Proceeding Book
<table>
<thead>
<tr>
<th>Time</th>
<th>Room A</th>
<th>Room B</th>
<th>Room C</th>
<th>Room D</th>
<th>Room E</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>October 19, 2021</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13:20-15:00</td>
<td>SPC-1: Radar and Imaging</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Room A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:00-15:20</td>
<td>Break</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:20-17:00</td>
<td>SPC-2: EM Surfaces and Antennas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Room A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>October 20, 2021</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08:50-09:20</td>
<td>Opening Ceremony</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Room A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>09:20-10:20</td>
<td>Keynote 1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Applying Computational Electromagnetics for Engineering Applications</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Jin-Fa Lee</strong>, The Ohio State University</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Room A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:20-10:30</td>
<td>Break</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:30-11:30</td>
<td>Keynote 2</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Millimeter wave planar arrays in &quot;Tokyo Tech Wireless Fiber Project&quot; - B5G Heterogeneous Network and Planetary Exploration-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Makoto Ando</strong>, Tokyo Institute of Technology</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Room A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11:30-12:30</td>
<td>Keynote 3</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mobile Antenna Perspectives: From 4G/5G to B5G/6G</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Kin-Lu Wong</strong>, National Sun Yat-sen University</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Room A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Room A</td>
<td>Room B</td>
<td>Room C</td>
<td>Room D</td>
<td>Room E</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------------------------</td>
<td>---------------------------------------------</td>
<td>---------------------------------------------</td>
<td>---------------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td><strong>October 20, 2021</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:30-13:20</td>
<td></td>
<td>Lunch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13:20-15:00</td>
<td>SS01: mmWave/sub-THz Antenna Technologies for 6G Communications</td>
<td>WE-3-2 SS02: Innovative Antenna Techniques and Solutions for 5G and B5G</td>
<td>WE-3-3 SS13: Recent Developments in Dielectric Resonator Based Components</td>
<td>WE-3-4 SS16: Advanced Array Architectures at mmWave and sub-THz for Focused Beam and Beamforming (1/2)</td>
<td>Interactive Forum: WE-IF</td>
</tr>
<tr>
<td>15:00-15:20</td>
<td></td>
<td>Break</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:20-17:20</td>
<td>SS22: EurAAP Special Session</td>
<td>WE-4-2 SS08: Recent Trial on Novel Ideas of Antennas for Various Applications</td>
<td>WE-4-3 SS17: Small Antennas and RF Sensors</td>
<td>WE-4-4 SS16: Advanced Array Architectures at mmWave and sub-THz for Focused Beam and Beamforming (2/2)</td>
<td></td>
</tr>
<tr>
<td><strong>October 21, 2021</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:10-10:30</td>
<td></td>
<td>Break</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Session</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:20-13:20</td>
<td>Lunch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13:20-13:40</td>
<td>Industrial Talk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>The Latest Simulation Technology and Best Practice in Antenna and Electromagnetic Designs</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Benson Wei</strong>, <em>ANSYS</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Room A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13:40-14:00</td>
<td>Industrial Talk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Novel Diamond CATR Design for B5G and Radar Testing</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Richard Liu</strong>, <em>Wavepro Inc.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Room A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:00-14:10</td>
<td>Break</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14:10-15:10</td>
<td>Keynote 4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Antennas and RF Technologies for 6G</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Y. Jay Guo</strong>, <em>University of Technology Sydney</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Room A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:00-15:20</td>
<td>Break</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:20-16:20</td>
<td>Keynote 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Millimeter-Wave Antennas for Next Generation Telecommunications Networks</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Mauro Ettorre</strong>, <em>Institut d'Electronique et des Technologies du numérique (IETR), French National Center for Scientific Research (CNRS)</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Room A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16:20-16:30</td>
<td>Break</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16:30-16:50</td>
<td>Industrial Talk</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Hardware and Software Solution for Wireless Power Transfer and mmWave</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Leslie Li</strong>, <em>Auden Techno Corp.</em></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(Room A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>Session Details</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------</td>
<td>---------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>08:30-10:10</td>
<td>08:30-10:10</td>
<td>FR-1-1 Antennas for Laptops or Handheld Devices</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-1-2 Antennas for Laptops or Handheld Devices</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-1-3 Antenna Designs, Solutions, Measurements, and Trends for 5G and Beyond</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-1-4 Antenna Modeling and Measurements</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-1-5 Radar, DOA, localization and Sensing (1/3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:10-10:30</td>
<td>Break</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10:30-12:20</td>
<td>FR-2-1 Antenna Technologies Related to Human Monitoring</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-2-2 Antenna Technologies Related to Human Monitoring</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-2-3 Antenna Technologies Related to Human Monitoring</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-2-4 Antenna Technologies Related to Human Monitoring</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-2-5 Radar, DOA, localization and Sensing (2/2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12:20-13:20</td>
<td>Lunch</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13:20-15:00</td>
<td>FR-3-1 Glide Symmetries and Their Applications for Microwave Devices</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-3-2 Broadband and Multi-band Antennas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-3-3 Multi-Antenna based Technologies of Open Radio Access Network (O-RAN) for 5G/B5G/6G Applications at Millimeter Wave (1/2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-3-4 EBG, Metamaterials and Periodic Structures</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-3-5 Radar, DOA, localization and Sensing (3/3)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:00-15:10</td>
<td>Break</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15:10-17:10</td>
<td>FR-4-1 Millimeter-wave, Terahertz Antennas and System</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-4-2 Millimeter-wave, Terahertz and Optical Antennas</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-4-3 Multi-Antenna based Technologies of Open Radio Access Network (O-RAN) for 5G/B5G/6G Applications at Millimeter Wave (2/2)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-4-4A Microwave, mmWave, and THz Imaging</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-4-4B Reflectarrays</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>FR-4-5 Design Method and Application of Multi-Antenna Systems</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17:10-17:25</td>
<td>Closing Ceremony (Room A)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Greetings from General Chair

On behalf of the Organizing Committee, it is my pleasure and privilege to welcome you to attend the 26th International Symposium on Antennas and Propagation, ISAP 2021, to be held virtually at Taipei, Taiwan from October 19 (Tuesday) through 22 (Friday), 2021.

This Symposium is organized by National Taiwan University of Science and Technology and National Taiwan University, co-organized by National Chung-Shan Institute of Science & Technology and the Industrial Technology Research Institute, and is held in cooperation with the Communications Society of the Institute of Electronics, Information and Communications Engineers (IEICE-CS), the Antennas and Propagation Society of the Institute of Electrical and Electronics Engineers (IEEE AP-S), the International Union of Radio Science (URSI), the European Association on Antennas and Propagation (EurAAP), the Antenna Measurement Techniques Association (AMTA), the Korean Institute of Electromagnetic Engineering and Science (KIEES), the ECTI Association (Thailand), the Taiwan Microwave Association, and the Institute of Antenna Engineers of Taiwan (IAET).

ISAP is one of the Asia’s largest and most significant antennas and propagation conferences attracting academic and industrial participants at all career stages from all over the world. It is a premier forum for exchanging new technical-scientific achievements, for demonstrating state-of-the-art technology, and for establishing and strengthening professional cooperation and network in antennas, propagation, electromagnetic wave theory, and related fields.

I would like to express my sincere appreciation to all the participants, financial sponsors, exhibitors, supporting organizations and all the committee members who make the ISAP2021 successful. With the strong supports, we believe the ISAP2021 will be beneficial and fruitful to all participants.

Taipei is a beautiful city known for her fusion of cultures around the Asia-Pacific region. Signature sightseeing spots, tasty food, and fashion shopping districts are all in the nearby. Despite we are unable to meet you in person this year, we still sincerely invite you to visit our lovely city after the pandemic!

We are looking forward to meeting you virtually, in October 2021.

Prof. Tzyh-Ghuang Ma
National Taiwan University of Science and Technology
General Chair, ISAP2021
Welcome to the 26th International Symposium on Antennas and Propagation, ISAP 2021. We are pleased to continue the tradition of ISAP, the premier AP conference in Asia, in offering a high-quality technical program in a virtual and friendly setting that facilitates close interactions among participants. Initially planned in Taipei, ISAP 2021 will run as a fully virtual web-based event, due to the uncertainty of the unfolding Covid-19 pandemic.

The ISAP 2021 technical program features 198 and 126 scientific papers in 42 oral sessions and 3 poster sessions, respectively. Among the oral papers, 25 invited papers presented by eminent AP researchers are scheduled in different sessions from October 20 through October 22, and 10 papers selected as the finalist of the Student Paper Competition (SPC) will be presented by the leading student authors in the 2 SPC sessions on October 19. In addition, one poster session is scheduled each day from October 20 through October 22.

Keynote speeches are another fundamental part of the technical program. We are honored to have Prof. Jin-Fa Lee (OSU, USA), Prof. Makoto Ando (TIT, Japan), Prof. Kin-Lu Wong (NSYU, Taiwan), Prof. Y. Jay Guo (UTS, Australia), and Dr. Mauro Ettorre (CNRS, France), all well-known world-class AP researchers. We are convinced that their talks, which will deal with topics of enormous relevance and novelty, are one of the most attractive parts of our technical program.

We would like to thank the many people who have contributed to this year's ISAP program. Foremost, we wish to thank all the paper authors for choosing ISAP as the channel to present their quality research. We are grateful to the 107 members of the Technical Program Committee for providing timely and quality reviews and the help in the final paper selection process. The program of the conference would not have been possible without their generous work and efforts.

Finally, we would like to welcome all the attendees to the conference and thank them for participating in ISAP 2021. We hope that you will enjoy attending the 2021 online activities, and look forward to meeting you in person in future ISAP conferences!

Prof. Shih-Yuan Chen
National Taiwan University
TPC Chair of ISAP 2021
ISAP 2021 Committee Members

**International Advisory Committee**

**Chair:**
Kin-Lu Wong  
National Sun Yat-sen University, Taiwan

**Co-Chair**
Wen-Shan Chen  
Southern Taiwan University of Science and Technology, Taiwan
Hirokuki Arai  
Yokohama National University, Japan
Yingjie Jay Guo  
University of Technology Sydney, Australia
Koichi Ito  
Chiba University, Japan
Richard W. Ziołkowski  
The University of Arizona, USA
Jaehoon Choi  
Hanyang University, Korea
Qiang Chen  
Tohoku University, Japan
Mohamad Kamal A Rahim  
Universiti Teknologi Malaysia

**Industry Advisory Committee**

**Co-Chair**
Daniel Chang  
Chairman, Auden Techno Corp.
Rong-Chung Liu  
President, WavePro Inc.

**Organizing Committee**

**Honorary Chairs:**
Chang-Fa Yang  
National Taiwan University of Science and Technology, Taiwan
Hsi-Tseng Chou  
National Taiwan University, Taiwan

**Honorary Co-Chair:**
Ding-Bing Lin  
National Taiwan University of Science and Technology, Taiwan

**General Chair:**
Tzyh-Ghuang Ma  
National Taiwan University of Science and Technology, Taiwan

**General Co-Chair:**
Chow-Yen Desmon Sim  
Feng Chia University Taiwan

**Technical Program Committee Chair:**
Shih-Yuan Chen  
National Taiwan University, Taiwan

**Technical Program Committee Co-Chairs:**
Wen-Jiao Liao  
National Taiwan University of Science and Technology, Taiwan

**General Secretariats:**
Wen-Jiao Liao  
National Taiwan University of Science and Technology, Taiwan
Yen-Sheng Chen  
National Taipei University of Technology, Taiwan

**Publication Chair:**
Yen-Sheng Chen  
National Taipei University of Technology, Taiwan

**Student Paper Competition Chairs:**
Takeshi Fukusako  
Kumamoto University, Japan
Jui-Han Lu  
National Kaohsiung Marine University, Taiwan

**Finance Chair:**
Chao-Hsiung Tseng  
National Taiwan University of Science and Technology, Taiwan

**Exhibition & Sponsor Chair:**
Shu-Chuan Chen  
National Defense University, Taiwan

**Local Arrangement Chair**
Wen-Jiao Liao  
National Taiwan University of Science and Technology, Taiwan

**Poster Chair**
Kun-You Lin  
National Taiwan University
Emerald Sponsor

Far Eastern Electronic Toll Collection Co.

Gold Sponsors

Gold Sponsors

Silver Sponsors

Silver Sponsors
<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>13:20-15:00</td>
<td><strong>Student Paper Competition</strong></td>
<td><strong>SPC-1: Radar and Imaging</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Chairs:</strong> Takeshi Fukusako, Kumamoto University, Japan</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Yen-Sheng Chen, National Taipei University of Technology, Taiwan</td>
<td></td>
</tr>
<tr>
<td>220172</td>
<td>Multi-target Monitoring for Distinguishable Range Improvement Using a Hybrid FMCW-FSK 24 GHz Radar</td>
<td>Ming Hong Li, Kuan Ju Wu, Chin Lung Yang</td>
<td>National Cheng Kung University, Taiwan</td>
</tr>
<tr>
<td>220212</td>
<td>On Effective Parameter for Human Motion Recognition with MW-MIMO Radar Using CNN</td>
<td>Fumiya Sakagami and Hiroyoshi Yamada</td>
<td>Niigata University, Japan</td>
</tr>
<tr>
<td>220321</td>
<td>A C-band 4096-QAM OFDM Data Link for 5G Private Network Applications</td>
<td>Ming Hong Li, Kuan Ju Wu, Chin Lung Yang</td>
<td>National Cheng Kung University, Taiwan</td>
</tr>
<tr>
<td>220343</td>
<td>Experimental Study on 3-Dimensional Imaging Using MW-2D-MIMO Radar</td>
<td>Tateki Kato, Hiroyoshi Yamada, Hiroki Mori</td>
<td>Niigata University, Japan</td>
</tr>
<tr>
<td>220370</td>
<td>A Study on THz Reflection Imaging of Two Metal Wires Using Compressed Sensing</td>
<td>Rio Yanagi, Keizo Cho, Hiroaki Nakabayashi, and Koji Suizu</td>
<td>Chiba Institute of Technology, Japan</td>
</tr>
<tr>
<td>15:20-17:00</td>
<td><strong>Student Paper Competition</strong></td>
<td><strong>SPC-2: EM Surfaces and Antennas</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Chair:</strong> Yen-Sheng Chen, National Taipei University of Technology, Taiwan</td>
<td></td>
</tr>
<tr>
<td>220093</td>
<td>A Dual-polarized Electromagnetic Energy Harvesting Surface with A Simple Structure</td>
<td>Fengshuo Zhang, Wei Li*, Ying Suo</td>
<td>Harbin Institute of Technology, China</td>
</tr>
<tr>
<td>220146</td>
<td>Frequency Selective Surface Design by Adaptive Artificial Neural Network</td>
<td>Jingyue Zhang, Jin-Fa Lee</td>
<td>The Ohio State University, United States</td>
</tr>
<tr>
<td>220182</td>
<td>Seminalytically Designed, Transverse Magnetic,Printed Circuit Board Metagratings</td>
<td>Yuval Shklarsh and Ariel Epstein</td>
<td>Technion-Israel Institute of Technology, Israel</td>
</tr>
<tr>
<td>220187</td>
<td>Bandwidth Enhancement of Printed Monopole Element Quasi-Yagi antenna using a Parasitic Resonator</td>
<td>Amar D. Chaudhari, and K. P. Ray</td>
<td>Defence Institute of Advanced Technology (DIAT), India</td>
</tr>
<tr>
<td>220233</td>
<td>Enhancing and Localizing Surface Wave Propagation with Reconfigurable Surfaces</td>
<td>Zhiyuan Chu, Kai-Kit Wong, and Kin-Fai Tong</td>
<td>University College London, United Kingdom</td>
</tr>
</tbody>
</table>
We Wednesday, October 20

8:50-12:30

Room A

Chair: Wen-Jiao Liao, National Taiwan University of Science and Technology, Taiwan

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:50-09:20</td>
<td>Opening Ceremony</td>
</tr>
<tr>
<td>09:20-10:20</td>
<td>Keynote 1</td>
</tr>
</tbody>
</table>

Applying Computational Electromagnetics for Engineering Applications

Prof. Jin-Fa Lee, The Ohio State University, United States

Abstract:
Non-Conformal Numerical Methods

Non-conformal numerical methods, such as non-conformal domain decomposition methods (DDMs) [1], the multi-solver DDM, the integral equations discontinuous Galerkin (IEDG) method [2], and the newly developed embedded domain decomposition methods [3] have been introduced successfully within the computational electromagnetic (CEM) community. I will briefly review these methodologies and highlight some recent advancements that we have made to further enhance their adoption for engineering applications.

Engineering Applications

In recent years, we have witnessed many engineering applications benefited from the employment of CEM, such as antenna designs, electromagnetic wave interactions with convoluted 3D platforms, signal integrity analysis in highly complex electronics, just to name a few. The second part of my talk will detail two specific engineering applications: integration of non-conformal numerical methods with the neural network to design frequency selective surface on doubly-curved surfaces, and the co-simulation to conduct emission and vulnerability analyses of analog mixed signal (AMS) chips on printed circuit board (PCB).

Biography:

Jin-Fa Lee received the B.S. degree from National Taiwan University, in 1982 and the M.S. and Ph.D. degrees from Carnegie-Mellon University in 1986 and 1989, respectively, all in electrical engineering. From 1988 to 1990, he was with ANSOFT Corp., where he developed several CAD/CAE finite element programs for modeling three-dimensional microwave and millimeter-wave circuits. From 1990 to 1991, he was a post-doctoral fellow at the University of Illinois at Urbana-Champaign. From 1991 to 2000, he was with Department of Electrical and Computer Engineering, Worcester Polytechnic Institute. He joined the Ohio State University at 2001 where he is currently a Professor in the Dept. of Electrical and Computer Engineering. Prof. Lee is an IEEE fellow and was serving as an associate editor for IEEE Trans. Antenna Propagation from 2008 to 2013. Prof. Lee is the conference co-Chair of the ACES Conference, 2012, at Columbus. He was an IEEE APS Distinguished Lecturer from 2012 to 2014. Prof. Lee is one of the co-authors of the 2014 Sergei A. Schelkunoff Prize Paper Award and is the recipient of the 2016 Harrington-Mittra CEM award from IEEE AP Society. Prof. Lee received the distinguished scholar award from the Ohio State University for the year 2012.
Millimeter wave planar arrays in "Tokyo Tech Wireless Fiber Project" - B5G Heterogeneous Network and Planetary Exploration -

Prof. Makoto Ando, Tokyo Institute of Technology, Japan

Abstract:
Unique planar waveguide slot arrays have been developed in Tokyo Institute of Technology. The low loss and high gain characteristics stand out in high frequency. The design started from the single layer waveguide with traveling wave excitation with minimized conductor loss and then was extended to multiple layers with corporate feed for wider bandwidth. In 5G and beyond, millimeter and even terahertz frequency will be utilized, and these arrays are promising for it. This talk introduces the proof-of-concept demonstration of the millimeter wave heterogeneous network systems named as "Tokyo Tech Wireless Fiber Project" supported by Ministry of Internal Affairs and Communications, JAPAN. The compact range communication in 60GHz and the direction division duplex system in 40GHz were developed where high gain waveguide planar arrays were fully utilized for big file transfer. Another application is the radial line slot antenna (RLSA) in 32GHz on board of JAXA Asteroid explorer “Hayabusa 2” which came back to earth on 6 December 2020. Latest development of arrays of these types would also be mentioned in the light of the increasing roles of wireless technology in the society.

Biography:
Makoto Ando received his doctorate of engineering in electrical engineering from Tokyo Institute of Technology in 1979. He subsequently joined NTT and was engaged in the development of antennas for satellite communication. He moved to Tokyo Institute of Technology in 1982 and served as a Professor and 2015-2018 Executive Vice President for Research. In 2018, he moved to National Institute of Technology (KOSEN) where he is currently serving as the senior executive director. His main interests have been field and waves in radio science, especially high frequency diffraction theory, the design of waveguide planar arrays, and millimeter-wave antennas for future wireless communication. He plays a leading role in the promotion of a wide range of applications of millimeter-wave wireless communications in Japan.

His international activities have included service as 2009 president of the IEEE Antennas and Propagation Society, 2018-2019 President of The Institute of Electronics, Information and Communication Engineers (IEICE), Japan and the Chair of the ISAP International Steering Committee and 2017-2020 president of the International Union of Radio Science (URSI), Professor Ando is a fellow of IEEE, URSI and an honorary member of IEICE.

Recognized by the IEICE with the Distinguished Achievement and Contributions Award, he has also received the Inoue Prize for Science, both the Meritorious Award on Radio and the Meritorious Award on Contributions to the Promotion of Computerization from the Minister of Internal Affairs and Communications (MIC) and the 2016 Culture Award from the Japan Broadcasting Corporation (NHK).
Mobile Antenna Perspectives: From 4G/5G to B5G/6G

Prof. Kin-Lu Wong, National Sun Yat-sen University, Taiwan

Abstract:
Based on mobile antenna developments from 4G to 5G communications, mobile antenna perspectives for beyond 5G (B5G) and 6G communications are addressed. The corresponding frequency spectrums including low-band, mid-band, and high-band from 1G/2G/3G to 4G/5G are first discussed and their promising evolution to B5G/6G mobile communication are then elaborated. It should be noted that the frequency spectrum from low to high bands are required for wider coverage and higher throughput for mobile communication. To achieve higher throughput such as the multi-Gbps throughput for 5G mobile terminals, the multi-input-multi-output (MIMO) operation in the sub-6GHz band to support at least 4 MIMO streams and the high-gain beamforming operation in the millimeter-wave band have been applied. The corresponding advances in the system throughput testing for the 5G mobile antennas in real environments are introduced. Finally, based on advanced 5G mobile antenna development and the possible frequency spectrum for B5G/6G mobile communication, promising design concepts of the mobile antennas for future user equipment and access points are discussed.

Biography:
Prof. Kin-Lu Wong is a National Chair Professor of Ministry of Education, a Distinguished Researcher of Ministry of Science and Technology, a Distinguished Chair Professor with National Sun Yat-sen University, Taiwan, a Thomson Reuters Highly Cited Researcher, an Elsevier Most Cited Researcher, and an IEEE Fellow. He has graduated 56 PhD students, published 560 refereed journal papers, and granted over 300 patents, including 101 U.S. patents. Prof. Wong’s published articles have been cited over 30,000 times with an H-index of 83 in Google Scholar. He was General Chairs of 2012 APMC, 2014 ISAP, and 2016 APCAP held in Kaohsiung, Taiwan.
### Room A

**SS01: mmWave/sub-THz Antenna Technologies for 6G Communications**

Chair: **Won Bin Hong**, Pohang University of Science and Technology, Korea  
**Wen-Jiao Liao**, National Taiwan University of Science and Technology, Taiwan

<table>
<thead>
<tr>
<th>SS20357: WiThRay: Versatile 3D Simulator for Intelligent Reflecting Surface-aided MmWave Systems</th>
</tr>
</thead>
</table>
| Hyuckjin Choi, Junil Choi  
Korea Advanced Institute of Science and Technology (KAIST), South Korea |

<table>
<thead>
<tr>
<th>SS20389: D-band Affordable Phased-Array Antenna-on-Package for 6G Transceivers</th>
</tr>
</thead>
</table>
| Seongwoog Oh, Jungsuek Oh  
Seoul National University, South Korea |

<table>
<thead>
<tr>
<th>SS20415: Tunable Huygens’ Transmission Metasurface on Double-Layer PCB</th>
</tr>
</thead>
</table>
| Kd M Raziul Islam, Sang Min Lee, and Sangeo Choi  
University of Ulsan, South Korea |

<table>
<thead>
<tr>
<th>SS20198: Realization of an 110GHz Antenna Array Module by Using AiP Technologies for Potential 6G Applications</th>
</tr>
</thead>
</table>
| Kuan-Hsun Wu¹, Hsi-Tseng Chou¹, Ding-Bing Lin²  
¹National Taiwan University, Taiwan, ²National Taiwan University of Science and Technology, Taiwan |

<table>
<thead>
<tr>
<th>SS20259: Large Scale Characteristics of Millimeter-Wave Propagation Channels in Various Indoor Office Environments</th>
</tr>
</thead>
</table>
| Keiichiro Kumakura, Shuaiqin Tang, Hibiki Tsukada, and Minseok Kim  
Niigata University, Japan |

### Room B

**SS02: Innovative Antenna Techniques and Solutions for 5G and B5G**

Chair: **Wei Lin**, University of Technology Sydney, Australia  
**Chia-Te Liao**, Air Force Institute of Technology, Taiwan

<table>
<thead>
<tr>
<th>SS20039: A Dual-polarized Wideband Reconfigurable Reflected / Transmitted Filter Array Antenna Element</th>
</tr>
</thead>
</table>
| Min Wang¹, Wei Luo¹, Jianlin Feng¹, Zhengchuan Chen²  
¹Chongqing University of Posts and Telecommunications, China, ²Chongqing University, China |

<table>
<thead>
<tr>
<th>SS20206: A Highly Compact and Highly Efficient Huygens Antenna Array</th>
</tr>
</thead>
</table>
| Wei Lin and Richard W. Ziolkowski  
University of Technology Sydney, Australia |

<table>
<thead>
<tr>
<th>SS20418: A Highly-Integrated Low-Sidelobe Monopulse Array with Additive Manufacturing Technique</th>
</tr>
</thead>
</table>
| Guan-Long Huang¹, Rui-Shen Chen¹, and Sai-Wai Wong²  
¹Foshan University, China, ²Shenzhen University, China |

<table>
<thead>
<tr>
<th>SS20147: Substrate Integrated Waveguide Cavity slot Antenna at millimeter wave for 5G application</th>
</tr>
</thead>
</table>
| Yaqdhan Mahmood Hussain, Mohamad Kamal A. Rahim, Noor Asniza Murad, H. O. Hanoosh, Hussam Hamid Keriee  
¹Universiti Teknologi Malaysia, Malaysia |
### Room C

**RFID and Wireless Power Transfer**

**Chairs:** Chien-Hung Chen, *R.O.C. Air Force Academy, Taiwan*
Yaxin Yu, *Chang’an University, China*

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>220078</td>
<td>Shorted Four-Element Patch Antenna with High Directivity and Wideband for Small Metal-Tag</td>
<td>Minh-Tan Nguyen¹, Yi-Fang Lin¹, Chin-Cheng Chang¹, Chien-Hung Chen², and Hua-Ming Chen¹</td>
<td>¹National Kaohsiung University of Science and Technology, Taiwan, ²R.O.C. Air Force Academy, Taiwan</td>
</tr>
<tr>
<td>220133</td>
<td>Multi-Tag Detection Using Multivariate Statistical Analysis for Frequency-Coded Chipless RFID</td>
<td>Wen-Sen Li, Ko-Chun Liu, Fei-Peng Lai, and Yen-Sheng Chen</td>
<td>National Taipei University of Technology, Taiwan</td>
</tr>
<tr>
<td>220139</td>
<td>Chipless Radiofrequency Identification Using Pauli Matrix Decomposition in Unlicensed Bands</td>
<td>Fei-Peng Lai*, Han Chang, and Yen-Sheng Chen</td>
<td>National Taipei University of Technology, Taiwan</td>
</tr>
<tr>
<td>220345</td>
<td>Development of a Simple and Lightweight Phantom Focusing on RCS at 920 MHz</td>
<td>Kazuki Sato¹, Kazuyuki Saito</td>
<td>Chiba University, Japan</td>
</tr>
<tr>
<td>220127</td>
<td>A Flux Compensation Structure for Wirelessly Charging the Electric Vehicles</td>
<td>Yaxin Yu*, Bo Xu, Yang Dong, Lingyu Xiao</td>
<td>Chang’an University, China</td>
</tr>
</tbody>
</table>

### Room D

**SS13: Recent Developments in Dielectric Resonator Based Components**

**Chairs:** Kai Lu, *City University of Hong Kong, Hong Kong SAR*
Shao-Yong Zheng, *Sun Yat-sen University, China*

<table>
<thead>
<tr>
<th>Paper ID</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>220372</td>
<td>(Invited talk) A New Class of Dielectric Resonator Circuit Without Metallic Enclosure</td>
<td>Shaoyong Zheng</td>
<td>Sun Yat-sen University, China</td>
</tr>
<tr>
<td>220315</td>
<td>Design of a Compact Dielectric Resonator Antenna with Flat-top Radiation Pattern</td>
<td>Shu Yu¹, Shaoyong Zheng¹, Yong-Mei Pan²</td>
<td>¹Sun Yat-sen University, China, ²South China University of Technology, China</td>
</tr>
<tr>
<td>220408</td>
<td>Low-Profile and Broadband Dielectric Resonator Antenna by Using Air Regions</td>
<td>Ying Liu, Xu Wang Li, Changfei Zhou, Hui Li, and Lei Guo</td>
<td>Dalian University, China</td>
</tr>
<tr>
<td>220409</td>
<td>Wideband Unidirectional Dielectric-Loaded Dipole</td>
<td>Kai Lu¹, Zhi-li Su², and Kwok Wa Leung¹²</td>
<td>¹Sun Yat-sen University, Guangzhou, China, ²City University of Hong Kong, Hong Kong SAR, China</td>
</tr>
</tbody>
</table>
SS16: Advanced Array Architectures at mmWave and sub-THz for Focused Beam and Beamforming (1/2)

**Chairs:** Mauro Ettorre, *University of Rennes 1, France*
Jiro Hirokawa, *Tokyo Institute of Technology, Japan*

**220160:** (Invited talk) Low-profile CTS Antenna with Circular Polarization for Satcom Applications in PCB technology
Adham Mahmoud¹, Michele Del Mastro¹, Thomas Potelon¹, Ronan Sauleau¹, Gilles Quagliaro², Anthony Grbic³, and Mauro Ettorre¹

¹Univ. Rennes, CNRS, IETR (Institut d’Electronique et des Technologies du numérique), France, ²Thales SIX GTS, France, ³University of Michigan, USA

**220120:** A Switchable Linear to Circular Polarization Converter Using PIN Diodes
Reda Madi¹, Antonio Clemente¹, Ronan Sauleau²

¹CEA-Leti, Université Grenoble Alpes, France, ²Univ Rennes, CNRS, IETR (Institut d’Electronique et des Technologies du numérique), France

**220255:** Linearly-Polarized and Circularly-Polarized Discrete Lenses for Wideband Applications
Fan Wu¹, Jingxue Wang², and Zhi Hao Jiang¹

¹Southeast University, China, ²Hohai University, China

**220041:** Beam-Switching 2-D Butler Matrices Generating a Triangular Lattice of Beams
Jiro Hirokawa¹ and Nelson J. G. Fonseca²

¹Tokyo Institute of Technology, Japan, ²European Space Agency, The Netherlands

**15:20-17:20 Oral Sessions**

Room A

SS22: EurAAP Special Session

**Chairs:** Stefania Monni, *The Netherlands Organisation for applied scientific research, The Netherlands*
Chin-Lung Yang, *National Cheng Kung University, Taiwan*

**220115:** (Invited talk) Recent Achievements on Passive and Beam Steering Transmitarrays at Millimeter Waves
Orestis Koutsos¹,², Reda Madi¹,², Francesco Foglia Manzillo¹, Maciek Smierzchalski¹, Antonio Clemente¹, and Ronan Sauleau²

¹CEA-Leti, Univ. Grenoble-Alpes, France, ²Univ Rennes, CNRS, IETR – UMR 6164, France

**220360:** (Invited talk) Mm-wave antennas in package for 5G applications
Alessandro Garufo¹, Roland Bolt¹, E. Suijker¹, P. Kaminski¹, M. Geurts², M. Acar², J. W. Bergman², R. Mandamparambil², and S. Monni¹

¹TNO Radar Technology, The Netherlands, ²NXP Semiconductors, The Netherlands

**220088:** Evaluation of Array Fed Reflector Architectures for Broadband Satellite Missions
Alejandro Baldominos¹, Alberto Mengali², Nelson J.G. Fonseca² and George Goussetis¹

¹Heriot-Watt University, U.K., ²European Space Agency

**220089:** Realistic Interference Simulations in a Data Center Offering Wireless Communication at Low Terahertz Frequencies
Johannes M. Eckhardt, Christoph Herold, Björn Frieben, Nils Dreyer, and Thomas Kürner

Technische Universität Braunschweig, Germany

**220227:** Luneburg Lenses for the New Generation of Communication Systems
Oscar Quevedo-Teruel, Oskar Zetterstrom

KTH Royal Institute of Technology, Sweden
Room B

**SS08: Recent Trial on Novel Ideas of Antennas for Various Applications**

**Chairs:** Takeshi Fukusako, Kumamoto University, Japan  
Chuwong Phongcharoenpanich, King Mongkut's Institute of Technology Ladkrabang, Thailand

220289: (Invited talk) Design Techniques for Conductor-backed Low-profile Antennas  
Takeshi Fukusako*, Ryuji Kuse and Choei Genka  
Kumamoto University, Japan

220067: 1-bit Unit-Cell For Ka-band Reconfigurable Transmitarrays  
Minh Thien Nguyen1,2, Binh Duong Nguyen1,2  
1International University, Vietnam, 2Vietnam National University, Vietnam

220307: A High Noise Immunity Monopulse Direction of Arrival Estimation Antenna for Vehicle Tracking  
Yutaka Umeda¹, Eisuke Nishiyama¹, Ichihiko Toyoda¹, Masayuki Miyashita², Kazuma Tomimoto², and Ryo Yamaguchi²  
¹Saga University, Japan, ²SoftBank Corp., Japan

220204: Multiband Antenna for Multi-source Ambient RF Energy Harvesting System  
Anh Tuan Le, Dai Duong Nguyen* and Minh Thuy Le  
Hanoi University of Science and Technology, Vietnam

220349: Single-Layer Wideband CP CPW-Fed Antenna based on Staircase-Shape Metasurface  
Nathapat Supreyatatitkul¹, Prayoot Akkaraekthalin², and Chuwong Phongcharoenpanich³  
¹Civil Aviation Training Center, Thailand, ²King Mongkut's University of Technology North Bangkok, Thailand, ³School of Engineering, King Mongkut’s Institute of Technology Ladkrabang, Thailand

Room C

**Small Antennas and RF Sensors**

**Chair:** Ming-Tien Wu, National Penghu University of Science and Technology, Taiwan

**(Invited talk) Recent Development of Magneto-electric Dipole Antennas and Arrays**  
Kwai Man Luk  
City University of Hong Kong, Hong Kong SAR

220168: Design of Dual-Band Miniaturized Loop Antenna for Harmonic Radar Transponder  
Kuan-Ting Chen, Hsiu-Ping Liao and Shih-Yuan Chen  
National Taiwan University, Taiwan

220074: Design of 77 GHz Patch Array Antenna with Horn for Industrial Radar Applications  
Da-Wei Li, Wei-Chen Cheng, Jwo-Shiun Sun*, and Guan-Yu Chen  
National Taipei University of Technology, Taiwan

220362: An Electrically Small Top-Loaded Monocone Antenna With Wide Bandwidth  
Kyoseung Keum, Jaehoon Choi  
Hanyang University, Republic of Korea

220330: Calibration Factor Pattern for Isotropy Simulation and Measurement of Three-Axis Electric Field Probes  
Haoyan Ma, Zheng Wang, Qiuji Zhang, Shunli Li, Hongxin Zhao and Xiaoxing Yin  
Southeast University, China
Room D

**Reconfigurable Antennas and Circuitries**

**Chair:** Abu Sadat Md Sayem, University of Technology Sydney, Australia
Shih-Cheng Lin, National Chung Cheng University, Taiwan

220310: Decoupling Design of Quadri-Polarization Overlay Antenna Element
Shota Takato¹, Hiroyuki Arai¹, Young-Chan Moon², Duk-Yong Kim²
¹Yokohama National University, Japan, ²KMW, Inc.

220201: A Robust, Flexible and Frequency Reconfigurable Antenna with Flexible Superstrate and Substrate
Abu Sadat Md. Sayem and Karu P. Esselle
University of Technology Sydney, Australia

220304: A Planar Direction-Finding Antenna with Reconfigurable Circuit for Scan Range Extension
Jo Tamura, Hiroyuki Arai
Yokohama National University, Japan

220228: Realization of Broadband Butler Matrix-based Beamforming Network Using Reconfigurable Synthesized Transmission Lines
The Hop Hoang¹, Huy Nam Chu², Tzyh-Ghuang Ma¹
¹National Taiwan University of Science and Technology, Taiwan, ²MediaTek, Taiwan

Room E

**SS16: Advanced Array Architectures at mmWave and sub-THz for Focused Beam and Beamforming (2/2)**

**Chairs:** Mauro Ettorre, University of Rennes 1, France
Nan-Wei Chen, Yuan Ze University, Taiwan

220066: Multi-Beam Geodesic Lens Antenna with Enhanced Aggregate Gain in the Ka-band
Omar Orgeira¹, Germán León², Nelson J. G. Fonseca³, and Oscar Quevedo-Teruel¹
¹KTH Royal Institute of Technology, Sweden, ²University of Oviedo, Spain, ³European Space Agency, The Netherlands

220150: A 30 GHz slot array with artificial dielectrics to enhance radiation characteristics
Ralph van Schelven¹, Waqas Syed², Giorgio Carluccio², Costas Doris², Anton de Graauw², Andrea Neto¹, Daniele Cavallo¹
¹Delft University of Technology, The Netherlands, ²NXP Semiconductors, The Netherlands

220248: A Dual Circularly Polarized Array Antenna for Ka-Band Satellite Communications
Qiannan Ren, Ashraf Uz Zaman, Jian Yang
¹Chalmers University of Technology, Sweden

220394: Metal-only Reflecting Luneburg Lens Design for Sub-THz Applications
C. Bilitos¹, J. Ruiz-García¹, R. Sauleau¹, E. Martini², S. Maci² and D. González-Ovejero¹
¹Univ. Rennes, CNRS, IETR (Institut d’Electronique et des Technologies du num’ERique) - UMR 6164, France, ²University of Siena, Italy

220117: Electronically Reconfigurable Leaky Cavity Antennas
Jean-Baptiste Gros, Vladislav Popov, Mikhaïl Odit, Rémi Faggiani, and Geoffroy Lerosey
Greenerwave, France
220217: Metamaterial Antenna Analysis using Wave Concept Iterative Process
Imen Sansa, Abdelkhaelek Nasri, and Hassen Zairi
University of Carthage, Tunisia

220294: Design of Small Loop Antenna for Detection of Electromagnetic Earthquake Precursors
Adel Mahfooz, Musa Huda, Annatoma Arif, Ziaul Haq
Muhammad, Jarin Sultana, Ehtesanul Islam
Ahsanullah University of Science and Technology, Bangladesh

220297: Null Frequency Scanning Antenna Based on Asymmetric Phase Transforming of spoof Surface Plasmon Polaritons (SSPPs)
Hao Shen, Qiuyi Zhang, Shunli Li, Hongxin Zhao and Xiaoxing Yin
Southeast University, China

220312: Feed Antenna Optimization of W Band Active Millimeter Wave Imaging System
He Zhang, Hua Zong, Jinghui Qiu
Harbin Institute of Technology, China

220336: High Gain Dual Parasitic Patch Loaded Wideband Antenna for 28 GHz 5G Applications
Wahaj Abbas Awan¹, Mohammad Alibakhshikenari², and Ernesto Limiti³
¹Seoul National University of Science and Technology, South Korea, ²Universidad Carlos III de Madrid, Spain, ³University of Rome, Italy

220375: Evaluation of Radio Reception Environment in Consideration of Surrounding Terrain and Buildings for Temporal Disaster-Broadcasting
Seitaro Taira*, Makoto Kobayashi, Koichi Shin, and Masahiro Nishi
Hiroshima City University, Japan

220337: Band Enhancement of a Compact Flexible Antenna for WLAN, Wi-Fi and C-Band Applications
Wahaj Abbas Awan¹, Musa Husain², Mohammad Alibakhshikenari³, Ernesto Limiti⁴
¹Seoul National University of Science and Technology, South Korea, ²Bahria University Islamabad Campus, Pakistan, ³Universidad Carlos III de Madrid, Spain, ⁴University of Rome, Italy

220090: Analysis of Pyramidal Horn Antenna for Ku Band Applications
Adelaida Heiman, Alina Badescu
University Politehnica of Bucharest, Romania

220135: A Double Band-Notched UWB Antenna Based on Complementary ERR-Defected Ground
Komsan Kanjanasit¹, Irina B. Vendik², Alexander S. Rusakov²
¹Prince of Songkla University, Thailand, ²St. Petersburg Electrotechnical University, Russia.

220309: Phase-less hemispherical near field measurement using initial phase information by PR method
Yusuke Mitsui and Hiroyuki Arai
Yokohama National University, Japan

220413: On the Resonant Electrical Length of Helical Antennas Placed between Metallic Parallel Plates
Walid Dyab¹, Mourad Ibrahim¹, Ahmed Sakr², and Ke Wu³
¹Prince Sultan University, Saudi Arabia, ²Cairo University, Egypt, ³Polytechnique Montreal, Canada

220033: A Low Profile UWB Antenna on a Large Flat Conductor
Yifan Wang, Wenbin Dou
Southeast University, China
220317: Research on an Optimized Structure of Terahertz Turbo Encoding and Decoding Technology
Li Sikai, Li Bo, Wang Hong
Xi’an University of Posts and Telecommunications, China

220396: Reception Level in a Touchless Ticket Gate Including the Element Pattern in the Millimeter-Wave Band Waveguide Slot Array Installed on the Sides
Mizuki Kurose, Takashi Tomura, Jiro Hirokawa
Tokyo Institute of Technology, Japan

220344: Experimental Evaluation of a Wave Source Location Estimation Method Using UAVs
Hiromu Takarada¹, Kentaro Nishimori¹, Shun Takase¹, Takahiro Matsuda¹
¹Niigata University, Japan, ²Tokyo Metropolitan University, Japan

220336: Passive Microwave Electric Field Display with Neon Light Bulb
Shen Shou Max Chung¹, Ming-Tien Wu¹, Chao Chun Ku¹, Wen-Jie Wang¹, Meng-Han Shieh¹, and Shih-Chung Tuan²
¹National Penghu University of Science and Technology, Taiwan, ²Oriental Institute of Technology, Taiwan

220186: Reduction in Rain Attenuation Statistics of Ku-Band Satellite Communications Links
Yasuyuki Maekawa
Osaka Electro-Communication University, Japan

22036: Universal Complex for Sounding and Estimation of Ionospheric Radio Channels Ranging from 3 kHz to 1 MHz Wide
Dmitry Ivanov, Vladimir Ivanov, Natalya Ryabova, Ruslan Belgibaev, Alexey Elsukov, Vladimir Ovchinnikov
Volga State University of Technology, Russia

220380: Modulation Recognition Algorithm of Radar Signal Based on ICanny-CNN
Xinrui Mao¹, Jingpeng Gao¹, and Junwei Qi¹
¹Harbin Engineering University, China

220122: Gain Variation of Phased-Arrays with Normally Distributed Pointing Errors
Yao-Wen Hsu¹
¹National Space Organization

220292: An FDTD Analysis of a Sensing Technique Based on Variation of Reflection Characteristics of an Antenna
Kazuki Shintani¹, Kenjiro Kubo¹,², Hisato Iwai¹, Shinsuke Ibi¹, Satoru Shimizu², Takuya Kurihara², and Yoshinori Suzuki²
¹Doshisha University, Japan, ²Advanced Telecommunications Research Institute International, Japan

220332: Recent Increase in Rain Attenuation Statistics of Ku-Band Satellite Communications Links
Yasuyuki Maekawa
Osaka Electro-Communication University, Japan

220154: Propagation Delay Time Estimation in Street Cells by Machine Learning
Shinnosuke Hayashi¹, Mitoshi Fujimoto¹, Koshiro Kitao², Mitsuki Nakamura², Satoshi Suyama², and Yasuhiro Oda²
¹University of Fukui, Japan, ²NTT DOCOMO, INC., Japan
### Thursday, October 21

**Oral Sessions**

#### Room A

**SS10: Novel Antenna Design Method Utilizing Numerical Simulation**

**Chairs:** Takuji Arima, *Tokyo University of Agriculture and Technology, Japan*  
Wei-Chung Weng, *National Chi Nan University, Taiwan*

220342: *(Invited talk)* Antenna Design Technique Utilizing Autoregressive Moving Average Techniques  
Takuji Arima, and Toru Uno  
*Tokyo University of Agriculture and Technology, Japan*

220202: One-Port Near-field Antenna Measurement Using a Small Wire Scatterer  
Seunggyu Yang, Kangwook Kim  
*Gwangju Institute of Science and Technology, South Korea*

220282: Detection of Defective Elements in Array Antennas Using Artificial Neural Networks and Eigenmode Currents  
Keisuke Konno, Xin Wang, and Qiang Chen  
1*Tohoku University, Japan*

220400: Platform Excitation for Radiation Efficiency Enhancement Using Slot Antenna  
Takumi Nishime, Hiroshi Hashiguchi, Naobumi Michishita*, and Hisashi Morishita  
*National Defense Academy, Japan*

#### Room B

**SS14: Metamaterials/Metasurface-based Antennas for Engineering Applications**

**Chairs:** Wanchen Yang, *South China University of Technology, China*  
Zhihao Jiang, *Southeast University, China*

220040: The Design of An All-Metal Low Profile End-Fire Array Antenna with High Gain  
Min Wang1, Jin Zhang1,2, Peng Ye1, Zhengchuan Chen3  
1Chongqing University of Posts and Telecommunications, China, 2Southeast University, China, 3Chongqing University, China.

220064: Researches on Frequency-Reconfigurable Metasurface Antennas Based on VO2 Films  
Jinghao Li, Wanchen Yang*, Quan Xue, and Wenquan Che  
*South China University of Technology, China*

220208: High-Efficiency Conformal Transmitarray With Two-layer Ultra-Thin Huygens Elements  
Li-Zhao Song, Pei-Yuan Qin, and Y. Jay Guo  
*University of Technology Sydney, Australia*

220232: Classification and opportunities of metasurfaces for antenna designs  
Oscar Quevedo-Teruel, Qiao Chen  
*KTH Royal Institute of Technology, Sweden*
### Room C

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS17</td>
<td>In-Band Full Duplex Applications</td>
<td>Kenneth E. Kolodziej</td>
<td>MIT Lincoln Laboratory, USA</td>
</tr>
<tr>
<td>220059</td>
<td>In-Band Full-Duplex Propagation-Domain Techniques and Applications</td>
<td>Yichi Zhang, Xiao Liu, Hongying Gao, and Zhao He</td>
<td>National Institute of Metrology, China</td>
</tr>
<tr>
<td>220062</td>
<td>Investigation of NVNA-based IBFD Antenna Test using Spectrally-Overlapped Stimuli</td>
<td>Maksim Kuznetcov, Symon K. Podilchak, and Mathini Sellathurai</td>
<td>Heriot-Watt University, Scotland UK; The University of Edinburgh, Scotland UK</td>
</tr>
<tr>
<td>220116</td>
<td>Antenna Integrated with Dual-Differential Feeding for In-Band Full-Duplex Applications</td>
<td>Tsung-Yu Shen, Hsin-Lung Su, and Ming-Lin Chuang</td>
<td>National Pingtung University, Taiwan; National Penghu University of Science and Technology, Taiwan</td>
</tr>
<tr>
<td>220192</td>
<td>(Invited talk) What Can We Learn from Replicating Hertz’s Electromagnetic-Wave Experiment?</td>
<td>Chen-Pang Yeang, Kai-Hung Cheng, Hong-Yu Tsao, Yun-Ying Chan, and Shih-Yuan Chen</td>
<td>University of Toronto, Canada; National Taiwan University, Taiwan; National Taiwan University, Taiwan</td>
</tr>
</tbody>
</table>

### Room D

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS18</td>
<td>Antenna Design and Applications for 5G and Wireless Devices</td>
<td>Saou-Wen Su, Derry Permana Yusuf, and Fang-Hsien Chu</td>
<td>Antenna Design Department, Advanced EM &amp; Wireless Communication R&amp;D Center, Taiwan</td>
</tr>
<tr>
<td>220075</td>
<td>Printed MIMO antennas for 5G C-band for laptop computer applications</td>
<td>Yue Li, Wen-Shan Chen, Yung-Tao Liu, and Hong-Twu Chen</td>
<td>Southern Taiwan University of Science and Technology, Taiwan; R.O.C. Military Academy, Taiwan</td>
</tr>
<tr>
<td>220205</td>
<td>A Uniplanar Multi-Bands Antenna for The Mobile Phone Applications</td>
<td>Tsung-Yu Shen, Hsin-Lung Su, and Ming-Lin Chuang</td>
<td>National Pingtung University, Taiwan; National Penghu University of Science and Technology, Taiwan</td>
</tr>
<tr>
<td>220069</td>
<td>Conjoined, Wi-Fi 6E MIMO Antennas for Laptops</td>
<td>Saou-Wen Su, Derry Permana Yusuf, and Fang-Hsien Chu</td>
<td>Antenna Design Department, Advanced EM &amp; Wireless Communication R&amp;D Center, Taiwan</td>
</tr>
<tr>
<td>220347</td>
<td>Design of Dual-band Slot Antenna Array for 5G Sub-6GHz CPE</td>
<td>Ju-Han Lu, Bo-Ming Chen and Wei-Ren Chu</td>
<td>National Kaohsiung University of Science and Technology, Taiwan</td>
</tr>
</tbody>
</table>
### Room E

**Wearable Device Networks and Medical Applications**

*Chair: Pongphan Leelatien, Thammasat University, Thailand*

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>220048</td>
<td>Design of Non-invasively Active Patch Antenna Integrated with Microwave Radiometer for Subcutaneous Temperature Measurement</td>
<td>Bing-Chao Huang¹, Yu-Jen Chi², Muddineni Raveendra¹, and Chien-Wen Chiu¹</td>
<td>¹National Ilan University, Taiwan, ²Tamkang University, Taiwan</td>
</tr>
<tr>
<td>220079</td>
<td>Characterization of Ultra-Wideband Propagation for Liver-Implant Channel</td>
<td>Min Wang¹, Yuxin Mo¹, Ya Liao¹², Zhengchuan Chen³</td>
<td>¹Chongqing University of Posts and Telecommunications, China, ²Southeast University, China, ³Chongqing University, China</td>
</tr>
<tr>
<td>220324</td>
<td>Identification of bedsore using electromagnetic waves for a non-contact detection system</td>
<td>Hiroki Kobayashi, Masaharu Takahashi</td>
<td>Chiba University, Japan</td>
</tr>
<tr>
<td>220339</td>
<td>(Invited talk) Antenna Technologies for Beyond-5G Wireless Communication: Challenges and Opportunities</td>
<td>Marianna Ivashina¹, Artem Vilenskiy¹, Hsi-Tseng Chou², Joachim Oberhammer³, and M. Ng Mou Kehn⁴</td>
<td>¹Chalmers University of Technology, Sweden, ²KTH Royal Institute of Technology, Sweden, ³National Taiwan University, Taiwan, ⁴National Chiao Tung University, Taiwan</td>
</tr>
<tr>
<td>220340</td>
<td>A 55-105 GHz PIN Diode SPDT Switch</td>
<td>Vessen Vassilev¹, Artem Vilenskiy¹, Hsi-Tseng Chou², Marianna Ivashina¹, Herbert Zirath¹</td>
<td>¹Chalmers University of Technology, Sweden, ²National Taiwan University, Taiwan</td>
</tr>
<tr>
<td>220425</td>
<td>Millimeter Wave Antennas Using Gap Waveguides with Beam Steerability at Fixed Frequencies for Beyond 5G Mobile Communications</td>
<td>Teng-Hsiang Ko¹, Wei-Min Hsu¹, Pei-Lun Kao¹, M. Ng Mou Kehn¹, Hsi-Tseng Chou², and Marianna Ivashina³</td>
<td>¹National Yang Ming Chiao Tung University, Taiwan, ²National Taiwan University, Taiwan, ³Chalmers University of Technology, Sweden</td>
</tr>
</tbody>
</table>

### Room A

**Oral Sessions**

*Chair: Hsi-Tseng Chou, National Taiwan University, Taiwan*

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>220348</td>
<td>Relationship between Local Peak SAR and MIMO Performance for 5G Sub-6GHz Antennas</td>
<td>Kun Li¹, and Kazuhiro Honda²</td>
<td>¹Kagawa University, Japan, ²Toyama University, Japan</td>
</tr>
<tr>
<td>220353</td>
<td>Measurement of Rice factor for In-Body Radios at 950 MHz in Indoor Environment</td>
<td>Ryushun Oka¹, Kun Li¹, and Kazuhiro Honda²</td>
<td>¹Kagawa University, Japan, ²Toyama University, Japan</td>
</tr>
</tbody>
</table>

### Room A

**SS07: Taiwan-Sweden Joint Research Works toward 6G Mobile Communications**

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>220339</td>
<td>(Invited talk) Antenna Technologies for Beyond-5G Wireless Communication: Challenges and Opportunities</td>
<td>Marianna Ivashina¹, Artem Vilenskiy¹, Hsi-Tseng Chou², Joachim Oberhammer³, and M. Ng Mou Kehn⁴</td>
<td>¹Chalmers University of Technology, Sweden, ²KTH Royal Institute of Technology, Sweden, ³National Taiwan University, Taiwan, ⁴National Chiao Tung University, Taiwan</td>
</tr>
<tr>
<td>220087</td>
<td>An Ultra-Wideband Design of Vivaldi-type antenna for multi-communication applications at millimeter wave frequencies</td>
<td>Yen-Ju Lin, Hsi-Tseng Chou</td>
<td>National Taiwan University, Taiwan</td>
</tr>
<tr>
<td>220299</td>
<td>Lens-based Multi-Beam Antenna Technologies for Highly Efficient Dual-Polarized Radiations at Sub-THz Frequencies</td>
<td>Hsi-Tseng Chou, Zhi-Da Yan</td>
<td>National Taiwan University, Taiwan</td>
</tr>
<tr>
<td>220340</td>
<td>A 55-105 GHz PIN Diode SPDT Switch</td>
<td>Vessen Vassilev¹, Artem Vilenskiy¹, Hsi-Tseng Chou², Marianna Ivashina¹, Herbert Zirath¹</td>
<td>¹Chalmers University of Technology, Sweden, ²National Taiwan University, Taiwan</td>
</tr>
<tr>
<td>220425</td>
<td>Millimeter Wave Antennas Using Gap Waveguides with Beam Steerability at Fixed Frequencies for Beyond 5G Mobile Communications</td>
<td>Teng-Hsiang Ko¹, Wei-Min Hsu¹, Pei-Lun Kao¹, M. Ng Mou Kehn¹, Hsi-Tseng Chou², and Marianna Ivashina³</td>
<td>¹National Yang Ming Chiao Tung University, Taiwan, ²National Taiwan University, Taiwan, ³Chalmers University of Technology, Sweden</td>
</tr>
</tbody>
</table>
### Room B  
**SS09: Wideband and Multiband Antennas**

**Chairs:** Takafumi Fujimoto, Nagasaki University, Japan  
Hsin-Lung Su, National Pingtung University, Taiwan

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
</table>
| 220254 | (Invited talk) A Printed-Inverted F Antenna Combined with Two L-Shaped Elements for Dual Band Circular Polarization | Takafumi Fujimoto and Chai-Eu Guan  
Nagasaki University, Japan |
| 220129 | One-sided directional wideband slot array antenna for 28 GHz application | Shunsuke Yamamoto, and Haruichi Kanaya  
Kyushu University, Japan |
| 220305 | Parameter Study of Dual-Band Array Antenna for Stacked Differential Rectenna Arrays | Kento Saito, Eisuke Nishiyama, and Ichihiko Toyoda  
Saga University, Japan |
| 220121 | Array Design of Broadband Circularly Polarized Patch Antenna Using Metasurface | Uuganbayar Purevdorj, Ryuji Kuse, Takeshi Fukusako  
Kumamoto University, Japan |
| 220142 | An Experimental Study on Half-Shaped Printed UWB Monopole Antenna with Short Stub | Nobuyasu Takemura and Chikayo Hata  
Nippon Institute of Technology, Japan |

### Room C  
**SS12: Advanced Antenna Arrays and Their Beamforming for Future Wireless Communications**

**Chairs:** Pei-Yuan Qin, University of Technology Sydney, Australia  
Haihan Sun, University of Technology Sydney, Australia; Nanyang Technological University, Singapore

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
</table>
| 220234 | (Invited talk) 1-Bit Reconfigurable Huygens Element for Beam-Steering Transmitarrays | Xuan Wang¹,², Pei-Yuan Qin², and Y. Jay Guo²  
¹Shanghai Jiao Tong University, China, ²University of Technology Sydney, Australia |
| 220279 | The Design of A Single-Layer High-Gain Reflectarray Antenna with Polarization Conversion | Min Wang¹, Yuxin Mo¹, Ya Liao¹,², Zhengchuan Chen³  
¹Chongqing University of Posts and Telecommunications, China, ²Southeast University, China, ³Chongqing University, China |
| 220118 | Element-Rotated Linear, Planar, and Conformal Arrays with Shaped Patterns | Ming Li¹,², Yanhui Liu¹, Peiyan Qin¹  
¹University of Electronic Science and Technology of China, China, ²University of Technology Sydney (UTS), Australia |
| 220148 | Spiral Choking Method for Scattering Suppression in 4G and 5G Base Station Antenna Arrays | Hai-Han Sun¹,², He Zhu¹, Can Ding¹, Bevan Jones¹, and Y. Jay Guo¹  
¹University of Technology Sydney, Australia, ²Nanyang Technological University, Singapore |
| 220149 | Conformal Dielectric Linear-to-Circular Polarization Converter With Broadband Bandwidth and High Angular Stability | Xi-Bei Zhao, Xiao-Yu Tong, and Feng Wei  
Xidian University, China |
Room D

**SS20: Novel Compact High-Gain Antennas and Their Applications**

**Chairs:** Danai Torrungrueng, King Mongkut’s University of Technology North Bangkok, Thailand  
Nonchanutt Chudpooti, King Mongkut’s University of Technology North Bangkok, Thailand

220393: (Invited talk) A Low-Cost Partially Reflective Surface with Corner Reflector Antenna for Gain Enhancement  
Nonchanutt Chudpooti, Krittisak Phaebua, Titipong Lertwiryaprapa, Prayoot Akkaraekthalin, and Danai Torrungrueng  
King Mongkut’s University of Technology North Bangkok, Thailand

220131: Indoor Radio Wave Coverage by Phased Arrays of Antennas at Millimeter Wave Frequencies  
Chen-Yi Chang and Hsi-Tseng Chou  
National Taiwan University, Taiwan

220132: Contoured Beamforming of Reflectarray Antennas for 5G Indoor Coverage at Sub-6 GHz Band  
Chen-Yi Chang¹, Chang-Lun, Liao²,³, and Hsi-Tseng Chou¹  
¹National Taiwan University, Taiwan, ²National Taiwan University of Science and Technology, Taiwan, ³Telecommunication Laboratories Chunghwa Telecom Co., Ltd.

220414: THz Photo-Polymeric Lens Antennas for Potential 6G Beamsteering Frontend  
Nonchanutt Chudpooti¹, Nattapon Duangrit², Sukanya Chudpooti¹, Prayoot Akkaraekthalin¹, Ian D. Robertson², and Nutapong Somjit¹  
¹King Mongkut’s University of Technology North Bangkok, Thailand, ²Rajamangala University of Technology Lanna, Thailand, ³University of Leeds, U.K.

220392: Gain Enhancement of Compact Parabolic Reflector Antennas Using Partially Reflective Surfaces  
Krittisak Phaebua, Nonchanutt Chudpooti, Titipong Lertwiryaprapa and Danai Torrungrueng  
King Mongkut’s University of Technology North Bangkok, Thailand.

Room E

**Antenna Arrays**

**Chair:** Ding Bing Lin, National Taiwan University of Science and Technology, Taiwan

220214: (Invited talk) Wideband Phased Arrays with Large Scan Range and Low Profile  
Shi-Wei Qu* and Shiwen Yang  
University of Electronic Science and Technology (UESTC), China

220288: Feasibility Study of a Wide Coverage Dual-Polarized Phased Array Antenna at 10 GHz  
Prabhat Khanal, Jian Yang, Marianna Ivashina  
Chalmers University of Technology, Sweden

220301: A Series-Fed Patch Antenna Array for Biomedical Radar Applications  
Yi-Jie Ye, Hui-Yu Chueh, Wei-Chan Chang, and Wen-Jiao Liao  
National Taiwan University of Science and Technology, Taiwan

220203: Demonstration of Radial Line Helical Phased Array with Antenna Elements Rotated by Motors  
Narihiro Nakamoto, Yusuke Suzuki, Satoshi Yamaguchi, Toru Fukasawa, Yoshio Inasawa, and Hiroaki Miyashita  
Mitsubishi Electric Corporation, Japan

220166: Low-Cost AiP Array Design Using Machine Learning for mmWave Mobile Systems  
Mohammed Farouk Nakmouche¹, M. Idrees Magray², A.M.M.A. Allam³, Diaa E. Fawzy¹, Ding Bing Lin⁴, Jenn-Hwan Tarng²  
¹Izmir University of Economics, Turkey, ²National Chiao Tung University, Taiwan, ³German University in Cairo, Egypt, ⁴National Taiwan University of Science and Technology, Taiwan
13:20-16:20  Keynotes & Industrial Talks
Room A
Chair: Chow-Yen-Desmond Sim, Feng Chia University Taiwan

13:20-13:40  Industrial Talk 1

The Latest Simulation Technology and Best Practice in Antenna and Electromagnetic Designs
Benson Wei
Ansys Taiwan

Abstract:
Ansys is the largest engineering simulation company in the world and very focusing on simulation technologies. ANSYS uses multiple advanced solver technologies that allow users to match the appropriate solver to any simulation. For Antenna designs, each solver in ANSYS HFSS is an automated, powerful solution processor for which the user dictates the geometry, properties of the material and the required range of solution frequencies.

In this session you can learn about how Ansys drive new simulation technology in Antenna and Electromagnetic designs that will help engineers increase the efficiency for variant antenna and EMI designs.

13:40-14:00  Industrial Talk 2

Novel Diamond CATR Design for B5G and Radar Testing
Richard Liu
WavePro Inc., Taiwan

Abstract:
CATR being used for satellite and military radar testing for years. Recently even being widely used for 5G and automotive radar testing. A normal accuracy would be enough for 5G. B5G, so called LEO, or military radar would require a highly accurate CATR to calibrate their EUTs. WavePro developed an novel and innovative CATR design to meet the requirements.
Antennas and RF Technologies for 6G

Prof. Y. Jay Guo, University of Technology Sydney, Australia

Abstract:
As the fifth generation (5G) mobile and wireless communications networks are being rolled out globally, research on the sixth generation (6G) networks has started in earnest. 6G is expected to deliver a number of features different from 5G. These include greater cost, energy and spectral efficiency, higher data rates to support such applications as virtual reality and augmented reality, universal coverage provided by integrated terrestrial, airborne and spaceborne networks, high level of intelligence in both the user terminals and networks enabled by advance in machine learning, and enhanced security and privacy. These new features call for innovation in air interfaces and transmission technologies, many of which subsequently translate into challenges in antennas and radio frequency (RF) technologies.

In this talk, we shall discuss our 6G vision and present some main challenges of 6G to antennas and RF technologies. In particular, we shall cover technologies for integrated space and terrestrial networks, in-band full duplex and multiple beam-forming antennas. Recent research progress made by our group in those areas will be presented. These range from reconfigurable beam scanning antennas, low-cost analogue multiple beam-forming, and conformal antenna arrays, to radio frequency interference cancellation circuits for in-band full duplex MIMO systems.

Biography:
Dr Y. Jay Guo is a Distinguished Professor and the Director of Global Big Data Technologies Centre (GBDTC) at the University of Technology Sydney (UTS), Australia. Prior to this appointment in 2014, he served as a Director in CSIRO for over nine years. Before joining CSIRO, he held various senior technology leadership positions in Fujitsu, Siemens and NEC in the U.K. His research interest includes antennas, mm-wave and THz communications and sensing systems as well as big data technologies. He has published five books and over 550 research papers including 280 transaction papers, and he holds 26 patents.

Prof Guo is a Fellow of the Australian Academy of Engineering and Technology, a Fellow of IEEE and a Fellow of IET. He has won a number of most prestigious Australian Engineering Excellence Awards and CSIRO Chairman’s Medal. He was named one of the most influential engineers in Australia in 2014 and 2015, respectively, and one of the top researchers across all fields in Australia in 2020.

Prof Guo has chaired numerous international conferences and served as guest editors for a number of IEEE publications in various technical societies. He is currently the Chair of International Steering Committee, International Symposium on Antennas and Propagation (ISAP).
Millimeter-Wave Antennas for Next Generation Telecommunications Networks

Dr. Mauro Ettorre, Institut d'Electronique et des Technologies du numérique (IETR), French National Center for Scientific Research (CNRS), Rennes, France

Abstract:
In this talk, I will describe the current research efforts of my group at IETR in millimeter-wave antennas for next generation telecommunications networks for high data-rate communication links. Millimeter-wave antennas are key to deploying next generation 5G networks and beyond and satellite systems that promise broad bandwidths and smart data links for mobile users. In collaboration with major industrial and academic partners, I recently proposed quasi-optical planar systems as efficient beam formers for multi-beam, wide scanning antennas. Such an approach overcomes the loss and prohibitive cost associated with phased arrays in the millimeter wave range, while preserving the agility of the radiating unit. Implementations of the proposed system in the millimeter and subterahertz frequency range will be presented in different technologies such as substrate integrated waveguide (SIW), low temperature co-fired ceramic (LTCC) and silicon micromachining. For satellite links in Ka-band, I will show that these quasi-optical planar systems can be used to drive the focal array of a multi-reflector system. Such a configuration reduces the phase aberrations of multi-reflector configurations for high-data rates and wide coverage. For terminal users, I will present some recent activities on wideband wide-angle continuous stub arrays. I will introduce the unique scanning and bandwidth capabilities of such arrays and their implementation in low-cost printed circuit board technology.

Biography:
Dr. Mauro Ettorre received a Laurea degree “summa cum laude” in Electrical Engineering and a Ph.D. in Electromagnetics from the University of Siena, Italy, in 2004 and 2008, respectively. Part of his Ph.D. work was developed at the Netherlands Organisation for Applied Scientific Research (TNO), The Netherlands, where he later worked as an Antenna Researcher. From 2008 to 2010, Dr. Ettorre was a Postdoctoral Fellow at the IETR, University of Rennes 1, France. In October 2010, he joined IETR as CNRS Research Scientist. In 2010 and 2016, he was a Visiting Scholar in the Radiation Laboratory, University of Michigan, Ann Arbor, USA. In 2015, he was an invited professor at Tokyo Institute of Technology, Japan. From 2014 until 2020, he assumed responsibilities for the multi-beam antenna activity for satellite applications in the joint laboratory (MERLIN) between IETR and Thales Alenia Space, France. From 2016 until 2021, he was a member of the French National Committee for Scientific Research, Section 08, CNRS, Paris, France. Dr. Ettorre’s research interests include the analysis and design of leaky-wave antennas, periodic structures, millimeter-wave antennas, non-diffractive radiation, near-field focusing techniques, and wireless power transfer systems.

Since 2017, Dr. Ettorre serves as Associate Editor of the IEEE Transactions on Antennas and Propagation. In 2020 and 2021 he was appointed European Association on Antennas and Propagation (EurAAP) ambassador. From 2017 until 2020 he was a member of the Selection Committee for the Best Paper Award, IEEE Transactions on Terahertz Science and Technology. In 2020, he co-founded the open access journal Reviews on Electromagnetics of EurAAP for which he serves as Associate Editor.

Dr. Ettorre received or was co-recipient of several awards among them the Innovation Award at 2018 ESA Antenna Workshop in the Netherlands, the Best Paper Award in Electromagnetics and Antenna Theory at EuCAP 2018, London, UK and the Best Antennas Paper Award at EuCAP 2021, Düsseldorf, Germany.
Hardware and Software Solution for Wireless Power Transfer and mmWave
Leslie Li
Auden Techno Corp.

Abstract:
SPEAG’s SEMCAD X 5G Toolkit is tested for its efficiency and user-friendliness in order to design and optimize on-device phased-array antennas for 5G applications. In this video, an industrial power-user demonstrates how the 5G toolkit allows engineers to boost the development process of two phased-array antennas. Moreover, it is outlined how the 5G Toolkit empowers to perform compliance evaluations based on surface-averaged power density within short time and how to obtain the worst-case power density to fulfill regulatory compliance requirements.
<table>
<thead>
<tr>
<th>Session Code</th>
<th>Title</th>
<th>Authors</th>
<th>Institution(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>220098</td>
<td>Development of MACKEY II type M miniaturized using multiple slits</td>
<td>Kota Hakamata, Keisuke Miyashita, Yokoe Keito, Shigeru Makino, Kenji Itoh</td>
<td>Kanazawa Institute of Technology, Japan</td>
</tr>
<tr>
<td>220100</td>
<td>On the use of a Microstrip Antenna for Moisture Content Evaluation of Pharmaceutical Tablets</td>
<td>Pongphan Leelatien</td>
<td>Thammasat University, Thailand</td>
</tr>
<tr>
<td>220071</td>
<td>A Millimetre-Wave Tri-Band Antenna Embedded on Smart Watch for Wearable Applications</td>
<td>Sarosh Ahmed¹, Adnan Ghaftar², Xue Jun Li³, and Nabil Cherif⁴</td>
<td>¹Government College University (GCUF), Pakistan, ²Auckland University of Technology, New Zealand, ³Mustapha Stambouli University, Algeria</td>
</tr>
<tr>
<td>220038</td>
<td>Development of cable antenna for UHF-RFID identification</td>
<td>Tomohiro Osaki, Yoshinobu Okano</td>
<td>Tokyo City University, Japan</td>
</tr>
<tr>
<td>220042</td>
<td>A Very Compact and High Efficient Rectenna for RF Energy Harvesting Applications</td>
<td>Zongyu Zhang, Jiawang Li</td>
<td>Southeast University, China</td>
</tr>
<tr>
<td>220130</td>
<td>In the use of a Microstrip Antenna for Moisture Content Evaluation of Pharmaceutical Tablets</td>
<td>On the use of a Microstrip Antenna for Moisture Content Evaluation of Pharmaceutical Tablets</td>
<td>On the use of a Microstrip Antenna for Moisture Content Evaluation of Pharmaceutical Tablets</td>
</tr>
<tr>
<td>220078</td>
<td>Experimental Investigation of Planar Frequency Dispersive Phase Shifter for Base Station Antennas</td>
<td>Toshiki Soma¹, Keizo Cho¹, Naobumi Michishita², Ichiro Oshima³, and Hiroaki Nakabayashi¹</td>
<td>¹Chiba Institute of Technology, Japan, ²National Defense Academy, Japan, ³DKK Co., Ltd., Japan</td>
</tr>
<tr>
<td>220045</td>
<td>A Simple and Tunable Reflective Polarization Converter Based on Vanadium Oxide Built-in Metamaterial Structure</td>
<td>Fuyuan Yu, Cheng Wang, Xiang Liu, Jiabing Zhu, and XiaoBo Shen</td>
<td>Huainan Normal University, China</td>
</tr>
<tr>
<td>220163</td>
<td>Metamaterial Minkowski Fractal Antenna With Defective Ground Structure</td>
<td>Arshad Karimbu Vallappil¹, Mohamad Kamal A. Rahim¹, Bilal A. Khawaja²,³, Noor Asniza Murad¹</td>
<td>¹Universiti Teknologi Malaysia, Malaysia, ²Islamic University of Madinah, Saudi Arabia, ³National University of Sciences and Technology (NUST), Pakistan</td>
</tr>
<tr>
<td>220319</td>
<td>Design of a Miniaturized Annular Ring Metamaterial Microstrip Antenna</td>
<td>Bei Zhang, and Xiaofei Xu</td>
<td>Shanghai University, China</td>
</tr>
<tr>
<td>220378</td>
<td>Experimental Investigation of Planar Frequency Dispersive Phase Shifter for Base Station Antennas</td>
<td>Toshiki Soma¹, Keizo Cho¹, Naobumi Michishita², Ichiro Oshima³, and Hiroaki Nakabayashi¹</td>
<td>¹Chiba Institute of Technology, Japan, ²National Defense Academy, Japan, ³DKK Co., Ltd., Japan</td>
</tr>
<tr>
<td>220190</td>
<td>Wideband Planar Microstrip Antenna Inspired by Metamaterial for Mid Band 5G Applications</td>
<td>Hussam Keriee¹,², Mohamad Kamal A. Rahim¹, Nawres Abbas Nayyef³, and Osman Ayop¹</td>
<td>¹Universiti Teknologi Malaysia, Malaysia, ²Al-Hadi University College, Iraq, ³Universiti Teknikal Malaysia Melaka, Malaysia</td>
</tr>
<tr>
<td>220311</td>
<td>Compact Circularly Polarized Disc Patch Antenna Designed with Sector Mushroom Structures</td>
<td>Hao Lu, Guoxiang Dai, and Xiaofei Xu</td>
<td>Shanghai University, China</td>
</tr>
<tr>
<td>Paper ID</td>
<td>Title</td>
<td>Authors</td>
<td>Affiliations</td>
</tr>
<tr>
<td>-----------</td>
<td>----------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>220056</td>
<td>A Broadband 8-Antenna Array Design for 5G MIMO Smartphone Applications</td>
<td>Jayshri Kulkarni¹, Jia-Yu Chen², Tong-Yu Zhang², and Chow-Yen-Desmond Sim²</td>
<td>Vishwakarma Institute of Information Technology, India, Feng Chia University, Taichung, Taiwan</td>
</tr>
<tr>
<td>220391</td>
<td>A Design of Circular Polarization Antenna Array using Sequential Rotation for SATCOM</td>
<td>Hamed Alsuraisry¹, Hsin-Chia Lu², Tian-Wei Huang²</td>
<td>King Abdulaziz City for Science and Technology (KACST), Saudi Arabia, National Taiwan University Taiwan</td>
</tr>
<tr>
<td>220063</td>
<td>A Novel CPW Wideband Circularly Polarized Antenna for 5G Millimeter-wave System</td>
<td>X.M. Chen, Junlin Wang, Xin Wang, and Rui Shao</td>
<td>Inner Mongolia University, China</td>
</tr>
<tr>
<td>220065</td>
<td>Dual-Band Circularly Polarized Helical Antenna for Satellite Buoy</td>
<td>Wei-Zhi Xiao, Wei-Chen Cheng, Jwo-Shiun Sun, and Guan-Yu Chen</td>
<td>National Taipei University of Technology, Taiwan</td>
</tr>
<tr>
<td>220356</td>
<td>Orthogonal Polarized Antenna Composed of Halo Antenna with Parasitic Elements and Sleeve Antenna</td>
<td>Tomokazu Mizutani¹, Naobumi Michishita¹, Hiroshi Sato², Yoshio Koyanagi², Hisashi Morishita¹</td>
<td>National Defense Academy, Japan, Panasonic Corporation, Japan</td>
</tr>
<tr>
<td>220082</td>
<td>Design of ultra-wideband TEM horn antenna for life detection</td>
<td>Ying Suo, Feixiang Qi, Wei Li</td>
<td>Harbin Institute of Technology, China</td>
</tr>
<tr>
<td>220247</td>
<td>Smith Chart Based Method for Rapid Design of Wideband and Multiband Quasi-Yagi Antennas</td>
<td>Nai-Chen Liu¹, Ching-Cheng Tien², and Jenn-Hwan Tarng¹</td>
<td>National Yang Ming Chiao Tung University, Taiwan, Sigurd Microelectronics Corp., Taiwan</td>
</tr>
<tr>
<td>220028</td>
<td>FDTD Simulation of DC Plasma Antenna</td>
<td>Shen Shou Max Chung¹, and Shih-Chung Tuan²</td>
<td>National Penghu University of Science and Technology, Taiwan, Oriental Institute of Technology Taiwan</td>
</tr>
<tr>
<td>220144</td>
<td>Design of Multifunctional Reflectarray Elements Based on the Switchable Ground Plane</td>
<td>Xianbo Cao and Qiang Chen</td>
<td>Tohoku University, Japan</td>
</tr>
<tr>
<td>220162</td>
<td>Frequency Reconfigurable Complementary Electric LC Resonator Antenna</td>
<td>Arrauzah Razak¹, Mohamad Kamal A. Rahim¹, Noor Asniza Murad¹, Mohd Fairus Mohd Yusoff¹, Huda A Majid¹</td>
<td>Universiti Teknologi Malaysia, Malaysia, Universiti Tun Hussein Onn Malaysia, Malaysia</td>
</tr>
<tr>
<td>220057</td>
<td>Design of Laptop Antenna for WLAN and Wi-Fi 6E Applications</td>
<td>Tuan-Yung Han¹, Wei-Tzu Hsieh², Kai-Hong Jheng², Shih-Hua Wang², and Chow-Yen-Desmond Sim²</td>
<td>National Taitung Junior College, Taiwan, Feng Chia University, Taichung, Taiwan</td>
</tr>
<tr>
<td>220081</td>
<td>Design of exponential gradient TEM horn antenna for ground penetrating radar</td>
<td>Ying Suo, Feixiang Qi, Wei Li</td>
<td>Harbin Institute of Technology, China</td>
</tr>
<tr>
<td>220162</td>
<td>Frequency Reconfigurable Complementary Electric LC Resonator Antenna</td>
<td>Arrauzah Razak¹, Mohamad Kamal A. Rahim¹, Noor Asniza Murad¹, Mohd Fairus Mohd Yusoff¹, Huda A Majid¹</td>
<td>Universiti Teknologi Malaysia, Malaysia, Universiti Tun Hussein Onn Malaysia, Malaysia</td>
</tr>
</tbody>
</table>

¹Vishwakarma Institute of Information Technology, India, ²Feng Chia University, Taichung, Taiwan
220171: Simulation Design of Cavity-Backed Self-Phased Polarization-Reconfigurable Antenna Based on Liquid Metal
Yuwei Zhang1, Shu Lin2, Qun Ding1, Jiaxuan Li3, and Xingqi Zhang1
1Heilongjiang University, China, 2Harbin Institute of Technology, China, 3University College Dublin, Ireland.

220049: A Pattern Reconfigurable Antenna Design for 5G Communication System
Tuan-Yung Han1, Zhi-Kai Hsieh2, Jeng-Jr Lo3, and Chow-Yen-Desmond Sim2
1National Taitung Junior College, Taiwan, 2Feng Chia University, Taiwan

220188: Wide-Multi-Narrowband Reconfigurable Antenna
Izni Husna Idris1, Mohamad Rijal Hamid1, Kamilia Kamardin2, and Mohamad Kamal A. Rahim1
1Universiti Teknologi Malaysia, Johor Bahru, Malaysia, 2University Teknologi Malaysia, Kuala Lumpur, Malaysia

220058: A Circularly Polarized UHF RFID Tag Antenna Design
Chow-Yen-Desmond Sim, Tzu-Wei Huang, Yu-Chieh Hsuan, Shun-Yu Tsai, and Chuan-Kuei Weng
Feng Chia University, Taiwan

220042: A 4×4 Planar Dual-Polarization Retrodirective Array
Xiao-Fei Li and Yong-Ling Ban
University of Electronic Science and Technology of China, China

220043: Independent Dual-LP Reflectarray Unit Cell Based on Crossed Dipoles with Split Rings
Yun-Ying Chan and Shih-Yuan Chen
National Taiwan University, Taiwan

220101: Adaptation of Reflectarray Antenna to Yield Scanning-Spot Beam
Yusuke Kaimori, Shigeru Makino, Shota Takino, Sanshiro Shigemitsu
Kanazawa Institute of Technology, Japan

220241: Design of Optimized Multiple Frequency Shaped Beam Reflectarray Antenna
Sanshiro Shigemitsu, Mei Fukaya, Shigeru Makino, Shota Takino
Kanazawa Institute of Technology, Japan

220080: A Wideband Planar Array Antenna Using Both-Sided MIC and Leaf-Shaped Bowtie Slot Elements
Naoya Yamamoto, Mangseang Hor, Takashi Hikage, and Manabu Yamamoto
Hokkaido University, Japan

220125: A Substrate Integrated Waveguide Planar Slot Array Antenna with Low Sidelobe Level
Yun-Ting Tsai, Yu-Chen, Hsu, HuyNam Chu, Tzyh-Ghuang Ma
National Taiwan University of Science and Technology, Taiwan

220368: Correction Method of Element Phase Error in Multi-Feed Beam Scanning Reflectarray for Radio Astronomy Observation
Takumi Kato1, Kentaro Murata1, Naoki Honma1, Osamu Kameya2, Tomoaki Oyama2, and Mareki Honma2
1Iwate University, Japan, 2National Astronomical Observatory of Japan, Japan

220043: Independent Dual-LP Reflectarray Unit Cell Based on Crossed Dipoles with Split Rings
Yun-Ying Chan and Shih-Yuan Chen
National Taiwan University, Taiwan

220051: Design of 24 GHz Antenna Array for Powder Materials Flow Measurement Applications
Wei-Chen Cheng, Da-Wei Li, Wei-Zhi Xiao, Guan-Yu Chen, Chu-Hsien Cheng, and Jwo-Shiun Sun
National Taipei University of Technology, Taiwan

220058: A Circularly Polarized UHF RFID Tag Antenna Design
Chow-Yen-Desmond Sim, Tzu-Wei Huang, Yu-Chieh Hsuan, Shun-Yu Tsai, and Chuan-Kuei Weng
Feng Chia University, Taiwan

220042: A 4×4 Planar Dual-Polarization Retrodirective Array
Xiao-Fei Li and Yong-Ling Ban
University of Electronic Science and Technology of China, China

220043: Independent Dual-LP Reflectarray Unit Cell Based on Crossed Dipoles with Split Rings
Yun-Ying Chan and Shih-Yuan Chen
National Taiwan University, Taiwan

220101: Adaptation of Reflectarray Antenna to Yield Scanning-Spot Beam
Yusuke Kaimori, Shigeru Makino, Shota Takino, Sanshiro Shigemitsu
Kanazawa Institute of Technology, Japan

220241: Design of Optimized Multiple Frequency Shaped Beam Reflectarray Antenna
Sanshiro Shigemitsu, Mei Fukaya, Shigeru Makino, Shota Takino
Kanazawa Institute of Technology, Japan

220080: A Wideband Planar Array Antenna Using Both-Sided MIC and Leaf-Shaped Bowtie Slot Elements
Naoya Yamamoto, Mangseang Hor, Takashi Hikage, and Manabu Yamamoto
Hokkaido University, Japan

220125: A Substrate Integrated Waveguide Planar Slot Array Antenna with Low Sidelobe Level
Yun-Ting Tsai, Yu-Chen, Hsu, HuyNam Chu, Tzyh-Ghuang Ma
National Taiwan University of Science and Technology, Taiwan

220368: Correction Method of Element Phase Error in Multi-Feed Beam Scanning Reflectarray for Radio Astronomy Observation
Takumi Kato1, Kentaro Murata1, Naoki Honma1, Osamu Kameya2, Tomoaki Oyama2, and Mareki Honma2
1Iwate University, Japan, 2National Astronomical Observatory of Japan, Japan
220266: Design of a Slot Array Antenna on Alternating-phase Feed Parallel-plate Waveguide
Yuta Ishikawa, Takashi Tomura, and Jiro Hirokawa
Tokyo Institute of Technology, Japan

220280: A New Approach to Design Microstrip Patch Antenna with Wideband Harmonic Suppression
Hao Zhang, Feng Huang, Ye Han
Nanjing University of Posts and Telecommunications, China.

220287: A WLAN/WiFi-6E MIMO Antenna Design for Handset Devices
Chun-An Cai, Kuo-Yu Kai, and Wen-Jiao Liao
National Taiwan University of Science and Technology, Taiwan

220300: V-band Array Antenna Made of Liquid Crystal Polymer
Yuta Hasegawa1, Masayuki Ota1, Toshiya Iwamura2, Yusuke Nakatani3, Daisuke Awaji1, and Ning Guan1
1Fujikura Ltd., Japan, 2Tohoku Fujikura Ltd., Japan

220351: Planar Sleeve Antenna with Choke Structure Composed of Zeroth-Order Resonator
Keisuke Sakakibara, Hiroshi Hashiguchi, Naobumi Michishita*, and Hisashi Morishita
National Defense Academy, Japan

220354: Dual-Band Decoupling for Two PIFAs Using Linear Parasitic Elements and Bridge Line
Quang Quan Phung1, Naobumi Michishita1, Hiroshi Sato2, Yoshio Koyanagi2, Hisashi Morishita1
1National Defense Academy, Japan, 2Panasonic Corporation, Japan

220355: Design of a Circularly Polarized Slot Array on a Parallel-plate Waveguide fed by Longitudinal Coupling Slots with Posts
Yuki Tomori Tianyu Wang Jiro Hirokawa Takashi Tomura
Tokyo Institute of Technology, Japan

220358: Simulation Results of a Foldable Reflectarray Composed of Four Triangular Notched Patches
Takashi Tomura, Masato Machida, and Hiraku Sakamoto
Tokyo Institute of Technology, Japan

220020: A Broadband Reflectarray Based on Multi-Resonance Unit
Tao Liao1, Yong-Chang Jiao2
1Beijing Institute of Radio Measurement, China, 2Xidian University, China

220073: Microstrip Array Antenna Fed by a Slotted Waveguide
D. R. Shachrur1, U. Nissanov2, E. Levine3 and H. Matzner1
1HIT, Israel, 2University of Johannesburg, South-Africa, 3Afeka College of Engineering, Israel

220035: A High Gain Narrowband Microstrip Antenna Array for Wireless Applications
Budhadeb Maity and Sisir Kumar Nayak
Indian Institute of Technology Guwahati, India

220091: Dual-Polarized Microstrip Array Antenna Fed by Cavity Slots
U. Nissanov1, E. Levine2, and H. Matzner3
1University of Johannesburg, South-Africa, 2Afeka College of Engineering, Israel, 3HIT, Israel

220269: Compact Dual-Polarized 5GHz WiFi Stacked patch Antenna Array
Aimé Levavasseur, Gildas Bengloan, Julien Harel, Eduardo Motta Cruz,1
1Univ Nantes, France

220169: Millimeter Wave Linear Array Microstrip Antenna with Circular CSRR
Norsaidah Muhamad Nadzir1, Mohamad Kamal A. Rahim1, Noor Asniza. Murad1, Osman Ayop1, and Mohamed. Himdi2
1Universiti Teknologi Malaysia, Malaysia, 2Université de Rennes 1, France
### Room A

## Antennas for Laptops or Handheld Devices

**Chair:** Chien-Pai Lai, *HP, Taiwan*

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>220083</td>
<td>Asymmetrical, Self-Isolated Laptop Antenna in the 2.4/5/6 GHz Wi-Fi 6E Bands</td>
<td>Saou-Wen Su* and Che-Chi Wan&lt;br&gt;&lt;br&gt;<em>Antenna Design Department, Advanced EM &amp; Wireless Communication R&amp;D Center, Taiwan</em></td>
</tr>
<tr>
<td>220110</td>
<td>Wideband Self-decoupled Dual Antennas for 5G MIMO Operation in Smartphone</td>
<td>C. Y. Tsai and H. Y. Wang&lt;br&gt;&lt;br&gt;<em>Huawei Technologies, United Kingdom</em></td>
</tr>
<tr>
<td>220285</td>
<td>LTE-band Slot Antenna Design for Laptops with Metal Enclosure</td>
<td>Hui-Yu Chueh, Yan-Jun Lin, and Wen-Jiao Liao&lt;br&gt;&lt;br&gt;<em>National Taiwan University of Science and Technology, Taiwan</em></td>
</tr>
<tr>
<td>220290</td>
<td>A Multiband LTE/WWAN Antenna Design for Tablet and Laptop Devices</td>
<td>Chen-Yi Ho, Yu-Hsien Chang, and Wen-Jiao Liao&lt;br&gt;&lt;br&gt;<em>National Taiwan University of Science and Technology, Taiwan</em></td>
</tr>
<tr>
<td>220298</td>
<td>A Two-Antenna System for LTE MIMO Uses on Laptops with Metal Covers</td>
<td>Yu-Xiang Wang, Hung-I Lin, and Wen-Jiao Liao&lt;br&gt;&lt;br&gt;<em>National Taiwan University of Science and Technology, Taiwan</em></td>
</tr>
</tbody>
</table>

### Room B

## SS15: Millimeter-wave and sub-6G Antennas for 5G Systems (1/2)

**Chairs:** Hang Wong, *City University of Hong Kong, Hong Kong SAR, China*
Yang Yang, *University of Technology Sydney, Australia*

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>220213</td>
<td>Conductive and Dielectric Fully-Integrated 3D Printed Dual-Band Millimeter-Wave Fresnel Zone Plate Lens</td>
<td>Jianfeng Zhu¹, Xiaopeng Li² and Yang Yang¹&lt;br&gt;&lt;br&gt;¹University of Technology Sydney, Australia, ²The University of New South Wales (UNSW Sydney), Australia</td>
</tr>
<tr>
<td>220112</td>
<td>Wideband MIMO Antenna for 5G Smartphone Applications</td>
<td>Xiao-Ting Yuan¹, Zhe Chen¹, Tianqi Gu², Yangping Zhao¹ and Tao Yuan¹&lt;br&gt;&lt;br&gt;¹Shenzhen University, China, ²Beijing Smartchip Microelectronics Technology Company Limited, China</td>
</tr>
<tr>
<td>220176</td>
<td>A Transparent MMW Liquid Fresnel Lens Antenna for 5G Communication</td>
<td>HanZhen Cai, KaiXu Wang&lt;br&gt;&lt;br&gt;<em>Harbin Institute of Technology, China</em></td>
</tr>
<tr>
<td>220055</td>
<td>(Invited talk) A wideband millimeter-wave magneto-electric dipole array with pillbox-distributed network</td>
<td>Guang-Hua Sun* and Hang Wong&lt;br&gt;&lt;br&gt;City University of Hong Kong, Hong Kong*</td>
</tr>
</tbody>
</table>
### Room C

**SS21: Antenna Designs, Solutions, Measurements, and Trends for 5G and Beyond (1/2)**

**Chairs:** Cheng-Nan Hu, *Oriental Institute of Technology, Taiwan*

Huan Chu Huang, *National Yang Ming Chiao Tung University, Taiwan*

---

220047: Band-Notched Reconfigurable Ultra-wideband Antenna Based on Square Ring Slot

Xinyu Wang, Wenmei Zhang, Liping Han, Xinwei Chen  
*Shanxi University, China*

---

220104: LTCC End-Fire Array Antenna with Dual-Band and Dual-polarization for Mobile

Daisuke Yamashita  
*NGK SPARK PLUG CO., LTD., Japan*

---

220251: The Effects of Array Element Number on 28 GHz Propagation

Shen Shou Max Chung¹ and Shih-Chung Tuan²  
¹National Penghu University of Science and Technology, Taiwan, ²Oriental Institute of Technology, Taiwan

---

220037: The Hybrid Over-the-Air (OTA) Test Method

Cheng-Nan Hu, Jiaquan Wu, P. X. Wang, Jacobi Chen, and Dau-Chyrh Chang  
*Oriental Institute of Technology, Taiwan*

---

220038: Coherent Phase Calibration of the 5G Massive MIMO Devices Using CATR OTA Test Method

Cheng-Nan Hu, Jacobi Chen, Zong-Ting Csai, P. X. Wang, and Jiaquan Wu  
*Oriental Institute of Technology, Taiwan*

### Room D

**Antenna Modeling and Measurements**

**Chairs:** Wen-Jiao Liao, *National Taiwan University of Science and Technology, Taiwan*

Prof. Jia-Shiang Fu, *National Central University, Taiwan*

---

(Invited Talk) Time Domain Equivalent Circuit for the Characterization of Pulsed Photoconductive Antennas

Andrea Neto  
*Delft University of Technology, Netherlands*

---

(Invited Talk) Surrogate Targets Developments for Automobile Radar Testing

Chi-Chih Chen  
*Ohio State University, USA*

---

220274: Vehicular MIMO Antenna Measurements in Outdoor Environments using Coherent Base Station Scanner with Real-time Demodulation

Kazuma Tomimoto¹², Ryo Yamaguchi¹, and Takeshi Fukusako²  
¹Softbank Corp., Japan, ²Kumamoto University, Japan

---

220184: Evaluation of Automotive Antenna Over the Air Performance

M. Mercier¹*1, F. Mioc1°, K. Rutkowski1°, A. Scannavini1°, and T. Nowack², C. Bornkessel², and M. A. Hein²  
¹Microwave Vision Group (MVG), *Hong Kong, °Italy, +France, ²TU Ilmenau, Germany
<table>
<thead>
<tr>
<th>Room E</th>
<th>Radar, DOA, localization and Sensing (1/3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chairs: Yi-Hsin Pang, National University of Kaohsiung, Taiwan</td>
<td></td>
</tr>
<tr>
<td>Takeshi Amishima, Mitsubishi Electric Corporation, Japan</td>
<td></td>
</tr>
<tr>
<td><strong>220034: Recursive geolocation of unknown emitters using TDOAs of three GEOs</strong></td>
<td></td>
</tr>
<tr>
<td>Takeshi Amishima and Ryuhei Takahashi</td>
<td></td>
</tr>
<tr>
<td>Mitsubishi Electric Corporation, Japan</td>
<td></td>
</tr>
<tr>
<td><strong>220099: Analysis of an Interferometric AOA Antenna with Ground Plane in a Rician Fading Channel</strong></td>
<td></td>
</tr>
<tr>
<td>Kaito Otsubo and Kazuhiro Honda</td>
<td></td>
</tr>
<tr>
<td>University of Toyama, Japan</td>
<td></td>
</tr>
<tr>
<td><strong>220210: DOA Estimation by Synthetic Aperture Measurement with Compressed Sensing and Neural Network</strong></td>
<td></td>
</tr>
<tr>
<td>Tomonori Ikeda¹, Mitoshi Fujimoto¹, Kazuma Tomimoto², and Ryo Yamaguchi²</td>
<td></td>
</tr>
<tr>
<td>¹University of Fukui, Japan, ²SoftBank Corp, Japan</td>
<td></td>
</tr>
<tr>
<td>Takashi Katsumata¹, Kazuki Onodera¹, Naoki Honma¹, Kentaro Murata¹, Mari Takeda², Atsushi Takei², Kazuhiro Matsumoto², Nobuyuki Shihano³ and Tetsuya Hishikawa²</td>
<td></td>
</tr>
<tr>
<td>¹Iwate University, Japan, ²Panasonic Corporation, Japan</td>
<td></td>
</tr>
<tr>
<td><strong>220219: Multi Port Single Patch Antenna for DNN based Direction Finding</strong></td>
<td></td>
</tr>
<tr>
<td>Seung Gook Cha¹, Donghyun Kim¹, Dongwook Lee¹, Young Joong Yoon¹, Hyungrak Kim²</td>
<td></td>
</tr>
<tr>
<td>¹Yonsei University, Republic of Korea, ²Daelim College, Republic of Korea</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Room A</th>
<th>Oral Sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SS11: Antenna Technologies Related to Human Monitoring</strong></td>
<td></td>
</tr>
<tr>
<td>Chair: Naoki Honma, Iwate University, Japan</td>
<td></td>
</tr>
<tr>
<td><strong>220327: (Invited talk) A State-Machine-Based Approach for Human Activity Classification Using MIMO Radar</strong></td>
<td></td>
</tr>
<tr>
<td>Naoki Honma¹, Dai Sasakawa¹, Nobuyuki Shiraki¹, Kentaro Murata¹, Takeshi Nakayama², and Shoichi Iizuka²</td>
<td></td>
</tr>
<tr>
<td>¹Iwate University, Japan, ²Panasonic Corporation, Japan</td>
<td></td>
</tr>
<tr>
<td><strong>220076: Detecting locations and vital signs of multiple humans with MIMO FMCW radar</strong></td>
<td></td>
</tr>
<tr>
<td>Kawon Han¹, and Songcheol Hong¹</td>
<td></td>
</tr>
<tr>
<td>¹KAIST, Republic of Korea</td>
<td></td>
</tr>
<tr>
<td><strong>220036: Adaptive Array Processing for Radar Measurements of Pulse Wave Propagation</strong></td>
<td></td>
</tr>
<tr>
<td>Takehito Koshisaka¹ and Takuya Sakamoto¹²</td>
<td></td>
</tr>
<tr>
<td>¹Kyoto University, Japan, ²Japan Science and Technology Agency, Japan</td>
<td></td>
</tr>
<tr>
<td><strong>220152: Switch-based Self-injection-locked Radar with Data Fusion Algorithm</strong></td>
<td></td>
</tr>
<tr>
<td>De-Ming Chian, Chao-Kai Wen, Wei-Chih Huang, Chun-Wei Liu, Fu-Kang Wang, and Tzvy-Sheng Horng</td>
<td></td>
</tr>
<tr>
<td>National Sun Yat-sen University, Taiwan</td>
<td></td>
</tr>
<tr>
<td><strong>220374: Multipath Tracking of On-Body Tag in Linear and Spin Motions</strong></td>
<td></td>
</tr>
<tr>
<td>Xiaochen Liu¹, Ibrahim Bilal², Yang Miao¹</td>
<td></td>
</tr>
<tr>
<td>¹University of Twente, the Netherlands, ²Xsens, The Netherlands</td>
<td></td>
</tr>
</tbody>
</table>
Room B

SS15: Millimeter-wave and sub-6G Antennas for 5G Systems (2/2)

Chair: Shu Chuan Chen, National Defense University, Taiwan

220318: (Invited talk) A Filtering Hemisphere Dielectric Resonator Antenna
Xiyao Liu¹², Kwok Wa Leung¹², and Nan Yang³
¹City University of Hong Kong, Hong Kong SAR, China, ²CityU Shenzhen Research Institute, China
³Sun Yat-sen University, China

220179: QMSIW Cavities for Compact Dual-Frequency Millimeter-Wave 5G Antenna Array Design
Yu-Xiang Sun¹² and Di Wu¹
¹Shenzhen University, China, ²Southeast University, China

220046: Design & Optimization Procedure of 5G Millimeter-Wave Antenna Integrated in Mobile Devices
Tung Nguyen
ANSYS JAPAN K.K, Japan

220270: Compact Multi-Input Multi-Output Loop Antenna System for 5G Laptops
Shu-Chuan Chen, Chih-Kuo Lee, and Sheng-Min Li
National Defense University, Taiwan

Room C

SS21: Antenna Designs, Solutions, Measurements, and Trends for 5G and Beyond (2/2)

Chair: Huan Chu Huang, National Yang Ming Chiao Tung University, Taiwan

220306: Reconfigurable Cavity-Backed Slot Antennas using Fluid Dielectric
Rui-Sen Chen¹, Sai-Wai Wong¹, Guan-Long Huang², and Kam-Weng Tam³
¹Shenzhen University, China, ²Foshan University, China, ³University of Macau, Macau SAR, China

220138: Modified Half-Mode Substrate Integrated Waveguide Antenna Design for 5G NR mmWave Applications
Chia-Mei Peng¹, Ting-Ren Li¹, and I-Fong Chen²
¹Feng Chia University, Taiwan, ²Jinwen University of Science and Technology, Taiwan

220291: Broadband Vortex Beam Generation Using a Pancharatnam-Berry Metasurface
Yangdong Zhang¹, Qingsheng Zeng¹
¹Nanjing University of Aeronautics and Astronautics, China

220417: Relationships between Mobile Phones’ Metal Exteriors and Millimeter-Wave Antennas
Huan-Chu Huang
Etheta Communication Technology Co., Ltd., China

220128: Design of MIMO Antennas for WiFi/5G Small Cell Applications
Chin-Cheng Chang¹, Yi-Fang Lin¹, Minh-Tan Nguyen¹, Yi-Xiao Liu¹, Hong-Twu Chen², and Hua-Ming Chen¹
¹National Kaohsiung University of Science and Technology, Taiwan, ²R.O.C. Military Academy, Taiwan
### Room D

#### Metamaterial-/Metasurface-inspired Antennas

**Chair: Malcolm Ng Mou Kehn, National Yang Ming Chiao Tung University, Taiwan**

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>220021</td>
<td>(Invited talk) Circularly Polarized Conical Radiation from a Metaspiral Antenna</td>
<td>Hisamatsu Nakano, Tomoki Abe, Junji Yamauchi</td>
<td>Hosei University, Japan</td>
</tr>
<tr>
<td>220096</td>
<td>Feasibility study of an unbalanced MACKEY type R with enhanced robustness on metal</td>
<td>Keisuke Miyashita, Shigeru Makino, Kenji Itoh</td>
<td>Kanazawa Institute of Technology, Japan</td>
</tr>
<tr>
<td>220308</td>
<td>Development of Circular Polarization MACKEY</td>
<td>Keiyo Yokoe, Keisuke Miyashita, Kota Hakamata, Shigeru Makino, Kenji Itoh</td>
<td>Kanazawa Institute of Technology, Japan</td>
</tr>
<tr>
<td>220346</td>
<td>Mantle Cloak Antenna Using Strip Conductors for Mutual Coupling Reduction at Frequency Lower Than Operating Frequency</td>
<td>Thanh Binh Nguyen¹, Hiroshi Hashiguchi¹, Naobumi Michishita¹, Hisashi Morishita¹, Teruki Miyazaki², and Masato Tadokoro²</td>
<td>¹National Defense Academy, Japan, ²Yokohama Rubber Co., Ltd., Japan</td>
</tr>
<tr>
<td>220399</td>
<td>Optimization of a Metasurface Antenna Composed of Dual T-shaped Antenna Elements Based On Machine Learning</td>
<td>Li Zhang, Lijia Chen, Zhuli Yuan, and Shengchang Lan</td>
<td>Harbin Institute of Technology, China</td>
</tr>
</tbody>
</table>

### Room E

#### Radar, DOA, localization and Sensing (2/3)

**Chairs: Hiroyoshi Yamada, Niigata University, Japan  
Masahiko Nishimoto, Kumamoto University, Japan**

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliation</th>
</tr>
</thead>
<tbody>
<tr>
<td>220231</td>
<td>Number of Antenna Elements Characteristics of Heart Rate Estimation Accuracy Using Arctangent Demodulation</td>
<td>Yuta Ogawa¹, Kota Sasaki¹, Naoki Honma¹, Morio Iwai¹, Koichiro Kobayashi¹, Atsushi Sato², and Kentaro Murata¹</td>
<td>¹Iwate University, Japan, ²EQUOS Research Co., Ltd., Japan</td>
</tr>
<tr>
<td>220236</td>
<td>Indoor Localization Method Using PDR and RSSI Distribution Generated by Two Antennas</td>
<td>Kohei Uchisawa, Naoki Honma, and Kentaro Murata</td>
<td>Iwate University, Japan</td>
</tr>
<tr>
<td>220267</td>
<td>Room Geometry Estimation based Device-Free Localization Method</td>
<td>Yuto Miyake, Minseok Kim, Takeshi Tasaki</td>
<td>Niigata University</td>
</tr>
<tr>
<td>220382</td>
<td>Phase Parameter Extraction from UWB Radar Response for Non-destructive Inspection</td>
<td>Masahiko Nishimoto¹, Budiman P.A. Rohman¹,², and Kohichi Ogata¹</td>
<td>¹Kumamoto University, Japan, ²Indonesian Institute of Sciences, Indonesia</td>
</tr>
<tr>
<td>220256</td>
<td>Measurement and Analysis of Building Entry Loss in High Base Station Environment</td>
<td>Sho Kimura, Hoyu Lin, Shoma Tanaka, Akihiro Sato and Hideki Omote</td>
<td>Softbank Corp., Japan</td>
</tr>
<tr>
<td>Session</td>
<td>Title</td>
<td>Authors</td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>----------------------------------------------------------------------</td>
<td>-------------------------------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>SS19:</td>
<td>Glide Symmetries and Their Applications for Microwave Devices</td>
<td>Chairs: Oscar Quevedo-Teruel, KTH Royal Institute of Technology, Sweden</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Carlos Molero, Universidad de Granada, Spain</td>
<td></td>
</tr>
<tr>
<td>220244:</td>
<td>(Invited talk) Overview on glide-symmetric periodic structures</td>
<td>Oscar Quevedo-Teruel, KTH Royal Institute of Technology, Sweden</td>
<td></td>
</tr>
<tr>
<td>220044:</td>
<td>Analysis of Glide-Symmetric FSS Structures from a Circuit Model Standpoint</td>
<td>Antonio Alex-Amor¹, Francisco Mesa², Ángel Palomares-Caballero¹, Carlos Molero¹, and Pablo Padilla¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>¹Universidad de Granada, Spain, ²Universidad de Sevilla, Spain</td>
<td></td>
</tr>
<tr>
<td>220178:</td>
<td>Multimodal Transfer Matrix Method Applied to 3-D Periodic Structures</td>
<td>Federico Giusti¹, Francisco Mesa², Qiao Chen¹, Guido Valerio³, Oscar Quevedo-Teruel¹</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>¹KTH Royal Institute of Technology, Sweden, ²Universidad de Sevilla, Spain, ³Sorbonne Université, France, ⁴Univ. Paris-Saclay, France</td>
<td></td>
</tr>
<tr>
<td>220387:</td>
<td>Dispersion Analysis of Glide-Symmetric Periodic Structures with Coaxial Holes</td>
<td>Marko Bosiljevac¹, Nafsika Memeletzoglou², Zvonimir Sipus, Eva Rajo-Iglesias²</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>¹University of Zagreb, Croatia, ²University Carlos III of Madrid, Spain</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Room B</td>
<td>Broadband and Multi-band Antennas</td>
<td>Chairs: Jeen-Sheen Row, National Changhwa University of Education, Taiwan</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Xingqi Zhang, University College Dublin, Ireland</td>
</tr>
<tr>
<td>220156:</td>
<td>Design and Experimental Verification of an Ultra-Wideband Rridged TEM Horn Antenna for Partial Discharge Detection</td>
<td>Shu Lin¹, Xiaobing Wei¹, Jiaxuan Li², Shoulan Liu¹, Hongjun Zhang¹, and Xingqi Zhang²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>¹Harbin Institute of Technology, China, ²University College Dublin, Ireland.</td>
</tr>
<tr>
<td>220273:</td>
<td>Ultrawideband dual-layer Magnetoelectric Dipole with Circular Polarization</td>
<td>Ganyu Liu¹, Hailiang Zhu¹, Yuwei Qiu¹, Kai Wang¹, Pei Zheng², and Zhiye Jiang²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>¹Northwestern Polytechnical University, China, ²National Key Laboratory of Science and Technology on Test Physics and Numerical Mathematics, China</td>
</tr>
<tr>
<td>220095:</td>
<td>A High Gain Broadband Circularly Polarized Antenna with Sector Dipole</td>
<td>Fengshou Zhang, Wei Li, Ying Suo, Harbin Institute of Technology, China</td>
</tr>
<tr>
<td>220332:</td>
<td>Compact Triple-Band Wearable Circular Patch Antenna for WLAN/WiMAX Applications</td>
<td>Haiyan Li, Jinxin Du, Xue-Xia Yang, Shanghai University, China</td>
</tr>
<tr>
<td>220119:</td>
<td>A Compact and Flexible Dual-Band Antenna for Near-Body Applications</td>
<td>Gildas Bengloan¹, Jõao M. Felicio², Carlos A. Fernandes², Anne Chousseaud¹, Bruno Froppier¹ and Eduardo Motta Cruz²</td>
</tr>
<tr>
<td></td>
<td></td>
<td>¹Univ Nantes, France, ²Instituto de Telecomunicações, Portugal</td>
</tr>
</tbody>
</table>
**Room C**

**SS06: Multi-Antenna based Technologies of Open Radio Access Network (O-RAN) for 5G/B5G/6G Applications at Millimeter Wave (1/2)**

**Chair: Ding-Bing Lin, National Taiwan University of Science and Technology, Taiwan**

<table>
<thead>
<tr>
<th>Presentation Title</th>
<th>Authors</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>220235: A Low-Profile Dual-band Circularly Polarized Cavity Antenna for Satellite Communications</td>
<td>Hao-Hsiang Yang and Cheng-Nan Chiu</td>
<td>Yuan Ze University, Taiwan</td>
</tr>
<tr>
<td>220243: A High-Gain and Wideband Circularly-Polarized Horn-like Antenna for Low Orbit Satellite Communication Systems</td>
<td>Jia-Cheng Liang and Cheng-Nan Chiu</td>
<td>Yuan Ze University, Taiwan</td>
</tr>
<tr>
<td>220313: 79GHz Antenna Gain Enhancement by Using Planar Dielectric Lens on the Housing</td>
<td>Ding-Bing Lin(^1), Nien-Chih Tsai(^1), and Yi-Ju Lee(^2)</td>
<td>(^1)National Taiwan University of Science and Technology, Taiwan, (^2)Alpha Inc., Taiwan</td>
</tr>
<tr>
<td>220366: Path Loss, Diffraction and Attenuation for 38 GHz Millimeter-Wave Channel</td>
<td>Chi-Min Li(^1), Po-Yu Lee(^1), Pao-Jen Wang(^2), and Shun-Zhong Zheng(^2)</td>
<td>(^1)National Taiwan Ocean University, Taiwan, (^2)Ming Chi University of Technology, Taiwan</td>
</tr>
<tr>
<td>220407: Tunable Frequency Selective Surface (FSS) based on LC Material for mmWave Communications</td>
<td>Cheng-Chung Lin(^1), Guo-Sheng Lin(^1), Guan-Jhou Ke(^2), and Hsi-Hsir Chou(^3)</td>
<td>(^1)National Chung-Shan Institute of Science and Technology, Taiwan, (^2)National Taiwan University of Science and Technology, Taiwan</td>
</tr>
</tbody>
</table>

**Room D**

**EBG, Metamaterials and Periodic Structures**

**Chairs: Rakhesh Kshetrimayum, Indian Institute of Technology Guwahati, India**

Mohammad Kamal A Rahim, Universiti Teknologi Malaysia, (UTM), Malaysia

<table>
<thead>
<tr>
<th>Presentation Title</th>
<th>Authors</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>220175: Polarization and Beam Regulation of Electromagnetic Wave Based on Metasurface</td>
<td>Xinyu Liu, Beijia Liu, and Jinghui Qiu</td>
<td>Harbin Institute of Technology, China</td>
</tr>
<tr>
<td>220181: 3D Printed Periodic Structures for RF Packaging of Integrated Array Module at sub-6GHz Band</td>
<td>Ashraf Uz Zaman and Marianna Ivashina</td>
<td>Chalmers University of Technology, Sweden</td>
</tr>
<tr>
<td>220158: Dual Band Horn Antenna Using Frequency Selective Surface Superstrate</td>
<td>Muhammad Naeem Iqbal, Mohd Fairus Mohd Yusoff, Mohammad Kamal A Rahim, Mohammad Rijal Hamid and Zaharah Johari</td>
<td>Universiti Teknologi Malaysia, (UTM), Malaysia</td>
</tr>
<tr>
<td>220397: UWB Monopole Antenna Miniaturization and Gain Enhancement using FSS Reflector</td>
<td>Abdennasser Lamkaddem, Ahmed El Yousfi, Kerlos Atia Abdalmalak, and Daniel Segovia-Vargas</td>
<td>Carlos III University of Madrid, Spain</td>
</tr>
<tr>
<td>220260: A Unidirectional Ku-band Antenna With a High Front-to-Back ratio by Integration of Cylindrical DRA With Cylindrical SSPP Structure</td>
<td>Sonu Kumar, Rakhesh Singh Kshetrimayum</td>
<td>Indian Institute of Technology Guwahati, India</td>
</tr>
</tbody>
</table>
Room E

**Radar, DOA, localization and Sensing (3/3)**

**Chair: Liang-Yu Ou Yang, National Central University, Taiwan**

**220258: Calibrating Living-Body MIMO Radar Having Miniaturised Array with Imperfect Radiation Patterns**
Tomonori Ito¹, Teppei Hayashi¹, Nobuyuki Shiraki¹, Naoki Honma¹, Abudusaimi Abduaini¹, Kentaro Murata¹, Takeshi Nakayama², And Shoichi Iizuka²
¹Iwate University Japan, ²Panasonic Corporation, Japan

**220322: Detection of buried targets under limited number of scans with a synthetic aperture radar**
Akihisa Uematsu, and Toshiyuki Nishibori
Japan Aerospace Exploration Agency, Japan

**220105: Robust Beamforming for Antenna Arrays with Source Location Probability Density Function**
Jiahao Wang, Koen Mouthaan
National University of Singapore, Singapore

**220314: An Attempt of Underwater Position Estimation in Pseudo-Scale Model Using Cross-Dipole Array**
Ryota Sase, and Nozomu Ishii
Niigata University, Japan

**220369: Estimation of 1090MHz Signal Types Used in Aircraft Surveillance System**
Junichi Honda, Yasuyuki Kakubari, and Takuya Otsuyama
Electronic Navigation Research Institute (ENRI), Japan

**15:20-17:10 Oral Sessions**

**Room A SS04: Millimeter-wave, Terahertz Antennas and System**

**Chair: Dongquan Sun, Xidian University, China**

**220023: (Invited talk) A Novel Wideband Quasi-Optical Monopulse Antenna at Terahertz Band**
Huan Guo, Wenbin Dou
Southeast University, China

**220167: A D-band H-plane Hard-Soft Horn Antenna**
Dongquan Sun¹, Yong Yang², and Xiang Chen³
¹Xidian University, China, ²Nanjing University of Science and Technology, China, ³China Academy of Space Technology, China

**220086: A Solution for Simulation of the Electrically Large Reflectarray**
Jiapeng Yuan, Huan Guo, Wenbin Dou
Southeast university, China

**220123: Design of Wideband Dielectric Resonator Antenna for D-Band Applications**
Teng Li¹,², Karina Schneider², Alexander Haag², Akshay Visweswara³, Akanksha Bhutani² and Thomas Zwick²
¹Southeast University, China, ²Karlsruhe Institute of Technology, Germany, ³IMEC, Belgium

**220140: Reflective Beamforming Metasurface Using Exact Incident Phase**
Si Yu Miao, and Feng Han Lin
Shanghai Tech University, China
Room B

Millimeter-wave, Terahertz and Optical Antennas

Chair: Yu-Hsiang Cheng, National Taiwan University, Taiwan

(Invited talk) Recent Advances in Shorted Patch Antennas
Zhang Yue Ping
Nanyang Technological University, Singapore

220068: Measurement of Far Field Radiation Pattern of 300GHz-band Cassegrain Antenna
Ken Watanabe¹, Akihiko Hirata¹, Issei Watanabe², Norihiko Sekine², and Akifumi Kasamatsu²
¹Chiba Institute of Technology, Japan, ²National Institute of Information and Communications Technology, Japan

220405: A Filtering Antenna And Its Sub-Array Based On The Self-Shielded Coupling Feeding Structure
Wei Ling, Yu-jin Zhou, De-si-fan Gao, Chong-hu Cheng
Nanjing University of Posts and Telecommunications, China

220200: Millimeter-Wave Conformal Antenna Array Concept for Metal-Covered 5G Mobile Handsets
Jihoon Bang, Sunwoo Kim, and Jaehoon Choi
Hanyang University, Seoul, Republic of Korea

220170: Automatic Deployment Planning of 300-GHz-Band Wireless Fronthaul Link in Metropolitan Areas
Akihiko Hirata
Chiba Institute of Technology, Japan

Room C

SS06: Multi-Antenna based Technologies of Open Radio Access Network (O-RAN) for 5G/B5G/6G Applications at Millimeter Wave (2/2)

Chair: Prof. Ding-Bing Lin, National Taiwan University of Science and Technology, Taiwan

220199: (Invited talk) Antenna-in-Packages for Array Modularization at Millimeter-wave Frequencies and its Applications in 5G O-RAN
Hsi-Tseng Chou¹, Kuan-Hsun Wu¹, Zhao-He Lin¹, Zhi-Da Yan¹, Ding-Bing Lin²
¹National Taiwan University, Taiwan, ²National Taiwan University of Science and Technology, Taiwan

220250: Side-lobes Suppression for 5G Millimeter Wave Sparse Array Antenna
Shih Chung Tuan¹, Chia Hung Chang²
¹Oriental Institute of Technology, Taiwan, ²National Yunlin University of Science and Technology, Taiwan

220165: Beam Switchable Antenna Array Design by Rotman Lens with SIW Feeding Lines for Vehicular Applications
Chia-Hung Chou¹, Shih-Kai Ho², Ding-Bing Lin¹, His-Tseng Chou²
¹National Taiwan University of Science and Technology, Taiwan, ²National Taiwan University, Taiwan

220173: Polarization-Tunable Phased Antenna Array Module at 28 GHz Band for 5G Applications
Zhao-He Lin, Hsi-Tseng Chou
¹National Taiwan University, Taiwan

220174: Dual-Polarized Antenna Array Modularization by LTCC Process at Millimeter Wave Frequencies for 5G Applications
Sheng Ju Chou¹, Hsi-Tseng Chou², Joseph D. S. Deng¹, and Zhi-Da Yan²
¹Cyntec Co., Ltd., Taiwan, ²National Taiwan University, Taiwan
Room D

Microwave, mmWave, and THz Imaging

Chair: Hiroyasu Sato, Tohoku University, Japan
Pei-Ling Chi, National Yang Ming Chiao Tung University, Taiwan

220365: Imaging of Object in Front of Human Body Phantom Using Leaky-Wave Focusing Antenna
Kevin Kipruto Mutai, Hiroyasu Sato, and Qiang Chen
Tohoku University, Japan

220383: Accurate Reconstruction Algorithm of Millimeter Wave Holography
Hua Zong, He Zhang, Jinghui Qiu
Harbin Institute of Technology, China

Reflectarrays

220209: A Broadband Single-Layer Reflectarray Antenna Using Multiresonance Elements
Ming-Che Li, Po-Lin Huang, Tzyh-Ghuang Ma
National Taiwan University of Science and Technology, Taiwan

220102: One Layer of Reflectarray Antenna Changing Beam Direction by Polarization
Shota Takino, Shigeru Makino, Sanshiro Shigemitsu, Yusuke Kaimori
Kanazawa Institute of Technology, Japan

220333: Design of A 2-Bit Dual Linearly Polarized Reconfigurable Reflectarray Element
Min Wang, Kunyang Shan, Wei Luo, Zhengchuan Chen
Chongqing University of Posts and Telecommunications, China, Southeast University, China, Chongqing University, China.

Room E

SS05: Design Method and Application of Multi-Antenna Systems

Chairs: Hui Li, Dalian University of Technology, China
Tamami Maruyama, National Institute of Technology, Japan

220111: (Invited talk) An Eight-port MIMO Antenna for Mobile Handsets
Wencong Li and Hui Li
Dalian University of Technology, China

220027: Ten-Element MIMO Array Using Stable Current Nulls for 5G smartphones
Aidi Ren, Zhanhao Zhang, Haoran Yu, Hong-Wei Yu
Anhui University, China, 38th Research Institute of China Electronic Technology Corporation, China

220430: Wideband MIMO Antenna with Decoupling Slots for 5G Smartphone Applications
C. F. Zhou, J. X. Sun, H. Li
Dalian University of Technology, China

220402: Novel Circuit-Shape Leaky Wave Waveguide for Microwave Snow melting
Tamami Maruyama, Shunta Kasai, Koki Shibata, Manabu Omiya, Masashi Nakatsugawa and Yashiro Tamayama
National Institute of Technology, Japan, Hokkaido University, Japan, Nagaoka University of Technology, Japan
Interactive Forum: FR-IF

220242: Electromagnetic Analysis of Thin Film with Periodic Metal
Hironori Shibagaki, Seiya Kishimoto, Yoshito Ashizawa, Katsuji Nakagawa, Shinichiro Ohnuki
Nihon University, Japan

220295: Low-SCS Microstrip Thinned Array
Peng-Fa Li, Shi-Wei Qu, and Shiwen Yang
University of Electronic Science and Technology of China, China

220376: A microstrip patch antenna design based on ANN
Haizhuo He, Shengchang Lan, Beijia Liu and Lijia Chen
Harbin Institute of Technology, China

220411: FDTD Algorithms for Modeling Cold Plasmas
Yarong Cao, Lingyu Xiao, and Yaxin Yu
Chang'an University, China

220072: Analysis of Truncation Error in 3-D Microwave Holographic Imaging
Hsu-Chi Chen and Shih-Yuan Chen
National Taiwan University, Taiwan

220097: Mode-matching Analysis and Genetic Algorithm Optimization for a Two-plane Coupler by Changing the Cross-sectional Shape of the Coupling Region
Shota Yamakawa, Takashi Tomura, and Jiro Hirokawa
Tokyo Institute of Technology, Japan

220416: Thermal Enhanced modelling of 6-energy-level system
Yaxin Yu, Yang Dong and Lingyu Xiao
Chang'an University, China

220155: ISAR Image Inpainting Algorithm Based on DCGAN
Tingfei Wang¹, Jingpeng Gao¹, and Zhiye Jiang²
¹Harbin Engineering University, China, ²Beijing Institute of Space Long March Vehicle, China

220047: Low-Frequency Electromagnetic Characterization of Layered Media Using Deep Neural Network
M. Shifatul Islam¹, Sadman Shafi¹, and Mohammad Ariful Haque²
¹Anyeshan Limited, Bangladesh, ²Bangladesh University of Engineering and Technology, Bangladesh

220410: Low-Frequency Electromagnetic Characterization of Layered Media Using Deep Neural Network
M. Shifatul Islam¹, Sadman Shafi¹, and Mohammad Ariful Haque²
¹Anyeshan Limited, Bangladesh, ²Bangladesh University of Engineering and Technology, Bangladesh

220151: A Reconfigurable Balanced Dual-Band Bandpass Filter Using Asymmetric Short Stub-Loaded Resonators
Chi Yuan Zhang, Bo Liu, and Feng Wei
Xidian University, China

220363: Design of Amplitude-Modulated Transponder with Liquid Metal
Jian-Bo Liao, Meng-Hsuan Lin, and Chia-Chan Chang
National Chung-Cheng University, Taiwan
220412: Single-Layer Wide-band 45 Degree Phase Shifter with Filter Function
Duo Xu, Yiming Tang
Nanjing University of Posts and Telecommunications, China

220325: A Millimeter-Wave Bandpass Filter Based on Substrate Integrated Dielectric Resonator
Wei Sheng Tang¹, Shao Yong Zheng³, and Yong Mei Pan²
¹Sun Yat-sen University, China, ²South China University of Technology, China

220054: Millimeter-Wave Bandpass Filter on Printed Circuit Board with Conventional Microstrip Line Structure
Yu-Chen Lin¹, Szu-Cheng Lin², Yun-Jhang Lee², and Ting-Yi Huang²
¹Feng Chia University, Taiwan, ²Compal Electronics, INC., Taiwan

220325: A Millimeter-Wave Bandpass Filter Based on Substrate Integrated Dielectric Resonator
Wei Sheng Tang¹, Shao Yong Zheng³, and Yong Mei Pan²
¹Sun Yat-sen University, China, ²South China University of Technology, China

220239: Gain Enhancement of the Millimeter Wave Radar Sensor Using a Composite Metamaterial Radome
Tianmeng Cui¹, Chen-Pang Chao¹, Teng-Yu Lo¹, Chang-Fa Yang¹, Wen-Hsiung Lin², Hsin-Wei Wang², Chun-Yi Chai³, Ike Lin⁴, Bryan Chu⁴
¹National Taiwan University of Science and Technology, Taiwan, ²Jorjin Technologies Inc., Taiwan ³XMMSE Co., Ltd, Taiwan, ⁴WaveFidelity Inc., Taiwan

220108: Influence of Mutual Coupling and Surrounding Objects on Base Station Antennas in ITS
Kaito Nishimura¹, Mitoshi Fujimoto¹, Katsutoshi Kawai², and Toshinori Iinuma²
¹University of Fukui, Japan, ²KYOCERA Corporation, Japan

202111: A Study on Location of Vehicle-mounted Antennas for Single-Frequency Full-Duplex Communication
Kohei Nono¹, Mitoshi Fujimoto¹, Ryo Yamaguchi², and Kazuma Tomimoto²
¹University of Fukui, Japan, ²SoftBank Corp, Japan

202054: Millimeter-Wave Bandpass Filter on Printed Circuit Board with Conventional Microstrip Line Structure
Yu-Chen Lin¹, Szu-Cheng Lin², Yun-Jhang Lee², and Ting-Yi Huang²
¹Feng Chia University, Taiwan, ²Compal Electronics, INC., Taiwan

220092: An Over 100 Gbps Large-Scale MIMO Antenna with Double-Helix Array
Kazuhiro Honda
toyama University, Japan

220271: New Microwave Generator for 28 GHz band of 5G mobile communication using an Optical High-order Harmonic Generation for LiNbO3 Optical Intensity Modulator
Satoru Kurokawa¹,², Michitaka Amey¹, and Masanobu Hirose³
¹National Institute of Advanced Industrial Science and Technology, Japan, ²7G aa Co. Ltd., Japan

220085: Reception Characteristics Improvement by Polarization MIMO Gap-filler on Long-distance Transmission in Terrestrial TV Broadcasting
Kentaro Tanaka, Mitoshi Fujimoto¹
¹University of Fukui, Japan

220286: UE selection method using determinant in Coordinated MU-MIMO
Shotaro Sasaki, Mitoshi Fujimoto
University of Fukui, Japan

220092: An Over 100 Gbps Large-Scale MIMO Antenna with Double-Helix Array
Kazuhiro Honda
toyama University, Japan

220386: Numerical Simulation of Aircraft Position Verification using AOA and TDOA for ADS-B
Junichi Naganawa, Hiromi Miyazaki, Hirohisa Tajima, Tadashi Koga, Jun Kitaori
National Institute of Maritime, Port and Aviation Technology, Japan

220028: UE selection method using determinant in Coordinated MU-MIMO
Shotaro Sasaki, Mitoshi Fujimoto
University of Fukui, Japan
220329: High Isolation MIMO Antenna using Electromagnetic Band Gap - EBG Structure
M. F. Ismail¹, M. K. A. Rahim², Noor Asmawati Samsuri², Noor Asniza Murad² and Adya A Pramudita³
¹Universiti Tun Hussein Onn Malaysia Pagoh Campus, Malaysia, ²Universiti Teknologi Malaysia, ³Telkom University, Indonesia

220341: Evaluation of Channel Capacity Characteristics for Asymmetric LoS-MIMO
Takanobu Watanabe, Kentaro Nishimori
Niigata University, Japan

220107: Implementation of 8 Channels Phase Conjugation on FPGA for Microwave Power Transmission
Taewoo Yu¹, Joon-Hong Kim² and Sangwook Nam³
¹Seoul National University, Korea, ²Samsung Research, Korea

220177: High Output DC Power Rectenna Arrays Using Densely Arranged Antenna Elements
Takuma Kichiji, Eisuke Nishiyama and Ichihiko Toyoda
Saga University, Japan

220189: A Study of Multiple Folding Array Antennas on Satellite Installation and Radiation Characteristics after Deployment
Daiki Hosaka¹, Tadashi Takano, Kenji Saegusa
Nihon University, Japan

220320: Study of Characteristic Impedance of Near-Field Antenna in Coupled State as Transmission Line
Takanori Washiro
Nippon Telegraph and Telephone Corporation, Japan

220094: IRS Aided OAM-MIMO Communication
Yang Wang, Ndagijimana Cyprien, Tao Hu, Xi Liao
Chongqing University of Posts and Telecommunications, China

220145: Miniaturized and Wideband Chipless RFID Tag Antenna
Mohd Ezwan Bin Jalil, Mohamad Kamal A. Rahim, Noor Asmawati Samsuri, Noor Asniza Murad
Universiti Teknologi Malaysia, Malaysia

220240: A Compact Frequency-Selective Shielding Enclosure Design for Wireless Applications
Chen-Ying Hsieh, Chien-Ju Chen, and Cheng-Nan Chiu
Yuan Ze University, Taiwan

220403: Measurement of 4 GHz Radio Altimeter Interference Path Loss Including 5G Sub-6 Frequency Bands Using Beechcraft B300 Aircraft
Shunichi Futatsumori¹, Norihiko Miyazaki¹, Ai Sato², Ryunosuke Ozaki², Takashi Hikage³, and Toshio Nojima²
¹Electronic Navigation Research Institute, Japan, ²Hokkaido University, Japan

220061: RF Front-end of ISDB-T Receiver for High Mobility Applications
Wen-Cheng Lai
National Yunlin University of Science and Technology, Taiwan

220252: Lumped Reflection-type Phase-shifter for Sub-6 GHz application
Chia-Hung Chang¹, Shih-Chung Tuan², and Tse Sheng Tai³
¹National Yunlin University of Science and Technology, Taiwan, ²Oriental Institute of Technology, Taiwan, ³Feng-Chia University, Taiwan
**220257: Broadband Measurement of Dielectric Constant on FR-4 PCB by Using Discontinuous Microstrip Lines**
Yao-Wen Hsu, Shao-Jie Shen, Chia-An Chen, Shi-Han Qiu and Hao-Hui Chen
National Kaohsiung University of Science and Technology, Taiwan

**220390: Design of a Printed Monopole Antenna with Periodic Patch Director on the Laminated Window Glass for Autonomous Vehicles**
Sangwoon Youn¹, Doyoung Jang¹, Kong Nak Kyung², and Hosung Choo¹
¹Hongik University, Korea, ²Hyundai, Korea
Call for Papers

------- Special Cluster on Antennas and Propagation Technologies 2021 -------

The IEICE Communications Express (ComEX) announces that it will publish a special section entitled “Special Cluster on Antennas and Propagation Technologies 2021” in June 2022. The objective of this special section is to report the advanced technologies on the antenna and propagation related to progressing technologies for next-generation mobile communication systems, MIMO, PAN/BAN, and wireless power transmission and so on. In 2021, several conferences (The IEICE Society Conference 2021 and ISAP2021 in Taipei, etc.) will be held, which aim at providing an international forum for exchanging information on such progress of research and development in antennas, propagation, electromagnetic wave theory, and the related fields. By taking this opportunity, the special section has been planned to publish letters in cluster fashion, which aims to raise the interest of researchers in the field of antennas, propagation, and the related topics.

1. Scope
This special section aims at the timely dissemination of research in these areas. Possible topics include but are not limited to antennas and propagation technologies related to progressing technology for next-generation mobile communication systems, MIMO, PAN/BAN, and wireless power transmission, so forth. The topics also include electromagnetic wave theory and its related topics, including emerging topics for metamaterial, nano-electromagnetics, and its antenna application.

2. Submission Deadline
Two submission periods are prepared for this special cluster, and the deadlines are set as:

- **First deadline: November 19th, 2021 (JST)** (The submission site will open on October 22nd, 2021.)
- **Second deadline: January 7th, 2022 (JST)** (The submission site will open on December 14th, 2021.)

3. Submission Instructions
The maximum number of words is 1500; the maximum number of items (Figures plus Tables) is 3. Manuscripts should be prepared according to the guideline in the “Information for Authors.” The latest version is available at the web site, [https://www.ieice.org/publications/comex/data/for_authors.html](https://www.ieice.org/publications/comex/data/for_authors.html). In particular, please refer to the paragraph on novelty. The review process will begin immediately after submission. The notification of review evaluation for the letter submitted in the first submission period and that in the second one will be sent by December 13th, 2021, and January 31st, 2022, respectively. It is allowed that authors submit a revised version of the letter, which is rejected in the first submission period, in the second submission period. All the accepted papers will appear on the IEICE ComEX website immediately as a pre-print version of the manuscripts posterior to the notification of acceptance. The publication date of the special cluster is fixed on June 1st, 2022. ComEX will accept only the letter type of manuscripts by electronic submission using one of the officially approved formats (LaTeX style file or Microsoft Word template). Submit a manuscript and electronic source files (LaTeX/Word files, figures) via the IEICE Web site [https://review.ieice.org/regist/regist_baseinfo_e.aspx](https://review.ieice.org/regist/regist_baseinfo_e.aspx). In this regard, authors should choose the Special Cluster on Antennas and Propagation Technologies 2021 as a “Journal/Section” on the online screen. Do not choose [Regular-XB].

**Contact Person:** Eisuuke Nishiyama, Saga University  
**Phone:** +81-952-28-8660  
**Email:** ap_ac-comex2021@mail.ieice.org

4. Special Section Editorial Committee

**Guest Editor-in-Chief:** Hiroyoshi Yamada (Niigata University)  
**Guest Editors:** Yen-Sheng Chen (National Taipei University of Technology), Eisuuke Nishiyama (Saga University), Kentaro Saito (Tokyo Denki University),  
**Guest Associate Editors:** Shih-Yuan Chen (National Taiwan University), Toru Fukasawa (Mitsubishi Electric Corporation), Takeshi Fukusako (Kumamoto University), Hisato Iwai (Doshisha University), Satoru Kurokawa (AIST), Wen-Jiao Liao (National Taiwan University of Science and Technology), Takayuki Sasamori (Hokkai-Gakuen University), Hidehisa Shiomi (Osaka University), Shigeki Takeda (Ibaraki University), Ryo Yamaguchi (SoftBank)

* Authors must agree to the “Copyright Transfer and Page Charge Agreement” via electric submission.  
* Please note that if accepted, all authors are requested to pay for the page charges.  
* **All non-member submissions are accepted. Please take this opportunity to submit in our journals.**  
* If there are non-members among the authors, we recommend that the authors take this opportunity to join the IEICE. For detailed information on the IEICE Membership Application, please visit the web-page, [https://www.ieice.org/eng_r/join/individual_member.html](https://www.ieice.org/eng_r/join/individual_member.html).
Auden Techno Corp. offers end-to-end RF design, manufacture & testing service by customization.
**Pervasive Engineering Simulation from Ansys**

**Large Scale Antenna**
Ansys HFSS SBR+ employs the shooting and bouncing ray (SBR) technique for rapid computation of EM solutions, and it can compute installed antenna performance, far-field radiation patterns, satellite antennas and radar signatures.

**5G Antenna Array Analysis**
3D component array provides a means of combining different unit cells in one array, and it will copy the converged unit cell mesh to the other same component. This method will help designers to solve large and complex antenna array problems effectively.

**Ansys Toolkit**
Ansys HFSS offers an antenna design toolkit, a standalone utility which automates the geometry creation, solution setup, and post-processing reports for 50 popular antenna elements.

**ADAS Radar**
Ansys HFSS provides complete radar simulation tools to solve electromagnetic problems, such as passive IC components, dynamic Link with circuit and ADAS radar.

掃QR code 填問卷
好禮天天送！
Only limited in Taiwan
業界首款單次掃描實現
70 kHz~220 GHz 量測

VectorStar™ ME7838G
4-port 向量網路分析儀

ME7838G 寬頻向量網路分析儀可滿足新興射頻及微波通訊系統的設備特性需求，支援單次掃描高達 220 GHz 量測，使 RF 建模及特性分析更具效率。探針直連毫米波模組可提供前所未有的量測動態範圍，微型體積並有助於提升寬頻設備的量測精度以及晶圓探針台的成本效益。

MA25400A 毫米波模組
搭配 T 型偏壓器

- 使 DC path 支援至 220 GHz
- Max V/I：16 VDC/100mA；50 VDC/500mA

MS2760A/MS2762A
超寬頻頻譜分析儀

- 9 kHz~170 GHz 一次涵蓋所有頻帶
- 動態範圍 >100dB；DANL -127@110GHz

Anritsu
www.anritsu.com
JOIN US

台灣是德科技徵才 我們要的就是你 !!!

 KEYSIGHT
 TECHNOLOGIES

熱門職缺：應用工程師、銷售工程師、維修工程師
• 電子電機、光電通信、半導體、射頻微波、汽車工程、自動化、資訊等相關專業。
• 熱愛技術，擁有陽光心態，願意與優秀的業界菁英一起奮鬥！

加入是德 福利多多
您不僅可以接觸最領先的科技，與全球業界最優秀的菁英共事，為您量身打造的個人職業發展計畫，還可以享受全方位的福利：
• 優於勞基法的休假制度
• 彈性上下班時間
• 對員工和家人的醫療保障
• 自選式福利

請將履歷 email 至 Keysight HR: yi-hui_lee@keysight.com
Mobile Communications Certification Department Wireless Business Unit

Taiwan

HsinChu Branch
Tel: +886-3-327-3456
No. 52, Sec. 3, HsinChu Road, HsinChu City

Taichung Branch
Tel: +886-4-2156-7890
No. 75, Sec. 3, FengHua Rd., Taichung City

USA

Tel: +1-408-904-3300
1175 Montague Expressway, Milpitas, CA 95035

China

Hangzhou Branch
Tel: +86-571-88012345
No. 123, West Lake Road, Hangzhou City

Nanjing Branch
Tel: +86-25-85678901
No. 456, Nanjing Road, Nanjing City

Nanjing Branch
Tel: +86-25-85678901
No. 456, Nanjing Road, Nanjing City

Shenzhen Branch
Tel: +86-755-88888888
No. 789, Shenzhen Road, Shenzhen City

Sales Promotion

Tel: +86-21-66668888
No. 098, Shanghai Road, Shanghai City

Sales Promotion

Tel: +86-10-12345678
No. 987, Beijing Road, Beijing City


EMC Testing & Certification

- EMI Standards:
  - CFB Part 18
  - CISPR 11
  - 47 CFR Part 15
  - EN 55022/32
  - EN 55024/32
  - EN 55027/32

- EMC Standards:
  - EN 61000-6-1
  - EN 61000-6-2
  - EN 61000-6-3
  - EN 61000-6-4

- Other Standards:
  - VCCI (Class B)
  - ICES-3
  - BSMI (Class B)
  - CAR (Class B)

Better Certification, Better Sporton. Sporton is your Best Choice for Certification.
5G射頻與基頻電路開發設計

你的射頻電路是否有良好的基頻封包設計？基頻封包演算法是否有升頻電路可驗證？

羅德史瓦茲提供您絕佳的方案

即刻掃描QRcode

參加好禮抽獎
RF Design
Accelerating system innovation for 5G and RF communications

Cadence RF 解決方案
加速 5G RF 通讯系统创新
StarWave

StarWave combines smart mechanical positioners with plane wave generators to create accurate far-field conditions in a compact system. Composed of hundreds of antenna elements, the PWG has been specifically designed to create a quiet zone within a few meters in front of its radiating surface. Limited DUT movement atop an azimuth-only positioner enables 3D measurements of 5G devices including medium or low gain antennas.

SHAPING THE FUTURE
OF 5G MMWAVE
OTA TESTING

• Compact
• Accurate
• Flexible

For more information:
salesteam@mvg-world.com
www.mvg-world.com/StarWave