instruments and equipment with a total value of over RMB 170 million as well as a book and literature collection of over 2.3 million volumes. The university currently has over 1100 full-time teachers, of which 86% are provided with doctor' s or master's degree.

At present, there are 78 undergraduate majors offered by the university, among which 3 are national characteristic majors, 8 are provincial characteristic majors. 8 are provincial key majors. The university is now operating 1 Ph.D program catering for special demands of our country, 16 first-grade disciplines for master's degree, 17 professional master degree program and 1 characteristic, advanced and key discipline,covering 12 main disciplines. In addition, there are 14 provincial and ministerial level key research bases，1 national experimental teaching demonstration center, 5 provincial practice teaching demonstration centers.

The students of various types total over 30,000, of which over 27,000 are undergraduate, master's and doctoral students. The number of undergraduates in the independent college is almost 8000, and that of adult diploma education students is over 7000.

Over half a century, the university adheres to the educational philosophy of "Populace University", regards it as its own duty to serve for the regional economic and social development, fulfill irreplaceable educational function in the west of Hunan and in the border area of Hunan, Hubei, Chongqing and Guizhou provinces, forming distinguished schooling-running characteristics and being widely approved by all sectors of the society.

吉首大学简介

吉首大学始建于 1958 年 9 月，是湖南省湘西土家族苗族自治州的一所公办大学，也是武陵山片区唯一的综合性大学。学校由吉首市和张家界市两个校区组成，主校区设在湘西土家族苗族自治州首府吉首市。

2003 年，吉首大学获得硕士学位授予权。2006 年 10 月，学校顺利通过教育部组织的普通高等院校本科教育评价，评为"优秀"。2012 年，吉大跻身"中西部能力建设项目"之列。同年，学校获批开展"满足我国特殊需要的博士项目"。

吉首大学占地面积 160 万平方米，总建筑面积 60 万平方米。目前，学校已配备各类教学科研仪器设备，总价值 2.3 亿多元，藏书、文献 230 多万册。学校目前拥有 1100 多名专职教师，其中 86%拥有博士或硕士学位。

学校现有本科专业 78 个，其中国家特色专业 3 个，省级特色专业 8 个。省级重点专业 8 个。学校现开设 1 个适应我国特殊要求的博士点，16 个一级硕士学位点，17 个专业硕士学位点和 1 个特色、高级和重点学科，涵盖 12 个主要学科。此外，还有省部级重点研究基地 14 个，国家级实验教学示范中心 1 个，省级实践教学示范中心 5 个。

各类在校生 3 万余人，其中在校本科生、硕士生、博士生共 27000 余人。吉首大学独立学院本科生近 8000 人，成人文凭教育学生 7000 多人。

半个多世纪以来，学校秉承"平民大学"的教育理念，以服务区域经济社会发展为己任，在湘西地区和武陵山片区发挥不可替代的教育功能，形成了鲜明的办学特色，得到社会各界的广泛认可。

Introduction to Guangzhou University

Guangzhou University is a comprehensive university named after the third largest city in China - Guangzhou. It is a high-level university developed under the support of both the Guangdong province and Guangzhou city. The university was forged through the merger of five institutions of higher education in 2000 and can trace its history to over 90 years. Bestowed with the advantage of its location in the Guangdong-Hong Kong-Macao Greater Bay Area, Guangzhou University is fulfilling its mission and making break-through strides in its endeavor to reform and innovate. Seizing the historical opportunity of national promotion of "double first-class" construction and provincial and municipal construction of high-level university, the University adheres to be oriented to international academic frontiers, adapts to the needs of national major strategies, and national and regional economic and social needs, actively docks with the construction, innovation and opening of Guangdong-Hong Kong-Macao Greater Bay Area, focuses on new engineering, new teacher's ethics and new arts construction, all according to the development concepts of connotation construction, innovation-driven, characteristic development and open education, and takes initiative to explore new medical development, and it is a high-level university appointed for the construction of key disciplines in Guangdong Province and a university for the construction of high-level university in Guangzhou City.

The University has three campuses in Guangzhou Higher Education Mega Center (HEMC), Guihuagang and Huangpu Graduate School of Guangzhou University respectively, including 30077 full-time undergraduate students and 7956 students of master and doctoral programs. The University has a full range of comprehensive disciplines, with 25 professional colleges, covering ten disciplines including Philosophy, Economics, Law, Education, Literature, History, Science, Engineering, Management and Art. It has 10 doctoral programs in the first-level discipline and doctoral degree programs, 4 post-doctoral research stations, 36 master's degree programs in the first-level discipline, and 27 master's degree programs. In 2022, it has 74 undergraduate enrollment majors, including 41 science-and-engineering majors, 21humanities and social sciences majors, and 8 arts majors.

The University insists on the construction relying upon talents, and through both cultivation and introduction of talents, it has basically formed a team of high-quality faculty with noble ethics, reasonable structure, superb academic skills and full of vitality. At present, the University has 3283 teaching and administrative staffs, including 2539 professional and technical personnel and 2056 full-time teaching and research personnel, 1497 of full-time teaching and research personnel have been employed for professional and technical positions higher than associate senior titles, and 1610 doctoral degree holders.

Currently, there are 4 full time academicians of CAS and CAE, 1 full time foreign academician, 3 distinguished academicians, 4 dual-employed academicians, 1 member of International Academy of Astronautics and 1 member of International Eurasian Academy of Sciences; 1 foreign academician of Russian Academy of Natural Sciences;

1 national famous teacher; 4 specially invited professors and 2 young scholars of the National Major Talents Program of the Ministry of Education; 2 Young Scholars; 10 overseas high-level talents introduction Program; 7 candidates of NSFC Outstanding Youth Science Fund, 7 candidates of NSFC Excellent Youth Science Fund; 11 candidates of the New Century National Hundred, Thousand and Ten Thousand Talent Project;11 national middle-aged and young experts with outstanding contributions; 11 leading talents of the National High-level Talents Special Support Program; 1 famous teacher; 1 youth top talent; 33 experts receiving State Council Special Allowance; 4 cultural masters and "Four Batches" Talents Project of the Publicity Department of the CPC Central Committee, 22 candidates of New Century Excellent Talents Support Program of the Ministry of Education; "1 innovation team of "Pearl River Talents Program", 1 leading talent of "Pearl River Talents Program", 6 youth top talents, 6 leading talents of "Guangdong Special Support Program for Talent Young Scholars", 1 youth top talent, 4 famous teachers; 7 distinguished professors and 2 chair professors as Pear River Scholars, and 10 young Pearl River Scholars; 20 candidates of Guangdong Natural Science Funds for Distinguished Young Scholars; and 329 Guangzhou high-level talents (including Guangzhou outstanding experts, excellent experts, outstanding young reserve talents).

The University adheres to be oriented to major needs, and through continuously restructuring and optimizing the structure of discipline, deepens the connotation construction of superiority disciplines in humanities, social science and sciences, strengthens the construction of pedagogical education and characteristic arts disciplines, highlights the construction of new engineering oriented to the needs of the new technology and high-tech industries, explores development of new medicine in biomedicine, gene editing, biological information and brain science with emphasis on the main direction. At present, it has formed a construction of system key disciplines consisting of 6 provincial "edging in first-class" key disciplines, 14 provincial key disciplines and 16 municipal key disciplines and key supporting disciplines. Its Engineering, Computer Science, Chemistry, Materials Science, General Environmental/ Ecological, Social Sciences, enter ESI Global Rankings Top 1%, among them, Engineering and Computer Science have entered the top 2‰. The university ranks No. 91 in the list of The Best Universities in China in 2022. The US. News 2023 World University Rankings ranks 551 in the world and 56 in Mainland China. It is ranked 601-800 in the world by The Times Higher Education World University Rankings 2023.

The University adheres to the fundamental task of moral education and character cultivation, maintains the central position of training undergraduate talents, takes as its objectives of training talents "having both ability and integrity, patriotism, broad vision, enthusiastic about sports, good taste of art appreciation, and strong ability development", sets up "culture, art, sports and language " four quality public education centers, and commits to cultivating innovative talents with extensive background. The University has 40 national first-class undergraduate major construction sites and 53 Guangdong first-class undergraduate major construction sites; 5 national-level characteristic specialties, 1 national-level comprehensive reform pilot major, 1 national-level talent

cultivation model innovation experimental area, 1 national-level college student practice teaching base, 11 national-level excellent courses and national-level excellent open courses, 10 national first-class courses, 1 national-level teaching team and 45 provincial-level teaching teams; won 4 national teaching achievement awards and 52 provincial teaching achievement awards.Guangzhou University has achieved remarkable results in the construction of "Golden Courses" system. Currently, it includes 10 state-level premium online open courses, 81 provincial-level premium courses, and 200 courses interconnected with and mutually recognized by credits from high-level universities around the world. The "Creation, Innovation & Entrepreneurship Camp" space has been approved by the national mass innovation space. Our students' achievements in national innovation and entrepreneurship competitions such as "Internet +", "Challenge Cup" and "China College Students' Entrepreneurship Competition" rank among the top among universities in Guangdong and even similar universities in China. The employment quality of graduates has been steadily improving. The average first-time employment rate of undergraduates in the past three years is 90.9%.

The University adheres to the strategy of scientific and technological innovation, orients to the main industrial, economic and social battlefields, strengthens the construction of scientific research and innovation capacity, sets up the training base of high-level innovative talents and major scientific and technological innovation platform, and forms the development pattern of "one body two wings" in the innovation corridor of Guangzhou, Shenzhen, Hong Kong and Macao; sets up the Huangpu Research Institute/Graduate School to actively plan new developments in Nansha District.

The University has 5 national scientific research platforms (including cultivation base) and 73 provincial and ministerial scientific research platforms. It has established scientific research teams in the fields of Earthquake Mitigation and Disaster Prevention in Urban Infrastructure and Security, Cyberspace Advanced Technology, Artificial Intelligence and Block Chain, Intelligent Manufacturing, Intelligent Equipment, Intelligent Transportation, Astrophysics, Analytical Science and Technology, Environmental Engineering, Clean Energy Materials, Applied Mathematics, Bio-computing, Molecular Genetics and Evolution, Gene Editing, Geographical Science, Lingnan Culture and Art, Regional Development and other fields. In 2021, the University invested RMB1.123 billion Yuan in scientific research. In the past three years, the number of projects undertaken by the National Social Science Fund and the number of projects undertaken by the National Natural Science Foundation of China ranks 30 and 80 respectively among universities in the country; it has been presided over a total of 30 national key research and development projects and topics. Since 2016, a total of 4219 international and domestic patents have been applied. In the past five years, the University has won over 100 national, provincial and ministerial technology and social science awards. It continues to deepen exchanges and cooperation with universities and enterprises in the Greater Bay Area, strengthen the in-depth integration of enterprises, universities and research institutes and the docking with venture capital, and promote the transformation of scientific and technological achievements of "mass entrepreneurship and innovation" in the Greater Bay Area. Since 2016, the University

has signed 176 industry-university-research cooperation agreements with local governments, enterprises and public institutions, added 56 industry-university-research cooperation platforms, joined 22 industry-university- research cooperation alliances, and built more than 50 R&D centers and 448 practice bases. The University has established partnership with Guangzhou Radio Group, Guangzhou Yuexiu Group, Guangdong Silk Textile Group, Guangzhou Intelligent Equipment Group, China Machinery Industry Group, Tencent Technology, Huawei, 360 Group, Ali Cloud Computing and nearly 100 other large enterprises. A number of innovative achievements, such as earthquake mitigation and disaster prevention, sound, image & lighting, cyber security and water environment technology, have been fully applied in major domestic projects or enterprises such as the Canton Tower and Hong Kong-Zhuhai-Macao Bridge. The role of the University in political advisory is becoming increasingly prominent, and a number of research reports have been adopted and applied.

The university enjoys its own art and performance team which includes the Guangzhou Ballet Troupe and the Guangzhou Singing and Dancing Troupe. The university also has a large number of students' organizations and cultural projects which are enjoyed by the students and community.

The University adheres to the principle of open education. Relying on the international influence of Guangzhou as a major national central city, a comprehensive gateway city, the University focuses on the construction of the Greater Bay Area and the "Belt & Road" initiative, and constantly expands the pattern of international schooling. The university has established exchange and cooperative relationships with more than 200 universities and institutions from 33 countries and regions all around the world. The university sends over 3500 students overseas over the past three years to study abroad and has established three Confucius Institutes, the Hong Kong University of Science and Technology (Guangzhou) (HKUST (GZ)) and the Alliance of Guangzhou International Sister-City Universities (GISU). Established 15 international research collaboration platforms, such as International Research Center for Sino-Italia Historical Architectural and Cultural Heritage Conservation, Guangzhou University-Linkoping University Joint Research Center for Urban Sustainable Development, Guangzhou University-Keele University Joint Research Center for Gene Interference and Application and so on; the University has cooperated with University of California, San Diego, University of Washington, University of Heidelberg, University of British Columbia, University of Queensland, University of Western Australia, University of Padua and other world-famous universities to carry out overseas learning program for top-notch innovative talents and joint training of doctoral candidates. In the past three years, more than 3500 students have been selected and funded to study abroad. In addition, the University has jointly established Confucius Institute with Wesleyan College in the United States, University of Padua in Italy and Mazandaran University in Iran.

Stay learning and practicing, and keep pace with the times. Guangzhou University adheres to the guidance of Xi Jinping Thought on Socialism with Chinese Characteristics for a New Era, adheres to the direction of socialist education, roots in

China, integrates Chinese and foreign, based on the times, and faces the future, strengthens services to build an innovative country, serves the Guangdong-Hong Kong-Macao Greater Bay Area strategy, and serves Guangzhou Responsible for the mission of building a leading global city, constantly pursuing academic excellence, and cultivating high-quality innovative talents, and strives to build the University into a high-level university of in-depth fusion with urban development of Guangzhou, to bring out the best of the status of Guangzhou as a national central city, and highlight its specialty disciplines, urban regional and international characteristics.

广州大学简介

广州大学与城市共生共荣共成长。广州大学是以国家重要中心城市"广州"命名的综合性大学，于 2000 年合并组建，有着 90 多年的办学传统。学校紧紧抓住国家"双一流"建设、广东省和广州市高水平大学建设机遇，坚持"四个面向"（面向世界科技前沿、面向经济主战场、面向国家重大需求、面向人民生命健康），深化与广州和粤港澳大湾区"三个对接"（对接高质量发展、对接创新驱动、对接扩大开放），聚焦新工科、新文科、新师范建设，积极探索新医科发展，是广东省高水平大学建设计划重点建设高校、广州市高水平大学建设高校。

学校现有大学城、桂花岗、黄埔研究院/研究生院"一校三园"，在校全日制本科生 30077 人，硕士和博士研究生 7956 人。学校学科门类齐全、综合性强，设有 25 个专业学院，涵盖哲学、经济学、法学、教育学、文学、历史学、理学、工学、管理学、艺术学等十大学科门类。现有 10 个一级学科博士授权点和博士专业学位授权点，4 个博士后科研流动站，36 个学术型硕士学位授权点，27 个硕士专业学位授权点。2022 年本科招生专业 74 个，其中理工类专业 41 个、人文社科类专业 25 个、艺术类专业 8 个，国家级和省级一流本科专业建设点占 2022 年招生专业 74%。

学校坚持人才强校，通过培育与引进并举，基本形成一支师德高尚、结构合理、学术精湛、充满活力的高素质师资队伍。学校现有在岗教职工 3283 人，其中专业技术人员 2539 人、专职教学科研人员 2056 人，专职教学科研人员中被聘为副高以上专业职务者 1497 人，具有博士学位人员 1610 人。现有全职两院院士 4 人、全职外国院士 1 人、特聘院士 3 人、双聘院士 4 人、国际宇航科学院院士 1 人、欧亚科学院院士 1 人、俄罗斯自然科学院外籍院士 1 人，俄罗斯工程院外籍院士 1 人。国家级教学名师 1 人；教育部国家重大人才项目特聘教授 4 人、青年学者 2 人；国家海外高层次人才引进计划 10 人；国家自然科学基金杰出青年基金获得者 7 人、国家自然科学基金优秀青年基金获得者 7 人；入选国家百千万人才工程国家级人选 11 人；国家突出贡献中青年专家 11 人；国家高层次人才特殊支持计划领军人才 11 人、教学名师 1 人、青年拔尖人才 4 人；享受国务院政府特殊津贴专家 33 人；中宣部文化名家暨"四个一批"人才工程 4 人，教育部新世纪优秀人才 22 人；"珠江人才计划"创新团队 1 个，"珠江人才计划"青年拔尖人才 6 人；"广东特支计划"领军人才 6 人、青年拔尖人才 1 人、教学名师 4 人；珠江学者特聘教授 7 人、讲座教授 2 人、青年珠江学者 10 人；广东省自然科学杰出青年基金 20 人；广州市高层次人才（含广州市杰出专家、优秀专家、青年后备人才）329 人。

学校坚持重大需求导向、一流建设、创新引领、特色发展、精准聚焦的发展原则，按照"理厚工精、文优教特、交叉融合、创新发展"的学科建设思路，不断

调整和优化学科专业结构，深化人文社科、理科类优势学科内涵建设，提升基础学科支撑能力；强化师范教育、艺术类学科特色建设；面向新科技领域和高新技术产业需求，集聚工科力量、强化交叉融合，增创和形成新工科优势；探索拓展以生物医药、基因编辑、生物信息、脑科学等为重点主攻方向的新医科。现已形成由大土木学科群、信息学科群、数字经济与管理学科群、物质科学与装备制造学科群等优势学科群辐射带动，6 个省高水平大学建设"冲一流"重点建设学科、14 个省级重点学科、16 个市级重点学科和重点扶持学科构成的重点建设学科体系。工程学、计算机科学、化学、材料科学、环境/生态学、社会科学总论等 6 个学科进入 ESI 全球前 1%，其中工程学、计算机科学已进入或接近 2‰；13 个学科上榜 2022 软科世界一流学科排名；31 个学科上榜软科 2022"中国最好学科"，其中 2 个位列全国前 10 位、6 个位列全国前 20 位。学校在 2022 软科中国大学排名位列主榜第 91 位；在 2022 软科世界大学学术排名榜中位列世界第 521 位，中国内地高校第 78 位；在 US.News2023 世界大学排名中位列世界大学第 551 位、中国内地高校第 56 位；在 2023 泰晤士高等教育世界大学排名列全球高校第 601-800 位。

学校坚持立德树人根本任务，坚持本科人才培养中心地位，以"德才兼备、家国情怀、视野开阔，爱体育、懂艺术，能力发展性强"为人才培养目标，设立"文体艺语劳"五个公共素质教育中心，致力于培养具有广大底色的创新型人才。学校现有 40 个国家级一流本科专业建设点、52 个广东省一流本科专业建设点（含国家级），国家级、省级一流本科专业建设点学院覆盖率达 100%。拥有 5 个国家级特色专业、1 个国家级专业综合改革试点专业、1 个国家级人才培养模式创新实验区、1 个国家级大学生实践教学基地、1 个国家级现代化产业学院、11 门国家级精品课程和国家级精品开放课程、1 个国家级教学团队、45 个省级教学团队；获 4 项国家级教学成果奖、52 项省级教学成果奖。广大"金课"体系建设成效显著，现有国家级一流本科课程 10 门、省级一流本科课程 81 门、省级系列精品课程 73 门，与世界高水平大学课程互联和学分互认课程 200 门。"三创营"众创空间获批国家级众创空间，学校入选为首批国家级创新创业学院建设单位。学生在"互联网+""挑战杯""创青春"等国家创新创业竞赛成绩位居广东高校乃至全国同类高校前列。毕业生就业质量稳步提升，近 3 年，本科生平均初次就业率为 90.9%。

学校坚持科技创新战略，面向产业和经济社会主战场，强化科研创新能力建设，重点布局"重大基础设施安全+智慧运维创新枢纽""网络空间信息+智能应用技术创新枢纽"等 2 个创新枢纽，新材料新装备新制造交叉创新等 5 个重大科技创新平台，在穗深港澳创新走廊上形成"一体两翼"发展格局，设立黄埔研究院/研究生院，积极谋划在南沙的新发展。现拥有国家级科研平台（含培育基地）5 个，省部级科研平台 73 个。在城市基础设施减震防灾与安全、网络空间先进技术、人工智能与区块链、智能制造、智能装备、智慧交通、天体物理、分析科学技术、环境工程、清洁能源材料、应用数学、生物计算、分子遗传与进化、基因编辑、

地理科学、岭南文化艺术、区域发展等领域组建了一批高水平科研团队。2021 年全校科研经费投入 11.23 亿元。近 3 年承担国家社科基金项目数和国家自然科学基金项目数分别位列全国高校 30 位和 80 位左右；连续获主持国家重点研发项目与课题共 30 项。2016 年以来，共申请国际、国内专利 4219 项，授权专利 2026 项，连续荣获广州市专利大户荣誉称号。论文质量稳步提升，发表在《Science》《Nature》等期刊上的论文数不断增加，学校 2021 年 SCIE/SSCI、CSSCI 发文量 2794 篇。近 5 年，学校获得国家、省部级科技和社科奖励 100 余项。不断深化与粤港澳大湾区内的高校、企业间的交流与合作，加强产学研深度融合及与风投资本对接，促进"双创"科技成果在大湾区转化。2016 年以来，学校与地方政府和企事业单位签署产学研合作协议 176 项，新增产学研合作平台 56 个，加入产学研协同合作联盟 22 个，共建研发中心 50 多个、实习基地 448 个。与广州无线电集团、广州越秀集团、广东丝绸纺织集团、广州智能装备集团、中国机械工业集团、腾讯科技、华为、360 集团、阿里云计算等近百家大型企业新建合作关系。减振抗震、声像灯光、网络安全和水环境技术等一批创新成果在广州塔、港珠澳大桥等国内重大工程或企业中得到充分应用。咨政建言作用日益凸显，一批研究报告得到采纳应用。

学校坚持开放办学，依托广州国家重要中心城市、综合性门户城市和粤港澳大湾区核心引擎的国际影响力，聚焦粤港澳大湾区建设和"一带一路"倡议，不断拓展国际/港澳台交流与合作。与香港科技大学合作建设香港科技大学（广州）；发起成立广州国际友城大学联盟，联盟成员大学 18 所，分布于五大洲 15 个国家 17 个主要城市。土木工程新型复合材料与复合结构学科创新引智基地入选科技部"高等学校学科创新引智计划"（111 基地）。与 33 个国家和地区的近 200 所大学、科研院所建立了合作关系，成立了中意历史建筑与文化遗产保护国际研究中心、广州大学--林雪平大学城市可持续发展联合研究中心、广州大学--基尔大学基因干扰与应用联合研究中心等 15 个国际科研合作平台；与剑桥大学、加州大学伯克利分校、西澳大学、海德堡大学、亚琛工业大学、澳门大学、英属哥伦比亚大学、昆士兰大学、帕多瓦大学、华威大学等世界知名大学合作开展"拔尖创新人才境外学习"计划或博士生联合培养等项目。分别与美国卫斯理安学院、意大利帕多瓦大学、伊朗马赞德兰大学联合举办孔子学院。

博学笃行、与时俱进。广州大学坚持以习近平新时代中国特色社会主义思想为指导，坚持社会主义办学方向，扎根中国、融通中外、立足时代、面向未来，强化服务建设创新型国家、服务粤港澳大湾区人才高地和国际科技创新高地建设、服务广州建设引领型全球城市的使命担当，不断追求学术卓越，培养高素质创新人才，为把学校建设成为与国家和粤港澳大湾区发展深度融合、广州城市地位相得益彰的中国特色社会主义一流创新型大学而努力奋斗！

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