

**BCWSP 2017**

# **PROGRAM BOOK**

**2017 INTERNATIONAL CONFERENCE ON BROADBAND  
COMMUNICATION, WIRELESS SENSORS AND POWERING**

**Jakarta, November 22 - 23, 2017**



## BCWSP 2017 Program at a glance

Time	Activity	Venue: Tower Building
Wednesday, November 22, 2017		
07.30 – 08.30	Registration & Coffee Break	1 <sup>st</sup> and 2 <sup>nd</sup> floor
08.30 – 08.40	Welcoming Dance: Tari Godeg Ayu	7 <sup>th</sup> floor
08.40 – 09.55	Opening <ol style="list-style-type: none"> <li>1. BCWSP Chair</li> <li>2. Rector of Universitas Mercu Buana</li> <li>3. IEEE Indonesia Section Chair</li> <li>4. Minister of Communication and Informatics</li> </ol>	7 <sup>th</sup> floor
10.00 – 12.15	Keynote Speeches <ol style="list-style-type: none"> <li>1. Prof. Dr. –Ing. Thomas Eibert</li> <li>2. Prof. Dr. Arokiaswami Alphones</li> <li>3. Prof. Dr. Yifan Chen</li> <li>4. Dr.-Ing. Wahyu Sediono</li> </ol>	7 <sup>th</sup> floor
12.15 – 13.15	Lunch	1 <sup>st</sup> floor 3 <sup>rd</sup> floor (Mushola)
13.15 – 15.15	Parallel Session	3 <sup>rd</sup> floor
15.15– 15.45	Coffee Break	1 <sup>st</sup> floor
15.45 – 16.30	Closing Ceremony Best papers announcement	1 <sup>st</sup> floor
Thursday, November 23, 2017		
07.00– 17.00	City Tour to Istana Bogor, Kebun Raya and Hot Spring Water Tirta Arsanta Sentul	1 <sup>st</sup> floor

PROGRAM BOOK of  
2017 International Conference on  
Broadband Communication, Wireless Sensors  
and Powering (BCWSP 2017)

Jakarta, Indonesia

November 22-23, 2017





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IEEE Catalog Number: CFP17WWG-USB

ISBN: 978-1-5386-2832-4



## Message from Conference Chairman

On behalf of the BCWSP committee, we would like to welcome

His Excellency Minister of Communication and Informatics of Republik Indonesia, Mr. Rudiantara, Rector of Universitas Mercu Buana, Dr. Arisetyanto Nugroho, Invited and Keynote Speakers and all participants to the BCWSP 2017 Conference.



The conference on Broadband Communication, Wireless Sensors and Powering was initiated by the Joint Chapter Microwave Theory and Techniques/Antennas and Propagation Society one year ago. The conference is supported and organized by the IEEE Indonesia Section and Universitas Mercu Buana, Jakarta.

The scope of the conference is broadband communications ranging from cellular and satellite systems to fiber optics, wireless systems, Internet of Things, signal processing and others including telecommunication business and regulation.

In this conference, we invited four keynote speakers, we have 56 submitted papers and accepted 34 papers, it is about 61% acceptance rate.

In this occasion, let me express our gratitude to the patrons of this conference, The German Academic Exchange Service (DAAD), PT Rohde-Schwarz Indonesia, Tirta Arsanta, Suntory Garuda, and SCTV.

We want to thank the keynote speakers and all the participants for their contributions. And also thanks to the committee for their excellent work for realizing this conference.

Enjoy your participation in the BCWSP 2017 and memorable time visiting our campus and the city of Jakarta.

Thank you. Have a wonderful day, happy conference and Viel Spass

Prof. Dr.-Ing. Mudrik Alaydrus

BCWSP 2017 Conference Chair, Senior Member of IEEE



## Message from Rector of Universitas Mercu Buana Jakarta

Selamat datang!

On behalf of Universitas Mercu Buana Jakarta, I am honored to welcome all participants to 2017 International Conference on Broadband Communication, Wireless Sensors and Powering (BCWSP 2017) in Jakarta.



The advances of broadband communication in the last twenty five years result not only in coverage of the services but especially in the variety of the transmitted data and the amount of the transmitted data in time unit. The increasing capacity of the wireless communications has opened new technological applications, which have eminent impact to economics, such as e-commerce, and to social networking, which in turn cause several considerable implications globally. The Internet of Things becomes viral. The sensor technologies together with secure and reliable connections, especially wireless connections, make many daily activities more efficient or even possible.

It is the aim of this conference, to bring academic scientists, research scholars and practitioners to exchange and share their experiences and research results on all aspects of Broadband Communications, Wireless Sensors, and Powering. It also provides a premier interdisciplinary platform for researchers, educators and practitioners to present and discuss the most recent innovations, trends, and concerns as well as practical challenges encountered and solutions adopted in these fields.

BCWSP 2017 is proud to have 4 distinguished keynote speakers, Prof. Thomas Eibert from Technical University of Munich Germany, Prof. Arokiaswami Alphones from Nanyang Technological University Singapore, Prof. Yifan Chen from Waikato University New Zealand, and Dr. Wahyu Sediono from International Islamic University Malaysia. We would like to thank you for your contributions and presence in this conference.

Also we are grateful to have support from IEEE Indonesia Section, The German Academic Exchange Service (DAAD), PT Rohde-Schwarz Indonesia, Tirta Arsanta, Suntory Garuda, and SCTV.

To all participants, this conference will not be the same without your hard work for submitting research papers. We wish you have a great time and we hope the outcome of this conference will give substantial benefits for the nations and global welfare.

Thank you and have a good day!

Dr. Arissetyanto Nugroho, MM

Rector of Universitas Mercu Buana



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We would like to thank all reviewers for the voluntary activities.

<b>Name of Reviewers</b>	<b>Affiliation</b>
Mudrik Alaydrus	Universitas Mercu Buana, Indonesia
Thomas Eibert	Technical University of Munich, Germany
Arokiaswami Alphones	Nanyang Technological University, Singapore
Andrea Massa	University of Trento, Italia
Muhammad Afzal	Macquarie University, Australia
Denny Setiawan	Universitas Mercu Buana, Indonesia
Yifan Chen	University of Waikato, New Zealand
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Moc Yunus	University of Pakuan, Indonesia
Abdi Wahab	Universitas Mercu Buana, Indonesia



## Keynote Speakers

Wednesday, November 22, 2017, Tower UMB 7<sup>th</sup> floor

10.00-12.15:

Prof. Thomas Eibert, Technical University of Munich

**Towards Flexible Antenna Measurements and Field Transformations in Arbitrary Environments**

Prof. Arokiaswami Alphones, Nanyang Technological University, Singapore

**Wireless Power Transfer Technology**

Prof. Yifan Chen, Waikato University, New Zealand

**From Biologically Inspired ICT to ICT Inspired Biomedicine**

Dr. Wahyu Sediono, International Islamic University Malaysia

**FMCW Radars**

## Parallel Session

Wednesday, November 22, 2017, Tower UMB 3<sup>rd</sup> floor

13.15-15.15:

### Room 1 (T301) : Signal Processing and IoT

Regina Lionnie and Mudrik Alaydrus

A Comparison of Human Skin Color Detection for Biometric Identification

Wulan Meiniar, Filda Ayu Afrida, Ai Irmasari, Ali Mukti and Dwi Astharini,  
Human Voice Filtering with Band-Stop Filter Design in MATLAB

Afiyati Amaluddin, Edi Winarko and Anis Cherid

Recognizing the Sarcastic Statement on WhatsApp Group with Indonesian Language Text

Mar'Atus Sholikhah, Fattah Abdurrahman, Rifqi Muhammad Imaduddin and Dwi Astharini

Comparison Performance of Low pass Filter for Audio Filtering



Faisal Piliang and Sri Marini

Development of Mango Throwing Application in Conservation of Traditional Games Using Story Board

Trie Maya Kadarina and Rinto Priambodo

Preliminary Design of Internet of Things (IoT) Application for Supporting Mother and Child Health Program in Indonesia

Neji Kouka and Tareuk Geusmi

Performance Evaluation of IEEE 802.15.6 in WBAN

### **Room 2 (T302): Scattering and Wireless Systems**

Galang Hakim, Try Wafiq and Mudrik Alaydrus

Empirical Approach Investigation Li-Fi Pathloss Propagation Model And Filter Coloring Effect

Erfan Handoko, Iwan Sugihartono, Mangasi Alion Marpaung, Maulana Randa, C Kurniawan, Zulkarnain Jalil

Magnetic and Microwave Absorbing Studies of  $\text{BaFe}_{12-2x}(\text{Co}_{0.8}\text{Ti}_{0.8}\text{Mn}_{0.4})_x\text{O}_{19}$  ( $x = 0$  and  $x = 1$ ) for X-Band Frequencies

Ucuk Darusalam, Purnomo Sidi Priambodo and Eko Tjipto Rahardjo

Minimizing the Temporal Fluctuation in the Signal Spectral of FSO Communications to Improve BER Performance under the Influence of Atmospheric Turbulence

Misfa Susanto, Yona Annisa, Agus Trisanto and Syaiful Alam

Impact of Mobile Sink on Grid Topology of Wireless Sensor Network

Andrei A. Voronin and Anatolii N. Leukhin

Simulation of Scattered Field in X-Band Synthetic Aperture Radar

Thomas Vaupel and Volkert Hansen

Application of a TSMFM Planar-3D Fast Integral Equation Solver for Surface Wave Characterization of Antenna Arrays

Danladi Agadi Tonga, Jazuli Sanusi Kazaure, Fatai Amuda Kayode and Ja'afaru Ibrahim  
Path Loss Propagation Model Prediction for GSM Mobile Networks Planning in Dutse-Town Jigawa State Capital

### **Room 3 (T303): Automation and Security**

Arif Widiyanto, Muhammad Raditya Gumelar, Pradipta Mahatidana, Rizky Ramadian Wijaya, Intan Nurfitri, Kresna Devara and Retno Wigajatri Purnamaningsih



The Effect of Moving Load on Remote Weight Monitoring System for Simple Infant Incubator

Andika Syaiful Rizal, Sulaeman Sabana, Pouw Rudi Gunawan, Nanda Iryani, Tabitha Siwi Lusya Bakti, Lilies Juliana Gultom and Andi Andriansyah  
Testing Analysis of Auto Recloser Circuit Breaker 150kV Bay Cilegon Lama Using DOBLE F6150 On The Mitsui Master Substation

Lie Jasa, I Putu Ardana and Antonius Ibi Weking, Ratna Ika Putri and Mauridhi Hery Purnomo  
Effects of Pressure and Nozzle Angle on RPM: New Turbine Pico Hydro Nest-Lie Model

Sirep Purwanti, Beny Nugraha and Mudrik Alaydrus  
Enhancing Security on e-Health Private Data using SHA-512

Hamzah Hilal and Anas Nangim  
Network Security Analysis SCADA System Automation on Industrial Process

Gunawan Wibisono, Gilang Permata Saktiaji and Ihsan Ibrahim  
Techno Economic Analysis of Smart Meter Reading Implementation in PLN Bali using LoRa Technology

#### **Room 4 (T304): Cellular and Broadband Systems**

Fery Andriyanto and Muhammad Suryanegara  
The QoE Assesment Model for 5G Mobile Technology

Awangga Febian Surya Admadja and Kasmad Ariansyah  
The Barriers of Long Term Evolution (LTE) Adoption: Indonesian Consumers Perspective

Denny Setiawan and Nurwan Reza Fahrurrozi  
Feasibility Analysis With Capital Budgeting Backbone Network Fiber Optic Cable West Palapa Ring

Kasmad Ariansyah and Sri Ariyanti  
The Linkage Analysis of Telecommunication Sector in the Indonesian Economy in Mobile Broadband Era

Eko Ramadhan, Ahmad Firdausi and Setiyo Budiyanto  
Design and Analysis QoS VoIP using Routing Border Gateway Protocol (BGP)

Korry Azrina, Rifqi Muhammad Imaduddin and Suci Rahmatia  
Long Term Evolution (LTE) Network Planning Time Division Duplex (TDD) 2100 MHz On Gili Trawangan Island, Gili Meno And Gili Air, East West Nusa in 2017



### **Room 5 (305): Antennas**

Jimi Prasojo and Dian Widi Astuti

Rectangular Microstrip Antenna with Annular Slot for WLAN

Teguh Firmansyah, Herudin Herudin, Fery Kurniawan and Yus Denny

Multiband Microstrip Antenna Array with Slot and Array Method for GSM, WCDMA, and LTE

Iskandar Fitri and Al Amin Akbar

A New Gridded Parasitic Patch Stacked Microstrip Antenna For Enhanced Wide Bandwidth in 60 GHz Band

Rahmad Hidayat, Rushendra Rustam and Ellisa Agustina

Digital Beamforming of Smart Antenna in Millimeterwave Communication

Syah Alam, Indra Surjati and Yuli Kurnia Ningsih

Patch Modification and Slot Arrangement Of Microstrip Antenna For Improving The Axial Ratio

Fitri Yuli Zulkifli and Febrika Wenas Rahmawan

Dual Voltage Differentially-Driven Rectifier for Rectenna Application

Ike Yuni Wulandari and Mudrik Alaydrus

Observation of Multiband Characteristics of Microstrip Antenna Using Defected Ground Structure

Muhammad Umer Shahzad, Waqas Ahmed, Rameez Bukhari and Farhan Hassan

Multiple Band Reconfigurable Dual H-Shaped Patch Antenna



## Keynote Speakers

### 1. Prof. Dr. -Ing. Thomas Eibert, Technical University of Munich



Thomas F. Eibert received the Dipl.-Ing. (FH) degree in electrical engineering from Fachhochschule Nürnberg, Nuremberg, Germany, the Dipl.-Ing. degree in electrical engineering from Ruhr-Universität Bochum, Bochum, Germany, and the Dr.-Ing. degree in electrical engineering from Bergische Universität Wuppertal, Wuppertal, Germany, in 1989, 1992, and 1997, respectively. From 1997 to 1998, he was with the Radiation Laboratory, Electrical Engineering and Computer Science Department, University of Michigan, Ann Arbor, MI, USA. From 1998 to 2002, he was with Deutsche Telekom, Darmstadt, Germany. From 2002 to 2005, he was with the Institute for High-Frequency Physics and Radar Techniques of FGAN e.V., Wachtberg, Germany, where he was the Head of the Department of Antennas and Scattering. From 2005 to 2008, he was a Professor of Radio Frequency Technology with the Universität Stuttgart, Stuttgart, Germany. Since 2008, he has been a Professor of High-Frequency Engineering with the Technical University of Munich, Munich, Germany. His current research interests include numerical electromagnetics, wave propagation, measurement and field transformation techniques for antennas and scattering, and all kinds of antenna and microwave circuit technologies for sensors and communications.

#### **Towards Flexible Antenna Measurements and Field Transformations in Arbitrary Environments**

Due to the continuously increasing use of electromagnetic services for communications and sensor functionalities, the accurate and reliable characterization of antennas by measurements becomes increasingly important. Traditionally, antenna measurements have been performed in very specialized measurement chambers, which are very expensive and not very flexible in use. The antennas must be brought into the chamber and the measurements must be performed with great care. Due to reduced size requirements for the chamber, near-field measurements with subsequent near-field far-field transformations have become standard over the past years. A particular requirement of near-field measurements is the need to measure amplitude and phase in very many measurement locations, in the ideal case on a closed surface around the test object, where phase coherence must be maintained among all measurement values. Classical near-field far-field transformation approaches were also designed for very specialized and inflexible measurement configurations, such as for spherical measurements with equidistant sampling or for measurement planes with equidistant sampling. In recent years, more flexible near-field far-field transformation approaches have been established which allow for much more flexibility and which give more insight into the radiation mechanisms of the test antennas at the same time. With such novel transformation capabilities, completely new measurement scenarios can be thought of, where it seems possible that we have very flexible and portable measurement solutions in a couple of years, which “can



come” to the antenna, where ever it is, and not vice versa. Starting from basic considerations of antenna measurements, the presentation will introduce a very flexible and powerful near-field far-field transformation approach, which is able to transform measured fields in arbitrary locations and measured with more or less arbitrary probes. Based on these considerations, the capabilities of this approach will be demonstrated for a variety of near-field measurements, where far-field results and diagnostic capabilities will be discussed. Due to their increasing importance, measurement scenarios for automobiles will be considered, where the automobile is e.g. located on a metallic ground plane. Since the measurement of coherent phases can be problematic in many applications, the possibility of phaseless measurements with subsequent near-field far-field transformation will be considered and approaches towards near-field measurements and transformations in fully reflective environments will also be discussed. The presentation will close by looking into concepts of drone based near-field measurements and transformations.



## 2. Prof. Dr. Arokiaswami Alphones, Nanyang Technological University



A Alphones received his B.Tech. from Madras Institute of Technology in 1982, M.Tech. from Indian Institute of Technology Kharagpur in 1984 and Ph.D. degree in Optically Controlled Millimeter wave Circuits from Kyoto Institute of Technology (Japan) in 1992. He was a JSPS visiting fellow from 1996-97 at Japan. During 1997-2001, he was with Centre for Wireless Communications, National University of Singapore involved in the research on optically controlled passive/active devices. Since 2001 he is Professor with the School of Electrical and Electronic Engineering, Nanyang Technological University, Singapore. He has 30 years of research experience. He has published and presented over 260 technical papers in peer reviewed International Journals/ Conferences. His current interests are electro-magnetic analysis on planar RF circuits and integrated optics, microwave photonics, metamaterial based leaky wave antennas and wireless power transfer technologies. He was involved many IEEE flagship conferences held in Singapore and General Chair of APMC 2009, MWP 2011 and TENCON 2016. He was the chairman of IEEE Singapore section during 2015-2016 and a senior member of IEEE. He is also the panel member of IEEE Conference Quality Committee.

### **Wireless Power Transfer Technology**

**Abstract:** Wireless power transfer (WPT) technology is recently undergoing intense investigations in both academia and industry. WPT refers to the transmission of electrical energy without a direct physical cable connection, which in turn, useful to electrify a number of electrical loads where the use of cables is hazardous, inconvenient, or impossible. There have been many types of wireless energy transfer technologies including laser, photoelectric, radio waves, microwaves, capacitive coupling and inductive coupling. Out of these, inductive coupling techniques based on the resonance principle has gain an increased attention, as it is capable of delivering power with acceptable efficiency up to sub-centimeter distances. WPT has been exploited in a wide range of applications such as biomedical implants, electric vehicles, sensor networks and industrial automations. This talk will cover the overview on WPT and key performance indicators for this technology.



### 3. Prof.Dr. Yifan Chen, Waikato University, New Zealand



Dr. Yifan Chen is a Professor of Engineering and the Associate Dean External Engagement for the Faculty of Science and Engineering and the Faculty of Computing and Mathematical Sciences in the University of Waikato, Hamilton, New Zealand. From 2012 to 2016, he was a Professor and the Head of Department of Electrical and Electronic Engineering with Southern University of Science and Technology, Shenzhen, China, appointed through the Recruitment Program of Global Experts (known as “the Thousand Talents Plan”). In 2013, he was a Visiting Professor with Singapore University of Technology and Design, Singapore. From 2007 to 2012, he was a Lecturer and then a Senior Lecturer with the University of Greenwich and Newcastle University, U.K. From 2005 to 2007, he was a Project Officer and then a Research Fellow with Singapore-University of Washington Alliance in bioengineering, supported by Singapore Agency for Science, Technology and Research, Nanyang Technological University, Singapore, and the University of Washington at Seattle, USA. He received the B.Eng. (Hons I) and Ph.D. degrees in electrical and electronic engineering from Nanyang Technological University in 2002 and 2006, respectively. Professor Chen’s current research interests include electromagnetic medical imaging and diagnosis, transient communication with application to healthcare, touchable communication and computation with application to targeted drug delivery and contrast-enhanced medical imaging, fundamentals and applications of nanoscale and molecular communications, and channel modelling for next-generation wireless systems and networks. He is the Coordinator of the European FP7 “CoNHealth” project on intelligent medical ICT, an elected Working Group Co-leader of the European COST Action TD1301 “MiMed” project on microwave medical imaging, an Advisory Committee Member of the European Horizon 2020 “CIRCLE” project on molecular communications, a Voting Member of the IEEE Standards Development Working Group 1906.1 on nanoscale and molecular communications, an Editor for IEEE ComSoc Best Readings in Nanoscale Communication Networks and IEEE Access Special Section in Nano-antennas, Nano-transceivers, and Nano-networks/Communications, and a Vice Chair of the IEEE Nano-scale, Molecular and Quantum Networking Emerging Technical Subcommittee. He also served as a Tutorial and Special Session Chair of the 2018 IEEE International Conference on Industrial Electronics for Sustainable Energy Systems (IESES), a Technical Program Chair of the 2017 IEEE Electrical Design of Advanced Packaging and Systems Symposium (EDAPS), a Technical Program Chair of the 2017 IEEE International Symposium on Intelligent Signal Processing and Communication Systems (ISPACS), a General Chair of the 2016 IEEE International Conference on Communication Systems (ICCS), a Technical Symposium Chair of the 2016 IEEE International Conference on Communications in China (ICCC), and a Technical Program Chair of the 2014 IEEE International Conference on Consumer Electronics – China (ICCE China). He is a Fellow of IET and a Senior Member of IEEE.



### **“From Biologically Inspired ICT to ICT Inspired Biomedicine”**

Abstract – Nature’s blueprints have inspired exciting new fields of science such as bio-inspired computing and communication, creating problem-solving and information transmission techniques using insights from natural systems. The emerging molecular communication paradigm mimics existing communication mechanisms among microorganisms and utilizes biological molecules both as carriers and as information. On the other hand, we can ‘look the other way’ by exploiting communication and computing strategies for biomedicine. Communication-inspired bio-delivery models drug transport as an information sending and receiving process, which allows for the utilization of classical communication models, techniques, and protocols to design optimally targeted therapies. Furthermore, computing-inspired cancer detection can be viewed as a form of natural computing; it is nanomachine-oriented, externally controllable and trackable. Such a perspective can lay a foundation for the application of numerous computational techniques in the quest to design optimal cancer detection procedures. In this talk I will review the latest advancement in the exciting field of communication- and computing-inspired biomedicine.



#### 4. Dr.-Ing. Wahyu Sediono, International Islamic University Malaysia



Wahju Sediono received Dipl.-Ing. degree in electrical engineering from RWTH Aachen University, Germany, in 1997, and the Ph.D. (Dr.-Ing.) degree in electrical engineering and information technology from Universität Karlsruhe (TH), Germany, in 2003. He is Assistant Professor with the Department of Mechatronics Engineering, the International Islamic University, Malaysia. Previously, he worked with the Agency for the Assessment and Application of Technology, Jakarta (until 2010), and was involved in the development of the first Indonesian FMCW maritime radar with Radar and Communication Systems (RCS) in Jakarta. His research interests include signal and image processing, intelligent radar and navigation systems, biomedical instrumentation and finite element method. Dr. Sediono is a member of VDI and senior member of IEEE.

##### **FMCW Radar System**

At present, radar has become a standard system on all commercial vessels, and is widely used in the leisure maritime sector. Especially in the area with high dense vessel traffic, radar retains its primary role in collision avoidance. The use of radar as primary navigational aid as well as safety tool is still an essential part of safe watch-keeping.

There are two types of radars: pulse and continuous wave radar. In a frequency modulated continuous wave (FMCW) radar system, the radar device continuously transmits electromagnetic signals whose frequencies are modulated to detect targets in the surrounding area. Compared to more common conventional pulse radar, FMCW radar uses low power to transmit its signals. By applying the Fourier transform, radar echoes coming from targets at a particular direction are projected onto a radial path on the display screen. When the radar antenna performed one full cycle rotation and received all radar echoes from every direction, we will obtain a complete two dimensional radar image.

A skilled radar operator can visually recognize certain targets (e.g. suspicious moving targets) among other objects within the radar image. However, this visual method will work only in good weather conditions in which the effects of clutters are negligible small. In other situations, where the clutter effects cannot be neglected anymore, it is very difficult –if it is not impossible– for human eyes to detect and recognize real targets from the noisy radar image. In fact, very similar situations are often encountered when the FMCW radar is operated as marine radar during a sea voyage. In such a situation, only an experienced radar operator can perform the recognition task without great difficulties. Thus, in either situation, automatic target recognition is very useful for the operation of an FMCW radar. This feature can significantly improve the performance of an FMCW radar and hence increase the safety of a sea voyage.





## PERFORMANCE EVALUATION OF IEEE 802.15.6 IN WBAN

\*NEJI KOUKA, \*TAREUK GUESMI

\*Modeling of Automated Reasoning (MARS), Tunisia, Monastir  
*koukaneji@yahoo.fr*

### *Abstract*

The Internet of things (IoT) refers to any object that may contain an embedded and connected computer device. IoT is an intelligent collaboration of tiny sensors and devices giving new challenges to the end to end communication of things. In Wireless Body Area Networks (WBAN) some applications are data sensitive and may require same mechanisms in sending the sensed data. IEEE 802.15.6 supported QoS based CSMA/CA priority algorithm. In this paper we evaluate the effectiveness of this algorithm in various scenarios. We show that under very heavy or low networks load this algorithm have a limited to respect the various QoS.

*Keywords : Internet of Things, Quality of Service, Wireless Body Area Networks*



# SIMULATION OF SCATTERED FIELD IN X-BAND SYNTHETIC APERTURE RADAR

A. A. VORONIN A. N. LEUKHIN

Training Research Center of High-Performance Computing  
Mari State University - Yoskar-Ola, Russia  
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## *Abstract*

A synthetic aperture radar is usually a complex software and hardware package that allows obtaining images in the radio range comparable in resolution with optical systems. The advantage of radio waves is that high-quality photography takes place despite cloudiness and dark time of the day. The development of algorithms for this kind of system is quite a complex process, in order to reduce its cost, mathematical modeling is used.

*Keywords— Synthetic aperture radar, polarization, scattered field.*



# APPLICATION OF A TSMFM PLANAR -3D FAST INTEGRAL EQUATION SOLVER FOR SURFACE WAVE CHARACTERIZATION OF ANTENNA ARRAYS

THOMAS VAUPEL

Antenna Technology and Electromagnetic Modelling AEM Fraunhofer Institute for High Frequency Physics and Radar Techniques FHR  
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VOLKERT HANSEN

Chair of Electromagnetic Theory  
Bergische Universität Wuppertal, Germany

## *Abstract*

This contribution deals with a Thin stratified medium fast multipole (TSMFM) fast integral equation framework for the characterization of Planar-3D structures consisting of planar metallizations combined with vertical components like probe feeds and other vertical interconnects (vias) and especially finite dielectric regions embedded in a multilayered environment. First formulations of this type of fast integral equation solvers were presented already in [2]. In a similar approach in [1],[3], a cumbersome decomposition in radiation and receiving patterns is performed, in contrast to this we use a generalized Green's function tensor containing all integrations with regard to the vertical directions leading to a more stringent and effective implementation. Together with the different Green's functions of the structure and the residue theorem as well as steepest descent path considerations, the radiated space domain fields and especially the fields of surface waves can be determined with very high accuracy but very low computational effort. With vertical volume polarization currents, the finite extend of the substrate can be modeled quite efficiently together with the parasitic radiation of the surface waves from the edges of the substrate. Together with impedance sheets and vias with resistors this can be used to reduce the surface wave effects within antenna arrays.

*Keywords—integral equation methods; fast solvers; stratified media; surface waves; polarization currents*



# MULTIPLE BAND RECONFIGURABLE DUAL H-SHAPED PATCH ANTENNA

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## *Abstract*

The purpose of this research is to design such microstrip patch antenna which has multiple band of frequencies and has ability to change its operating frequency and main lobe direction electronically using switches. The proposed antenna has dual H-Shape with two switches at the bottom which can operate in four different state of switching, each state of switching has multiple operating frequency band which means a single antenna can cover different wireless applications of GPS, GSM, ISM and many others at the same time. This antenna can be designed for any desired operating frequency by shifting the position of switch which is demonstrated in the analysis section of the paper. All results of S-parameter and radiation pattern of four different state of switches are briefly described in this paper.

*Keywords--Reconfigurable;ISM;Microstrip-patch-antenna;Multiple band*



# DESIGN AND ANALYSIS QOS VOIP USING ROUTING BORDER GATEWAY PROTOCOL (BGP)

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## *Abstract*

Computer network technology as a medium of communication between devices has made significant progress in terms of communication media. Currently we can communicate through this network by utilizing technology called Voice over Internet Protocol (VoIP). It is one of the fastest growing internet applications now. One benefit is VoIP can be used as a communication network implemented with Asterisk applications as a server to a Private Automatic Branch eXchange (PABX ) in a system simulation using GNS3 emulator. In this research the routing used is BGP routing protocol to get optimal QoS value with different bandwidth. From the simulation results of testing using the bandwidth of 64 kbps, 128 kbps and 256 kbps are performed each test three times as much bandwidth as QoS values obtained on average better than the results of delay, jitter, packet loss and throughput obtained from the VoIP network based on a standard ITU- T G.114.

*Keywords— QoS, VoIP, bandwidth, BGP, GNS3, Asterisk*



# ENHANCING SECURITY ON E-HEALTH PRIVATE DATA USING SHA-512

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## *Abstract*

Health information data of a patient is confidential. Especially, if the patient's medical record information is disseminated it can cause adverse effects for the patient. This study aims to analyze the impact of Man In The Middle (MITM) attacks on patient privacy data. Data is sent and attacked by MITM active attack method. The experimental results show that the unprotected data and the MD5-protected data are able to be successfully modified within 3 minutes and 2 minutes and 4.2 seconds respectively. The experimental data on the comparison of security mechanisms between MD5 and SHA512, indicates that for SHA512, the attacker can only do a phishing password but cannot modify the data. As for MD5, in addition to phishing password and then steal the data, the attacker is also able to read and modify data with a minimum of 9 characters of data characters in 3 minutes 3 seconds, the rest of the data still cannot be cracked / burglarized so it cannot be modified.

*Keywords—MITM; Phising; MD5; SHA512; HL7*



## DUAL VOLTAGE DIFFERENTIALLY-DRIVEN RECTIFIER FOR RECTENNA APPLICATION

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### *Abstract*

This research discusses the design of rectifier circuit in rectenna system using dual voltage differentially-driven rectifier method which work at 2.45 GHz WLAN application. The research also discusses the circuit configuration, method, diode selection and the right load so that the rectifier for this rectenna system can work at low power level while producing high DC voltage output. In the simulation, rectifier has bandwidth 200 MHz at range frequency 2.35 – 2.55 GHz , reflection coefficient -24.37 and insertion loss -0.47 dB at frequency 2.45 GHz. Measurement result shows that the rectifier has 400 MHz bandwidth at range frequency 2.16 – 2.56 GHz, reflection coefficient -22.64 and insertion loss -2.65 at frequency 2.45 GHz. The rectifier has DC output voltage 0.543 volt.

*Keywords—dual voltage; differentially-driven rectifier; WLAN*



# OBSERVATION OF MULTIBAND CHARACTERISTICS OF MICROSTRIP ANTENNA USING DEFECTED GROUND STRUCTURE

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## *Abstract*

Multiband antennas play a significant role in many wireless applications. A simple rectangular microstrip with defected ground structure is observed. As defected ground structures, single and double slot with several lengths in ground are modeled. The numerical simulation shows, the second resonance of the structure with single slots is shifted to lower frequency significantly if the slot length is longer, while the first resonance changes around 1 GHz. Whereas, for double slot case, the second resonance is shifted more, and there is a third resonance under 10 GHz, while the first resonance is practically unchanged. The measurements validated the numerical results.

*Keywords—Defected Ground Structures, Dualband antenna, microstrip, multiband antenna*



# THE LINKAGE ANALYSIS OF TELECOMMUNICATION SECTOR IN THE INDONESIAN ECONOMY IN MOBILE BROADBAND ERA

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## *Abstract*

This paper aims to investigate the linkage of telecommunication sectors and the rest of sectors in Indonesian economy in the mobile broadband era. The year 2006 is regarded as the beginning of the mobile broadband era as in this year, the third generation (3G) of the cellular system (the first generation of mobile broadband) began to serve Indonesian consumers. This study applies the Input-Output approach to obtain Backward and Forward Linkage (BL and FL) of telecommunication sectors with the rest of Indonesian economy sector. Due to data limitations, we only analyze the linkage for the year of 2000 to 2014. We compare the magnitudes of BL and FL in the period before 2006 with those in 2006 and beyond. The results show that the magnitudes of BL and FL along the period of 2000-2014 did not show big difference. This finding is not in line with the rapid increase of mobile broadband penetration in Indonesia. We identify that one of the causes is the low utilization of mobile broadband in economic activities, while another cause is the inavailability of local upstream industries of mobile broadband network equipment. Therefore, the network equipment manufacturing industry will not create the added value for the Indonesian economy, but for the device-producing country.

*Keywords— forward linkage; backward linkage; mobile broadband; telecommunication; input output*



# EFFECTS OF PRESSURE AND NOZZLE ANGLE ON RPM: NEW TURBINE PICO HYDRO NEST-LIE MODEL

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## *Abstract*

The characteristics of pressure and nozzle angle are an important aspect of the nest-lie turbine in order to produce maximum RPM. The goal is to design a small-capacity turbine with high efficiency for the limited flow of water throughout the year. This research was carried out through the following stages: (1) designing a turbine, (2) creating a prototype turbine nest-lie, (3) taking measurements, and (4) analyzing the measurement data. At a water pressure of 20 psi, the nest-lie model turbine yielded a maximum RPM of 71.07 for pump A at a nozzle angle of 25.5°, an RPM of 65.50 for pump B at a nozzle angle of 27°, and an RPM of 119.21 for the combination of pumps A and B at a nozzle angle of 27°. At the nozzle 0° position against the turbine axis, the nozzle was set to 240, resulting in a maximum RPM of 170.52 at 28 psi pressure. This suggests that the higher the air pressure, the higher the resulting RPM from the volume of air held in the nest-lie.

*Keywords— turbine; RPM; nozzle; hydropower; nest-lie*



# RECTANGULAR MICROSTRIP ANTENNA WITH ANNULAR SLOT FOR WLAN

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## *Abstract*

In recent years, microstrip antenna has been the most interesting topic research in wireless telecommunication system. In this paper, we present a compact rectangular microstrip antenna with annular slot for wireless local area network (WLAN) application. We inserted an annular slot to increase the gain of the antenna and use proximity coupled as feed line to increase the bandwidth of the antenna. The microstrip antenna had been studied and designed using ANSYS HFSS for the verified of simulation result. The measured results show that the antenna can be designed to cover the resonant frequencies at 2.4 GHz and 5.8 GHz used for IEEE 802.11.a/b/g WLAN system.

*Keywords— Annular Slot, Proximity Coupled, Microstrip Antenna, WLAN Application.*



## HUMAN VOICE FILTERING WITH BAND - STOP FILTER DESIGN IN MATLAB

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### *Abstract*

This paper discusses human voice filtering. The filtering was done by attenuating human voice's frequencies within a song's frequencies using filter design. Band-stop filter design is one of filter design that is used in this research. The band-stop filter design uses one type of windowing that is the Butterworth windowing. The method for the human voice filtering is offered by using a band- stop filter design simulated in MATLAB. The specified stop-band is based on the human voice's frequencies. The algorithm was done to filter the human voice from an audio. The result is then optimized to find the optimal result for the filtering. The methods for the optimization are used to simulate the band-stop filter design with different stop-band, FFT the result to show its frequency spectrum, and repeat the process until the heard voice has the optimal result. Based on the methods, a comparison between various stop-band specifications is presented to find the most optimal one. The chosen stop-band is used for male voice filtering and female voice filtering to see if it is suitable for both kind of voices.

*Keywords—human voice filtering, MATLAB, band-stop filter design, Butterworth windowing, stop-band, male voice filtering, female voice filtering*



# DIGITAL BEAMFORMING OF SMART ANTENNA IN MILLIMETERWAVE COMMUNICATION

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## *Abstract*

In this paper, a digital beamforming technique is studied which its transmitter model is designed for a 16- element linear phased array to a 256 -element (16x16) rectangular phased array. First, its directivity is calculated. Base on the result, beam pattern characteristics are analyzed. Furthermore, the interference potential is compared by means the beamforming demo of millimeter waves against the microwave band used now. The simulation results demonstrate that the beam squint effect is relatively better at a higher frequency of millimeter wave band; the addition of directivity is in line to the increasing of the amount of the antenna array elements. Although, the potential of destructive interference is increasingly in the millimeters wave bands.

*Keywords—digital beamforming, beam squint, millimeter wave, directivity, beam pattern, smart antenna*



## A COMPARISON OF HUMAN SKIN COLOR DETECTION FOR BIOMETRIC IDENTIFICATION

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### *Abstract*

Human skin color detection plays an important role in the biometric identification and recognition system. In this paper, androgenic hair pattern recognition system compared 10 rules of human skin color detection, employing color spaces such as RGB, HSV, YCbCr, CIE Lab and YIQ color spaces. There were 400 images of androgenic hair pattern investigated, obtained from 25 male respondents. Detected human skin area images were converted into grayscale images and binary images. Precision of the recognition system was measured for each rule by employing 2-fold cross validation and Euclidean distance to calculate the nearest neighbor. The recognition system did not use any feature extraction algorithm. The experimental results showed that binary images were more suitable for simple recognition system without any feature extraction method and the best recognition precision was obtained by using color space that divided luminance component and chrominance component such as YCbCr, CIE Lab, HSV, and applied only chrominance components to the rules of human skin detection. The best precision recognition, achieved by utilizing YCBCr color space (using of Cb and Cr only), was 84.1% from database with binary images.

*Keywords—androgenic hair pattern; biometric identification; color space; recognition system; skin color detection*



# FEASIBILITY ANALYSIS WITH CAPITAL BUDGETING BACKBONE NETWORK FIBER OPTIC CABLE WEST PALAPA RING

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## *Abstract*

Fiber optic backbone network becomes an important factor in broadband infrastructure, where Palapa ring is a telecommunication infrastructure network mega project of high speed fiber optic backbone network with assumption an investment value of 1 Trillion IDR. Therefore, in the investment planning of the construction of the Palapa ring project, feasibility analysis is needed to optimize the implementation. In this research, feasibility is analyzed based on capital budgeting on Payback Period, NPV, and IRR. Capital Budgeting simulation results show that it takes 3 years 1 month for payback,  $NPV > 0$ , IRR of 35%.

*Keywords : Fiber Optic, Palapa Ring, Investment Feasibility, Capital Budgeting*



# THE BARRIERS OF LONG TERM EVOLUTION (LTE) ADOPTION: INDONESIAN CONSUMERS PERSPECTIVE

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## *Abstract*

This paper aims to investigate the barriers of LTE adoption from the viewpoint of Indonesian consumers. Data collection was carried out by Research Center for Post and Informatics, Ministry of Communication Technology of Republic of Indonesia in 2016 through a survey. We utilize descriptive statistical analysis to describe respondent's profile, and binary logistic regression to analyze the factors hampering the adoption of LTE-based mobile broadband service in Indonesia. Those factors are classified into two groups, i.e., quantifiable and unquantifiable factors. The findings of this study confirmed that of six cost variables, only device cost, learning cost, and uncertainty cost, considered as the barriers to adopting LTE-based services. These findings expected could contribute in devising the strategy to promote mobile broadband adoption in Indonesia.

*Keywords—barriers; LTE adoption; mobile broadband*



# MINIMIZING THE TEMPORAL FLUCTUATION IN THE SIGNAL SPECTRAL OF FSO COMMUNICATIONS TO IMPROVE BER PERFORMANCE UNDER THE INFLUENCE OF ATMOSPHERIC TURBULENCE

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## *Abstract*

The optical propagation of free-space optical (FSO) communications under the influence of atmospheric turbulence exhibits deterioration of signal spectral. By this nature, fiber-detection method that is implemented in the receiver system frequently, cannot overcome the turbulence effects. In order to improve the fiber-detection method, an optical spatial filter (OSF) that is composed of cone reflector, pinhole and multi-mode fiber is proposed as a detection method. It aims to increase intensity of signal spectral and signal power by suppressing temporal fluctuation. Thus performance improvement of FSO can be achieved by the OSF. The measurements of signal spectral from the OSF are compared to fiber-detection method. The OSF is installed in rear focus spot of receiver lens before photodetector. The experiment results show significant improvement in suppressing temporal fluctuation in signal spectral from the OSF.  $\langle SNR \rangle$  increases that are 36.5 dB, 37.5 dB, 37.7 dB, and 38.2 dB for  $D_{p19}$ ,  $D_{p39}$  and  $D_{p49}$  respectively.  $\langle BER \rangle$  are produced lower that are  $10^{-9}$  to  $10^{-12}$  by OSF. Those performances improvement is achieved higher by the OSF compared to fiber-detection method. The outcome of this work is recovering signal spectral that is deteriorated caused by turbulence effects modulation into optical propagation. Hence the OSF can be implemented for integrating FSO with optical fiber communication system in order to enhance bit-error-rate and signal-to-noise ratio performances.

*Keywords—optical spatial filters; beam wander; scintillation; turbulence effects; temporal fluctuation; free-space optical communications.*



# NETWORK SECURITY ANALYSIS SCADA SYSTEM AUTOMATION ON INDUSTRIAL PROCESS

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## *Abstract*

Supervisory Control and Data Acquisition (SCADA) is a unit control system that has been used almost in various industries around the world in terms of process automation. This system delineates the real infrastructure and provides ease in operations and monitoring, but this system has a vulnerability in the security aspects of data communications connected between SCADA support devices. This can have a major impact on industry and the economy. This research was conducted by designing and building SCADA infrastructure and analyzing vulnerability threats to SCADA network security. This research penetrates SCADA network using Kali Linux and data traffic analysis on SCADA network using Wireshark. From the results of Wireshark analysis got the attacker with User Anonymous. Analysis performed with normal and abnormal data traffic conditions. The result of this research is penetration of SCADA network using Kali Linux, which is used to attack and make data traffic between Programmable Logic Controller (PLC) with Human Machine Interface (HMI) becomes solid, and result from penetration testing, SCADA system become down due of data traffic on a dense network, thereby indicating that SCADA networks are vulnerable to malware threats and attacks, the results of this study are recommendations and network security strategy SCADA system

*Keywords- SCADA, Security; Wireshark; Kali Linux*



# MULTIBAND MICROSTRIP ANTENNA ARRAY WITH SLOT AND ARRAY METHOD FOR GSM, WCDMA, AND LTE

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## *Abstract*

The development of communication technology is increasingly fast and diverse. Some of these technologies include Global System of Mobile Communication (GSM) which has working frequency at 900 MHz, Wideband Code Division Multiple Access (WCDMA) has working frequency at 1.8 GHz, and Long Term Evolution (LTE) which has working frequency at 2600 MHz. To provide the needs of data access at high speed with various standards, a multiband antenna is designed which supports wireless communication. One type of antenna used for wireless communication is a microstrip antenna. As novelty, this research proposed a multiband microstrip antenna based on slot for GSM, WCDMA, and LTE. Array methods also was used to increase gain on microstrip antenna. The antenna is simulated using Advanced Design System 2009 (ADS 2009) software, and fabricated using FR4 substrate with  $\epsilon_r = 4,3$ ,  $\tan \delta = 0,0265$ ,  $h = 1,66$  mm, and measured using Vector Network Analyzer (VNA). The measurement results show the validation of the multiband antenna design.

*Keywords—antenna, microstrip, multiband, stub*



# A NEW GRIDDED PARASITIC PATCH STACKED MICROSTRIP ANTENNA FOR ENHANCED WIDE BANDWIDTH IN 60 GHz BAND

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## *Abstract*

In this paper is describe a concept of modification design of gridded parasitic patch stacked microstrip antenna for produce wideband characteristic and high gain which is could operate in around 60 GHz band. The modified antenna has combination of feeding microstrip line with multi tuning stubs, two narrow slots and shorting pin. The antenna is use substrate of Taconic TLY with thickness of 0.127 mm and Arlon CuClad with thickness of 0.0762 mm. From the modified antenna can produce bandwidth of 15.6 GHz around 60 GHz as operate frequency in frequency range around from 49.6 to 65.2 GHz. The antenna gain can reach up to 8.4 dBi at 60 GHz with VSWR of 1.06 and directional radiation pattern. The antenna design will be the promised and prospect for millimeter wave application of mobile communication devices such as 5G and 6G standard.

*Keywords— Multi tuning stubs, gridded parasitic patch, stacked microstrip, wideband, 60 GHz.*



# THE EFFECT OF MOVING LOAD ON REMOTE WEIGHT MONITORING SYSTEM FOR SIMPLE INFANT INCUBATOR

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## *Abstract*

In this paper, a remote weight monitoring system for premature baby incubator application is proposed. The system consists of load cell as a sensor, an active filter, and an Arduino Uno R3 microcontroller integrated with a SIM900 GSM Module to send the body weight data monitored by the system to the medical expert. We evaluated system by using a moving baby doll to simulate the baby moving inside the incubator. From the experimental results, we found out that even if the object measured was moving, the measurement output remained stable. Moreover, the system was capable to send the measured data to mobile phone via SMS.

*Keywords— premature baby; infant incubator; load cell; Arduino Uno R3; GSM sim900; remote monitoring system; weight monitoring system; rural area*



# EMPIRICAL APPROACH INVESTIGATION LI-FI PATHLOSS PROPAGATION MODEL AND FILTER COLORING EFFECT

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## *Abstract*

Li-Fi (Light Fidelity), is one of technology complement with radio communication. This technology aim was to provide a new way of communication using light instead of radio communication. In this paper we studied path loss propagation model for Li-Fi and also the effect of colorings filter. Our method is using one light sensor and do walk test with 1 meter interval. As a result the new model was better compare to the basic invers square law and light measurement model. For 90 ° angle the new model only had 0.01 lux (for 800 Lumens) and at about 0.76 lux (for 350 Lumens) at 8 meter. It also interesting that the filtering color has some effect, such as green and blue color filter has same result measurement hence it cannot be used for Li-Fi WDM application.

*Keywords—Path loss Propagation Model, Li-Fi, Filter.*



# THE QOE ASSESSMENT MODEL FOR 5G MOBILE TECHNOLOGY

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## *Abstract*

This paper aims to develop the assessment model of Quality of Experience (QoE) for the upcoming 5G mobile technology. The 5G usage scenarios have been developed by ITU to facilitate mobile capabilities that will be needed in the future, namely Enhanced Mobile Broadband, Ultra-reliable and low latency communications, and Massive Machine type communications. The model links the technical concern of Quality of Service (QoS) to the relevant 5G service experience on each of 5G scenarios. It utilizes the crowdsourcing service quality assessment on the three characteristics. First, it signifies the 5G service applications underlying enhanced multimedia broadband scenario which is differentiated by location-related two cases, i.e. the hotspot area and wide area coverage. Second, the model signifies the 5G service underlying the ultra-reliable and low-latency communications which is focusing on QoS parameters, i.e. latency, reliability and availability. Third, the developed model emphasizes energy efficiency implication on the scenario of massive-machine type communications. Finally, the model can be used by mobile operators as a reference guide to assess and also to improve the quality of experience when the values are below expectation.

*Keywords—QoE, 5G, QoE assessment, Quality of Experience*



# MAGNETIC AND MICROWAVE ABSORBING STUDIES OF $\text{BaFe}_{12-2x}(\text{Co}_{0.8}\text{Ti}_{0.8}\text{Mn}_{0.4})_x\text{O}_{19}$ ( $X = 0$ AND $X = 1$ ) FOR X-BAND FREQUENCIES

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## *Abstract*

Barium hexaferrite  $\text{BaFe}_{12-2x}(\text{Co}_{0.8}\text{Ti}_{0.8}\text{Mn}_{0.4})_x\text{O}_{19}$  ( $x = 0$  and  $x = 1$ ) have been prepared by ceramic method and sintered at temperature  $1100\text{ }^\circ\text{C}$  for 5 hours in the atmosphere ambient. In order to realize a microwave absorber composite, the ferrites powder are mixed with the resin. The Crystal structure, magnetic, and microwave absorption properties were performed by using XRD, Permagraph, and VNA, respectively. The results confirm that the barium hexaferrite has single phase with hexagonal structure and Co-Ti-Mn change magnetic properties and improve reflecting loss (RL) values.

*Keywords: Barium hexaferrite; permeability ; permittivity; reflection loss*



# PRELIMINARY DESIGN OF INTERNET OF THINGS (IOT) APPLICATION FOR SUPPORTING MOTHER AND CHILD HEALTH PROGRAM IN INDONESIA

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## *Abstract*

Research trends in Internet of Things (IoT) in health care show its potential to improve quality of health care. It helps to enable preventive care and promote automation to reduce the risk of human error. In Indonesia, mother and child health care is still an important agenda of the government because the maternal and child mortality rate is still high. This paper describes a preliminary design of IoT applications for supporting mother and child healthcare program. We reviewed government regulations and guidelines to determine the needs and used them as a starting point. Then we defined the networks (topology, architectures, and platform), service and application, security and technology used in the design. This multi-platform system design constitutes portable medical devices with multiple sensors for collecting medical data and sending them to server. A mobile application works as mobile gateway for the devices and as a portal for accessing context-aware personalized information related to patient's condition. It also works as communication tool for teleconsultation. All of these functionalities are supported by service applications in a cloud so that patients and caregivers can access them from anywhere at any time. This system is designed to enable remote monitoring and early detection by medical specialist and physicians at the clinic for mother and child preventive care.

*Keywords—Internet of Things; mother and child health care; mobile application; multi-platform; context-aware personalization*



# IMPACT OF MOBILE SINK ON GRID TOPOLOGY OF WIRELESS SENSOR NETWORK

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## *Abstract*

Motivated by the news in the local newspaper that there was occurrence of elephant moving out from their conservation area in Lampung province of Indonesia, this paper proposes the use of Wireless Sensor Network (WSN) as a monitoring system that is applicable for monitoring elephant movement in the conservation area. This paper studied the effect of mobile sink node on that WSN system. Modeling and simulation have been carried out to evaluate the system. The area of conservation was modeled as a square area with a grid topology of WSN inside the square area. At the first, it was applied a static sink node to collect the sensed data of sensor nodes. The WSN with single static sink node was used as a baseline system. And then, the static sink node was replaced by a mobile sink node for the purpose to improve the energy efficiency in order to lengthen the lifetime of WSN. The extensive simulation was carried out to examine both WSN systems with static sink node and with mobile sink node. The simulation results for the designed network topology show the significant improvement comparing the one with mobile sink node and another one with static sink node. It was achieved the improvement of network lifetime by the factor of 9.26.

*Keywords—WSN based monitoring system; elephant movement monitoring; grid topology; mobile sink node; energy efficiency*



# TECHNO ECONOMIC ANALYSIS OF SMART METER READING IMPLEMENTATION IN PLN BALI USING LORA TECHNOLOGY

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## *Abstract*

Traditional electricity meters read manually, large workloads, major errors and distributed at different installation locations, need to spend a lot of time and labor costs. In real-time, the accuracy and extension of the application cannot be fulfilled. With technological developments, electric meters now can be used both ways, for real-time remote reading, and can be used as prepaid and postpaid, making it smart meter. Currently the smart meter has become an important part of the smart grid system. Therefore, the national power utility company (PLN) Bali region decided to replace the existing meter with smart meter to support Bali Eco Smart Grid. Long Range (LoRa) wide area network (WAN) is the access technology that used for implementing smart meter because it has benefits including can reach long distance, low power, and lower cost. This study aims to analyze the techno economic smart meter 2 ways implementation at Bali region by using techno-economic method and cost-benefit analysis. In addition to analyze technological and economic aspects, the business model and the regulatory aspect analysis are also included. The results show that LoRa WAN is one of the technology options that can be used today, the business model that can be used is build own or implementation is done by itself, build operate transfer (BOT) or outsourcing to third party, and rental model. According the ministry of communication and information regulation number 35/2015, LoRa WAN that operate at frequencies 923-925 MHz can be implemented to support smart meter implementation by Bali PLN.

*Keywords—cost-benefit analysis, LoRa, LoRaWAN, smart grid, smart meter*



# RECOGNIZING THE SARCASTIC STATEMENT ON WHATSAPP GROUP WITH INDONESIAN LANGUAGE TEXT

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## *Abstract*

An expression of resentment, criticism, and mockery by using harsh words that intended to offend someone or something can be called Sarcasm statements. While detection or recognizing those sarcastic statements could be very important for sentiment analysis of data that collected from social media such as WhatsApp Group, although doing it automatically is not an easy task. For this research, we propose a method to recognize the sarcasm statements on WhatsApp Group with Indonesian language text using pattern-based approach. Our proposed method uses several sets of features to classify whether the statement consist of sarcastic or non-sarcastic statements, namely sentiment-related features, punctuation-related features, syntactic and semantic related features, and pattern-related features.

*Keywords*—sarcasm; recognition; social network media; WhatsApp; sentiment analysis



# DEVELOPMENT OF MANGO THROWING APPLICATION IN CONSERVATION OF TRADITIONAL GAMES USING STORY BOARD

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## *Abstract*

Development of education is very important because education has a significant role in achieving the nation's progress in various areas of life. The research purpose is to provide mango throwing game service, so this game become media of education and learning and can grow feeling of pleasure to challenge for society in Indonesia. This research uses descriptive analytic and design methods by presenting a summary of interviews and field surveys to build models of electronic mango throwing game. The research output is to be able to do the design process and empower an electronic mango throwing game. This research is expected also can be used as media of education and learning and can foster a sense of fun to challenge for society in Indonesia, has been proven by implementing model of electronic mango throwing game.

*Keywords—Conservation of Traditional Games, Diagram Model, Mango Throwing Application, Story Board*



## PERFORMANCE COMPARISON OF LOW PASS FILTER FOR AUDIO FILTERING

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### *Abstract*

This paper discusses the comparison of FIR filter and IIR filter with audio recording as the input signal. Audio filtering was done by attenuating the frequency which is higher than cut-off frequency using low pass filter. Low pass filter uses many types of windowing, but in this experiment Blackman and Hanning windowing is used for FIR filter while Elliptic and Chebyshev type 1 is used for IIR filter. The method of audio filtering is offered by made the script for this filter and simulated in MATLAB. The specified low pass filter based on desired cut-off frequency, pass-band frequency and stop-band frequency. This experiment uses the same specification for low pass filter design. The algorithm is used to simulate the low pass filter FIR and IIR filter than FFT the result to show its frequency spectrum. Based on the algorithm, a comparison between FIR and IIR filter is presented to find the best result for this experiment.

*Keyword— audio filtering, Low pass filter, FIR, IIR, Blackman, Henning, Elliptic, Chebyshev type 1*



# TESTING ANALYSIS OF AUTO RECLOSER CIRCUIT BREAKER 150KV BAY CILEGON LAMA USING DOBLE F6150 ON THE MITSUI MASTER SUBSTATION

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## *Abstract*

Auto Recloser Relay (AR) or automatic back cover relay is mounted on High Voltage as well as Extra High Voltage. It is based on the consideration that the airways is one of the most frequent parts of the channeling system, most of the cause of the disturbance is temporary that will soon disappear after the circuit breaker trip. So that the continuity of electricity supply is maintained as well as stability limits remain maintained then the operation of auto recloser is needed. In this paper, we have tested reclose time (dead time) and reclaim time test according to the guidance of SPLN 0520 using DOBLE F6150 test equipment to assess the suitability of setting time of reclose (dead time) and reclaim time on auto recloser GEC ALSTHOM type MVTR01 with consideration of the characteristics of trip close operation time circuit breaker and setting pole discrepancy. The results show that the failure of auto recloser bay 150kV Cilegon Lama in Mitsui Substation is known during the 2nd annual maintenance. The cause of failure is from the circuit breaker status for the auto recloser input is not appropriate so that the status adjustment is made circuit breaker as the auto recloser input. After adjustment of circuit breaker status continued auto test recloser time matching target setting is MVTR01 SPAR (Single Phase Auto Recloser) with reclose (dead time) 0.49 to 0.5 second and reclaim time 41.5 to 40 seconds, MVTR01 TPAR (Three Phase Auto Recloser) with reclose (dead time) 4.98 to 5.0 second and reclaim time 41.5 to 40 seconds so that auto recloser function can work according to its setting.

*Keywords—auto recloser, circuit breaker status, dead time, reclaim time, bay150kV*



# LONG TERM EVOLUTION (LTE) NETWORK PLANNING TIME DIVISION DUPLEX (TDD) 2100 MHZ ON GILI TRAWANGAN ISLAND, GILI MENO AND GILI AIR, EAST WEST NUSA IN 2017

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## *Abstract*

Communication services such as data or voice continue to experience increased, the telecommunications engineer is required to continue to improve the quality of service network to support the communication in order to more stable and fast satisfies all the demand of users communication services. Long Term Evolution (LTE) is the 8th release technology which developed by 3rd Generation Partnership Project (3GPP). LTE technology is a solution that used the engineer to resolve the problems of improving the quality of communications services. LTE capable of delivering speeds of up to 300 Mbps downlink and 75 Mbps uplink. In 900 MHz [1]. While LTE TDD frequency used on the 2300 MHz. Recently, the Government allocating new frequencies for the 4G LTE network on the 2100 MHz to maximize the use and expansion of the coverage of 4G in the motherland [1]. This paper uses TDD LTE network design frequency on the 2100 MHz in the three small islands of West Nusa Tenggara island Reviews those are Gili Trawangan, Gili Meno and Gili Air in 2017. The method used is that planning coverage using radio network planning software, Atoll. The parameters include the data population, altitude, radio link budget for urban and suburban areas. From the results is obtained the number of eNodeB roommates needed in the capacity planning method required 21 sites. The results of the simulation showed the area to be covered about 99.5%.

*Keywords—LTE, TTD, Coverage Planning*



# PATCH MODIFICATION AND SLOT ARRANGEMENT OF MICROSTRIP ANTENNA FOR IMPROVING THE AXIAL RATIO

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## *Abstract*

In this research, we produced a new design of microstrip antenna with truncated corner technique modified with slot in the middle patch of microstrip antenna to produce circular polarization for Long Term Evolution application. The value of return loss, VSWR and axial ratio of the antenna can be enhanced by adjusting the length of the slot provided in the middle patch of microstrip antenna. Antenna designed using FR4 substrate with value ( $\epsilon_r$ ) = 4.3, substrate thickness ( $h$ ) of 1.6 mm and loss tangent ( $\tan \delta$ ) of 0.0265. From the simulation results obtained return loss -45.45 dB, VSWR 1.014 and axial ratio 2.014 dB at a working frequency of 2300 MHz. The gain of the designed antenna is 6.93 dB. Slot method increased the axial ratio of the antenna until 26.17 % and array method increased gain until 26 %.

*Keywords* — Long Term Evolution, truncated corner, microstrip antenna, axial ratio, gain



# PATH LOSS PROPAGATION MODEL PREDICTION FOR GSM MOBILE NETWORK PLANNING IN DUTSE- TOWN JIGAWA STATE CAPITAL

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## *Abstract*

Precise characterization of wireless radio communication channel, through key parameters and mathematical model is significant for predicting signal coverage, channel efficiency and ability. Outdoor path loss propagation modeling plays a basic role in planning and designing of radio channel link. The desire goal of this research work is to find way out and develop a model that can be helpful in planning the best global system for mobile communication (GSM) network and address some of the challenges face by users of this system; The complain of poor quality of service by the subscribers within the study environment (Dutse Town). Outdoor fields measurements were conducted to be precise at 900MHz, the overall average path loss detected were 80.10, 74.27, 80.89 and 81.10dB, for the major GSM network service providers in Nigeria such as Airtel, MTN, Globacom and Etisalat networks respectively. The differences recorded may be due to the nature of the environment, or the location or heights of the respective base stations (BTS) or weather fluctuations. The variance of these average values lies between 6 to 10dB which is within the acceptable range. The empirical model developed from Lognormal shadowing model which has a unique advantage of accounting for shadowing effects that may be caused by varying degree of clutter between the transmitter and receiver, may be used in planning and optimization of GSM service within Dutse Town.

*Keywords— path loss, propagation, GSM Network service Providers, path loss Model.*



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