

PROGRAM **BOOK**

BCWSP 2020



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IEEE
INDONESIA SECTION



2nd International Conference on Broadband Communication, Wireless Sensors and Powering 2020

Jakarta, September 28, 2020



PROGRAM BOOK

**2020 2nd International Conference on
Broadband Communication,
Wireless Sensors
and Powering (BCWSP 2020)**

Jakarta, Indonesia
September 28th, 2020

BCWSP 2020 : Program at a glance

September 28, 2020 (WIB/GMT+7), Virtual on Zoom

TIME	DESCRIPTION
07.30 – 08.00	Participants Registration / Join Zoom
08.00 – 08.45	✓ BCWSP Chairman and MICOSS Chairwoman Reports ✓ Opening speech by Rector of Universitas Mercu Buana Prof. Dr. Ir. Ngadino Surip, MS
08.45 – 09.00	Greeting and Opening Event by Coordinating Minister for Economic Affairs of Republic Indonesia Dr. (H.C.) Ir. Airlangga Hartarto, M.B.A., M.M.T.
09.00 - 09.35	Speech from Governor of Daerah Istimewa Yogyakarta Sri Sultan Hamengkubuwono X
09.35 – 09.45	Break Time
09.45 – 11.30	Presentations by Keynote Speakers: 1. Prof. Dr. Eng. Takeshi Fukusako (Kumamoto University) 2. Prof. Dr. Felina Young (The Philippine Women's University) 3. Assoc. Prof. Dr. Normah Mustaffa (Universiti Kebangsaan Malaysia) 4. Dr. Ing. Benjamin A. Witvliet (Radiocommunications Agency Netherlands) 5. Anton Yudhana, S.T., M.T., Ph.D. (Universitas Ahmad Dahlan)
11.30 – 12.15	Q & A Session
12.15 – 12.45	Break Time
12.45 – 13.00	Participant Registration/ Join Zoom for Parallel Session
13.00 – 15.00	Parallel Session BCWSP 2020 Room 1A and 1B
15.00 – 15.15	Break Time
15.15 – 17.15	Parallel Session BCWSP 2020 Room 2A and 2B
17.15 – 17.30	Break Time
17.30 – 19.30	Parallel Session BCWSP 2020 Room 3A and 3B
19.30 – 19.45	Closing and Announcement Best Paper/Presenter BCWSP 2020

Note:

1. All time in the program schedules are in Western Indonesia Time / Waktu Indonesia Barat (WIB; GMT+7; UTC+07:00)
2. The detail schedules for all parallel sessions (including all Zoom's link) can be found in page 24
3. Several activities will be joined with MICOSS (Mercu Buana International Conference on Social Science)

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Message from Conference Chairman

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

His Excellency Coordinating Minister for Economic Affairs of the Republic Indonesia Dr. (H.C.) Ir. Airlangga Hartarto, M.B.A., M.M.T, Governor of Daerah Istimewa Yogyakarta Sri Sultan Hamengkubuwono X, Rector of Universitas Mercu Buana, Prof. Dr. Ir. Ngadino Surip, MS, Invited Speakers and all participants to the BCWSP 2020 Conference.



The conference on Broadband Communication, Wireless Sensors and Powering 2020 is a continuation of the same conference three years ago. The conference is technically supported and coordinated by the IEEE Indonesia Section and Universitas Mercu Buana, Jakarta and in partnership with Universitas Mercu Buana Yogyakarta, Yogyakarta.

The scope of the conference is broadband communications ranging from cellular and satellite systems to fiber optics, wireless networks, Internet of Things, signal processing and others including telecommunication business and regulation. We have also tried to draw up a number of papers on the role of researchers in tackling the pandemic COVID 19.

In this conference, we invited three keynote speakers, we have 97 submitted papers and accepted 40 papers with a 40% acceptance rate.

We would like to thank the keynote speakers and all the participants for their contributions. And also, thanks to the committee for the excellent work they have done on this conference. Special thanks to the Director of the Postgraduate Program at Universitas Mercu Buana, Prof. Dr. -Ing Mudrik Alaydrus, for providing smart direction and guidance.

Enjoy your participation in the BCWSP 2020.

Thank you. Have a lovely day, a happy conference and Semangat pagi.

Prof. Dr. Andi Adriansyah

BCWSP 2020 Conference Chair, Senior Member of IEEE

Message from Rector of Universitas Mercu Buana Jakarta

Your excellencies;

1. Coordinating Minister for economic affairs, Dr (HC). Ir. Airlangga Hartarto, M.B.A., M.M.T.
2. Governor of DI Yogyakarta, His Majesty Sri Sultan Hamengkubowono X who is represented by Her Royal Highness Princess Gusti Kanjeng Ratu Mangkubumi
3. Rector, Universitas Mercu Buana Yogyakarta, Dr. Alimatus Sahra
4. Vice-Rectors, Directors, and Deans of Mercu Buana University, Jakarta
5. Speakers and participants of today's international conference



Assalaamu'alaikum Wr. Wb,
Good morning,

First of all, let's give thanks for all the gifts given by God Almighty, Allah SWT. With His blessings, we can gather here and participate in Mercu Buana International Conference on Social Science (MICOSS) and the Conference on Broadband Communication, Wireless Sensor, and Powering (BCWSP) online today.

As an opening, I would like to welcome The Coordinating Minister for Economic Affairs, Dr (HC). Ir. Airlangga Hartarto, M.B.A., M.M.T., and the Governor of DI Yogyakarta, His Majesty Sri Sultan Hamengkubowono X who is represented by Her Royal Highness Princess Gusti Kanjeng Ratu Mangkubumi on the campus of Mercu Buana University. Even though this meeting took place virtually, as a joint effort to prevent the spread of the Covid-19 outbreak, we really hope that our meeting today will give benefits to the nation and country. Aamiin

I would like to say that Mercu Buana University this year, on October 22, will turn 35 years old. We hope that at this mature age, Mercu Buana University can take part for the sake of the nation and country.

Distinguished participants,

The Covid-19 pandemic that is currently affecting all countries has one global effect, which is the ability to adapt to the new habits and the ability to use technology. Because these two things are interrelated and essential during this pandemic.

For example, people need to get used to wearing face masks and make it into a habit. There is also a mass virtual communication technology, which also requires adaptation and skills to use.

It shows that the adaptation and mastery of technology have become the characteristics of society during the pandemic. Therefore, with this hypothesis, this international conference

becomes relevant to be held. By combining two scientific studies; social science, especially communication, and exact science, in this case, broadband - wireless technology.

Distinguished ladies and gentlemen,

Of course, we all hope that this activity can produce real solutions that can answer the challenges of the pandemic. Hopefully, this activity can further strengthen the relationship between scholars from all over the country. Because the pandemic is supposed to encourage us to collaborate more, not to compete.

I would like to express my gratitude to The Coordinating Minister for Economic Affairs, Dr. Ir. Airlangga Hartarto, M.B.A., M.M.T., and the Governor of DI Yogyakarta, Sri Sultan Hamengkubono X and Her Royal Highness Princess Gusti Kanjeng Ratu Mangkubumi, as well as honorable speakers and participants of today's conference. Especially to all participant from several country, I apologize if there is anything wrong with the arrangement of today's event. May we always be given health and the ability to do good for others.

Wassalamualaikum Wr. Wb
Rector

Prof. Ngadino Surip, MS

Committee

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Dwi Permatasari, SE
Linda Puspitasari, SE
Nina Zatina, S.Ikom

Reviewer List

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

Name of Reviewers	Affiliation
Andi Adriansyah	Universitas Mercu Buana, Indonesia
Mudrik Alaydrus	Universitas Mercu Buana, Indonesia
Ari Sihvola	Aalto University, Finland
Takeshi Fukusako	Kumamoto University, Japan
Arfianto Fahmi	Telkom University, Indonesia
Setiyo Budiyanoto	Universitas Mercu Buana, Indonesia
Ben Witvliet	University of Twente & Radiocommunications Agency Netherlands, The Netherlands
Muzammil Jusoh	Universiti Malaysia Perlis & School of Computer and Communication Engineering, Malaysia
Filbert H. Juwono	Curtin University Malaysia, Malaysia
Iwan Krisnadi	Universitas Mercu Buana, Indonesia
Adit Kurniawan	Bandung Institute of Technology, Indonesia
Fitri Yuli Zulkifli	Universitas Indonesia, Indonesia
Yusnita Rahayu	Universitas Riau, Indonesia
Leonard Goermanto	Universitas Mercu Buana, Indonesia
Riko Arlando Saragih	Maranatha Christian University, Indonesia
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Teguh Prakoso	Diponegoro University, Indonesia
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Umairah	Universitas Mercu Buana, Indonesia
Setyawan Widyarto	Universiti Selangor, Malaysia
Iwan Setyawan	Satya Wacana Christian University, Indonesia
I Gde Dharma Nugraha	Universitas Indonesia, Indonesia & Chonnam National University, Korea (South)
Hamzah Hilal	BRIN, Indonesia
Ahmad Firdausi	Universitas Mercu Buana, Indonesia
Muhammad Hajar	Universitas Mercu Buana, Indonesia
Prita Dewi Mariyam	Universitas Indonesia, Indonesia
Galang Hakim	Universitas Mercu Buana, Indonesia
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Eko Ihsanto	Universitas Mercu Buana, Indonesia
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Melinda	Syiah Kuala University, Indonesia
Marza Marzuki	Telecom Bretagne & L'ECOLE, France
Abdi Wahab	Universitas Mercu Buana, Indonesia
Julpri Andika	Universitas Mercu Buana, Indonesia

Speakers

Invited Speaker

Meeting ID: 822 9397 0676

Passcode: 11111

**Monday, September 28th, 2020, Zoom Meeting Application
09.00-10.00:**

Dr. (H.C.) Ir. Airlangga Hartarto, M.B.A., M.M.T.

Coordinating Minister for Economic Affairs of Republic Indonesia

Sri Sultan Hamengkubuwono X

Governor of Daerah Istimewa Yogyakarta, Indonesia

Keynote Speakers

**Monday, September 28th, 2020, Zoom Meeting Application
10.00-12.15:**

Prof. Takeshi Fukusako, Ph.D, Kumamoto University

Antenna Technologies for the Future

**Dr. Benjamin A. Witvliet, Radiocommunications Agency of The Netherlands and
Radio Systems Group of the University of Twente.**

Spectrum Management, Ionospheric Radio and Noise

Anton Yudhana, ST., MT., Ph.D, Universitas Ahmad Dahlan

Implementation of Internet of Thing on Agri Precision for Indonesian Farming

Parallel Sessions

Monday, September 28th, 2020, Zoom Meeting Application

13.00-15.00:

Meeting ID : 868 7344 4222

Passcode : 11111

Room 1A : Antenna

Hamza A. Mashaghba, Hasliza A. Rahim, Ping Jack Soh, Mohamedfareq Abdulmalek, Ismahayati Adam, Muzammil Jusoh, Thennarasan Sabapathy, Mohd Najib Mohd Yasin and Khairul Najmy Abdul Rani

Bending Assessment of Dual-band Split Ring-shaped and Bar Slotted All-Textile Antenna for Off-body WBAN/WLAN and 5G Applications

Lukman M Silalahi, Setiyo Budiyanto, Freddy Artadima Silaban, Imelda UV Simanjuntak, Putri S Hendriasari, Heryanto Heryanto

Design of 2.4 GHz and 5.8 GHz Microstrip Antenna on Wi-Fi Network

Muhammad Riza Darmawan, Catur Apriono, Eko Tjipto Rahardjo, Fitri Yuli Zulkifli and Mudrik Alaydrus

Development of Microstrip Antenna Array Series For Radar Foreign Object Debris (FOD)

Muhammad Tahir Hameed, Muhammad Yousaf, Adeel Akram and Muhammad Zahid

A Novel Flexible Compact Microstrip Antenna for Biomedical Applications

Muhammad Nurrachman, Galang P. N. Hakim and Ahmad Firdausi

Design of Rectangular Patch Array 1x2 MIMO Microstrip Antenna with Tapered Peripheral Slits Method for 28 GHz Band 5G mmwave Frequency

Hamza A. Mashaghba, Hasliza A. Rahim, Ping Jack Soh, Mohamedfareq Abdulmalek, Ismahayati Adam, Muzammil Jusoh, Mohd Najib Mohd Yasin, Thennarasan Sabapathy, Khairul Najmy Abdul Rani

1x4 Patch Array All-Textile Antenna For Wlan Applications

Monday, September 28th, 2020, Zoom Meeting Application

13.00-15.00:

Meeting ID : 542 193 3202

Passcode : 11111

Room 1B : Sensor and Control

Andrew Febrian Miyata, Lanny Agustine, Yuliati Yuliati, Rasional Sitepu, Andrew Joewono and Hartono Pranjoto

Graphical Pressure Mapping of a 2288 Sensing-Point Matrix Pressure Sensor Using Raspberry Pi

Dian Sahid and Mudrik Alaydrus

Multi Sensor Fire Detection in Low Voltage Electrical Panel Using Modular Fuzzy Logic

Mohammad Gaballah, Mariam Alfadhli and Maysam Abbod

Network Structure Routing Protocols of WSN: Focus, Review & Analysis

Rachmat Puaries Hadi Wibowo and Andi Adriansyah

Operation Analysis of Automation System Terminal Implementation in LPG Terminal

Teguh Imanto and Andi Adriansyah

Performance Analysis of Profinet Network in PLC-Based Automation System

Triyanto Pangaribowo, Wahyu Mulyo Utomo, Afarulrazi Abu Bakar and Deni Shidqi Khaerudini

Review on Fuzzy Control Strategies to Improve PEMFC Performance

Yuwan Jumaryadi, Diky Firdaus, Bagus Priambodo and Zico Pratama Putra

Determining the the Best Graduation Using Fuzzy AHP

Monday, September 28th, 2020, Zoom Meeting Application

15.15-17.15:

Meeting ID : 868 7344 4222

Passcode : 11111

Room 2A : Signal and Image Processing

Bagus Priambodo, Yuwan Jumaryadi and Zico Pratama Putra

Comparison of Local Binary Pattern and Eigenfaces for Predict Suspect Positive Drugs

Rachmat Muwardi, Huangyao Qin, Hongmin Gao, Harun Usman Ghifarsyam, Muhammad Hafizd Ibnu Hajar and Mirna Yunita

Research and Design of Fast Special Human Face Recognition System

Isack Farady, Chih-Yang Lin, Amornthep Rojanasarit, Kanatip Prompol and Fityanul Akhyar

Mask Classification and Head Temperature Detection Combined with Deep Learning Networks

M Chw Al Fajar, Mutia Fatmawati, Putri Wulandari, Dwi Astharini

Analysis of DFT and FFT Signal Transformation with Hamming Window in LabVIEW

Regina Lionnie and Mudrik Alaydrus

Performance of Biometrics Recognition System Using Multiple Scales Analysis

Zico Pratama Putra, Deni Setiawan, Bagus Priambodo, Yuwan Jumaryadi and Mila Desi Anasanti

Multi-Touch Gesture of Mobile Auditory Device for Visually Impaired Users

Monday, September 28th, 2020, Zoom Meeting Application

15.15-17.15:

Meeting ID: 542 193 3202

Passcode: 11111

Room 2B : Telecommunication

Ari Sadewa Yogapratama and Muhammad Suryanegara

Dealing with Latency Problem to Support 5G-URLLC: A Strategic View in the Case of Indonesian Operator

Oryza Wisesa, Andi Adriansyah and Osamah Ibrahim Khalaf

Prediction Analysis Sales for Corporate Service Telecommunications Company Using Gradient Boost Algorithm

Setiyo Budiyanto and Ilham Pratama

Classification of Network Status in Academic Information Systems Using the Naive Bayes Algorithm Method

Setiyo Budiyanto and Muhammad Gathmir

Improvement of Policy Charging Control Flow Based on Internet Sunscribers Behavior

Rio Mubarak, Setiyo Budiyanto, Andi Adriansyah and Mudrik Alaydrus

The Utilization of Information Systems for VSAT Development in Rural Areas

Setiyo Budiyanto and Ahmad Henry Machsuni

LTE Implementation Model with Combination Carrier Aggregation Based on Area Demographics

Setiyo Budiyanto and Erman Al Hakim

Feasibility Analysis the Implementation of the Dual Spectrum Licensed and Unlicensed Enhanced License Assisted Access (eLAA) on LTE Networks with the Techno Economic Method

Monday, September 28th, 2020, Zoom Meeting Application

17.30-19.30:

Meeting ID : 868 7344 4222

Passcode : 11111

Room 3A : Antenna (2)

Chew Kew Wei, M. Jusoh, T. Sabapathy, M.N. Osman, W.A. Mustafa, M. Alaydrus, M.R. Awal, H.A. Rahim and M.N.M. Yasin

Design of Electronically Steerable High Mode Dielectric Resonator Antenna using PIN Diode

Primadiana Sari, Ahmad Firdausi and Galang P. N. Hakim

The Design of Log Periodic Dipole Array Microstrip Antenna at Frequency 28 Ghz

Elly Gustina, Umairah Umairah and Mudrik Alaydrus

Design of Reflectarray Microstrip Antenna with Butterfly Patch and Square Ring Elements for WiGig Applications

Yusnita Rahayu, Hauzan Chalwy, M. Fadhlurrahman Hilmi and Rosdiansyah

Stretchable Metamaterial Inspired Antenna for WLAN Applications

F. H. Adan, M. Jusoh, T.Sabapathy, M.N.Osman, M.Alaydrus, M.R.Awal, H.A.Rahim, M.N.M.Yasin, A.Alomainy, M.R.Kamarudin, H.A. Majid

Switchable Beam Antenna with Five Planar Element using PIN Diode in Elevation Plane

Monday, September 28th, 2020, Zoom Meeting Application

17.30-19.30:

Meeting ID : 542 193 3202

Passcode : 11111

Room 3B : Computing and Power

Dede Fadhilah and Marza Ihsan Marzuki

Performance Analysis of IDS Snort and IDS Suricata with Many-Core Processor in Virtual Machines Against Dos/DDoS Attacks

Taufik Hidayat, Sianturi Tigor Franky D and Rahutomo Mahardiko

Forecast Analysis of Research Chance on AES Algorithm to Encrypt During Data Transmission on Cloud Computing

Javier Stillig and Nejila Parspour

Novel Concept for Wireless Power Transfer Module

Julpri Andika, Fuad Dwi Atmaja, Muhammad Hafizd Ibnu Hajar, Ketty Siti

Salamah and Ghazella Febrilia

Pocket DC Earth Fault Locator (P-DEL) for Alarm Interference of DC Power Supply Using the Internet of Things

Marwan Rosyadi, Atsushi Umemura, Rion Takahashi and Junji Tamura

A Study on Modular Multilevel Converter Based Wind Turbine Generator Connected to Medium Voltage DC Collection Network

Nasaruddin Nasaruddin, Ernita Dewi Meutia and Ramzi Adriman

Outage Probability and Power Efficiency of Quantize-And-Forward Relay in Multi-Hop D2D Networks

Tri Winahyu Hariyadi and Andi Adriansyah

Comparison of DC-DC Converters Boost Type in Optimizing the Use of Solar Panels

Invited Speakers

1. Dr. (H.C.) Ir. Airlangga Hartarto, M.B.A., M.M.T.

Coordinating Minister for Economic Affairs Republic of Indonesia

Airlangga was born in the East Java capital of Surabaya on 1 October 1962. His father Hartarto Sastrosoenarto, an engineer and politician, served as a minister in various portfolios for former president Suharto for 15 years from 1983 to 1998.

Airlangga was active in the boy scouts, attending national and international jamborees. He completed high school at Kanisius College in Jakarta in 1981. He received a bachelor's degree in mechanical engineering from Gadjah Mada University in 1987. He completed the AMP at Wharton School of the University of Pennsylvania and later received a master's degree in business administration from Monash University as well as a master's degree in management technology from the University of Melbourne. In 2015 he was received IPU (Insinyur Profesional Utama/ Chartered Professional Engineer) Professional Certification of Indonesian Engineers Association. In 2019 he was awarded an honorary doctorate in Development Policy by The KDI School of Public Policy and Management.

Airlangga joined Golkar Party in 1998. In 2004, he became a member of the House of Representatives as a member of Golkar. He served as deputy treasurer of Golkar from 2004–2009. In his second term as a legislator in the 2009-2014 period, he chaired House Commission VI on industry, trade, investment and state-owned enterprises. During this time, he introduced the 2014 Industry Law. In his third term as a legislator, which commenced in 2014, he served in House Commission VII on mineral resources, environment, research and technology. In April 2015, he was transferred to Commission X on education, tourism, creative economy, culture, sports and youth. In January 2016, he became a member of Commission XI on financial affairs. He was appointed to cabinet as industry minister on 27 July 2016 by President Joko Widodo. On 13 December 2017, he was selected to become Golkar chairman. And in 2019 till now he served as Coordinating Minister for Economic Affairs Republic of Indonesia.



2. Sri Sultan Hamengkubuwono X

Governor of Daerah Istimewa Yogyakarta, Indonesia

Represented by Gusti Kanjeng Ratu Mangkubumi

Gusti Kanjeng Ratu Mangkubumi is the eldest daughter of Sri Sultan Hamengkubuwono X named GRA Nurmalita Sari or Gusti Kanjeng Ratu Pembayun, and is currently called Gusti Kanjeng Ratu (GKR) Mangkubumi. GKR Mangkubumi was born in 1972. She continued her studies at the International School of Singapore as well as Griffith University Brisbane, Queensland, Australia. In addition to being the president commissioner and president director of various PT, she is also active in community activities and empowerment, especially in Yogyakarta and surrounding



areas. There have been many roles and contributions to the villagers, especially in efforts to improve the economy and welfare. In the palace environment, she served as one of the Penghageng who demanded him to lead several traditional ceremonies in the Palace such as "Tumplak Wajik", "Peksi Burak" as well as several traditional ceremonies that became a series of wedding processions of her younger sisters Ratu Hayu and Ratu Bendera. Other activities outside the palace, GKR Mangkubumi was mandated a very strategic role including chairwoman of the National Social Welfare CSR Forum, Chairwoman of the Central Board of Management of the Prosperous Family Income Improvement Business Group, Chairwoman of KADIN DIY and various other institutions such as KNPI DIY and Pramuka DIY. In October 2012, GKR Mangkubumi was elected as Chairwoman of DPD National Committee of Indonesian Youth DIY for the period 2012 - 2015. This position gives Mangkubumi the opportunity to bring KNPI in an effort to empower the poor.

Keynote Speakers

1. Prof. Takeshi Fukusako, Ph.D, Kumamoto University

TAKESHI FUKUSAKO received the B.E., M.E., and Ph.D. degrees in Engineering from Kyoto Institute of Technology, Kyoto, Japan, in 1992, 1994, and 1997, respectively. In 1997, he joined the Kumamoto University, Kumamoto, Japan, as a Research Associate. He is currently working with the Department of Computer Science and Electrical Engineering, Kumamoto University, as a Professor since 2016. From 2005 to 2006, he was a Visiting Researcher at the University of Manitoba, MN, Canada. Furthermore, he was a Visiting Associate Professor of the City University of Hong Kong, Hong Kong SAR, China, in 2015. His current research interests are mainly design techniques of broadband antennas, circularly polarized antennas, and electrically small antennas and their applications. For the studies, he has accepted many international students and researchers from various countries from such as Indonesia, Thailand, Malaysia, China, Mongolia, and so on. In academic services, he served IEICE Transactions on Communications as an Associate Editor from 2012 to 2016. He is currently an Associate Editor of IEEE Transactions on Antennas Propagation since 2015. In 2014, he served as one of the TPC co-chairs at the 2014 IEEE International Workshop on Electromagnetics: Applications and Student Innovation Competition (iWEM2014). In 2017, he served as one of the general chairs of the IEEE International Conference on Computational Electromagnetics (ICCEM2017). In addition to these conferences, he worked as TPC members in many international conferences. He is also an Administrative Committee (AdCom) Member of IEEE Antennas and Propagation Society (AP-S) from 2019 to 2021. Related to his activities, he received the Distinguished Service Award from IEICE Communications Society in 2016, Outstanding Associate Editor from IEEE AP-S in 2017, and the Director-General Award of Kyushu Telecommunication Bureau, Ministry of Internal Affairs and Communications (MIC) of Japan in 2016, etc. He is a Senior Member of IEEE and also a Senior Member of IEICE.



Antenna Technologies for the Future

The speaker has studied antenna hardware during the last 20 years. Some of the achievements are relevant to broadband antenna designs, some are small antenna designs, and some are reconfigurable antenna techniques. Most of the carriers are devoted to antenna element designs, and the speaker enjoyed working in this field with students and colleagues.

In this talk, the speaker will introduce the results of our past studies as seeds-oriented studies and would like to talk about the needs-oriented works in this field. As is often said, researchers and engineers working in antennas and propagation field should expand their eyesight following the requirement from the society and propose new concepts in addition to new technology.

Firstly, in this talk, designs of broadband circularly polarized antennas. And then, some small antenna design techniques will be presented. Following the first half, the

application of such antennas will be discussed. Generally, antennas have been developed for telecommunications; however, several new applications are required. Some of them may be sensors, radars, and so on. Talking about such applications, the speaker would like to discuss the required antenna technologies for the future.

2. Dr. Benjamin A. Witvliet

Dr. Benjamin A. Witvliet [pronounce: wit-fleet] was born in 1961 in Biak, Netherlands New Guinea, which is now West-Papua, Indonesia. His father worked as a physics teacher at the technical college in Biak, with students from all over Papua. After the transition to Indonesia in 1963, his family returned to The Netherlands. Dr. Witvliet studied electronics and telecommunication in Hilversum, The Netherlands and obtained his BSc degree in 1988. Since then he worked in Israel, The Netherlands and Madagascar, where he was the chief engineer of a high-power shortwave radio station. After that he worked in broadcast transmitter engineering in The Netherlands, before joining the Radiocommunications Agency of The Netherlands to do applied research related to broadcasting and radio wave propagation. He has over 25 years of working experience in telecommunications and spectrum management. From 2010-2015 he did part-time research into Near Vertical Incidence Skywave antennas and propagation, for which he received the Anton Veder scientific research award and obtained his PhD at the University of Twente in The Netherlands. From 2017-2019 he worked part-time in England as a research manager Radio Science for the University of Bath. Next to his work for the Radiocommunications Agency of The Netherlands he continues to do guest research at the Radio Systems group of the University of Twente. Research topics are antennas, radio wave propagation, radio noise and related field measurements. He also participates in ETSI radio equipment standardization, ITU Study Groups and IEEE standardization. Dr. Witvliet is a Senior Member of the Antennas and Propagation Society of the IEEE since 2011 and he is a regular reviewer for several journals.



Spectrum Management, Ionospheric Radio and Noise

Spectrum management is all about creating a ‘living space’ in which RF (radio frequency) communication and sensors (both passive and active) can thrive. Spectrum management covers the following three aspects:

Firstly, all spectrum is not equal. Radio wave propagation changes significantly with frequency. Also, the size of the antenna relative to the wave length determines the antenna efficiency and the maximum antenna gain that can be realized in the available space. For every application there is a ‘sweet spot’ in which antenna size and propagation are optimal. Locating wireless applications in inappropriate spectrum is therefore not only suboptimal for those applications, it may also occupy frequency space that cannot be missed for different applications.

Secondly, the amount of frequency assigned to a group of users must be (just) sufficient for the number of devices that is expected, their distribution and their frequency of use. Less spectrum will cause congestion, too much spectrum will lower the spectrum efficiency.

And thirdly, RF applications must occupy as little spectrum as possible, not only in bandwidth and duty cycle, but also in the space they occupy [1]. This explains often stringent requirements on unwanted emissions and spectral bandwidth.

The safeguarding of these ‘living spaces’ is essential for existing wireless technology to keep functioning, but also for new and innovative applications – using broadband communication and wireless sensors – to prosper.

Ionospheric Radio

As we've mentioned above, the selection of a frequency range also determines the radio wave propagation. I will discuss ionospheric radio, only possible in a frequency range between 3 and 30 MHz, which can be used to bridge large distances (from a few hundred to thousands of km) without the use of intermediate radio links or cell towers. This phenomenon is caused by the natural plasma that surround the earth, which can be used to reflect radio waves.

Ionospheric radio wave propagation and a few of its applications will be discussed, such as disaster relief communications [2] and the direct read-out of wireless sensors on Antarctica [3]. As this long-distance propagation mechanism can only be used in this very limited frequency range, this example is illustrative for the need to assign spectrum to the right applications and in this case to avoid short-range applications in the same spectrum.

Noise

Not only radio transmitters may radiate unwanted RF energy, many other electrical and electronic devices do so too. This is especially notable at frequencies below 30 MHz, which links this subject to the ionospheric radio discussion above. When the RF noise emitted by those devices is stronger than the wanted RF signal, reception becomes impossible. Therefore, measures to control the unwanted emissions from electrical and electronic equipment, such as power convertors and solar panel optimizers are essential. This is also a major aspect of the latest development in powering, the charging of mobile phones and cars via Wireless Power Transfer (WPT). With this we have shown that spectrum management is essential for radiocommunication and wireless sensors to work, and we have given an example showing the need to optimally assign frequency spectrum based on propagation and application. We have also shown that non-radio devices occupy large amounts of spectrum unless they are designed to minimize their RF footprint.

3. Anton Yudhana, Ph.D, Universitas Ahmad Dahlan, Indonesia

ANTON YUDHANA was born in Purworejo on 8th August 1976. He received the B.E., from Institut Teknologi Sepuluh Nopember (ITS) in 2001, M.E., from Universitas Gadjah Mada in 2005, and PhD from Universiti Teknologi Malaysia in 2010. He is currently working in Department of Electrical Engineering, Universitas Ahmad Dahlan. His research interests include digital signal processing, electromagnetics, and numeric method. He received HKI for “Alat Bantu Penunjuk Arah Mata Angin Bagi Tunanetra” and “SARPIN” Sarung Tangan Pintar Petunjuk Arah Penyandang Tunanetra Menggunakan Deteksi Jarak Berbasis Sensor Ultrasonik Dan Kompas. He actively writes publications in scientific journals and shares his research in international conferences. He won the best presenter award in National Seminar ARS Universitas Sriwijaya in 2016. Since 2018, he has written three books; “Otomasi dan Instrumentasi untuk Proyek Smart Farming dan Smart Glove” in 2018, “Proyek Instrumentasi Medis Berbasis Internet of Thing” in 2019 and “Pendidikan Inklusi dan Anak Berkebutuhan Khusus, Bersama Pustu Chifec” in 2019. He developed learning methods such as Pengajaran Sistem Project, Pengajaran Sistem MOOC (Massive Open Online Course) and Pengajaran Sistem Outdoor dan Kunjungan UKM. He also guides his students and some of their teams received awards such as AUTOMOS (Automatic Monitoring and Controlling System Hidroponik Agriculture) Team won Gold Medal in Festival Innovation on Green Technology (I-FINOG 2018), AUTOMOS Team won 1st Place in PKM PTM 2017 Lombok, Nusa Tenggara Barat, Student Team BPONIK in HKTI Awards won 1st place for young inventor. He was a guest lecture in Universiti Malaysia Pahang in 2014, visiting researcher in Iwate Prefectural University, Japan in 2017 and visiting professor in research collaboration with School of Engineering and Advanced Technology, Massey University in 2013. He also was a visiting professor in Sona College, Saleem, Tamil Nadu, India in April 2019 and visiting researcher in Karabuk University, Turkey, December 2019. He also was one of the reviewers for Penelitian RISTEKDIKTI in 2018.



Implementation of Internet of Thing on Agri Precision for Indonesian Farming

Indonesia is an equatorial tropical region that has considerable rainfall variation and consists of islands which are rich in agricultural potential areas such as paddy farming. Orderliness of patterns and distribution of rainfall in an area is an important aspect for the ongoing activities. However, not only the impact of climate change will cause irregular seasonal changes and ecological disasters such as floods, long droughts that will cause losses but also the rainy season, rainwater will greatly affect the macro content of the elements in most of the water used in agriculture fields. Meanwhile, modern farming does not have to cover large areas of land. Through the concept of urban farming, one of which is hydroponics, narrow land can be used to cultivate plants, especially vegetables. To support agricultural production, this narrow land model needs to be supported by automation technology that makes it easier to manage. For maximum results, hydroponic plants need special treatment. Moreover, each has its characteristics at its optimal situation for especially on temperature and humidity. It is complicated treatment for farmer to maintain all parameters individually. This research presents the use of IoT technology for monitoring rainfall and also technology applied to narrow land

farming with a hydroponic system under the name Simonkori. This technology presents an integrated solution, utilizing Internet of Things (IoT) technology. The modified Ombrometer and Simonkori have contributed well to Indonesian agriculture. The modified ombrometer plays a role as a basis in determining the planting period while simonkori has the ability to detect nutrients, water level, humidity, water pH and temperature.

Link Zoom Sessions

No	Time	Sessions	Topics	ID and Passcode
1	08.00 – 12.15	Plenary	Opening	Meeting ID: 822 9397 0676 Passcode: 11111
2	13.00 – 15.00	Room 1A	Antenna (1)	Meeting ID: 868 7344 4222 Passcode: 11111
		Room 1B	Sensor and Control	Meeting ID: 542 193 3202 Passcode: 11111
3	15.15 – 17.15	Room 2A	Signal and Image Processing	Meeting ID: 868 7344 4222 Passcode: 11111
		Room 2B	Telecommunication	Meeting ID: 542 193 3202 Passcode: 11111
4	17.30 – 19.30	Room 3A	Antenna (2)	Meeting ID: 868 7344 4222 Passcode: 11111
		Room 3B	Computing and Power	Meeting ID: 542 193 3202 Passcode: 11111
5	19.30 – 20.00	Closing	Closing and Announcement Best Paper/Presenter BCWSP 2020	Meeting ID: 868 7344 4222 Passcode: 11111

Bending Assessment of Dual-band Split Ring-shaped and Bar Slotted All-Textile Antenna for Off-body WBAN/WLAN and 5G Applications

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Abstract

This paper presents a dual-band split ring-shaped and bar slotted textile antenna for potential WBAN/WLAN and 5G applications. The antenna is made using textiles and features a full ground plane to possibly alleviate coupling to the human body. The overall size of the antenna is $70 \times 70 \text{ mm}^2$, with a patch sized at $47.2 \times 31 \text{ mm}^2$ $0.472\lambda \times 0.031\lambda$. The antenna is made using ShieldIt Super as its conductive textile and felt as its substrate. To enable its dual-band resonance at 2.45 and 3.5 GHz a split ring-shaped and bar slots are integrated onto the patch. The proposed antenna is evaluated when bent under different radii and at different axes to estimate its performance in terms of reflection coefficient, bandwidth, efficiency and gain. A 10-dB impedance bandwidth of 57 % or 135 MHz (from 2.39 to 2.52 GHz) and 70 % or 240 MHz (from 3.45 to 3.56 GHz) are obtained when evaluated in the planar /bent configuration. The maximum realized gain is 6 dBi for at 3.5 GHz. These performances indicate that the antenna proposed in this work can be potentially improved for applications in WBAN/WLAN and 5G bands.

Keywords—Microstrip Antenna, Wearable Textile Antenna, All-Textile Antenna, Off-Body, 5G.

Design of 2.4 GHz And 5.8 GHz Microstrip Antenna on Wi-Fi Network

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Abstract

Wi-Fi (Wireless Fidelity) is one of the most popular wireless communication standards in the market, this technology is widely used both in offices, shopping centers, campuses and other public places. To optimize the Wi-Fi communication system antenna optimization is needed. The role of the antenna is to transmit voice communication and data communication. However, due to the influence of several factors, the signals received by users often experience instability. The design of the trident microstrip antenna aims to find the microstrip antenna formula needed by Wi-Fi technology. So, the research will design a trident microstrip antenna for Wi-Fi that works at 2.40 GHz and 5.80 GHz frequencies. The software needed to design this antenna is computer simulation technology (CST). From the simulation results for the 2.4 GHz trident microstrip antenna has a return loss value of -18,514 dB, a VSWR value of 1.26 dB and a Gain value of 4.71 dB. As for the simulation results of the 5.8 GHz microstrip antenna antenna has a return loss value of -40,437 db, a VSWR value of 1.02 dB and a Gain value of 4.19 dB. As for the measurement results of the 2.4 GHz trident microstrip antenna has a return loss value of -24,767 dB, a VSWR value of 1,122 dB and a Gain value of 3.24 dB. As for the measurement results of the 5.8 GHz microstrip antenna antenna has a return loss value of -37,554 db, a VSWR value of 1,027 dB and a Gain value of 3.57 dB. Where the overall results of simulations and measurements can be said 5.8 GHz microstrip antenna has a good performance results for the parameters needed.

Keywords— Trident Microstrip Antenna, Wi-Fi, Wireless Communication, Optimization.

Development of Microstrip Antenna Array Series for Radar Foreign Object Debris (FOD)

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Abstract

Foreign Object Debris (FOD) at airport runways is a hazard that can cause accidents during takeoff and landing. A high accuracy detection system is critical to prevent any possible incidents. A radar system has become a technology for object detection, including FOD detection, by taking advantage of electromagnetic radiation emitted and detected by a high gain antenna. This research proposes a 64 element array series of rectangular patch microstrip antenna optimized by using array series method for radar FOD detection. The proposed microstrip antenna uses the Rogers RT / Duroid 5880 substrate with dielectric constant 2.2. The antenna size is 232.8 mm x 6 mm x 1.575 mm. Simulation results using CST Microwave Studio show that the antenna design can operate in a range frequency of 37.563 GHz – 38.863 GHz or 1.3 GHz (3.4%) bandwidth. The simulated gain, E-plane and H-plane beamwidths are 16.66 dBi, 75.5 degrees and 2.8 degrees, respectively. Measurement results show that the antenna can operate at frequency range of 37.47 GHz – 38.8 GHz or 1.33 GHz (3.49%) bandwidth, which has similar performances as simulation. In addition, the simulation of 128 x 64 element series linear array achieved gain 41.36 dB, unidirectional radiation patterns, E-plane beamwidth 0.4 degrees and H-plane beamwidth 1.5 degrees. The proposed antenna is potential for radar FOD detection applications.

Keywords— Microstrip, Antenna, Radar FOD, Array, Series.

A Novel Flexible Compact Microstrip Antenna for Biomedical Applications

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Abstract

A biomedical implantable antenna is proposed, which is operating at Industrial, Scientific and Medical (ISM) 5.8 GHz band. The design consists of a slotted metallic ground plane, and a Roger RT 6010 LM substrate is placed on top of the ground plane, cascaded by a slotted metallic patch. The design has a maximum size of 8.5×5.5 mm². Superstrate is placed at the top of the design for increasing the gain to -3 dBi. The proposed design is analyzed, by placing it on human skin and fat, respectively, and its results are analyzed and compared. This proposed design will be an ideal candidate for implantable biomedical applications.

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

Design of Rectangular Patch Array 1x2 MIMO Microstrip Antenna with Tapered Peripheral Slits Method for 28 GHz Band 5G mmwave Frequency

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Abstract

5G was a communication system intended for massive data wireless communication. One of the feature that need to be develop well to support massive data wireless communication would be antenna with MIMO system. In this paper we propose a microstrip antenna with rectangular MIMO array 1x2 and tapered peripheral slits method. This antenna proposed to be operated in 28 GHz for 5G wireless communication. It has small design and a tapered periperal slit method will be added to reduce the size of the microstrip antenna and other miniaturization techniques to obtain a compact antenna dimension. Using this design our antenna was compact just only 16mm x 14mm in dimension. Furthermore our frequency band was 28 GHz, with frequency center 27.8 GHz (simulation) and 27.44 GHz (measurement), for bandwidth 5.68 GHz (simulation) and 1.57 GHz (measurement), for S11 parameter -32.89 dB (simulation) and -21.14 dB (measurement).

Keywords— MIMO, Microstrip Antenna, Tapered Peripheral Slits.

1×4 Patch Array All-Textile Antenna for WLAN Applications

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Abstract

This paper proposes the design of 1×4 patch array all-textile antenna for Wireless Local Area Networks (WLAN) applications. The wearable antenna needs to have low profile and lightweight since such antenna is intended to operate in the vicinity of the human body. The key parameters are studied to determine their effects towards the performance of the antenna. The proposed design uses ShieldIt as the top radiator and ground plane, while fabric Felt is used as a substrate, sandwiched between the top radiator and ground plane. The obtained results show that there is improvement in the proposed array antenna in terms of gain enhancement and impedance bandwidth, maximum up to 143.6% and 19.08%, respectively, against single patch structure.

Keywords— Wearable Antenna, All-textile antenna, Patch array, Wireless Local Area Network.

Graphical Pressure Mapping of a 2288 Sensing-Point Matrix Pressure Sensor Using Raspberry Pi

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Abstract

A pressure sensor reading method has been developed continuously along with the different types of requirements, including in medical fields. A method to read piezoresistive matrix pressure sensors with 2288 sensing points is described in detail. The presentation of the output is in 2-D color graphics representing the pressure with a specific color. The matrix sensor is intended for mapping the body surface pressure of bedridden patients. The pressure sensor points are arranged into a 44 x 52 matrix rows and columns. Selecting the row and column will result in choosing the correct sensing points. The selection of rows and columns utilizes multiplexers and demultiplexers to reduce the input-output pins of the microcontroller. This system requires only one channel analog-to-digital converter (ADC) because the pressure sensor points are selected using a raster scan of row and column matrix. The pitch between sensors (0.5 cm pitch) provides very detailed information about the position and the value of the pressure. Many applications require such precision, such as the profile of foot pressure, the palm of hand pressure, and the back of a bedridden patient. The speed of reading the entire matrix is about 1 second, which is fast enough for this application. An Atmega2560 microcontroller performs the raster scanning process and converts the voltage into digital values. Atmega2560 sends the data serially via USB port to a Raspberry Pi computer. This computer shows the data into a four-color gradation heatmap that maps the pressure to the sensor.

Keywords— Pressure Sensor, Piezoresistive, Heatmap, Color Gradation, Raspberry Pi.

Multi Sensor Fire Detection in Low Voltage Electrical Panel Using Modular Fuzzy Logic

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Abstract

Fire in a building is one of the disasters that is very damaging and very serious for human safety, it is known that DKI Jakarta has the highest fire cases with an average of two incidents per day with the biggest cause coming from electricity. The use of multiple sensors, known as multi-sensors, has demonstrated its superiority in carrying out early detection of fire so that the development of technology is currently focused on the use of better decision making algorithms. This study uses many sensors consisting of flame sensors, carbon monoxide sensors, temperature sensors and smoke sensors as an early detection of fire with fuzzy logic decision making algorithms in modeling low voltage electrical panels, presented in the form of a comparison between conventional type fuzzy logic with fuzzy logic modular type. Sensor data processing from the simulation of smoke to fire through Arduino Mega, then simulations using Simulink on MATLAB, the simulation results showed a reduction in the number of rules from 81 to 43 in the modular type, while the probability output at the 5th second was higher and at the 21st second lower than the conventional type.

Keywords— Fuzzy Logic, Data Fusion, Multi Sensor, Fire.

Network Structure Routing Protocols of WSN: Focus, Review & Analysis

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Abstract

In wireless networks, huge throughput, minimum delay and optimum bandwidth efficiency are considered as the prime concerns when mobility has existence. In sensor networks, when nodes change position, the topology of the network can also amend rapidly, hence such networks seek for a responsive routing procedures that finds valid routes directly as the topology changes and old routes turned into broken. The restricted capacity of the network channel calls for efficient routing procedures that do not drive the network into a congested status when new routes are implemented. In this paper we strive to present a focus review and analysis for three fundamental routing categories in sensor networks based on the network structure, specifically data-centric protocols, hierarchical protocols and location based protocols. Hierarchical protocols are applied to achieve energy efficient routing, data centric protocols are inquiry based and concentrate on eliminating non essential transmissions whereas location based procedures need position coordinates in order that optimal path can be established without utilizing flooding scheme. This review provides a sprightly and structured introduction to the most important network structure routing protocols supported by illustrative layouts.

Keywords— Sensors network, Routing Protocols, Energy efficient.

Operation Analysis of Automation System Terminal Implementation in LPG Terminal

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Abstract

Terminal Automation System (TAS) is a well-known system for automating field operations in real time as well as in the measurement process that is connected to a commercial billing system, stock availability and operating safety. This TAS acts as an integrated automation system for sequential control, process control, electrical control. In the TAS Liquefied Petroleum Gas (LPG) Terminal it is necessary to supervise several facilities that require full safety in hazardous areas such as the receiving, back filling and distribution processes. The purpose of this article is to find the effectiveness found in terminals that use TAS. Useful for improving the quality of company distribution and utilization, productivity and safety through the system. From that an organized information system can also lead to increased work efficiency which can affect income.

Keywords— Terminal Automation System, Control System, Automation, ICT.

Performance Analysis of Profinet Network in PLC-Based Automation System

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Abstract

Industry 4.0 will be a new industrial revolution that will have a profound effect on the international industry. This industrial revolution is marked by the use of the Cyber Physical System (CPS) and the Internet of Things (IoT) where the equipment in the manufacturing process will change to become a Cyber Physical Production System (CPPS). The main key in the concept of CPPS and IoT is the speed in exchanging data between devices, so that data can be obtained in real time. In this study the authors conducted an experiment to find out the performance of traditional soft PLC and PLC (hard PLC). Build simulations by designing an HMI that will exchange data with a PLC. In this research, HMI is made different for each packet data capture, so there are 18 pages of HMI created to experiment with different types of controllers, variations in the number of tags and variations in the acquisition cycle settings. The data obtained from the measurement results are used to analyze the response time between the HMI and the controller used. These results indicate that the performance of exchanging data between devices using soft PLC as a controller 19 times faster than the hard PLC and more stable when adding the number of tags on the HMI system. So it is possible to use soft PLC as a controller instead of conventional PLC or hard PLC. Using a PC as a controller will make it easier to connect to a wider network so that it can help in the application of CPPS and the Internet of Things.

Keywords— CPPS, Hard PLC, Internet of Things, Performance, Profinet, Soft PLC.

Review on Fuzzy Control Strategies to Improve PEMFC Performance

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Abstract

Proton exchange membrane fuel cells (PEMFC) are important energy devices for the future that can convert chemical energy directly into electrical energy with environmentally friendly energy. This review paper comprehensively describes the performance of the fuzzy control algorithm as a tuner for the PID controller as well as a controller to regulate gas flow, pressure and PEMFC temperature. A combination of PID and fuzzy controllers are commonly used to optimize PID parameters to improve response and eliminate offsets. The demand for a control system is adaptable and responds quickly to dynamic changes such as sudden energy demands. Therefore, this paper aims to carry out a literature review to improve PEMFC performance through fuzzy strategies. The paper concludes with a detailed review of fuzzy control system to provide a sophisticated strategy to improve PEMFC performance based on in-depth surveys from journal papers.

Keywords— PEMFC, Control, Fuzzy, Energy, Hydrogen.

Determining the Best Graduation Using Fuzzy AHP

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Abstract

Each university is expected to produce graduates who have good academic and non-academic abilities. In determining the best graduation, every year each department send 5 candidates that will be selected by the Directorate of Student affairs. In the process of selecting a best graduation there are several criteria used as reference. Some of these criteria have fuzzy properties where objectivity can be increased. To solve the problem, we use Fuzzy Analytical Hierarchy Process (FAHP) method to provide a more measurable assessment in terms of objectivity and consistency. The implementation of the Fuzzy Analytical Hierarchy Process method consists of several stages, that is weighting between criteria, triangular fuzzy number, fuzzy synthesis, weight matrix, and priority. The results show that the priority order of determining best graduation is GPA, Competition / Championship, Behavior, and activity in the organization. Beside that we obtained GPA (W1) = 0.9925, and Competition / Championship (W3) = 0.0075 are the factors that influence in determining best graduation.

Keywords— Decision Support System, Best Graduation, Fuzzy AHP.

Comparison of Local Binary Pattern and Eigenfaces for Predict Suspect Positive Drugs

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Abstract

The current activity of drug inspection is usually carried out at school or university. This procedure, however, is less effective and efficient, as the urine samples are taken randomly. In many cases, the suspect student is not present or escapes the urine or hair inspection. A predictive drug user is needed, where only students suspected of positive drug use are selected for a urine test. To handle this problem, we need a system to predict suspect positive drugs. The dataset is generated from online sources by collecting and pre-processing 30 images of people before and after drug. We compare two algorithm local binary pattern and Eigenfaces for predicting suspect positive drugs based on face images. The experiment shows that the result of the prediction using Local binary pattern is better than the prediction using Eigenfaces. However, a higher accuracy of prediction reaches only 75 %.

Keywords— Predict Suspect Positive Drugs, Local Binary Pattern; Eigenfaces.

Research and Design of Fast Special Human Face Recognition System

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Abstract

During the use of face recognition systems appears the problems such as the system can't find a face and hasn't enough information of the image, changing illumination, occlusion, face shape change and so on. In order to solve the current problems and improve the ability of face recognition and detection, new methods for data acquisition and some tools are adopted, and the application development of improved face recognition system is proposed based on ARM architecture design, software development of face recognition system is taken in ARM embedded platform. The solve project for the acquisition of three-dimensional face data, biometric recognition, computer vision, computer graphics is researched and designed. The image edge contour detection method is used for face image features positioning, the adaptive feature extraction method of image entropy is used for facial feature extraction, the face recognition algorithm is optimized, and the face image output module are constructed. The simulation results show that the face recognition system designed in this paper has good robustness performance, and it can improve the accurate probability of face recognition.

Keywords : Face Recognition, Image Processing, Image Feature Extraction, Embedded System, Computer Vision.

Mask Classification and Head Temperature Detection Combined with Deep Learning Networks

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Abstract

Due to the COVID-19 pandemic, wearing a mask is mandatory in public spaces, as properly wearing a mask offers a maximum preventive effect against viral transmission. Body temperature has also become an important consideration in determining whether an individual is healthy. In this work, we design a real-time deep learning model to meet current demand to detect the mask-wearing position and head temperature of a person before he or she enters a public space. In this experiment, we use a deep learning object detection method to create a mask position and head temperature detector using a popular one-stage object detection, RetinaNet. We build two modules for the RetinaNet model to detect three categories of mask-wearing positions and the temperature of the head. We implement an RGB camera and thermal camera to generate input images and capture a person's temperature respectively. The output of these experiments is a live video that carries accurate information about whether a person is wearing a mask properly and what his or her head temperature is. Our model is light and fast, achieving a confidence score of 81.31% for the prediction object and a prediction speed below 0.1s/image.

Keywords—Neural Network, Object Detection, Deep Learning, RetinaNet

Analysis of DFT and FFT Signal Transformation with Hamming Window in LabVIEW

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Abstract

Fourier transform is a transformation method to convert signals from time domain into frequency domain. FFT and DFT is one form of Fourier transformation. FFT is an algorithm that used to calculate, whereas DFT is a pure mathematical concept, FFT has good efficiency because in the calculation process, FFT will eliminate unnecessary processes. FFT and DFT can be given filters that can produce different impulse responses, the filtering technique is called windowing. In this paper we will create a stand-alone program and discuss the analysis of sinusoidal type signal transformation using DFT, FFT, and FFT using the Hamming window technique in LabVIEW.

Keywords— DFT, FFT, hamming window, transformation, LabVIEW.

Performance of Biometrics Recognition System Using Multiple Scales Analysis

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Abstract

Biometrics trait can recognize individual based on the special characteristics unique to his/herself. New soft biometrics trait was introduced such as androgenic hair to overcome problem where the face of individual was hidden by the camera. In this work, performance of biometric recognition system was analyzed further using multiple scales methods such as the difference of Gaussian and discrete wavelet transform using Haar and Daubechies order 2. The difference of Gaussians was built using 6 octaves and 4 levels in each octave while discrete wavelet transform was built using nine levels of decomposition. There were two databases of biometric characteristics, androgenic hair pattern and face. Total of 400 images were studied from each database and performance results were calculated. The best performance of accuracy recognition was obtained, 85,25% for androgenic hair database and 92,5% for face database.

Keywords—Biometrics, Difference of Gaussian, Multiple-Scale, Recognition System, Wavelet

Multi-Touch Gesture of Mobile Auditory Device for Visually Impaired Users

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Abstract

In this study, we conducted experiments with 15 visually impaired users for graph reproduction tasks with additional modalities. The question we have tried to answer is the possibility of integrating multi-touch gestures into auditory graphs as an interactive tool for mental visualization and understanding data. We introduce a new multimodal approach, based on multi-touch gesture interaction, aiming to have more accurate mental models of the plots and to improve the accessibility of smartphone's user interfaces. The findings contribute to confirm empirically that multi-touch gestures provide more precise outcomes than passively listening to the audio. The evaluation confirms that the implementation of additional modalities to auditory graphs could improve the perception of the mental model of the plot.

Keywords— Mobile Application, Point Estimation, Auditory Graph, Data Analytics

Dealing with the Latency Problem to Support 5G-URLLC: A Strategic View in the Case of an Indonesian Operator

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Abstract

Before implementing 5G technology, each operator first needs to know their existing network capability. The operator's network must be able to meet the stringent 5G network requirements, including a very low latency, especially for the URLLC (Ultra Reliable Low Latency Communication) scenario. This scenario requires 1 ms latency for applications to run smoothly. In this paper, we use a case study from one of the operators in Indonesia to obtain measurements of the network, evaluate it, and then develop strategic steps that will allow the operator to determine whether the network can implement 5G URLLC. A correlation is observed between the latency and the distance from the site to the data center in the operator's network in Indonesia. The maximum site to data center distance to achieve 1 ms latency is 21.4 km using the existing 4G network infrastructure. We also discuss the optimum design for a new data center location and an efficient schema for building new 5G infrastructure.

Keywords—5G, URLLC, Latency, Transmission

Prediction Analysis Sales For Corporate Service Telecommunications Company Using Gradient Boost Algorithm

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Abstract

Sales prediction analysis requires smart data mining techniques with accurate prediction models and high reliability. Essentially, most market segments rely on the know-how base and the demand trend forecast for analysis of Business To Business (B2B) sales data. Data are provided by sales on how Telecommunication Company should manage its sales team, its products and also its budgeting flows. Precise estimates make it possible for Telecommunication Company to survive the market war and increase its market growth. In this research, the study and analysis of comprehensible predictive models use machine learning techniques to improve future sales predictions. Traditional forecasting systems are difficult to deal with big data and the accuracy of sales forecasting. In this paper, a brief analysis of the reliability of B2B sales using machine learning techniques. The latter part of this research explains a range of sales prediction strategies and interventions. Based on the performance assessment, a best-adapted predictive model for the B2B sales trend forecast is suggested. Projection, estimation and analysis findings are summarized in terms of reliability and consistency of efficient prediction and forecasting techniques. The results of this analysis are expected to generate reliable, accurate and effective forecasting data, a valuable resource for sales predictions. Research has shown that Gradient Boost Algorithm shows good accuracy in forecasting and future B2B sales prediction with $MSE = 24,743,000,000.00$, and $MAPE: 0.18$.

Keywords—*Gradient Boosted Trees, Prediction, Reliability, Sales forecasting, Business to Business (B2B), Telecommunication*

Classification of Network Status in Academic Information Systems Using Naive Bayes Algorithm Method

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Abstract

Academic Information System is a system used for academic data management with the application of computer technology, both hardware and software. Operating an academic information system requires an adequate server and good network quality. Dynamic Host Configuration Protocol (DHCP) server is a service that allows devices to automatically distribute IP address to host in a network. The DHCP server provides IP addresses, DNS, Default Gateway, and various TCP / IP information. The operating systems that support the DHCP server are Linux, GNU, Windows Net Server, Windows 2003 server. The method used in this research is the Naive Bayes algorithm, a machine learning method that utilizes probability and statistical calculations. Classification is carried out on data protocols which have low, medium and high categories. The results in this study were the throughput on the server was 38.8% in the medium category, the delay on the server was 2.80 ms in the very good category, and the packet loss was 0% in the very good category. The results of classification on the protocol have two confidence, that is producing an average accuracy value that is right for classification on the long protocol of 94.92% and the protocol counting of 81.35%.

Keywords—Naive Bayes, SIAK, HTTP, TCP, DHCP, ISP

Improvement Of Policy Charging Control Flow Based On Internet Sunscribers Behavior

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Abstract

Balitower has 2 kind of products which are paid internet and free internet. Unified Policy Charging Control (PCC) is handling both internet traffics which is paid internet and free internet in order to have more flexibility in managing various product. Technically both traffic will get same treatment by PCC refer to 3GPP Standard in accordance to deletion of session. 3GPP has arranged that deleting a session on PCRF can only be done if there is an initiation from different node. This rule is suitable to be applied for paid subscriber which is expected to be always active until run out of credit or expired, while to keep session for free internet will depending of subscriber behavior. Based on free internet data traffic from weeks first till twelfth of 2020, it was found that 70% of subscriber to access internet was less than 5 times a week and more than 60% of subscriber only accesses within 5 minutes. By referring from that data, it proposed to have automatic session deletion for free internet in PCRF to give other customers opportunity to access the internet without have to add cost for license upgrade.

Keywords—PCC, PCRF, 3GPP

The Utilization of Information Systems for VSAT Development in Rural Areas

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Abstract

One problem that is still common in Indonesia is the problem of the distribution of Internet network infrastructure. Meanwhile, as is well known, the internet has many roles in human life and especially in the technological advancements for the development of a country. To overcome this, several operators have developed internet networks using VSAT telecommunications technology for rural areas. VSAT be a choice because it has several advantages compared to other telecommunications media. In the VSAT development process, operators and customers do all the processes manually so that it requires a relatively long time. Therefore, this research will discuss about the use of information systems to help the VSAT development process. With the change of the system manually into an information system, for example based on web applications or with the internet, therefore it is hoped that all activities in the system can make it easy for operators to run VSAT builder projects. Other than that, by using information systems, the companies can be connected with consumers and sellers, thus enabling operators of VSAT development service providers to market their services more easily and efficiently. In this research will provide the best flowchart for system information that can be used for VSAT development.

Keywords—Information System, VSAT, Internet, Rural Area

LTE Implementation Model with Combination Carrier Aggregation Based on Area Demographics

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Abstract

Needs for rapid data services on telecommunications networks continues to increase, the amount of data traffic every year always increases while voice traffic tends to stagnate or even decrease. 4G LTE technology (Fourth Generation Long Term Evolution) as the latest telecommunications network technology from 3GPP (Third Generation Partnership Project) is able to provide better speed and capacity than the previous technology. This 4G LTE implementation answers the challenges of the growing need for data services. In the implementation process there are two major challenges, namely the limited frequency bandwidth at 1800 Mhz due to having to share with the existing 2G DCS 1800 Mhz system, and the varied demographic conditions in Indonesia. The model was built by combining carrier aggregation and 4x4 MIMO types. For bandwidth variations of 8 MHz, 10 MHz, 15 MHz and 20 MHz with a combination of frequencies at 1800 MHz and 2100 MHz. By simulating the area in Jabodetabek, different bandwidth models will be produced in each area based on technical aspects (coverage and capacity) and economic aspects. The results showed that in the type of metro area, dense urban and urban areas that are in accordance with techno-economic is a carrier aggregation broadband of 15 Mhz. Then for the appropriate sub-urban area, which is 8 MHz. Whereas for rural areas not yet included in any bandwidth criteria, this makes consideration that the rural area is not yet suitable for carrier aggregation for 8 Mhz, 10 Mhz, 15 Mhz and 20 Mhz

Keywords—Carrier Aggregation, MIMO, LTE, Techno-economic

Feasibility Analysis The Implementation Of The Dual Spectrum Licensed And Unlicensed Enhanced License Assisted Access (ELAA) On LTE Networks With The Techno Economic Method

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Abstract

Each year internet user traffic is growing, causing a surge in data service traffic while spectrum availability is increasingly limited which results in gaps in capacity requirements. Telecommunications service providers can respond by improving quality in anticipation of an increasingly high demand spectrum. Enhanced License Assisted Access (eLAA) technology on LTE networks that utilize unlicensed spectrum technology as an additional channel, is expected to be a solution in increasing capacity and throughput. In this research, an enhanced license assisted access implementation planning scenario is implemented using the dual spectrum method with spectrum licensed 900 MHz, 1800 MHz, 2100 MHz, 2300 MHz, and 5 GHz unlicensed spectrum. The dimensioning capacity method is used as a technical analysis method to get the number of cells and eNodeB. The NPV, IRR, and payback period methods are used as a methodology for measuring financial feasibility. In this study, obtained the most suitable scenario to be implemented is the second scenario, the frequency used is 1800 MHz and 5 GHz frequency with a bandwidth of 20 MHz. with an initial investment of \$ 1,602,487.48, resulting in an NPV of \$ 496,543.49, an IRR of 16,385%, and a 3 year 3 month Payback period.

Keywords— eLAA, dimensioning capacity, spectrum, NPV

Design of Electronically Steerable High Mode Dielectric Resonator Antenna using PIN Diode

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Abstract

This paper presents a reconfigurable beam dielectric resonator antenna (DRA) at 2.4 GHz by adopting the yagi-uda concept. Rectangular dielectric resonator antenna (RDRA) have been chosen as the radiator and fed by slot aperture. The antenna is designed in Taconic substrate with permittivity of 2.2. Firstly, a single antenna with two different modes is designed and investigated. The best performance mode in term of gain is then used to design the single driven RDRA with two parasitic RDRA, connected with the four RF pin diode BAR50-02V as switch. The analysis of the gap between driven and parasitic element is investigated. Four different types of switch configuration have been carried out to identify the performance of antenna in different cases. Depending on the switch configurations, the designed antenna can achieved highest gain of 7.386 dB and have steering angle capability at -42° , 42° , -54° and 54° .

Keywords— Dielectric Resonator Antenna, Reconfigurable Antenna, Pattern reconfigurable antenna, antenna and propagation

The Design of Log Periodic Dipole Array Microstrip Antenna at Frequency 28 GHz

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Abstract

5G technology is being developed to be able to overcome the increasingly dense communication needs. The development of 5G technology certainly requires various devices to support and facilitate the 5G technology. One of the core devices for the 5G system is an antenna which is a device for emitting and receiving electromagnetic waves. The 5G system uses millimeter wave frequency as its frequency spectrum. In this final project a periodic dipole array microstrip antenna design can be performed at a frequency of 28 GHz to support the development of the 5G system which is being carried out. The research method used is to do a simulation using Hfss software. Basic antenna elements using the material of the antenna is Roger 5880 with a thickness of 1.57 mm and 2.2 permittivity value. The material selection is based on the targeted frequency and bandwidth and antenna specifications in order to operate well at the expected working frequency. Based on the results that have been obtained, this study succeeded in getting the specification parameters of the expected antenna in accordance with the frequency of its work.

Keywords—Log Periodic Dipole Array, 5G, Microstrip

Design of Reflectarray Microstrip Antenna with Butterfly Patch and Square Ring Elements for WiGig Applications

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Abstract

Wireless Gigabit Applications in 60 GHz frequency spectrum provides up to 7 Gbps data rates. This rate is 7 times faster than the current WiFi network. To support high data speed, antenna with high gain is required. The reflectarray antenna that combines the features of the reflector and unit cells in array configuration, therefore can achieve high gain by controlling the phase of the unit cells. This paper proposes a reflectarray antenna with 163 butterfly-patch with square ring in 70 mm x 70 mm microstrip antenna that works in 60 GHz frequency. The reflectarray antenna was fabricated using RO4003C type PCB with ($\epsilon_r = 3.55$; $h = 0.51$ mm) and measured. Simulated results show that the proposed reflectarray antenna has 26.56 dBi gain, whereas measured results can achieve a high gain of 23 dBi at a frequency of 60 GHz.

Keywords—WiGig, WiFi, Reflectarray, High Gain

Stretchable Metamaterial Inspired Antenna for WLAN Applications

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Abstract

Stretchable microfluidic antenna has recently been developed and employed in many applications. However, they are still in their early stages of development and facing considerable challenges, such as practical system integration due to the limitation of costs, wired connections, and sensitivity. In this work, we present an SRR metamaterial-based antenna designed with stretchable and highly conductive patch Galinstan and elastomer polydimethylsiloxane (PDMS) substrate, which operates at a frequency of 5.2 GHz. This antenna can deform into any complex shapes such as the human body, and suitable for application that requires Wireless Local Area Network (WLAN) connectivity, such as for soldiers involved in missions and battles. As for the stretchable properties of the antenna, the effect of the bending also simulated, with the lowest return loss -23.6 dB in flat condition, and the highest return loss -12.3 dB in horizontal bent antenna

Keyword— Stretchable, Galinstan, polydimethylsiloxane (PDMS), metamaterial, Split Ring Resonator (SRR), Wireless Local Area Network (WLAN).

Switchable Beam Antenna with Five Planar Element using PIN Diode in Elevation Plane

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Abstract

This work focuses on the switchable beam parasitic patch antenna for the point to point communication system. This concept gives more flexibility due to their ability to modify the radiation and providing multiple functionalities. This work focuses on two points directly to minimize the number of PIN Diode and to maximize its reconfiguration capabilities. First, the concept of two parasitic element is addressed. The mutual coupling effect between both driven and parasitic has manage to steer the beam to -28° , 0° and $+28^\circ$ different angles in a single layer. The design consists of four parasitic elements with full ground and four pin diode switch HPND-4005, five different directions have been reached which are -45° , -30° , 0° $+30^\circ$ and $+45^\circ$. The parasitic patch antenna has achieved high gain of 8.92dBi at 5.8 GHz with the beam ability to steer until 45° for both side of the parasitic element.

Keywords—Reconfigurable Antenna, Pattern reconfigurable antenna, switchable beam antenna, high gain antenna.

Performance Analysis of IDS Snort and IDS Suricata with Many-Core Processor in Virtual Machines Against Dos/DDoS Attacks

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Abstract

The rapid development of technology makes it possible for a physical machine to be converted into a virtual machine, which can operate multiple operating systems that are running simultaneously and connected to the internet. DoS/DDoS attacks are cyber-attacks that can threaten the telecommunications sector because these attacks cause services to be disrupted and be difficult to access. There are several software tools for monitoring abnormal activities on the network, such as IDS Snort and IDS Suricata. From previous studies, IDS Suricata is superior to IDS Snort version 2 because IDS Suricata already supports multi-threading, while IDS Snort version 2 still only supports single-threading. This paper aims to conduct tests on IDS Snort version 3.0 which already supports multi-threading and IDS Suricata. This research was carried out on a virtual machine with 1 core, 2 core, and 4 core processor settings for CPU, memory, and capture packet attacks on IDS Snort version 3.0 and IDS Suricata. The attack scenario is divided into 2 parts: DoS attack scenario using 1 physical computer, and DDoS attack scenario using 5 physical computers. Based on overall testing, the results are: In general, IDS Snort version 3.0 is better than IDS Suricata. This is based on the results when using a maximum of 4 core processor, in which IDS Snort version 3.0 CPU usage is stable at 55% - 58%, a maximum memory of 3,000 MB, can detect DoS attacks with 27,034,751 packets, and DDoS attacks with 36,919,395 packets. Meanwhile, different results were obtained by IDS Suricata, in which CPU usage is better compared to IDS Snort version 3.0 with only 10% - 40% usage, and a maximum memory of 1,800 MB. However, the capabilities of detecting DoS attacks are smaller with 3,671,305 packets, and DDoS attacks with a total of 7,619,317 packets on a TCP Flood attack test.

Keywords—IDS, Intrusion Detection System, Snort, Suricata, DoS, DDoS

Forecast Analysis of Research Chance on AES Algorithm to Encrypt during Data Transmission on Cloud Computing

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Abstract

Cloud computing can be described as a network technology among users to share data, resources and even services. Because million users have the same rights to use network for data transmission, data is vulnerable to be hacked by irresponsible person. The concentration of security on current system can only be found on data storage on cloud, meanwhile less concentration is found on data transmission. As we determine security can be potential issue, the proposed system (encryption) will secure data transfer. The proposed system, Advanced Encryption Standard (AES) algorithm, will anticipate every irresponsible person to hack cloud system. The proposed algorithm will encrypt and decrypt information on data transmission and storage. To improve published research on security of data transmission by using AES algorithm is the paper purpose. In order to do that, the research will use several mathematical methods. There are Markov Chain and Forecasting methods. Research results show that there are possibilities to research on AES algorithm for security of data transmission in the near future by 29% in 2023.

Keywords —Data Transmission, AES Algorithm, Markov Chain, Forecasting, Cloud Computing

Novel Concept for Wireless Power Transfer Modules

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Abstract

In the factory of the future, the production equipment will be mobile in order to meet the market requirements for a convertible production. This results in the need for a mobile electrical supply of the production equipment. It can be achieved by using inductive, wireless energy transfer technology. The paper shows a novel design concept of an energy transfer system for the use in an industrial environment, which transfers electrical energy along a track to one or more mobile devices. The direction of energy flow can also be reversed, so that production equipment can feed contactless their surplus energy back into the DC grid.

Keywords—Wireless Power Transfer, Coils, Inductance, Couplings, Industry 4.0

Pocket DC Earth Fault Locator (P-DEL) for Alarm Interference of DC Power Supply using the Internet of Things

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Abstract

PT. Indonesia Power Kamojang POMU (Power Generation Operation Maintenance Unit) has one problem in the handling time of Ground Fault DC, where the handling time tends to increase over the last four years. This problem will impact the production cost where energy consumption is fixed. Equipment maintenance costs are quite expensive, the absence of standard manual tracking and the use of tools as well as many cables that are corrosive into a vital factor in increasing the duration of this disturbance handling. This paper proposes a Pocket DC Earth Fault Locator (P-DEL) with current injection method by assembling Nodemcu V3, Arduino Nano, RTC DS3231, INA219 current Sensor that can make it easier to track DC Earth Fault alarm interference. P-DEL, which focuses on ease and flexibility of use and affordability of price, has been a solution to accelerate the duration of handling DC Earth fault in Kamojang POMU. With this device, it can monitor DC Earth Fault interference on the DC system Kamojang POMU. From the test results conducted on the workshop and tools of Kamojang POMU with standard load measuring, the device can inject current from 9 mA to 562.5 mA, and detect 22 K Ω maximal loads. Anyone can access the interference tracking data through the public view on the Web (thinkspeak). With the existence of P-DEL, it can minimize the work order alarm of DC earth fault interference into a backlog.

Keywords—Earth Fault Locator, DC Power Supply, Current Injection, Internet of Things, Interference

A Study on Modular Multilevel Converter based Wind Turbine Generator Connected to Medium Voltage DC Collection Network

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Abstract

This study proposes an application of Modular Multilevel Converter (MMC) to wind turbine direct driven Permanent Magnet Generator (PMG) which is connected to medium voltage DC collection network. The topology, modeling, operation, and control method of the wind turbine generator connected to MMC system are presented. The aim of the application of MMC to the wind turbine generator is to increase its operating voltage so as to be connected to medium voltage of DC network. Besides that, a grid side converter, a harmonic filter device and a transformer of the wind turbine generator can be neglected. Feasibility and validity of operation and control method of the proposed MMC based wind turbine generator have been investigated through simulation study. The simulation is performed by using PSCAD/ EMTDC package program. The obtained results have confirmed that the proposed topology and control system have good dynamic performance, controllability, and reliable stability.

Keywords—modular multilevel converter, permanent magnet generator, DC collection network, wind farm

Outage Probability and Power Efficiency of Quantize-and-Forward Relay in Multi-hop D2D Networks

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Abstract

The fading effects that occur on the wireless signal during its propagation can deteriorate the performance and increase the power consumption of the system. A cooperative communication that utilizes other user devices as its relays to forward the information to a destination can address this problem. Moreover, a combination of cooperative communication with device-to-device (D2D) communication, known as cooperative D2D, is a promising candidate to be implemented in 5G technology. Therefore, we analyze the outage probability and power efficiency of a cooperative multi-hop D2D network using Quantize and Forward (QF) relay protocol. Then, we simulate the outage probability and power efficiency with respect to transmitted power, transmission distance, quantization level, and the number of relays in the network. The simulation results show that the outage probability of multi-hop QF relay decreases as the transmit power, the number of hops, and the quantization level increase. On the other hand, outage probability increases as the distance increases. Besides, the number of hops will also affect the average power efficiency of a cooperative D2D multi-hop relay network with QF protocol, in which the more hop relays used in the transmission path, the higher the average power efficiency, and consequently the better system performance.

Keywords—outage probability, power efficiency, cooperative D2D, Quantize and Forward (QF) protocol, multi-hop relay

Comparison of DC-DC Converters Boost Type in Optimizing the Use of Solar Panels

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Abstract

This research focused on finding DC/DC converters boost type with the best output through simulation methods by comparing the use of components from several boost converter topologies so that they can be used to maximize solar panel output. Several simulation scenarios are needed using PSpice A/D Lite software. Boost converter types that will be compared are Single Switch Cascaded Converter, Multilevel Boost Converter, Quadratic Boost Converter, Double Cascade Boost Converter and Phase Interleaved Boost Converter. The simulation scenario provided aims to see the converter output response to changes in load resistor parameters, switching frequency and input voltage. The load resistance value used is 1 KOhm, the greater the resistance value, the greater the output voltage value. The effective switching frequency is different in each converter. The converter type Single Switch Cascaded Converter has the highest voltage gain of 32.96 times with an output voltage of 988.8 V at the minimum switching frequency at 1KHz and with the use of the fewest number of components compared to other converters of 10 units. It can be said that the boost converter type Single Switch Cascaded Converter is the most optimal boost converter compared to 4 other boost converters.

Keywords—Boost converter, DC/DC converter, PSpice A/D Lite