



IEEE INTERNATIONAL RF & MICROWAVE CONFERENCE 2020

A photograph of a large conference room with many people seated at round tables, facing a stage area. The room has a high ceiling with a large chandelier and large windows. A decorative graphic of overlapping blue and green waves is overlaid on the image.

PROGRAM BOOK
December 14-16, 2020

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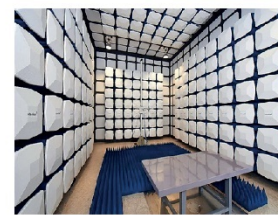
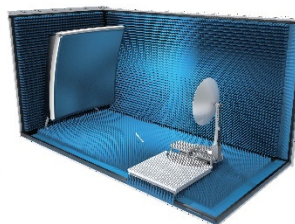
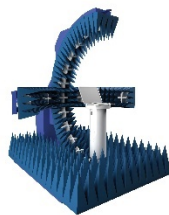
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WELCOME MESSAGE

Selamat Datang ke RFM 2020!

As the conference general chair, I wish to extend a warm welcome to all participants of RFM2020, which is the nine-th meeting of the IEEE International RF and Microwave Conference series. The series was initiated by IEEE Antennas and Propagation/Microwave Theory and Techniques/Electromagnetic Compatibility chapter of Malaysia in 2004 as part of the chapter's continuing efforts to promote research and development in the areas of radio frequency technology and applied electromagnetics among researchers and industrialists in Malaysia.

2020 also marks the fourth time the conference comes to Kuala Lumpur, which were previously RFM2004, 2006, 2008 and the most triggered moment is for the first time ever it is conducted virtually due to prolong COVID-19 pandemic issues. Despite the challenge to come out with significant research outputs worth for publication finding when many of us struggling working from home, plus economic downturn seen in most countries in the region, RFM 2020 still managed to attract a good number of papers. This year almost 94 papers were received, and out of these, only about 70 % were accepted. The reviewing panel completed about 462 reviews, with each paper being allocated a minimum of three reviewers. This rather stringent evaluation process is necessary to maintain the quality of papers IEEE conferences are famous for. These papers will be presented over two parallel tracks over two days at the conference.

As with previous editions of RFM, this year's meeting also features several distinguished speakers. This time we are honoured to have three eminent IEEE MTT-S DML Speaker, Professor James C. M. Hwang of Cornell University, USA; IEEE Fellow Professor Qing-Xin Chu of South China University of Technology Guangzhou, China; and Professor Wonbin Hong of Pohang University of Science and Technology, South Korea.

Two tutorial speakers, which are Professor Himdi of University of Rennes 1, France; and CT Chiang of SIMULIA IPS APAC, 3DS.COM. We also bring 11 plenary speakers Professor Prayoot Akkaraekthalin, Professor Sen Yan, Professor Dr Mohamad Kamal A Rahim, Professor Zahriladha Zakaria, Professor Mohd Fadzil Ain, Professor Yoshihide Yamada, Professor Widad Ismail, Professor Sharul Kamal Abdul Rahim, Assoc. Prof Muhammad Ramlee Kamarudin, Assoc. Prof Sharifah Hafizah and Assoc. Prof Sharifah Kamilah.

Again, the support we received from the industry was encouraging. In particular, I wish to acknowledge our sincere thanks to our loyal sponsor RF Station. Many thanks go to the researchers, for their willingness to share their findings with us and for their support in this event. This meeting would not have been possible without the support of members of the Organizing Committee, for which I am eternally grateful. I am also indebted to Microwave Research Institute (MRI) of Universiti Teknologi MARA, Shah Alam, as the conference secretariat, to ensure smooth sailing event.

I wish you a happy virtual conference and hope to see you again in future editions of RFM, perhaps in physical meeting.



Assoc. Prof. Dr Fauziahanim Che Seman, SMIEEE
RFM 2020 General Chair

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TECHNICAL PROGRAM OVERVIEW

Time	Webex 1	Webex 2
MONDAY, DECEMBER 14		
02:00 PM-03:30 PM	<p>TT1: Tutorial 1 - A Survey On Reconfigurable Plasma Antennas Up To Millimeter Waves.</p> <p>By Prof. Dr. Mohamed Himdi</p> <p>Webex DAY 1A: LINK</p> 	
03:30 PM-04:00 PM	TB: Break	
04:00 PM-05:30 PM	<p>TT2: Tutorial 2 - Industry Digitalization With Simulia-Cst Solution.</p> <p>By Mr. CT Chiang</p> <p>Webex DAY 1B: LINK</p> 	

TUESDAY, DECEMBER 15	
09:00 AM-09:20 AM	WM: Welcoming Address Webex DAY 2A: LINK 
09:20 AM-10:10 AM	KEY1: KEYNOTE 1 - Microwaving A Biological Cell Alive - Broadband Label-Free Noninvasive Electrical Characterization Of A Live Cell By Prof. Dr. James C. M. Hwang
10:10 AM-11:00 AM	KEY2: KEYNOTE 2 - DECOUPLING BETWEEN MIMO ANTENNAS BY COMPENSATION NETWORK METHOD By Prof. Dr. Qing-Xin Chu
11:00 AM-11:50 AM	KEY3: KEYNOTE 3 - CHALLENGES AND OPPORTUNITIES FOR MILLIMETER-WAVE AND SUB-THZ MOBILE ANTENNAS FOR BEYOND 5G AND 6G By Assoc. Prof. Dr. Wonbin Hong
01:00 PM-01:50 PM	LB1: LUNCH BREAK 1
01:50 PM-03:50 PM	PLE 1: PLENARY SPEAKERS SESSION 1 Webex DAY 2B: LINK 
03:50 PM-04:00 PM	TB: TEA BREAK

04:00 PM-06:20 PM	<p>A1: 5G, Millimeter Wave Antenna And Mimo Technologies</p> <p>Webex DAY 2C1: LINK</p> 	<p>B1: Antennas, Propagation & Electromagnetic Modeling</p> <p>Webex DAY 2C2: LINK</p> 
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WEDNESDAY, DECEMBER 16		
08:00 AM-10:40 AM	<p>A2: Antenna And Advanced Materials</p> <p>Webex DAY 3A1: LINK</p> 	<p>B2: Radars, Rf Sensors And Electromagnetic Waves Applications</p> <p>Webex DAY 3A2: LINK</p> 
10:40 AM-11:00 AM	TB: TEA BREAK	
11:00 AM-01:00 PM	<p style="text-align: center;">PLE 2: PLENARY SPEAKERS SESSION 2</p> <p style="text-align: center;">Webex DAY 3B: LINK</p> 	
01:00 PM-01:50 PM	LB2: LUNCH BREAK 2	

<p>01:50 PM-03:50 PM</p>	<p>A3: Antenna And Advanced Materials II</p> <p>Webex DAY 3C1: LINK</p> 	<p>B3: RF/Microwave Circuit Technologies</p> <p>Webex DAY 3C2: LINK</p> 
<p>03:50 PM-04:00 PM</p>	<p>TB: TEA BREAK</p>	
<p>04:00 PM-06:20 PM</p>	<p>A4: Microwave Systems And Applications</p> <p>Webex DAY 3D1: LINK</p> 	<p>B4: Coupling Structures & Metamaterials</p> <p>Webex DAY 3D2: LINK</p> 
<p>06:20 PM-06:30 PM</p>	<p>EB: EVENT BREAK</p>	

KEYNOTE SPEAKERS

15th December 2020, 09:20 – 10:10



Speaker 1:

Professor James C. M. Hwang

Cornell University, Ithaca, New York 14853 USA

Microwaving a Biological Cell Alive –Broadband Label-free Noninvasive Electrical Characterization of a Live Cell

Microwave is not just for cooking, smart cars, or mobile phones. We can take advantage of the wide electromagnetic spectrum to do wonderful things that are more vital to our lives. For example, microwave ablation of cancer tumor is already in wide use, and microwave remote monitoring of vital signs is becoming more important as the population ages. This talk will focus on a biomedical use of microwave at the single-cell level. At low power, microwave can readily penetrate a cell membrane to interrogate what is inside a cell, without cooking it or otherwise hurting it. It is currently the fastest, most compact, and least costly way to tell whether a cell is alive or dead. On the other hand, at higher power but lower frequency, the electromagnetic signal can interact strongly with the cell membrane to drill temporary holes of nanometer size. The nanopores allow drugs to diffuse into the cell and, based on the reaction of the cell, individualized medicine can be developed and drug development can be sped up in general. Conversely, the nanopores allow strands of DNA molecules to be pulled out of the cell without killing it, which can speed up genetic engineering. Lastly, by changing both the power and frequency of the signal, we can have either positive or negative dielectrophoresis effects, which we have used to coerce

15th December 2020, 10:10 – 11:00



Speaker 2:

Professor Dr. Qing-Xin Chu

South China University of Technology Guangzhou, Guangdong, P.R. China

Decoupling Between MIMO Antennas by Compensation Network Method

This talk will introduce a novel decoupling method, namely compensation network decoupling method, which can be used as a guiding idea to solve mutual coupling between antennas. The original network composed of two antenna elements is analyzed by

introducing two auxiliary ports at the appropriate location of the antenna elements. From a rigorous theoretical analysis, in order to obtain mutual coupling impedance of the total network Z_{21} is zero, mutual coupling impedance of the compensation network Z_{43} must be zero. According to the impedance characteristic of original coupling network, compensation network with opposite impedance characteristic is introduced to compensate for the original coupling network, and realizes Z_{21} is zero, so as to achieve the aim of decoupling. An ultra-wideband inverted F antenna is proposed. The impedance bandwidth with $|S_{11}| < -6\text{dB}$ is 3.3-6.0GHz. Based on the antenna element, the application of compensation network decoupling method is analyzed with the neutralization line as the concrete example of compensation network. The introduction of two auxiliary ports shows that impedance characteristic of the original coupling network is inductive in low frequency band and capacitive in high frequency band. So firstly, an inductive neutralization line is designed, which compensates the capacitive original coupling network in high frequency band and improves the isolation of MIMO antenna in high frequency band. Next, a capacitive neutralization line is designed, which compensates the inductive original coupling network in low frequency band and achieves decoupling between antenna elements in low frequency band. Finally, a neutralization line with three lumped capacitors and a coupling neutralization line, which is equivalent to loading three distributed capacitors, are proposed to compensate the inductive original coupling network in low frequency band and capacitive original coupling network in high frequency band, so as to improve the isolation of MIMO antenna over the ultra-wide band. Simulated and measured results verify the accuracy of the design for multiple MIMO antennas. The measured isolation of the MIMO antenna with coupling neutralization line is better than 12dB over the operating frequency band, 3.34-6.23GHz.

15th December 2020, 11:00 – 11:50



Speaker 3:

Assoc. Prof. Dr. *Wonbin Hong*

Pohang University of Science and Technology Pohang,
South Korea

*Challenges and Opportunities for Millimeter-wave
and sub-THz mobile antennas for Beyond 5G and 6G*

Expanding the technological footprint of millimeter wave and sub-THz antennas and propagation for Beyond 5G/6G cellular, access and infrastructures is expected to introduce unprecedented challenges. Practical design considerations and potential novel solutions related to the realization of millimeter-wave and sub-THz antennas with beamforming capabilities are discussed in detail. This talk attempts to assess the future direction of mobile antennas and RF circuits for high mobility devices such as future smartphones and data terminals using a holistic approach Afterwards, a series of detailed demonstrations will be discussed.

PLENARY SPEAKERS

15th December 2020, 13:50 – 14:10



Speaker 1:

Prof. Prayoot Akkaraekthalin

King Mongkut's University of Technology North
Bangkok

*Electromagnetic-Based Innovative Sensors for
Industrial and Agricultural Applications*

This paper focuses on the research of innovative sensors using electromagnetics for various applications. The proposed sensors utilize electromagnetic fields and internally operate at frequencies starting from ~ 300 MHz up to several gigahertz range. Some new materials including metamaterials and nanomaterials will be applied to the sensor structures for performance improvement. Some innovative sensors using electromagnetics including a metamaterial-based liquid sensor, a microfluidic sensor, a moisture sensor, and a nanomaterialbased gas sensor were designed, implemented and measurement

15th December 2020, 14:10 – 14:30



Speaker 2:

Assoc. Prof. Dr. Muhammad Ramlee Kamarudin

Universiti Tun Hussein Onn Malaysia, Malaysia

*The Review and Analysis of Antenna for Sixth
Generation (6G) Applications*

A wireless devices has continuous technology improvement to provide a better and interesting services. The next generation, 6G is expected to support the gigantic amount of data traffic to cope the rise of connection wireless device. As a solution, a large bandwidth is supposed to be focused and a better gain is required. Then, a new frequency region that is THz is utilized. Since 6G technology is very new and not defined yet, the previous work on 6G is reviewed to make a clear of antenna design specification. An antenna at 300 GHz for 6G application is also proposed in the of this paper. The simulated results have bandwidth from 275.63 GHz to 328.78 GHz at -10 dB level, the similar radiation pattern at E-plane and H-plane, and low gain

15th December 2020, 14:30 – 14:50**Speaker 3:****Prof. Dr. Sen Yan**

Xi'an Jiaotong University, Xi'an, China

Antenna with Artificial Magnetic Conductor for Wireless Application

This paper presents a design of a wideband antenna based on metasurface for wearable applications. The operating band of the proposed antenna can cover the industrial, scientific, and medical (ISM) 2.45 GHz band, and the resonant frequencies can be tuned simply by adjusting the dispersion curve of the metasurface through the calculation of a single unit cell. In this design, the metasurface consists of a 3×3 array of unit cells, which are fed by a printed coplanar waveguide (CPW) monopole antenna. By modeling the metasurface as a two dimensional composite right/left-handed transmission line (CRLH TL), the negative modes can be excited in this design, which can miniaturize the dimension of the antenna significantly. Then two negative modes are combined to extend the working band. The footprint of the proposed antenna is 50.6×43.5 mm² (0.14λ⁰²), and the impedance matching band ranges from 2.2 GHz to 2.65 GHz, with a fractional bandwidth of 18.3%. The maximum gain is 4.35 dBi and 2.57 dBi in free space and on the human body, respectively. This design provides a new approach to realize wideband miniaturized antennas for wearable applications.

15th December 2020, 14:50 – 15:10**Speaker 4:****Prof. Dr. Yoshihide Yamada**

Universiti Teknologi Malaysia, Malaysia

Antenna and Propagation Analysis in Several Dielectric Materials by EM Simulator

Recently, radio wave technologies are applying for human health care such as a capsule endoscopy and a hyperthermia. As another application, radio wave is planning to be used for sea water communication. At human body and seawater applications, a small size antenna is suitable. So, the normal mode helical antenna is selected. As for performance understanding, electromagnetic simulation tool is effective. The important subject in antenna application is to clarify the radio wave communication link budget in the dielectric material environment. In this paper, based on electromagnetic simulation results of antenna and radio propagation in the human body and seawater conditions, analytical understanding of antenna performance and radio propagation mechanism is conducted. Through this study, analytical equations for antenna performance and radio wave propagation are derived.

15th December 2020, 15:10 – 15:30



Speaker 5:

Prof. Dr. Fadzil Ain

Universiti Sains Malaysia, Malaysia

A 28 GHz mmWave Circular Microstrip Antenna with Rectangular Slots on Air-Substrate

This paper presents a circular-shaped copper (Cu)-based antenna for 28 GHz mmWave applications. The proposed design employs air as a substrate to substantially reduce the manufacturing cost. The coaxial probe feed technique was utilized to excite the system. Experimental results confirm that, by integrating a pair of rectangular slots at one of the radiating elements, wide bandwidth can be achieved. The optimum configuration occupied 324 sq. mm area and functioned with a bandwidth of 3.10 GHz, gain of 8.92 dBi and efficiency of 96.05%.

15th December 2020, 15:30 – 15:50



Speaker 6:

Prof. Dr. Zahriladha Zakaria

Universiti Teknikal Malaysia Melaka, Malaysia

Enhanced T-Resonator with Blazed Grating for Accurate Powder Material Characterization

This paper proposes an enhanced microwave T-resonator technique for powder material characterization using a blazed grating. The main advantage of this technique is the high sensitivity and non-invasive measurement such that it can be integrated easily for sensing applications. The non-invasive measurement is achieved by implementing powder container into the sensing area of the sensor, thus avoiding the need to deal with the cross error of directly contact measurement. The proposed sensor is designed at around 2.5 GHz resonant frequency and fabricated on a 0.787 mm-thickness Roger 5880 substrate. To validate the sensitivity of the proposed sensor, six common powder materials of different weights are tested. It is found the sensitivity achieved 11.96 MHz/ $\Delta\epsilon$ and the frequency is shifted between 23 and 56.6 MHz for all measured cases at 1- gram weight. This work will lead to a promising cost-effective sensor with compactness in size, ease of fabrication and small amount of the tested preparation for industrial applications that required advance sensing technique in quality control of the food industry.

16th December 2020, 11:00 – 11:20**Speaker 7:****Assoc. Prof. Dr Sharifah Kamilah Syed Yusof**

Universiti Teknologi Malaysia, Malaysia

SDN and 5G Network: The Role of Controller Placement for Scalable Control Plane

The evolution of wireless networks from the first to fourth generation has made smart devices and technologies a significant part of our daily activities. The 5G network is a ground-breaking technology that proposes to transform the way individuals use the internet, via the creation of an enabling atmosphere. 5G promises faster and superior quality with better security guarantee in comparison to preceding technologies. The software-defined networking (SDN) on the other hand is an enabling technology needed to actualise the huge promises of 5G networks. With extensive network in 5G, a centralised controller approach in SDN has limitations related to performance and scalability. Several studies have advocated the use and placement of multiple controllers to improve scalability in SDN. The controller placement problem (CPP) becomes more of a challenge, especially when network nodes/links and controllers have some constraint metrics such as latency, network load and distance. This paper proposes a multi-criteria clustering method that places the controllers based on predefined constraint metrics between the controllers and the switches while minimising the overall latency. The results showed the proposed technique improved nodes distribution than existing solutions for a dense network anticipated in 5G scenario.

16th December 2020, 11:20 – 11:40**Speaker 8:****Prof. Mohamad Kamal A Rahim**

Universiti Teknologi Malaysia, Malaysia

Frequency and Pattern Reconfigurable Antenna Using Electromagnetic Band Gap Structure

This paper presents the use of electromagnetic bandgap (EBG) structure for frequency and pattern reconfigurability. The first structure is the pattern and polarization reconfigurable antenna for beam-steering configurations. The proposed antenna consists of a group of EBG structure to control the pattern reconfigurability. The second application is the use of EBG for band stop rejection where the EBG is designed to suppress and control the signal transmission to the antenna. In this concept the UWB antenna is designed and the EBG structure is used to stop the signal transmission. The EBG is designed at different sizes. The results showed that at certain EBG structure the signal transmission was prevented from propagating to the UWB antenna and no radiation occurred at that particular frequency.

16th December 2020, 11:40 – 12:00**Speaker 9:****Prof. Dr. Sharul Kamal Abdul Rahim**

Universiti Teknologi Malaysia, Malaysia

CPW-UWB Flexible Composite Antenna Using Jute Textile for WPAN Applications

Ultra-wideband (UWB) antennas has seen to be one of the technologies that gaining fame in modern and future wireless communication systems, due to high demand for wideband communication, since it works at frequency ranges from 3.1GHz to 10.6GHz. UWB antenna can be suite with many wireless applications like WPAN (wireless Personal area network), portable devices which is it came with a lot of functions and operated at different frequency ranges. There is very less attention has been given to consider organics material like jute in designing an antenna, where it is more environmentally friendly, low cost of manufacturing, durability, sustainable and renewable. The antenna was mounted on the flexible raw material of Jute as a substrate that have relative permittivity of 2.36, tangent loss 0.005407 at 5GHz frequency and the thickness is 1.68mm. Conductive material Shield it Super with conductivity of 1.18×10^5 and thickness of 0.17mm has been use as radiator in this design and the antenna was designed with ungrounded coplanar waveguide feeding technic. A simple CPW-UWB antenna was designed and simulated using CST (Computer Simulation Technology) software. Optimization to the antenna resulted, improvement at bandwidth, compared with the first design antenna. The proposed antenna achieved bandwidth of ~ 7.15 GHz which is operating frequency is from 3.48Ghz to 10.63GHz. Moreover, the antenna has $VSWR < 2$, Efficiency more than 75%, realized gain and directivity more than 2dBi and it also works in omnidirectional pattern, at entire frequency range.

16th December 2020, 12:00 – 12:20**Speaker 10:****Prof. Dr. Widad Ismail**

Universiti Sains Malaysia, Malaysia

Compact Reconfigurable Ultra Wide Band and 5G Narrow Band Vivaldi Tapered Slot Antenna

For a multiband communication system, a simple compact reconfigurable Vivaldi Tapered Slot Antenna (VTSA) is analyzed and designed in this paper. The designed antenna is aimed to switch between Ultra Wide Band (UWB) frequency band and one of the recent 5G low-frequency Narrow Band (NB: 5.975 GHz - 7.125 GHz). The simulation return loss S_{11} is less than -11.36 dB and -11.2 dB for UWB (2.78 GHz-11.2GHz) and NB (5.96 GHz-7.65 GHz) cases, respectively. 7.03 dBi and 6.3 dBi peak gains are obtained for UWB and NB, respectively. In this work, Computer Simulation Technology (CST) software based on Finite Integration Technique (FIT) is used.

16th December 2020, 12:20 – 12:40

Speaker 11:



Assoc. Prof. Sharifah Hafizah Syed Ariffin

Universiti Teknologi Malaysia, Malaysia

Securing Internet of Things System Using Software Defined Network Based Architecture

Majority of the daily and business activities nowadays are integrated and connected to the world across national, geographic and boundaries. Securing the Internet of Things (IoT) system is a challenge as the low powered devices in IoT system are very vulnerable to attacks and this will reduce the reliability of the system. Software Defined Network (SDN) intends to vastly simplify policy enforcement and network reconfiguration in a dynamic manner. This paper presents several architectures in the integration of IoT via SDN to improve security in several layers of the network and system

INVITED PAPERS

No	Title	Session
1	Wideband Metamaterial Substrate Integrated Waveguide Antenna For Millimeterwave Applications Noor Asniza Murad (Universiti Teknologi (UTM))	A1:5
2	A Wideband Wearable Antenna Using Inverse Partial Ground Designed Using Characteristic Mode Analysis Ping Jack Soh (Universiti Malaysia Perlis (UniMAP))	A2:8
3	Radio Propagation Modelling Of Antique Shophouses In Malaysia Soo Yong Lim (University Of Nottingham Malaysia, Malaysia)	B2:6

TUTORIAL

14th December 2020, 14:00 – 15:30



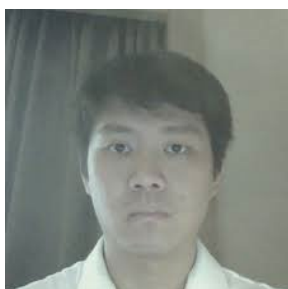
Tutorial 1:

Prof. Dr. Mohamed Himdi

Universite de Rennes 1, France

A Survey on reconfigurable plasma antennas up to millimeter waves

Today, wireless communications systems have become an integral part of daily life and continue to evolve in providing better quality and user experience. One of the recent emerging wireless technologies is Plasma antennas. It is important to note that Plasma antennas technology has been known for many decades, but has mainly been deployed for military applications. Over the past 10 years, advances in process technologies and low-cost integration solutions have made Plasma antennas a technology to watch and begun to attract a great deal of interest from academia and industry. In recent years, plasma has been used widely in order to realize reconfigurable antennas or reflectors. Plasma is the fourth state of the matter. When the plasma inside a container (tube) is energized (state ON), the media behaves like a conductive element capable to reflect radio signals like a metal. But when the tube is de-energized (State OFF), the plasma is non-conductor and visible to electromagnetic radiations. In the literature, plasma is used as a radiator to replace the metallic radiator. The main advantage of using a plasma reflector or plasma antenna instead metallic element is that allows an electrical control rather than a mechanical one. The tutorial is dedicated to a survey on reconfigurable plasma antennas from HF up to millimeter waves in the world. First, we will describe the basics of plasma physics, and the model of plasma, secondly, the technological and realization aspects will be described. After we will present examples of many studies of the plasma antennas using for beam steering using reflection or refraction of RF waves in plasma at different bands, antenna beam focusing signal, and beam spreading. The comparison between simulations and measurements will be also presented for many cases. Finally, major civil, military, automotive and medical applications will be presented.



Tutorial 2:

CT Chiang

SIMULIA-CST

Industry Digitalization with SIMULIA-CST Solution

We are oversaturated with 5G news and promises of the next best thing in technology. Dangerous misinformation is mixed in with the hype. Most consumers understand 5G as the next logical step in cellular technology, offering higher data speed for streaming. Business and industry leaders know it's important but may wonder how it will impact their business. There is no doubt that 5G will play a key role in industry digitalization, the ongoing revolution in automated production and operation efficiency. Leveraging the industrial internet of things, 5G will wirelessly connect all parts of the operation and enable digital twins that can predict and optimize performance in real-time. 5G will be a driver of smart manufacturing and industry 4.0 and add value by increasing productivity, reduce time to market, and lower development risk across globally separated operations and supply chains.

TECHNICAL PROGRAMME

TUESDAY, 15 DECEMBER 2020

	Webex 1	Webex 2
	<p>A1: 5G, Millimeter wave Antenna and MIMO Technologies</p> <p>Chair: Mohd Haizal Jamaluddin (Universiti Teknologi Malaysia, Malaysia)</p>	<p>B1: Antennas, Propagation & Electromagnetic Modeling</p> <p>Chair: Kamilia Kamardin (Universiti Teknologi Malaysia, Malaysia)</p>
16:00 – 16:20	<p>4x4 Element UWB Dual-Polarized Aperture Coupled Microstrip Patch Antenna Array for Chipless RFID</p> <p>Fatemeh Babaeian (Monash University, Australia); Nemaï Karmakar (MONASH University, Australia)</p>	<p>Impact of Mode of Operations on the Electromagnetic Emissions of a Complex Electronic Device</p> <p>Mohd Hafiz Baharuddin (Universiti Kebangsaan Malaysia, Malaysia); David Thomas (University of Nottingham, United Kingdom (Great Britain)); Tito Yuwono (Universitas Islam Indonesia, Indonesia); Chris Smartt (University of Nottingham, United Kingdom (Great Britain)); Mohammad Tariqul Islam (Universiti Kebangsaan Malaysia, Malaysia)</p>
16:20 – 16:40	<p>Radiation Pattern of Array Antenna with the Dual-Layer Butler Matrix</p> <p>Noorlindawaty Md Jizat (Multimedia University, Malaysia); Yoshihide Yamada (Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, Malaysia); Zubaida Yusoff (Multimedia University, Malaysia)</p>	<p>Electric Field Distributions of NMHA Inside and Outside of a Human Body Phantom</p> <p>Nur Amalina Kamaruddin (Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, Malaysia); Kamilia Kamardin (Universiti Teknologi Malaysia, Malaysia); Yoshihide Yamada (Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, Malaysia)</p>
16:40 – 17:00	<p>Caustic Analysis of Reflected Rays from a Spherical Reflector Antenna</p> <p>Kamelia Quzwain (Universiti Teknologi Malaysia, Malaysia); Ayuni Afiqah Arjunaidi and Yoshihide Yamada (Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, Malaysia); Kamilia Kamardin (Universiti Teknologi Malaysia, Malaysia); Nurul Huda Abd Rahman (Universiti Teknologi MARA, Malaysia); Alyani Ismail (Universiti Putra Malaysia, Malaysia); Nguyen Quoc Dinh (Le Quy Don Technical University & Faculty of Radio-Electronic Engineering, Vietnam)</p>	<p>Focal Spot Size Evaluation of a Focused Lens in Human Body</p> <p>Amirah Abd Rahman and Kamilia Kamardin (Universiti Teknologi Malaysia, Malaysia); Yoshihide Yamada (Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, Malaysia)</p>
17:00 – 17:20	<p>Ant-Colony Optimization for 5G NOMA User Grouping</p> <p>Hadhrani Ab Ghani and Nur Asyiqin BT Amir Hamzah (Multimedia University, Malaysia); Mohammed Ahmed Salem (Multimedia University (MMU), Malaysia); Ahmed Abdullah Ahmed (Universiti Teknikal Melaka, Malaysia); Azlan Abdul Aziz (Multimedia University, Melaka, Malaysia); Azizul Azizan (Universiti Teknologi Malaysia (UTM), Malaysia)</p>	<p>Analysis of a Meandered Loop Antenna Performance Under Muscle Implanted Condition</p> <p>Ngu War Hlaing (MJIIT & UTM, Malaysia); Kamilia Kamardin (Universiti Teknologi Malaysia, Malaysia); Yoshihide Yamada (Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, Malaysia)</p>

17:20 – 17:40	<p>Wideband Metamaterial Substrate Integrated Waveguide Antenna for Millimeterwave Applications Noor Asniza Murad (Universiti Teknologi Malaysia & HID GLOBAL Sdn. Bhd., Malaysia); Muataz Watheq Almeshehe (Faculty of Electrical Engineeri, Universiti Teknologi Malaysia, Malaysia); Osman Bin Ayop and Mohamad Kamal A Rahim (Universiti Teknologi Malaysia, Malaysia)</p>	<p>Performance Analysis of Normal Mode Helical Antenna in Seawater Siti Harliza Binti Mohd Razali (Universiti Teknologi Malaysia & Jabatan Pendidikan Politeknik, Malaysia); Razali Ngah (Universiti Teknologi Malaysia, Malaysia); Yoshihide Yamada (Malaysia-Japan International Institute of Technology, Universiti Teknologi Malaysia, Malaysia); Kamilia Kamardin (Universiti Teknologi Malaysia, Malaysia)</p>
17:40 – 18:00	<p>Wideband Millimeter Wave Rectangular Dielectric Resonator Antenna for 5G Applications Abinash Gaya and Mohd Haizal Jamaluddin (Universiti Teknologi Malaysia, Malaysia); Ayman A. Althuwayb (Jouf University, Saudi Arabia)</p>	<p>Comparison of Unit-Cell and All-Cells Active Element Patterns of Small Antenna Array Norun Abdul Malek, Khaleef Khairul Anuar, Othman Omran Khalifa and Md Rafiqul Islam (International Islamic University Malaysia, Malaysia)</p>
18:00 – 18:20	<p>Three-Dimensional Dirac Semimetal Antennas for Telecommunications in the Terahertz Spectrum Hong Cheng Law (Xiamen University Malaysia, Malaysia); Kelvin J. A. Ooi (Xiamen University Malaysia Campus, Malaysia); Yee Sin Ang (Singapore University of Technology and Design, unknown)</p>	<p>Selection of Suitable Feeding Mechanism for Maximum Gain in Reflectarrays Muhammad Hashim Dahri (Universiti Tun Hussein Onn Malaysia, Malaysia); Mohd Haizal Jamaluddin (Universiti Teknologi Malaysia, Malaysia); Fauziahanim Che Seman (Universiti Tun Hussein Onn Malaysia, Malaysia); Muhammad Ramlee Kamarudin (Universiti Tun Hussein Onn Malaysia, Malaysia)</p>

WEDNESDAY, 16 DECEMBER 2020

	Webex 1	Webex 2
	<p>A2: Antenna and Advanced Materials</p> <p>Chair: Eng Hock Lim (Faculty of Engineering and Science, UTAR, Malaysia)</p>	<p>B2: Radars, RF Sensors and Electromagnetic Waves Applications</p> <p>Chair: Idnin Pasya (University Teknologi MARA, Malaysia)</p>
08:00 - 08:20	<p>Flexible Folded-Patch Antenna with Tapered Edges for Metal-Mountable UHF RFID Tag Design</p> <p>Muthukannan Murugesu, Yong Hong Lee and Pei Song Chee (Universiti Tunku Abdul Rahman, Malaysia); Eng Hock Lim (Faculty of Engineering and Science, UTAR, Malaysia)</p>	<p>Non-Contact Respiration Rate Estimation using 24 GHz Pulse Radar Employing Envelop Detection</p> <p>Suraya Zainuddin (Universiti Teknologi MARA & Universiti Teknikal Malaysia Melaka, Malaysia); Nur Emileen Abd Rashid (Universiti Teknologi MARA, Malaysia); Khairul Khaizi Mohd Shariff (Faculty of Electrical Engineering, Universiti Teknologi MARA, Malaysia); Megat Syahirul Amin Megat Ali (Universiti Teknologi MARA, Malaysia); Idnin Pasya (University Teknologi MARA, Malaysia); Fauziahanim Che Seman (Universiti Tun Hussein Onn Malaysia, Malaysia)</p>
08:20 - 08:40	<p>Inverted Patch with an Inductive Loop-Shaped Feeder for On-Metal Tag Design</p> <p>Shin-Yi Ooi (Universiti Tunku Abdul Rahman, Malaysia); Eng Hock Lim (Faculty of Engineering and Science, UTAR, Malaysia); Pei Song Chee, Yong Hong Lee, Kim Yee Lee and Fwee Leong Bong (Universiti Tunku Abdul Rahman, Malaysia)</p>	<p>CWT Algorithm for Forward-Scatter Radar Micro-Doppler Signals Analysis</p> <p>Kama Azura Othman and Nur Emileen Abd Rashid (Universiti Teknologi MARA, Malaysia); Raja Syamsul Azmir Raja Abdullah (University Putra Malaysia, Malaysia)</p>
08:40 - 09:00	<p>Microstrip Rectangular Inset-Fed Patch Array Antenna for WiMax Application</p> <p>Norfisshah Ab Wahab, Siti Aminah Nordin and Wan Norsyafizan W. Muhamad (Universiti Teknologi MARA, Malaysia); Suzi Seroja Sarnin (University Technology MARA, Malaysia)</p>	<p>On the Frequency Scaling of High Power CW Magnetrons</p> <p>Aviraj Jadhav (Indian Institute of Technology, Bombay, India); Joseph John (I I T Bombay, India); Kushal Tuckley (Indian Institute of Technology, India); Promod Sharma (Institute for Plasma Research, India); Harish V. Dixit (Birla Institute of Technology and Science-Pilani, Hyderabad Campus & Vidyavardhini's College of Engineering and Technology, India)</p>
09:00 - 09:20	<p>Study on the Effects of Fabric Thickness and Human Phantom to Wearable Textile Antenna Performance</p> <p>Anis Fariza Md Pazil (SEGi University, Malaysia); Nurul Huda Abd Rahman (Universiti Teknologi MARA, Malaysia); Nurulazlina Ramli (SEGi University, Malaysia); Robiatun Adayiah Awang (Universiti Teknologi MARA, Malaysia)</p>	<p>Electromagnetic Wave Exposure Level from Mobile Base Station Around Residential Area</p> <p>Nor Ayu Zakaria (University of Technology MARA & UiTM, Malaysia); Zuhani Ismail Khan, Nur Emileen Abd Rashid and Siti Amalina Enche Ab Rahim (Universiti Teknologi MARA, Malaysia)</p>

09:20 – 09:40	<p>Angular Response Control in Sub-THz Phased Array Antenna Using Dual Graphene Layers Mohamed Habashy Mubarak and Shinsuke Hara (National Institute of Information and Communications Technology, Japan); Issei Watanabe (National Institute of Information and Communications Technology, Japan); Akifumi Kasamatsu (National Institute of Information and Communications Technology, Japan)</p>	<p>Shielding Efficiency Study of Sodium Based Chitosan Polymer with Different Types of Filler Nurul Osman (Universiti Putra Malaysia, Malaysia)</p>
09:40 – 10:00	<p>Design and Analysis of a Compact Wrench Shaped UWB Antenna for Spectrum Sensing in 3.1GHz to 10.6GHz Tangirala Gayatri and Garikipati Srinivasu (Bhagwant University, India); M K Chaitanya Durbhakula (Vasavi College of Engineering, India); Virendra Kumar Sharma (Bhagwant University, India)</p>	<p>Radio Propagation Modelling of Antique Shophouses in Malaysia Soo Yong Lim and Yujia Zhang (University of Nottingham Malaysia, Malaysia)</p>
10:00 – 10:20	<p>Performance Analysis of a Compact High Gain Antenna for RF Energy Harvesting in 1.71GHz to 12GHz Garikipati Srinivasu and Tangirala Gayatri (Bhagwant University, India); M K Chaitanya Durbhakula (Vasavi College of Engineering, India); Virendra Kumar Sharma (Bhagwant University, India)</p>	<p>Characterization of Liquid Sample Using Complementary Split Ring Resonator Sensor Muhammad Faris Sapuri (Universiti Teknologi MARA, Malaysia); Nor Ayu Zakaria (University of Technology MARA & UiTM, Malaysia); Nur Emileen Abd Rashid (Universiti Teknologi MARA, Malaysia); Khairul Khaizi Mohd Shariff (Faculty of Electrical Engineering, Universiti Teknologi MARA, Malaysia); Zuhani Ismail Khan and Siti Amalina Enche Ab Rahim (Universiti Teknologi MARA, Malaysia)</p>
10:20 – 10:40	<p>A Wideband Wearable Antenna Using Inverse Partial Ground Designed Using Characteristic Mode Analysis Bashar Bahaa Qas Elias (Universiti Malaysia Perlis (UniMAP), Malaysia); Ping Jack Soh (Universiti Malaysia Perlis (UniMAP) & Katholieke Universiteit Leuven, Malaysia); Azremi Abdullah Al-Hadi (University Malaysia Perlis, Malaysia); Saidatul Norlyana Azemi (Lecturer, UniMAP, Malaysia)</p>	<p>Electrical Characterization of Material Thickness Based on Free Space Method Using Patch Antennas Norun Abdul Malek and Norazlina Saidin (International Islamic University Malaysia, Malaysia); Khamis Ali (International Islamic University, Malaysia); Zuhairiah Zainal Abidin (Universiti Tun Hussein Onn Malaysia, Malaysia); Abdullah Hakim (International Islamic University Malaysia, Malaysia)</p>

	Webex 1	Webex 2
	A3: Antenna and Advanced Materials II Chair: Badrul Hisham Ahmad (Universiti Teknikal Malaysia Melaka, Malaysia)	B3: RF/Microwave Circuit Technologies Chair: Nur Emileen Abd Rashid (Universiti Teknologi MARA, Malaysia)
13:50 – 14:10	A Compact SRR Loaded Dual Band Antenna with Modified Ground for WLAN/WiMAX Applications Badrul Hisham Ahmad (Universiti Teknikal Malaysia Melaka, Malaysia)	Two-Stage Dickson Charge Pump Rectifier with Harmonics Suppression for 2.45 GHz WPT Lim Wei Cheng (University of Nottingham Malaysia & Keysight Technologies, Malaysia); Gnanam Gnanagurunathan (The University of Nottingham Malaysia Campus, Malaysia)
14:10 – 14:30	A Novel Dual Band Microstrip Patch Antenna for Ku/Ka Band Wireless Applications S j Vignesh (Manipal University Jaipur, India); Rashmi A. Pandhare (Indian Institute of Information Technology Nagpur, India); Dinesh Yadav (Manipal University Jaipur, India)	Practical Considerations for the CW Power Amplifier Design for Lower Hybrid Frequency Applications Sandeep Ramesh Sainkar (Veer mata Jijabai Technological Institute & K J Somaiya College of Engineering, India); A. N. Cheeran (Veer mata Jijabai Technological Institute (VJTI), India); Gajendrakumar Shinde (Astra Microwave Products Ltd., India); Promod Sharma (Institute for Plasma Research, India); Harish V. Dixit (Birla Institute of Technology and Science-Pilani, Hyderabad Campus & Vidyavardhini's College of Engineering and Technology, India)
14:30 – 14:50	Large NF UHF RFID Segmented Loop Antenna with Parasitic Coplanar Slot Loop Monica Wasfy (German University in Cairo, Egypt); Hany F Hammad (German University Cairo, Egypt)	A Modified Sinusoidal SWS with Dominant TM01 Mode and Improved Interaction Impedance for Use in BWOs Kapil Ram Gavali (BITS Pilani, Hyderabad Campus & Universal College of Engineering, India); Jayesh Ganji (Birla Institute of Technology and Science-Pilani, Hyderabad Campus, India); Harish V. Dixit (Birla Institute of Technology and Science-Pilani, Hyderabad Campus & Vidyavardhini's College of Engineering and Technology, India)
14:50 – 15:10	Electromagnetic Band Gap Structure for Microstrip Antenna Gain Enhancement at WLAN Band Yahiea Al-Naiemy (Budapest University of Technology and Economics, Hungary)	Quad Channel Wide Band Frequency Conversion with Integrated LO for High IF Bandwidth Madiwalesh Pattar (Bharat Electronics Limited, India); Gaurav Anand (Bharat Electronic Limited, India); Rohit Lahiri (Bharat Electronics Limited, India)
15:10 – 15:30	A Dual-Band Frequency Reconfigurable Antenna Array Based on Reconfigurable Defected Ground Structure Khalid Subhi Ahmad (Northern Technical University, (NTU) & Mosul Technical Institute, Iraq); Mohamad Zoinol Abidin Bin Abd Aziz (Universiti Teknikal Malaysia Melaka & Hang Tuah Jaya, Malaysia); Nuruliswa Abdullah (Universiti Teknikal Malaysia Melaka, Malaysia)	Analysis and Measurement of IM3 Anomalies in Single- and Double-Band Low-Noise Amplifiers Josef Dobeš, Jan Michal and Vaclav Navratil (Czech Technical University in Prague, Czech Republic); Zdenek Kolka (Brno University of Technology, Czech Republic)

15:30 – 15:50	<p>Coupled Slots Varactor-Tuned Unit Cell for Single Linear Polarization Reflectarrays at C-Band Tony Makdissy (TICKET Lab., Antonine University, Lebanon); Ihab Hassoun (City University, Lebanon)</p>	<p>The Advantages of Substituting Decoupling Capacitors on PWB with Embedded Capacitance Technology Chang Fei Yee (Keysight Technologies, Malaysia)</p>
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	Webex 1	Webex 2
	<p>A4: Microwave Systems and Applications Chair: Mohamad Zoinol Abidin Bin Abd Aziz (Universiti Teknikal Malaysia Melaka & Hang Tuah Jaya, Malaysia)</p>	<p>B4: Coupling Structures & Metamaterials Chair: Muhammad Farid Abdul Khalid (Universiti Teknologi MARA, Shah Alam, Malaysia)</p>
16:00 – 16:20	<p>Detecting Pathological Changes in the Brain Due to Alzheimer Disease Using Numerical Signal Analysis Rahmat Ullah (School of Engineering, Kings Building Campus, University of Edinburgh, United Kingdom (Great Britain)); Tughrul Arslan (The University of Edinburgh, United Kingdom (Great Britain))</p>	<p>Influence of Pre Sputtering Technique on Material Properties of BST Thin Films for Tunable Microwave Applications Muhammad Farid Abdul Khalid (Universiti Teknologi MARA, Shah Alam, Malaysia)</p>
16:20 – 16:40	<p>Multiple User MPT System Based on the Different Time Division Assignment (DTDA) Dayoung Kim, Hyeong Min Kwon and Heung-Gyoon Ryu (Chungbuk National University, Korea (South))</p>	<p>Split L-I Square Shaped Compact Metamaterial for Cube Satellite Applications Ahasanul Hoque (UKM & Universiti Kebangsaan Malaysia (UKM), Malaysia); Ali F. Almutairi (Kuwait University, Kuwait); Mohd Hafiz Baharuddin, Norsuzlin Mohd Sahar, Mohd Fais Mansor and Mohammad Tariqul Islam (Universiti Kebangsaan Malaysia, Malaysia)</p>
16:40 – 17:00	<p>Wearable Social Distancing Detection System Faatin Aneesah Ahmad Naqiyuddin, Wahidah Mansor, W., Nur Mahirah Sallehuddin, Muhammad Nur Shahzeley Mohd Johari and Muhammad Aidil Shazwan Shazlan (Universiti Teknologi MARA, Malaysia); Ahmad Naqiyuddin Bakar (Universiti Teknologi MARA (UiTM) Johor Branch & Centre for Bio-Diversity & Sustainable Development, Malaysia)</p>	<p>Performance Comparison Between Different Structures of FSS in Terms of Angular Stability Nurul Syafeeqa Ishak, Muhammad Hashim Dahri, Muhammad Ramlee Kamarudin and Fauziahanim Che Seman (Universiti Tun Hussein Onn Malaysia, Malaysia); Noor Azura Awang (UTHM, Malaysia); Chin Fhong Soon (Universiti Tun Hussein Onn Malaysia & Microelectronic and Nanotechnology-Shasmsuddin Research Center, Malaysia); Nurfarina Zainal (Universiti Tun Hussein Onn Malaysia, Malaysia)</p>
17:00 – 17:20	<p>Design and Development of FPGA Based Firmware for Automated Test Equipment for DWGRU Sai Srikar Dangeti (PES University & LRDE(DRDO), India); Sumanth Sakkara (PES University, India); Anant Raut (LRDE, DRDO, India)</p>	<p>Linear and Nonlinear Terahertz Three-Dimensional Dirac Nano-Plasmonic Waveguides Hong Cheng Law (Xiamen University Malaysia, Malaysia); Kelvin J. A. Ooi (Xiamen University Malaysia Campus, Malaysia); Mohammad Arif Sobhan Bhuiyan (Xiamen University Malaysia, Malaysia); Yee Sin Ang (Singapore University of Technology and Design, unknown)</p>

17:20 – 17:40	<p>How to Use a Graphical Programming Language in Functional Safety, Using the Example of LabVIEW Nick Berezowski (CCASS - Competence Center of Sensor Systems, Germany); Markus Haid (CCASS - Competence Center of Sensor Systems & Hochschule Darmstadt, Germany)</p>	<p>Design of H-Shape Defected Ground Structure Nor Ayu Zakaria (University of Technology MARA & UiTM, Malaysia); Khairul Khaizi Mohd Shariff (Faculty of Electrical Engineering, Universiti Teknologi MARA, Malaysia); Nur Emileen Abd Rashid, Zuhani Ismail Khan and Siti Amalina Enche Ab Rahim (Universiti Teknologi MARA, Malaysia)</p>
17:40 – 18:00	<p>A Hybrid Stack Up for Wide Band RF Cross Overs Rohit Lahiri (Bharat Electronics Limited, India)</p>	<p>PCL-BPF Using Different Types of Defected Ground Structure in Microwave Imaging System Syaza Syafiqah Zaidan (UNIMAS, Malaysia); Dyg Azra Awang Mat, Kismet Anak Hong Ping and Shafrida Sahrani (Universiti Malaysia Sarawak, Malaysia); Dyg Norkhairunnisa Abang Zaidel (Universiti Malaysia Sarawak & Faculty Engineering, Malaysia)</p>
18:00 – 18:20	<p>Numerical Simulation of Parameters Variation on SOI SSD YL Tan (Universiti Malaysia Perlis, Malaysia)</p>	<p>Microstrip Antenna Array with Defected Ground Structure and Copper Tracks for Bandwidth Enhancement Khalid Subhi Ahmad (Northern Technical University, (NTU) & Mosul Technical Institute, Iraq); Mohamad Zoinol Abidin Bin Abd Aziz (Universiti Teknikal Malaysia Melaka & Hang Tuah Jaya, Malaysia); Nurulswa Abdullah (Universiti Teknikal Malaysia Melaka, Malaysia)</p>

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