IEEE RFID-TA 2018

2018 IEEE International Conference on RFID Technology and Applications

26-28 September 2018, Macao SAR, China

Final Program

UNIVERSIDADE DE MACAU
UNIVERSITY OF MACAU

RFID
IEEE Council on RFID
Bridging the physical to the digital

IEEE (Macau) Chapter
AP/MTT

Program at a Glance

Sept. 26, 2018 (Wed.)	14:00 – 16:30	Registration	
	14:30 – 16:30	**Tutorial** **Advanced RFID Solutions**, Dr. Pui Yi Lau Room 4504	
	16:30 – 19:30	Local Tour	
	19:30 – 21:00	Welcome Reception	
Sept. 27, 2018 (Thurs.)	09:00 – 12:00 14:00 – 16:30	Registration	
	9:00 – 10:00	**Technical Session A** Signal Processing Room 4504	**Technical Session B** Protocol and Algorithm Room 4505
	10:00 – 10:15	Coffee Break and Exhibition	
	10:15 – 10:30	Opening Room 4503	
	10:30 – 11:00	**Keynote Speech I** **Recent RFID Systems in Hospitals**, Prof. Koichi ITO Room 4503	
	11:00 – 11:30	**Keynote Speech II** **Advances RFID Technologies and Applications**, Dr. Pui Yi Lau Room 4503	
	11:30 – 12:00	**Keynote Speech III** **The Internet of Things – The Importance of Testing Devices and Networks**, Mr. Nick Pugh Room 4503	
	12:00 – 14:00	Lunch	
	14:00 – 15:40	**Technical Session C** Antenna and Design Room 4504	**Technical Session D** Localization and Its Applications Room 4505
	15:40 – 16:30	Coffee Break and Exhibition	
	16:30 – 18:10	**Technical Session E** RFID Applications Room 4504	**Technical Session F** Systems, Methods, and Implementation Tools Room 4505
	19:00 – 21:30	Conference Banquet	
Sept. 28, 2018 (Fri.)	09:00 – 12:00 14:00 – 16:30	Registration	
	9:00 – 10:00	**Technical Session G** RFID Tags and Readers Room 4504	**Technical Session H** Antenna and RFID Chip Room 4505
	10:00 – 10:30	Coffee Break and Exhibition	
	10:30 – 11:00	**Keynote Speech IV** **Advanced Antennas for RFID Tags and Readers,** Prof. Zhi Ning Chen Room 4503	
	11:00 – 11:30	**Keynote Speech V** **Beyond Simple Identification - Developments in UHF RFID**, Dr. Jukka Voutilainen Room 4503	
	12:00 – 14:00	Lunch	
	14:00 – 16:30	**Invited Talk Session** Room 4505	
	16:30 – 17:00	Coffee Break and Exhibition	
		End of RFID-TA 2018 Conference	

Final Program

The 9ᵗʰ IEEE International Conference on RFID-Technology and Applications 2018

September 26-28, 2018

Holiday Inn Macao Sands Cotai Central, Macao SAR, China

Organized by

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> IEEE Macau AP/MTT Joint Chapter
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Greetings from the General Chair

On behalf of the Organizing Committee, it is our great pleasure to welcome you to the 9th annual IEEE International Conference on RFID Technology and Applications 2018 (IEEE RFID-TA 2018) held in Holiday Inn Hotel, Cotai, Macao SAR, China from 26 (Wednesday) through 28 (Friday) September 2018.

This technical program has a tutorial, eight presentation sessions, five keynote speeches, and five invited talks, which cover the state-of-the-art research areas of RFID. The conference will provide a forum for the advancement of RFID technology and practice, and will aim to strengthen relations between industry, research institutions and academia.

Macao (also known as *Macau* in Portuguese) is on the western bank of the Pearl River Delta in southern Guangdong Province, People's Republic of China. The Portuguese arrived and settled in Macao in the mid-16th Century. Thus, the city's architecture, art, religion, traditions, food and community reflect the integration of Chinese, Western and Portuguese cultures. Macao became a Special Administrative Region (SAR) of the People's Republic of China on December 20, 1999 and exercises a high degree of autonomy under the principle of "One country, two systems". In 2005, The Historic Centre of Macao was inscribed on the UNESCO World Heritage List because of its unique historical and cultural landscape. Macao is currently positioning itself as the World Centre of Tourism and Leisure as it develops into a quality international tourist destination.

We look forward to welcoming you here in September 2018.

Kam-Weng TAM, Ken, CEng, FIET
IEEE RFID-TA 2018 General Chair
Vice President of IEEE Council on RFID
Professor, Associate Dean, Faculty of Science and Technology, University of Macau
Director of Centre for Science and Engineering Promotion, Faculty of Science and Technology,
University of Macau
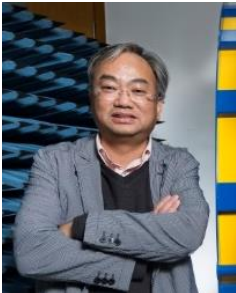
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Zhangyuan Xie – *University of Macau, Macau*
Li Yang – *University of Macau, Macau*
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Conference Venue and Travel Information

Holiday Inn Macao Sands Cotai Central
Sands Cotai Central Cotai Strip, Taipa, Macao SAR, China, Tel: (853) 2828 2228
https://www.sandscotaicentral.com/hotels/holiday-inn-macao.html

Travel to Macao

Macao is adjacent by land to the southern province of Guangdong, China, on the western bank of the Pearl River Delta. The Macao Special Administrative Region (SAR) has an area of 28.6 square kilometers, comprising the Macau Peninsula (9.3 square kilometers and connected to mainland China), and the island of Cotai/Taipa/Coloane (19.3 square kilometers). Three bridges connect these islands, ranging from 1-2 kilometers in length. Macao is accessible by Air, Ferry, and Land.

Arriving in Macao by Air

Macao International Airport (MFM)
Visitors can use the Macao International Airport for travelling to several destinations in the region on direct flights or catch connecting flights to different ports on all 5 continents. The airport is located on Taipa Island and is 5 minutes away from Sands Resorts. For detailed information on flight schedules, please visit:
www.macau-airport.com
22 airlines with direct flights to 37 destinations connect into Macao International Airport.

Transport from Macao International Airport
Sands Resorts provides transportation services which can be booked in advance or arranged upon arrival. A taxi ride from the airport to Sands Resorts costs approximately MOP 35 (USD 4).

Arriving in Macao by Ferry

Hong Kong International Airport (HKG)
For delegates arriving via Hong Kong International Airport, there is an airport ferry service available. Passengers can transit into or out of Macao via Hong Kong International Airport using the Ferry Transfer service without needing to go through Hong Kong Customs and Immigration formalities or pick up their baggage. All bags will be transferred from their international flight directly onto the ferry for collection in Macao. The trip to Macao is only 70 minutes. For detailed information on flight schedules, please visit:
www.hongkongairport.com
For details on Ferry Transfer, please visit:
http://www.hongkongairport.com/en/transport/mainland-connection/ferry-transfer.page

Sands Resorts owns one of the ferry companies offering this service -
Cotai Water Jet: www.cotaiwaterjet.com
Hong Kong-owned **TurboJET**: www.turbojet.com.hk also provides a regular ferry service to Macao.
100 airlines reaching 180 destinations connect into Hong Kong International Airport.

Arriving in Macao by Land

High Speed Train
There are several high-speed trains that connect Macao to most cities in mainland China. Visitors can now connect from cities such as Beijing and Guangzhou, a trip of only 8 hours with the new high-speed trains compared to 20 hours previously. From Guangzhou, visitors have the choice of a 46-minute non-stop train to Zhuhai, the Macao-mainland China border – the Border Gate, or 3 hours by coach.

The Sands Cotai Central Shuttle Bus Services

The Sands Cotai Central provides scheduled shuttle bus services from point of entry to the conference venue. Here are the schedules (*Subject to changes*)

Border Gate
General Station ⇒ Parisian ⇒ Sands Cotai Central
09:00 – 00:00
Every 10 – 15 minutes

Sands Cotai Central ⇔ Lotus Port
09:00 - 20:00
Every 15 – 20 minutes

Taipa Ferry Terminal
Taipa Ferry ⇒ Sands Cotai Central
08:15 – 18:00
Sands Cotai Central ⇒ Taipa Ferry
06:15 – 18:00
Every 10 - 15 minutes
Taipa Ferry ⇒ Sands Cotai Central ⇒ Parisian
18:00-01:05
Sands Cotai Central ⇒ Parisian ⇒ Taipa Ferry
18:00 – 00:15
Every 10 - 15 minutes

Lotus Port
Lotus Port ⇔ Venetian ⇔ Parisian ⇔ Sands Cotai Central
09:00 – 00:00
Every 15 – 20 minutes

Macao International Airport
MIA ⇔ Sands Cotai Central ⇔ Parisian
10:00 - 22:30
Every 15 - 20 minutes

Macao Ferry Terminal
Macau Ferry ⇒ Sands Cotai Central
09:00 - 00:00
Every 10 - 15 minutes
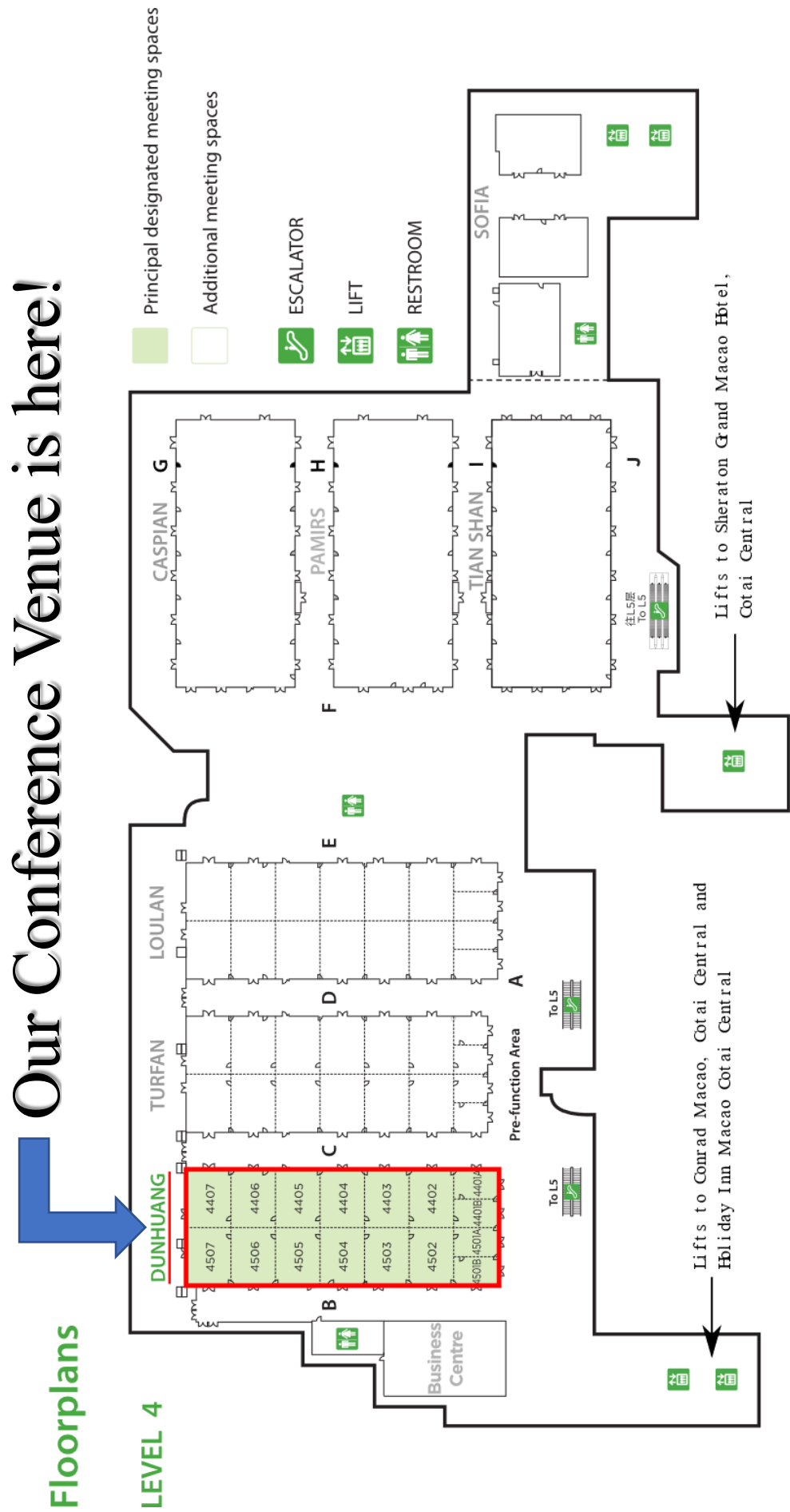**Sands Cotai Central ⇒ Macau Ferry**
09:30 - 00:00
Every 10 - 15 minutes

Cotai Connection
Sands Cotai Central ⇒ City of Dreams ⇒ MGM Cotai ⇒ Wynn Palace ⇒ Galaxy/Broadway ⇒ Venetian ⇒ Studio City
11:30 - 21:30
Every 15 - 20 minutes

Useful Telephone Numbers

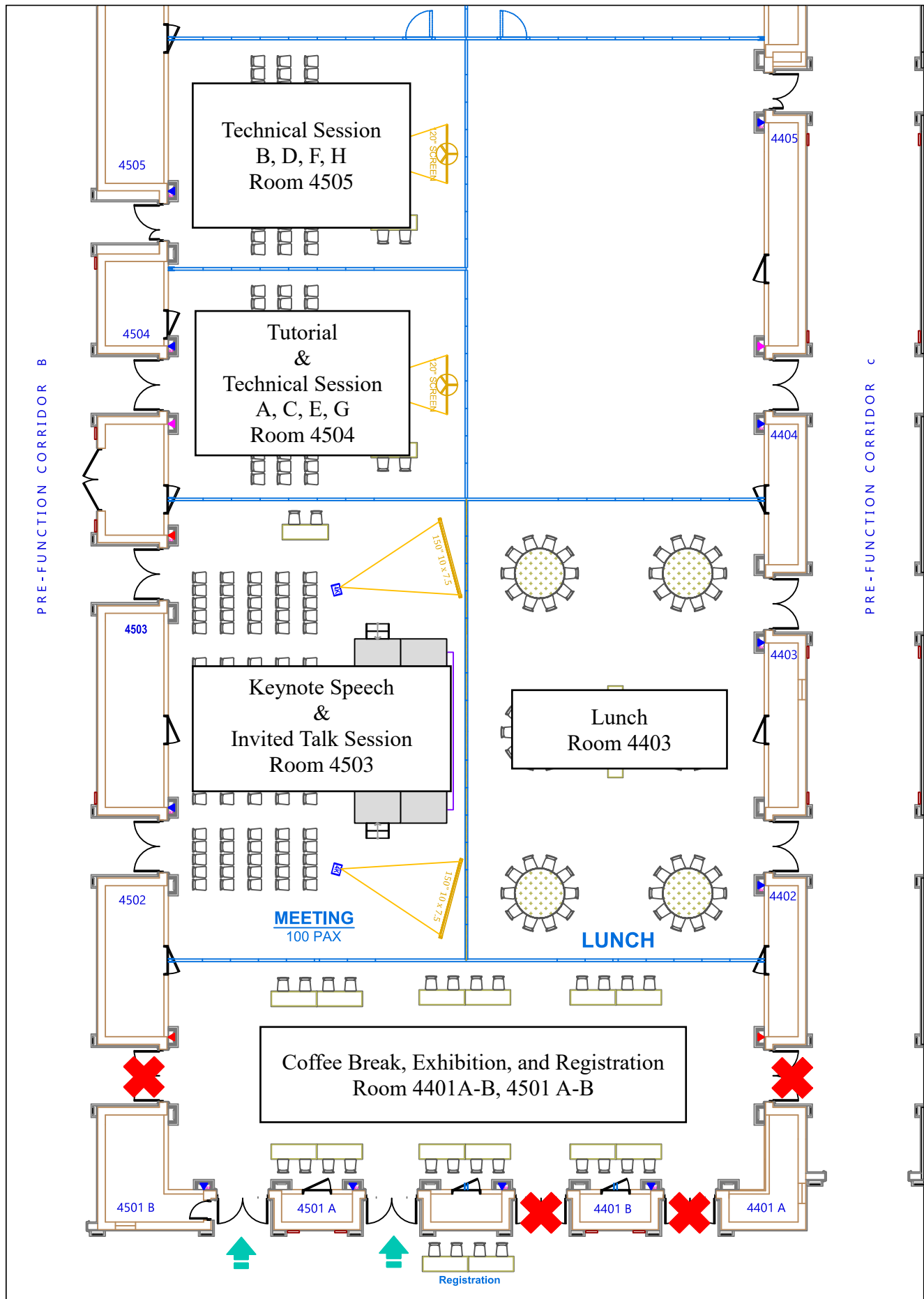|	
Emergency	999 / 110 / 112
Police	2857 3333
Fire	2857 2222
Conde S.Januario Hospital	2831 3731
Kiang Wu Hospital	2837 1333
Telephone Number Enquiry	181
Macao International Airport	2886 1111
Macao Government Tourist Office	2833 3000
Weather Enquiry	1311
Taxi	2851 9519 / 398 8800

Floorplan
Sands Cotai Central – Level 1: Arrival Entrance

Floorplans

LEVEL 4

Our Conference Venue is here!

Principal designated meeting spaces

Additional meeting spaces

ESCALATOR

LIFT

RESTROOM

SOFIA

CASPIAN — G

PAMIRS — H

TIAN SHAN — I

J

F

To L5

Lifts to Sheraton Grand Macao Hotel, Cotai Central

LOULAN

TURFAN

E

D

C

B

A

DUNHUANG

4407 | 4406 | 4405 | 4404 | 4403 | 4402

4507 | 4506 | 4505 | 4504 | 4503 | 4502 | 4501B | 4501A | 4401B | 4401A

Pre-function Area

To L5

To L5

Business Centre

Lifts to Conrad Macao, Cotai Central and Holiday Inn Macao Cotai Central

Sands Cotai Central – Level 4 - DUNHUANG: Meeting Rooms & Lunch Venue

Keynote Speeches

Time/Date	10:30 – 11:00 / 27 September 2018 (Thursday)
Venue	Room 4503

<div style="border:1px solid black">

Keynote Speech I

</div>

Title: Recent RFID Systems in Hospitals

Prof. Koichi Ito

Chiba University, Japan

███████ **Abstract**

Various RFID systems have been used to track, for example, patients, doctors, expensive equipment, critical instruments and medication containers in hospitals even in real time. RFID technology can also provide such tracking data to relevant networks and systems throughout the hospital or even among different hospitals.

Recently, RFID technology has been applied to surgical instrument management systems. With such a system, detailed and essential information of surgical instruments, for instance history of usage or disinfection, can be accurately and quickly managed. In addition, the system may prevent some medical accidents caused by human error, such as misuse of surgical instruments and misplacement in a human body. Also, the system may reduce workload of the medical staff in hospitals.

A tag antenna plays an important role in RFID systems. For the case of surgical instrument management systems, a tag antenna is attached on a metallic surgical tool. This usually causes significant performance degradation of the antenna. In this presentation, as an example of RFID systems in hospitals, a proposed tag antenna is introduced for managing surgical instruments. Changes of input impedance of the tag antenna and electric-field distributions around metallic surgical tools are calculated with different positions of the antenna. Then, maximum communication ranges are measured and compared with different positions of the antenna.

Koichi Ito was born in Nagoya, Japan, and received the B.S. and M.S. degrees from Chiba University, Chiba, Japan, in 1974 and 1976, respectively, and the Ph.D degree from Tokyo Institute of Technology, Tokyo, Japan, in 1985, all in electrical engineering. From 1976 to 1979, he was a Research Associate at Tokyo Institute of Technology. From 1979 to 1989, he was a Research Associate at Chiba University. From 1989 to 1997, he was an Associate Professor at the Department of Electrical and Electronics Engineering, Chiba University. From 1997 to 2003, he was a Professor at the Faculty of Engineering, Chiba University. From 2003 to 2016, he was a Professor at the Center for Frontier Medical Engineering, Chiba University. Currently, he is a Professor Emeritus and Visiting Professor, Chiba University. From 2005 to 2009, he was Deputy Vice-President for Research, Chiba University. From 2008 to 2009, he was Vice-Dean of the Graduate School of Engineering, Chiba University. From 2009 to 2015, he served as Director of the Center for Frontier Medical Engineering. In 1989, 1994, and 1998, he visited the University of Rennes I, France, as an Invited Professor. He has been appointed as Adjunct Professor to the University of Indonesia since 2010 and Visiting Professor to Hiroshima University, Japan, since 2015.

His main research interests include compact antennas for mobile communications, microwave antennas for medical applications such as cancer treatment, research on evaluation of the interaction between electromagnetic fields and the human body by use of phantoms, and antenna systems for body-centric wireless communications. He has authored and co-authored over 190 peer-reviewed journal papers, nearly

400 international conference papers and 20 book chapters including "Handbook of Microstrip Antennas" (IEE, 1989) and "Antennas and Propagation for Body-Centric Wireless Communications" (Artech House, 2012). He has received numerous research grants.

Dr. Ito is a Life Fellow of the IEEE, a Fellow of the Institute of Electronics, Information and Communication Engineers (IEICE), Japan, a member of the Bioelectromagnetics Society (BEMS), and the Japanese Society for Thermal Medicine (JSTM). He served as Chair of the Technical Group on Radio and Optical Transmissions, the Institute of Image Information and Television Engineers of Japan, from 1997 to 2001, Chair of the Technical Committee on Human Phantoms for Electromagnetics, IEICE, from 1998 to 2006, Chair of the Technical Committee on Antennas and Propagation, IEICE, from 2009 to 2011, Chair of the IEEE AP-S Japan Chapter from 2001 to 2002, General Chair of the 2008 IEEE International Workshop on Antenna Technology (iWAT2008), an AdCom member for the IEEE AP-S from 2007 to 2009, an Associate Editor for the IEEE Transactions on Antennas and Propagation from 2004 to 2010, a Distinguished Lecturer for the IEEE AP-S from 2007 to 2011, a member of the IEEE Life Sciences New Initiative (LSNI) Project Team from 2011 to 2013, General Chair of 2012 International Symposium on Antennas and Propagation (ISAP2012), a member of the Board of Directors, BEMS, from 2010 to 2013, a Delegate to the European Association on Antennas and Propagation (EurAAP) from 2012 to 2017 and Chair of Commission K, Japan National Committee of URSI (International Union of Radio Science) from 2014 to 2017. He currently serves as a Councilor to the Asian Society of Hyperthermic Oncology (ASHO), a Vice-President of JSTM, Vice-Chair of Commission K, URSI, and as IEEE AP-S President-Elect for 2018. He will serve as IEEE AP-S President for 2019.

Time/Date	11:00 – 11:30 / 27 September 2018 (Thursday)
Venue	Room 4503

Title: Advances RFID Technologies and Applications

Dr. Pui Yi (Anna) Lau

Laxcen Technology Ltd, Hong Kong

▉▉▉▉ Abstract

Radio frequency identification (RFID) technology has its big breakthrough on the adoptions and its applications in the recent years. Together with five partners from the retail industry, the Japanese Ministry of Economy, Trade, and Industry (METI) is aiming to achieve new heights in retail RFID adoption. In an official announcement, METI proposes RFID tagging of all retail products by 2025 – from cheap chewing gum to expensive delicacies. By 2025, up to 100 billion products per year will have to be labelled with RFID tags. In this talk, the advance UHF RFID technology and examples of RFID applications such as UHF RFID library solution, RFID robotics for library and retail, smart construction, intelligent medicine cabinet, RFID archives will be addressed.

Dr. Pui Yi LAU is a Radio-frequency identification (RFID) and antenna expert. She received her Bachelor, Mphil and PhD from Electronic and Engineering Department, City University of Hong Kong. She is a senior IEEE member and currently serves as chairman of IEEE Council on RFID Singapore Chapter. She is the General Co-chair of IEEE SOLI 2018 and just elected to be the new board of director of AIM global (2018-2020). As the only Asia representative in the board, she guides the strategic direction, financial health, policies, procedures, vision and mission of AIM, serving nearly 400 member companies and their employees around the world.

Dr. Lau joined the RFID team in Wireless communication laboratory (currently named State Key Laboratory of Millimeter Waves) since 2005 as Engineer and then as Research fellow from City University of Hong Kong. In 2010, she joined Singapore government institution I2R, A*STAR as Scientist. She was the technical director of Invengo Technology in 2014. And invited by the founder of Laxcen in 2017, she is now serving as Chief Technology Officer of Zhejiang Laxcen Info-Tech Inc. Ltd and as Chief Executive Officer of Laxcen Technology (Hong Kong). She leads the R & D team of Laxcen to develop the innovative RFID products such as RFID tags, antennas, reader and RFID robotic for library and retail applications, RFID sensor tags for cold-chain, smart refrigerator, intelligent medicine cabinet and RFID archives and so on. Dr. Lau was the recipient of 3 Best paper awards from International conferences, the co-author of the RFID chapter in The Industrial Electronic Handbook (2nd Edition) and published 30 papers in the top journals and international conference and 3 international patents in the related field.

Time/Date	11:30 – 12:00 / 27 September 2018 (Thursday)	**Keynote Speech III**
Venue	Room 4503	

Title: The Internet of Things – The importance of Testing Devices and Networks

Mr. Nick Pugh

Rohde & Schwarz Hong Kong Limited, Hong Kong

Abstract

Testing of devices and efficient network planning is an important aspect for the new technologies of IoT, to ensure true interoperability and coexistence with limited interference between devices and their surroundings. Optimized power consumption and secure communication of the 'Things' deployed in the 'Internet of Things' is also extremely important.

This talk will introduce the key challenges faced for deploying of IoT and how testing plays an important part in the overall success of the future connected world.

Mr. Nick Pugh is working for Rohde & Schwarz as Market Segment Manager for Wireless Device R&D. In this role, Nick is responsible for Market Development for the R&S product portfolio for R&D Device Test, particularly for IoT and 5G.

With 18 years in the Wireless Communications Test and Measurement industry, Nick has worked alongside many of the world's industry leading Mobile Chipset, Device Manufacturers and Test Labs for the development and testing of key wireless communication technologies. Nick has been living in Hong Kong for the past 14 years and has a particularly strong understanding of the Asian Market, with considerable exposure to China, India, Japan and Korea.

Nick received his Bachelor of Science in Computer Science from Essex University (UK) in the year 2000.

Title: Advanced Antennas for RFID Tags and Readers

Prof. Zhi Ning Chen

National University of Singapore, Singapore

Abstract

Radio frequency identification (RFID) technology has been rapidly being developed in recent years and the applications have been widely found in service industries, distribution logistics, manufacturing companies, and product-flow systems. Antenna design for readers and tags is one of the key factors for RFID systems. The optimized tag and reader antenna design will benefit RFID systems with longer reading range, better detection accuracy, lower fabrication cost, and simple system configuration and implementation. This talk will start with a brief introduction to RFID systems which may be active, passive, or semi-active systems, and operate at LF, HF, UHF, or MW bands. Then the key considerations related to the antenna design for tags and readers will be addressed from system perspectives. After that, case studies will highlight specific challenges for antennas in the HF near-field and UHF near/far-field systems. In particular, important engineering factors such as environmental effects vs. co-design methodology, size constraints, cost constraints, and UHF near-field reader antenna coverage will be presented with corresponding practical design cases.

Professor Zhi Ning Chen received his BEng, MEng, and PhD degrees all in Electrical Engineering from the Institute of Communications Engineering (ICE), China and his second PhD degree from University of Tsukuba, Japan, respectively.

During 1988-1995, he worked at ICE and Southeast University, China as a Postdoctoral Fellow and later as an Associate Professor. Professor Chen joined the City University of Hong Kong as a Research Assistant and later a Research Fellow in 1995-1997. In 1997, he conducted his research at the University of Tsukuba, Japan supported by the Japan Society for the Promotion of Science (JSPS) Fellowship. In 2001 and 2004, he visited the University of Tsukuba under a JSPS Fellowship Program (senior level). In 2004, he worked at IBM T. J. Watson Research Center, USA as an Academic Visitor. During 1999-2012, he worked with the Institute for Infocomm Research (I2R) as Member of Technical Staff (MTS) and later Principal Scientist as well as Department Head. In 2012, he joined the Department of Electrical and Computer Engineering, National University of Singapore as a Professor and concurrently held a joint appointment in I2R as Advisor till 2015. He was appointed as Visiting/Adjunct/Guest Professor positions at Southeast University, Nanjing University, Shanghai Jiaotong University, Tsinghua University, Tongji University, University of Science and Technology, China, Dalian Maritime University, Chiba University, and City University of Hong Kong. He visited the "Laboratoire des Signaux et Systèmes", UMR8506 CNRS-SUPELEC-Univ. Paris Sud, in Gif-sur-Yvette as a senior DIGITEO Guest Scientist in 2013.

Professor Chen has been the founding General Chairs of International Workshop on Antenna Technology (iWAT), International Symposium on InfoComm & Media Technology in Bio-Medical & Healthcare Applications (IS 3T-in-3A), International Microwave Forum (IMWF) as well as Asia-Pacific Conference on Antennas and Propagation (APCAP).

Professor Chen is currently interested in engineering electromagnetics and antennas for microwaves, mmW, submmW, and THz systems. He has published 600+ technical papers and authored/edited the books entitled

Broadband Planar Antennas, UWB Wireless Communication, Antennas for Portable Devices, and Antennas for Base Stations in Wireless Communications. He also contributed to the books entitled UWB Antennas and Propagation for Communications, Radar, and Imaging, Antenna Engineering Handbook as well as Microstrip and Printed Antennas. He published the Handbook of Antenna Technologies (Springer Reference) as Chief Editor. He is holding 38 granted/filed patents with 35 licensed deals. He is the recipient of ASEAN Outstanding Engineering Achievement Award 2013, International Symposium on Antennas and Propagation Best Paper Award 2010, the CST University Publication Award 2008, IEEE AP-S Honorable Mention Student Paper Contest 2008, IES Prestigious Engineering Achievement Award 2006, 2013 and 2014, I2R Quarterly Best Paper Award 2004, and IEEE iWAT 2005 Best Poster Award.

Professor Chen is a Fellow of the IEEE for the contribution to small and broadband antennas for wireless applications (2007). He is serving as Vice President and Distinguished Lecturer for IEEE Council on RFID. He served IEEE Trans Antennas and Propagation as an Associate Editor and IEEE Antennas and Propagation Society as a Distinguished Lecturer. (www.ece.nus.edu.sg/staff/bio/czn.html)

Time/Date	11:00 – 11:30 / 28 September 2018 (Friday)
Venue	Room 4503

<div style="border:1px solid">**Keynote Speech V**</div>

Title: Beyond Simple Identification - Developments in UHF RFID

Dr. Jukka Voutilainen

Voyanntic Ltd. Finland

Abstract

The EPC Class 1 Gen2 (ISO 18000-63) passive UHF RFID protocol was originally developed in 2004 for fast identification of large numbers of items. However, during the last 14 years, companies and academics have been stretching its limits. This presentation looks at the different functionalities released during the years, including performance improvements, sensing, security, and many others.

Dr. Jukka Voutilainen is the CEO and co-founder of Voyantic, a Finland based company that provides RFID testing and measurement solutions for companies and academics that either develop or use RFID technology. He received his doctoral degree in 2005 from Helsinki University of Technology (now Aalto University). His research focused on developing a novel method for measuring moisture in building structures that is based on chipless RFID.

Dr. Voutilainen's areas of expertise are electronics, embedded software development, and RFID technology. Currently he is an active member of the academic community, and a long-time program committee member and technical co-chair in IEEE RFID conferences. He also participates actively in standardization work within ISO, GS1, SAE, AIM, and RAIN RFID Alliance.

Tutorial

Time/Date 14:30 – 16:30 / 26 September 2018 (Wednesday)
Venue Room 4504

Title: Advance RFID Solutions

Dr. Pui Yi (Anna) Lau

Laxcen Technology Ltd, Hong Kong

Abstract

This year, radio frequency identification (RFID) technology has its big breakthrough on the adoptions and its applications are rapidly increased. How RFID technology can benefit to our daily life? In this tutorial, the advance UHF RFID solutions for library, archives managements, smart constructions, retails will be introduced and discussed. For example, what is main advantages of UHF RFID library solution compared to the existing EM or HF solutions? How AI integrated RFID robot can help in the library? How a 24 hours mini-library can help to promote the cultural smart city such as they can be easily adopted in the public transportation stations, communication centers, hotels and so on.

Laxcen has committed itself to IOT, Industrial 4.0, manufacturing, R & D for high quality RFID products, RFID application solutions for more than 10 years. Laxcen is one of the national high-tech enterprises, undertaken the research and development innovation projects such as National innovation fund, Zhejiang province leading plan, and so on. We were awarded for Red herring global Top 100 high tech companies, Zhejiang growing high-tech enterprise Top 100 winners. We owned more than 100 related products design patents.

RFID inventory robot

Book safety access control system

Self-service refrigerato

RFID smart bookshelf

Self-service library

Desktop reader

Registration

The Registration Desk is located on 4th floor of the Holiday Inn hotel. The opening hours are as follows:

Date	Time
26 September (Wednesday)	14:00 – 16:30
27 September (Thursday)	09:00 – 12:00, 14:00 – 16:30
28 September (Friday)	09:00 – 12:00, 14:00 – 16:30

Exhibition

The IEEE RF-TA 2018 Organizing Committee would like to thank for following exhibitors for their participation and support for this conference.

Exhibitors

Laxcen Technology Limited
Rohde & Schwarz Hong Kong Limited
Voyantic Limited

Exhibition Location and Hours

Exhibits are in the Room 4401 A-B and 4501 A-B. Exhibit hours are as follows:

Date	Time
27 September (Thursday)	09:00-17:00
28 September (Friday)	09:00-12:00

Program at a Glance

Sept. 26, 2018 (Wed.)	14:00 – 16:30	Registration
	14:30 – 16:30	**Tutorial** **Advanced RFID Solutions**, Dr. Pui Yi Lau Room 4504
	16:30 – 19:30	Local Tour
	19:30 – 21:00	Welcome Reception
Sept. 27, 2018 (Thurs.)	09:00 – 12:00 14:00 – 16:30	Registration
	9:00 – 10:00	**Technical Session A** Signal Processing Room 4504 — **Technical Session B** Protocol and Algorithm Room 4505
	10:00 – 10:15	Coffee Break and Exhibition
	10:15 – 10:30	Opening Room 4503
	10:30 – 11:00	**Keynote Speech I** **Recent RFID Systems in Hospitals**, Prof. Koichi ITO Room 4503
	11:00 – 11:30	**Keynote Speech II** **Advances RFID Technologies and Applications**, Dr. Pui Yi Lau Room 4503
	11:30 – 12:00	**Keynote Speech III** **The Internet of Things – The Importance of Testing Devices and Networks**, Mr. Nick Pugh Room 4503
	12:00 – 14:00	Lunch
	14:00 – 15:40	**Technical Session C** Antenna and Design Room 4504 — **Technical Session D** Localization and Its Applications Room 4505
	15:40 – 16:30	Coffee Break and Exhibition
	16:30 – 18:10	**Technical Session E** RFID Applications Room 4504 — **Technical Session F** Systems, Methods, and Implementation Tools Room 4505
	19:00 – 21:30	Conference Banquet
Sept. 28, 2018 (Fri.)	09:00 – 12:00 14:00 – 16:30	Registration
	9:00 – 10:00	**Technical Session G** RFID Tags and Readers Room 4504 — **Technical Session H** Antenna and RFID Chip Room 4505
	10:00 – 10:30	Coffee Break and Exhibition
	10:30 – 11:00	**Keynote Speech IV** **Advanced Antennas for RFID Tags and Readers,** Prof. Zhi Ning Chen Room 4503
	11:00 – 11:30	**Keynote Speech V** **Beyond Simple Identification - Developments in UHF RFID**, Dr. Jukka Voutilainen Room 4503
	12:00 – 14:00	Lunch
	14:00 – 16:30	**Invited Talk Session** Room 4505
	16:30 – 17:00	Coffee Break and Exhibition
		End of RFID-TA 2018 Conference

Technical Program – Day 1: 26 September 2018 (Wednesday)

14:00 – 16:30	**Registration**

Tutorial

Time/Date	14:30 – 16:30 / 26 September 2018 (Wednesday)
Topic	Advance RFID Solutions
Speaker	Dr. Pui Yi (Anna) Lau
	CEO of Laxcen Technology Ltd (Hong Kong)
	CTO of Zhejiang Laxcen Info-Tech Inc. Ltd
Venue	4504
Chair	Wai-Wa Choi, University of Macau

16:30 – 19:30	**Local Tour**
19:30 – 21:00	**Welcome Reception***
	Venue: Restaurante Litoral (Taipa)
	Address: Rua do Regedor, Bloco 4 Wai Chin Ko N^0 53/57 Taipa
	*Welcome Reception is supported by Macao Post and Telecommunications Bureau – CTT

Technical Program – Day 2: 27 September 2018 (Thursday)

Session A   Signal Processing
Time/Date   09:00 – 10:00 / 27 September 2018 (Thursday)
Venue   Room 4504
Chair   Fen Hou, University of Macau

1570462658   09:00 – 09:20

Research on Fast Algorithm for General Bistatic SAR Raw Signal
Li, MinZhi; Shen, Dong; Zhou, Yu; Sun, Qi

1570467265   09:20 – 09:40

Perfectly Synchronized Streaming from Digitally Modulated Multiple Backscatter Sensor Tags
Mitsugi, Jin; Kawakita, Yuusuke; Egawa, Kiyoshi; Ichikawa, Haruhisa

1570464879   09:40 – 10:00

Compact Balanced Dual-Band Bandpass Filter Based Sub-wavelength CRLH Resonator for RFID Application
Song, Yi; Liu, HaiWen; Zhao, Weilong; Wang, Zhengbiao

Session B   Protocol and Algorithm
Time/Date   09:00 – 10:00 / 27 September 2018 (Thursday)
Venue   Room 4505
Chair   Guoying Zhang, University of Macau

1570470157   09:00 – 09:20

Wireless Routing Clustering Protocol Based on Improved LEACH Algorithm
Yang, Tingting; Guo, Yuejun; Feng, Hailong; Ouyang, Zhenfeng

1570464202   09:20 – 09:40

An Energy-Aware and Time-Efficient Adaptive Multi-tree Anti-collision Protocol for RFID Systems
Liu, Qinshu; Xu, Jie; Yang, Li; Hu, Jing; Song, Tiecheng

1570465114   09:40 – 10:00

An effective velocity detection method for moving UHF-RFID tags
Zhai, Yue; Guo, Qiang; Min, Hao

10:00 – 10:15   **Coffee Break and Exhibition**
Room 4401A-B/ 4501A-B

| 10:15 – 10:30 | **Opening** |
| | Room 4503 |

Keynote Speeches

Time/Date	10:30 – 12:00 / 27 September 2018 (Thursday)
Venue	Room 4503
MC	Prof. Lei Zhu, University of Macau

Keynote Speech I

Time/Date	10:30 – 11:00 / 27 September 2018 (Thursday)
Title	Recent RFID Systems in Hospitals
Speaker	Prof. Koichi ITO
	Professor Emeritus and Visiting Professor, Chiba University, Japan

Keynote Speech II

Time/Date	11:00 – 11:30 / 27 September 2018 (Thursday)
Title	Advances RFID technologies and applications
Speaker	Dr. Pui Yi (Anna) Lau
	CEO of Laxcen Technology Ltd (Hong Kong)
	CTO of Zhejiang Laxcen Info-Tech Inc. Ltd

Keynote Speech III

Time/Date	11:30 – 12:00 / 27 September 2018 (Thursday)
Title	The Internet of Things – The importance of Testing Devices and Networks
Speaker	Mr. Nick Pugh
	Managing Director, Rohde & Schwarz Hong Kong Limited, Hong Kong

| 12:00 – 14:00 | **Lunch** |
| | Room 4403 |

1570472785   **14:00 – 14:20**

A Wideband Circularly Polarized Patch Antenna Using $\lambda/4$ and $\lambda/2$ Resonators
Wu, Qiong-Sen; Zhang, Xiao;Zhu, Lei

1570464214   **14:20 – 14:40**

Glove-Integrated Slotted Patch Antenna for Wearable UHF RFID Reader
Ahmed, Shahbaz; Rehman, S. M. Musfequr; Ukkonen, Leena; Björninen, Toni

1570469030   **14:40 – 15:00**

A Widely Linear MMSE RFID Receiver with Multi-antenna for Physical Layer Collision Recovery
Deng, Wei; Li, Zhe; Yili, Xia; Wang, Kai; Pei, Wenjiang

1570462931   **15:00 – 15:20**

Design of UWB Bandpass Filter with Dual Notched bands
Wang, Yunxiu; Liu, Yan; Zou, Wenhui; Hu, Yusong; Yang, Weichao

1570468482   **15:20 – 15:40**

Auditing of Ultra Dense RFID Straws in Cryogenic Container at -196 °C
Shen, Ming; Zhang, Shuai; Kim, Dong Min;Franek, Ondřej; Mikkelsen, Jan; Pedersen, Gert

Time/Date   14:00 – 15:40 / 27 September 2018 (Thursday)
Venue   Room 4505
Chair   Fen Hou, University of Macau

1570466304   **14:00 – 14:20**

Simultaneous 2D Localization of Multiple Standard Passive LF-RFID Transponders
Psiuk, Rafael; Müller, Alfred; Singh, Maximilian; Dräger, Tobias; Brauer, Hartmut; Töpfer, Hannes; Thielecke, Jörn

1570468151   **14:20 – 14:40**

Near Field Sources Localization Based on Robust Propagator Method
Li, Sen; Lin, Bin; LI, Bing; He, RongxiLei

1570468391   **14:40 – 15:00**

New Empirical Indoor Path Loss Model using Active UHF-RFID Tags for Localization Purposes
Hatem, Elias; Colin, Elizabeth; Abou Chakra, Sara; ElHassan, Bachar A.; Laheurte, Jean-Marc

1570468864   **15:00 – 15:20**

A Multi-Antenna SAR-based method for UHF RFID Tag Localization via UGV
Motroni, Andrea; Nepa, Paolo; Tripicchio, Paolo; Unetti, Matteo

1570468163   **15:20 – 15:40**

Indoor Vehicle Navigation by Cricket Location System with Position Estimation
Zou, Zheng; Wang, Zhuwei; Xie, Hao; Chen, Biao; Zhu, Junda; Hou, Fen

15:40 – 16:30   **Coffee Break and Exhibition**
                     Room 4401A-B/ 4501A-B

Session E   **RFID Applications**
Time/Date   16:30 – 18:10 / 27 September 2018 (Thursday)
Venue   Room 4504
Chair   Kang Hu, Zhejiang University

1570468360   **16:30 – 16:50**

RWC: A Robust Wireless Charging System for Dockless Bike-Sharing
Li, Songyuan; Hu, Kang; He, Shibo; Fu, Lingkun; Chen, Jiming

1570468185   **16:50 – 17:10**

A Flooding Warning System based on RFID Tag Array for Energy Facility
LI, Changhe; Lao, Keng Weng; Tam, Kam Weng

1570465824   **17:10 – 17:30**

Optimal Placement in RFID-Integrated VANETs for Intelligent Transportation System
Zhang, Wei; Lin, Bin; Gao, Changxuan;Yan, Qiuna; Li, Sen; Li, Wantong

1570465066   **17:30 – 17:50**

Development of Condition Monitoring System for Railway Facilities using Opportunistic Communication
Tanaka, Minoru; Ikeda, Ryohei; Yoda, Hiroshi; Aiba, Masayuki

1570463359   **17:50 – 18:10**

An Emerging Application Centric RFID Framework Based on New Web Technology
Sharma, Vijay; Malhotra, Sambhav; Hashmi, Mohammad

Systems, Methods, and Implementation Tools
Time/Date 16:30 – 18:10 / 27 September 2018 (Thursday)
Venue Room 4505
Chair Toni Björninen, Tampere University of Technology

1570467450 **16:30 – 16:50**

Defected Ground Structure of UWB Chipless RFID Tag for FMCW Radar
Tu, Mengting; Choi, Wai Wa; Cheong, Pedro

1570468998 **16:50 – 17:10**

Collaborative Optimization Scheduling of Maritime Communication for Mobile Edge Architecture
Zhang, Yue; Yang, Tingting; Dong, Jie

1570465051 **17:10 – 17:30**

Design of an Automated Measuring System for RFID Transponders in Complex Environments
Luetticke, Daniel; Meisen, Tobias

1570465434 **17:30 – 17:50**

X-Vision: An Augmented Vision Tool with Real-time Sensing Ability in Tagged Environments
Sun, Yongbin; Kantareddy, Sai Nithin Reddy; Bhattacharyya, Rahul; Sarma, Sanjay

1570464194 **17:50 – 18:10**

RF Energy Harvesting System with RFID-enabled Charge Storage Monitoring
Pournoori, Nikta; Khan, Muhammad Waqas Ahmad; Ukkonen, Leena; Björninen, Toni

19:30 – 21:00 **Conference Banquet***
Venue: Dragon Chinese Restaurant
Address: 2nd Floor of The Macau Roosevelt Hotel
No. 924-998 da Avenida dos Jogos Da Asia Oriental, Taipa

*The banquet is supported by Macao Science and Technology Development Fund – FDCT

Technical Program – Day 3: 28 September 2018 (Friday)

Session G	RFID Tags and Readers
Time/Date	09:00 – 10:00 / 28 September 2018 (Friday)
Venue	Room 4504
Chair	Ningyi Dai, University of Macau

1570468945   **09:00 – 09:20**

Low-power and Compact Microwave RFID Reader for Sensing Applications in Space
Qi, Cheng; Griffin, Joshua D; Durgin, Gregory

1570463372   **09:20 – 09:40**

Fabrication and Practical Evaluation of Glove-integrated Passive UHF RFID Tags
Chen, Xiaochen; He, Han; Xu, Jinxiong; Wang, Tao; Cheng, Lianglun; Ukkonen, Leena; Virkki, Johanna

1570468564   **09:40 – 10:00**

Referenced Backscattering Compression Level Indicator based on Passive UHF RFID Tags
Qureshi, Shoaib Tahir; Björninen, Toni; Virkki, Johanna

Session H	Antenna and RFID Chip
Time/Date	09:00 – 10:00 / 28 September 2018 (Friday)
Venue	Room 4505
Chair	Fen Hou, University of Macau

1570470583   **09:00 – 09:20**

Polarization Reconfigurable Antenna with Beam Steering Performance
Chen, Zhe; Xiang, Jun; Wong, Hang

1570468386   **09:20 – 09:40**

Secondary Near Field RFID Antennas for Wireless Structural Health Monitoring Systems
Scirocco, Nicolas; Yang, Shuai; Crisp, Michael J; Penty, Richard; White, Ian

1570468675   **09:40 – 10:00**

Alternatives to Current RFID Chip Set Market Offerings
Pratt, Ian; Oliver, Michael

10:00 – 10:15	**Coffee Break and Exhibition**
	Room 4401A-B/ 4501A-B

Keynote Speeches
Time/Date	10:30 – 11:30 / 28 September (Friday)
Venue	Room 4503
MC	Prof. Quan XUE, City University of Hong Kong

Keynote Speech IV
Time/Date	10:30 – 11:00 / 28 September 2018 (Friday)
Title	Advanced Antennas for RFID Tags and Readers
Speaker	Prof. Zhi Ning Chen
	Professor and Industry Program Director, National University of Singapore, Singapore

Keynote Speech V
Time/Date	11:00 – 11:30 / 28 September 2018 (Friday)
Title	Beyond Simple Identification - Developments in UHF RFID
Speaker	Dr. Jukka Voutilainen
	CEO, Co-founder, Voyantic Ltd. Finland

12:00 – 14:00	**Lunch**
	Room 4403

Invited Talk Session
Time/Date	14:00 – 16:30 / 28 September 2018 (Friday)
Venue	Room 4505
Chair	Wai-Wa CHOI, University of Macau

Invited Talk I
Title	New Challenges and Techniques in RFID Antenna Design
Speaker	Prof. Tao Ye
	Professor, South University of Science Technology, China

Invited Talk II
Title	Design of Microwave Cavity Components by using Multiple-mode Resonators
Speaker	Prof. Sai-Wai Wong
	Professor, Shenzhen University, China

Invited Talk III
Title	RFID Technology for Industry 4.0: Identification, Localization and Tracking
Speaker	Prof. Paolo Nepa
	Professor, University of Pisa, Italy

Invited Talk IV
Title	CEDAR" A Cost-effective Crowdsensing System for Detecting and Localizing Drones
Speaker	Prof. Zhiguo Shi
	Professor, Zhejiang University, China

Invited Talk V
Title	Flexible and Efficient Service Provisioning for IoT Devices
Speaker	Prof. Ju Ren
	Professor, Central South University, China

| 16:30 – 17:00 | **Coffee Break and Exhibition** |
| | Room 4401A-B/ 4501A-B |

END of IEEE RFID 2018

General Information

Welcome Reception*
19:30 - 21:00 on 26 September 2018 (Wednesday) at Restaurante Litoral (Taipa), Rua do Regedor, Bloco 4 Wai Chin Ko N^0 53/57 Taipa. All conference attendees are invited to the welcome reception to enjoy a festive and relaxing evening.
*Welcome Reception is supported by Macao Post and Telecommunications Bureau – CTT

Conference Banquet*
19:00 - 21:30 on 27 September 2018 (Thursday) at Dragon Chinese Restaurant, 2nd Floor of The Macau Roosevelt Hotel, No. 924-998 da Avenida dos Jogos Da Asia Oriental, Taipa. All conference attendees are invited to the welcome conference banquet to enjoy a festive and relaxing evening.
*The banquet is supported by Macao Science and Technology Development Fund – FDCT

Internet Access
The Holiday Inn Macao Cotai Central offers complimentary internet access.

Name badges
It is required that the conference attendees wear their name badges at all times. Your name badge is your entry to all technical sessions, the exhibitions, the coffee breaks, and the welcome reception.

Instructions for Presenters
Presentation Time: 15 min + 5 min Q&A

Speakers are requested to be in their respective session rooms at least 10 minutes prior to the commencement of each session. The duration of the presentation slot is 20 minutes. This includes 15 minutes for the presentation itself and 5 minutes for questions from the audience. We would appreciate it if all presenters can adhere strictly to this time limit.

Presentation slides must be prepared using Microsoft PowerPoint or Adobe Acrobat. Please make sure that all special characters and fonts are embedded in the presentation file. Speakers should bring their files on a CD/DVD ROM or thumb-drive and upload their file at least 15 minutes before the commencement of each session as well as report to their respective Session Chairs.

All papers must be presented at the conference in order to be included in the proceedings published in IEEE Xplore©.

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