LEMBAR
HASIL PENILAIAN SEJAWAT SEBIDANG ATAU *PEER REVIEW*
KARYA ILMIAH : PROSIDING

Judul Karya Ilmiah	:	Backward Compatible Low PAPR Preamble for Very High Throughput WLAN IEEE802.11ac		
Jumlah Penulis	:	3 orang (**Wahyul Amien Syafei**, Hidayatno, A., MacRina, A.A.Z.)		
Status Pengusul	:	Penulis Utama		
Identitas Prosiding	:	a. Judul Prosiding	:	The 6th International Conference on Information Technology, Computer, and Electrical Engineering (ICITACEE) 2019
		b. ISBN/ISSN	:	978-1-7281-2689-0
		c. Thn Terbit, Tempat Pelaks.	:	26-27 September 2019, Semarang - Indonesia
		d. Penerbit/Organiser	:	IEEE Xplore Digital Library
		e. Alamat Repository/Web	:	https://ieeexplore.ieee.org/document/8904371
		Alamat Artikel	:	https://doc-pak.undip.ac.id/7991/1/syafei2019.pdf
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Kategori Publikasi Makalah (beri ✓pada kategori yang tepat) : [√] *Prosiding* Forum Ilmiah Internasional
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b. Ruang lingkup dan kedalaman pembahasan (30%)	7,00	7,00	7,00
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	7,00	7,00	7,00
d. Kelengkapan unsur dan kualitas terbitan/prosiding(30%)	7,00	7,00	7,00
Total = (100%)	**23,50**	**23,50**	**23,50**
Nilai Pengusul = (60% x 23,50) = 14,10			

Semarang,

Reviewer 2

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Reviewer 1

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Hasil Penilaian *Peer Review* :

Komponen Yang Dinilai	Nilai Maksimal Prosiding		Nilai Akhir Yang Diperoleh
	Internasional [25]	Nasional [ ]	
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b. Ruang lingkup dan kedalaman pembahasan (30%)	7,50		7,00
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	7,50		7,00
d. Kelengkapan unsur dan kualitas terbitan/prosiding(30%)	7,50		7,00
Total = (100%)	**25,00**		**23,50**
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Catatan Penilaian Paper oleh Reviewer :

1. **Kesesuaian dan kelengkapan unsur isi paper:** Paper sesuai kaidah karya tulis ilmiah dan lengkap memuat judul, abstrak, pendahuluan, perancangan, pembahasan hasil, kesimpulan dan referensi. (Nilai 2,5).
2. **Ruang lingkup dan kedalaman pembahasan:** Paper ini membahas preamble untuk WLAN dengan laju data yang tinggi dengan sistematis meski ringkas. Ruang lingkup cukup luas karena berkontribusi terhadap penelitian tingkat internasional. (Nilai 7).
3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:** Paper ini diangkat sebagai topik di Keynote Speech plenary session karena terbukti efektif tidak hanya memberikan nilai PAPR yang rendah tetapi juga backward compatible dengan WLAN yg sudah ada. (Nilai 7)**.**
4. **Kelengkapan unsur dan kualitas terbitan:** Unsur Prosiding lengkap, mutu terbitan baik, dan terindeks Scopus. Paper tidak ada indikasi plagiasi. Topik memang bidang kepakaran pengusul. (Nilai 7).

Semarang,
Reviewer 1

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c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	7,50		7,00
d. Kelengkapan unsur dan kualitas terbitan/prosiding(30%)	7,50		7,00
Total = (100%)	**25,00**		**23,50**
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Catatan Penilaian Paper oleh Reviewer :

1. **Kesesuaian dan kelengkapan unsur isi paper:** Paper memenuhi kriteria karya tulis ilmiah, berisi judul, abstrak, pendahuluan, perancangan, pembahasan hasil, kesimpulan dan referensi. (Nilai 2,5).

2. **Ruang lingkup dan kedalaman pembahasan:** Ruang lingkup yang diangkat oleh paper ini berlevel internasional dan dibahas dengan susunan yang baik. Parameter dan hasil simulasi dijelaskan dengan detail. (Nilai 7).

3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:** Paper ini mempresentasikan preamble yang berkompatibilitas balik terhadap WLAN eksisting dengan PAPR yang rendah. Kontrobusi penelitian ini terhadap perkembangan teknologi system komunikasi nirkabel berlaju data tinggi cukup signifikan. (Nilai 7)**.**

4. **Kelengkapan unsur dan kualitas terbitan:** Prosiding sudah lengkap dan tersusun rapi. Kualitas terbitan bagus dan sudah terindeks Scopus. Paper sudah dicek dengan turn it in dengan indeks kemiripan 8%. Paper adalah bidang yang ditekuni oleh pengusul. (Nilai 7).

Semarang,
Reviewer 2

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No. 996/ UN7.P/HK/2019

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General Chair

Document type
Conference Paper

Source type
Conference Proceedings

ISBN
978-172812689-0

DOI
10.1109/ICITACEE.2019.8904371

View more

2019 6th International Conference on Information Technology, Computer and Electrical Engineering, ICITACEE 2019 • September 2019 • Article number 8904371 • 6th International Conference on Information Technology, Computer and Electrical Engineering, ICITACEE 2019, Semarang, 26 September 2019 - 27 September 2019, 155026

Backward compatible low PAPR preamble for very high throughput WLAN IEEE802.11ac

Syafei W.A., Hidayatno A. , MacRina A.A.Z.

Save all to author list

Diponegoro University, Department of Electrical Engineering, Semarang, Indonesia

Abstract

The new comer WLAN IEEE 802.11ac offers very high throughput wireless communication. By setting the modulation coding scheme to 9 in 80MHz of bandwidth and four spatial streams, it provides data rate up to 1.7Gbps. Operated in the 5GHz frequency band, it should be backward compatible to the former WLANs IEEE 802.11a/n. This paper presents the examination of backward compatibility performance of our novel low PAPR preamble proposed for IEEE802.11ac. Run test under channel model B and D of IEEE802.11TGn proved that the proposed low PAPR preamble in 80MHz can be

2019 6th International Conference on Information Technology, Computer and Electrical Engineering (ICITACEE 2019)

Semarang, Indonesia
26 – 27 September 2019

IEEE Catalog Number: CFP1989Z-POD
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Thursday, September 26

Invited Speaker Session 3

Room: Amarta 2 and Amarta 3

IS3.1 ***Backward Compatible Low PAPR Preamble for Very High Throughput WLAN IEEE802.11ac***

Wahyul Amien Syafei, Achmad Hidayatno and Ajub Ajulian Zahra

Presenter bio: B.Eng 95 Electrical Engineering Faculty of Engineering Diponegoro University, Indonesia. M.Eng 02 Multimedia Telecommunication Faculty of Engineering Sepuluh Nopember Institute of Technology, Indonesia. Ph.D 09 Department of Electronics and System Engineering Computer Science and Electronics Kyushu Institute of Technology, Japan. Field: Wireless Telecommunication and Mutimedia, MIMO, OFDM, Familiar with IEEE 802.11a/b/g/n/ ac, 3rd-Dan in Karate, 3rd-Dan in Kobudo, Instructor of Okinawan Kobudo, Gold Medal Shorinji Kempo. Speaking: Bahasa Indonesia, Java, Sunda, English, Japanese, Arabic

pp. 1-6

Parallel Session 1 (Power Systems)

Room: Amarta 2

PS1-PS.1 ***Performance Improvement of Scalar Feedback Control for Induction Motors by Using Third Harmony Injection SPWM***
Alif Nabiel Luqman, MIftah Adiguna, Abdul Fandi, Mochammad Facta, Trias Andromeda, Hermawan Hermawan and Iwan Setiawan
pp. 7-12

PS1-PS.2 ***Dynamic Power Injection for Solar PV Constant Power Generation***
Muhammad Kuncoro, Rudi Darussalam, Chandra Budi Sukmono and Iwa Garniwa
pp. 13-17

PS1-PS.3 ***Fast-Charging LTO 18650 Batteries Using a DC PS-3005D Power Supply***
Anggakara Syahbi Syagata, Angga, Trias Andromeda, Iwan Setiawan, Hermawan Hermawan, Abd. Rahim Mat Sidek and Imam Sumpono
pp. 18-22

PS1-PS.4 ***Power Consumption Analysis in Resonant Converter***
Mochammad Facta, Hermawan Hermawan and Muhammad Amjad
pp. 23-26

PS1-PS.5 ***Design of Temperature and Humidity Control Devices in the Leakage Current Test Chamber of 20kV Insulator***
Lastoni Wibowo, Abdul Syakur and Trias Andromeda
pp. 27-32

PS1-PS.6 ***Design of Monitoring Remote Terminal Unit(RTU) Panel Supply Based on IOT Case Study at PLN***
Fikri Shalahudin and Budi Setiyono

Presenter bio: Born in Tegal, 24 June 1995, now become student at Electrical Engineering Diponegoro University

pp. 33-38

Parallel Session 2 (Information and Computer Technologies 1)

Room: Amarta 3

PS2-ICT1.1 ***Understanding Digital Skill Use from the Technology Continuance Theory (TCT)***

Nurdin Nurdin, Sagaf S Pettalongi and Mansur Mangasing

Presenter bio: I am a senior Lecturer in Information System at IAIN Palu and the Director of STMIK Bina Mulia Palu- Indonesia. Currently I got a PhD degree in Information TeChnology at Swinburne University of Technology Australia. I have published a number of journal papers and proceedings. My skill related to information systems, e-government and social media.

pp. 60-65

PS2-ICT1.2 ***Analysis Social Media Application Message Trust Factor a Case Study University Student in Indonesia***

Surjandy Surjandy, Wanda Wandoko, Meyliana Meyliana and Erick Fernando

Presenter bio: Phd Student and researcher, Reserach Topic area - Blockchain for Enterprise System Solution (e.g. SCM) - Technology Risk Management - Financial Technology - IT Governance

pp. 66-70

PS2-ICT1.3 ***Early Warning System of Landslide Disaster Using Generalized Neural Network Algorithm***

Aghus Sofwan and Sumardi Sumardi

pp. 71-74

PS2-ICT1.4 ***Intelligent Multiple-Vehicular-Attributes (iMVA) Broadcast Protocol for VANETs***

Agung Prasetijo

pp. 75-80

PS2-ICT1.5 ***Data Privacy Factor of Female Passenger's Data in Indonesia Online Transportation System***

Surjandy Surjandy, Erick Fernando, Meyliana Meyliana, Yuli Eni, Alexandra Joya and Dimitrij Dharma

Presenter bio: Phd Student and researcher, Reserach Topic area - Blockchain for Enterprise System Solution (e.g. SCM) - Technology Risk Management - Financial Technology - IT Governance

pp. 81-85

PS2-ICT1.6 ***Success Factor of the Implementation Blockchain Technology in Pharmaceutical Industry: A Literature Review***

Erick Fernando, Meyliana Meyliana and Surjandy Surjandy

pp. 86-90

PS2-ICT1.7 ***Hierarchical Multi-label Classification to Identify Hate Speech and Abusive Language on Indonesian Twitter***

Faizal Adhitama Prabowo, Muhammad Okky Ibrohim and Indra Budi

pp. 91-96

Parallel Session 3 (Control and Circuits)

Room: Amarta 2

PS3-CC.1 ***Design of Fabric-Based Soft Robotic Glove for Hand Function Assistence***

Rifky Ismail

Presenter bio: An assistant professor in Department of Mechanical Engineering, Diponegoro University, Indonesia. A researcher in Center for Biomechanics, Biomaterial, Biomechatronics and Biosignal Processing (CBIOM3S) Diponegoro University. I conduct a research on biomechanics, biomaterial, biomechatronics, tribology and engineering design.

pp. N/A

PS3-CC.2 ***Spark Gap System of Electrical Discharge Machining (EDM)***

Betantya Nugroho, Azli Yahya, Trias Andromeda, Abd. Rahim Mat Sidek and Nor Hisham Khamis

pp. 138-142

PS3-CC.3 ***Development of Omni-Wheeled Mobile Robot Based-on Inverse Kinematic and Odometry***

Aghus Sofwan, Hafidz Mulyana, Hadha Afrisal and Abdul Goni

pp. 143-148

PS3-CC.4 ***Three-Fingered Soft Robotic Gripper Based on Pneumatic Network Actuator***

Mochammad Ariyanto and Rifky Ismail

Presenter bio: I am working on the area of dynamics system and control in Department of Mechanical Engineering, Diponegoro University. My expertises are: - Biomechatronics and biomedical Engineering - Unmanned vehicles, VTOLs and rotorcraft - Flight dynamic modeling, simulation, Navigation, and control - Hardware in-the loop simulation (HILS) & Pilot in-the loop simulation (PILS) - Flying Robot/Aerial robot - object interaction - Control system design, optimization design, Artificial Neural Network (ANN), & Genetic Algorithm (GA) - Biorobotics, robotic hand, supernumerary robotic limbs, exoskeleton robot

pp. 149-153

PS3-CC.5 ***MFCC Feature Extraction and KNN Classification in ECG Signal***

Siti Agrippina Alodia Yusuf and Risanuri Hidayat

pp. 154-158

PS3-CC.6 ***Design Semi-Automatic Control System Using PLC for Stalling Materials in the Forming Machine***

Syahril Ardi

pp. 159-162

PS3-CC.7 ***Designing a Fuzzy Controller of Crude Oil Dilution in Palm Oil Mills***

Enda Wista Sinuraya

pp. 163-168

PS3-CC.8 ***Inertial Navigation System of Quadrotor Based on 10-DOF IMU and GPS Sensors***

Sumardi Sumardi, Taufik Rahmadani and Hadha Afrisal

Presenter bio: Taufik Rahmadani was born on August 19th, 1997 in Semarang city, Middle Java province, Indonesia. In 2015, he joined the Department of Electrical Engineering, University Diponegoro, as a student specially in Control and instrumentation. His current research interests include inertial measurement unit, quadcopter, IoT, and power electronics. he has collaborated actively with researchers in several other disciplines of science and technology.

pp. 169-174

PS3-CC.9 ***Design of Data Acquisition System for Position and Attitude Quadcopter***

Aris Triwiyatno, Sumardi Sumardi, Hadha Afrisal, Dhamastya Adhi Putra and Taufik Rahmadani

pp. 175-178

Parallel Session 3 (Information and Computer Technologies 2)

Room: Amarta 3

PS3-ICT2.1 ***Towards Smart LMS to Improve Learning Outcomes Students Using LenoBot with Natural Language Processing***
Dina Fitria Murad, Dfm, Adhi Iskandar, Erick Fernando, Deryan Maured and Tica Octavia
pp. 179-184

PS3-ICT2.2 ***Using Minimum Distance to Classify Uttered Arabic Words into Subject - Object Name***
Salam Hamdan, Arafat A. Awajan and Akram Al-kouz

Presenter bio: I am a PhD candidate in Computer Science at Princess Sumaya University for Technology. I received my bachelor's degree in Computer Engineering from Al-Balqa Applied University, 2012.I received my master's degree in Information System Security and Digital Criminology from PSUT, 2015. My research interests include hardware security, network security and vehicular ad hoc networks.

pp. 185-190

PS3-ICT2.3 ***MEC Deployment with Distributed Cloud in 4G Network for 5G Success***
Andika Hairuman, Amalia Zahra, I Gede Putra Kusuma Negara and Dina Fitria Murad, Dfm

Presenter bio: Andika Hairuman received his Bachelor degree in Information Systems from Bina Nusantara University, Indonesia in 2019. He is currently pursuing the Master degree in Computer Science at Bina Nusantara University, Indonesia. He is working as a consultant for 15 years and been working in Telecommunication and IT Industry for 18 years. Deep knowledge of GSM, WCDMA, LTE, 5G Technology as a domain expert of RF, RAN and Virtualized RAN, Cloud and Edge Computing, NFV, Automation and Machine Learning.

pp. 191-196

PS3-ICT2.4 ***LC-MS Analysis: Mini Review Frequently Used Open Source Softwares***
Iwan Binanto, Bahtiar Saleh Abbas, Harco Leslie Hendric Spits Warnars and Nesti Sianipar

Presenter bio: Lecturer at Department of Informatics, Sanata Dharma University, Yogyakarta, Indonesia.

pp. 197-201

PS3-ICT2.5 ***Geometric Verification Method of Best Score Increasing Subsequence for Object Instance Recognition***
I Gede Putra Kusuma Negara, Kristopher David Harjono and Muhammad Taufik Dwi Putra
pp. 202-206

PS3-ICT2.6 ***Augmented Reality Technology as One of the Media in Therapy for Children with Special Needs***
Kurniawan Martono
pp. 207-211

PS3-ICT2.7 ***Implementation of Neural Network Classification for Diabetes Mellitus Prediction System Through Iridology Image***
Rievanda Putri and Adhi Harmoko Saputro
pp. 212-217

Additional Paper

Inertial Navigation System of Quadrotor Based on IMU and GPS Sensors
Sumardi, W. D. Nugroho, H. Afrisal, D. A. Putra, T. Rahmadani
pp. 218-223

Proc. of 2019 6th Int. Conf. on Information Tech., Computer, and Electrical Engineering (ICITACEE), Sep 26-27, 2019, Semarang, Indonesia

Backward Compatible Low PAPR Preamble for Very High Throughput WLAN IEEE802.11ac

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***Abstract*— The new comer WLAN IEEE 802.11ac offers very high throughput wireless communication. By setting the modulation coding scheme to 9 in 80MHz of bandwidth and four spatial streams, it provides data rate up to 1.7Gbps. Operated in the 5GHz frequency band, it should be backward compatible to the former WLANs IEEE 802.11a/n. This paper presents the examination of backward compatibility performance of our novel low PAPR preamble proposed for IEEE802.11ac. Run test under channel model B and D of IEEE802.11TGn proved that the proposed low PAPR preamble in 80MHz can be decoded excellently by IEEE802.11n 20MHz and 40MHz, regardless the location and correlation method. These results demonstrated backward compatibility and co-existence of those WLANs in 5 GHz band.**

Keywords*— *Backward compatibility, Low PAPR, preamble, WLAN, IEEE802.11a/n/ac, Co-existence

I. INTRODUCTION

Recently, the demand of high data rate wireless communication increases dramatically. This fact has forced the IEEE 802.11 work group to issue a new standard for very high throughput (VHT) Wireless LAN, i.e. IEEE802.11ac. It shall provide Gigabit throughput and intended to operate in 5GHz frequency band, co-existence with the formers WLAN IEEE802.11a [1] and high throughput (HT) WLAN IEEE802.11n [2]. Therefore it should be backward compatible to the existed WLAN systems. Further, its performance can be evaluated under channel models of Task Group IEEE802.11n [3].

A new frequency and time domain architectures of the digital block of a hardware simulator were tested with VHT WLAN IEEE802.11ac standard, in indoor environment, using time-varying channel model B of Task Group IEEE802.11n. After accuracy and latency test, those new architectures were designed on a Xilinx Virtex-IV FPGA [4].

Path loss (PL) model for WLAN in large conference rooms was proposed in [5]. Many parameters including the presence of persons were taken into consideration. It was shown that the exponent of PL was increased by two in the presence of persons.

Design parameters of the PHY layer that could maximize the efficiency of the Wi-Fi Direct WLAN IEEE802.11n system was investigated in [6]. For this purpose, a basic theoretical model is formulated for a Wi-Fi Direct network under MIMO channel model B of Task Group IEEE802.11n. An adaptive algorithm was proposed to choose optimal parameters for a specific purpose. It was claimed that the proposed method outperformed the standard one.

Preamble manipulation has been done successfully on low data rate WLANs operating in the 2.4GHz band. In [7], the effectiveness of preamble manipulation on WLANs operated in 5GHz, e.g., IEEE 802.11a and IEEE 802.11ac were examined for the first time. It is shown that the preamble short training sequence length can be manipulated to distinguish between devices accurately by less than 20 packets.

The throughput of VHT WLAN IEEE 802.11ac in MAC and PHY layers under MIMO channels of Task Group IEEE802.11n was analyzed in [8]. It was found that the throughput can be increased by adding new PHY features. In other side, the system would degrade almost half in case of a high error-prone in MIMO channel.

Since the number of subcarriers are the highest among WLANS, the IEEE802.11ac 80Hz faces the highest peak-to-average-power ratio (PAPR) problem. To mitigate this problem, a modified partial transmit sequence (PTS) technique has been proposed. Subcarriers were divided into four groups and phase rotated to get the minimum PAPR value. This technique produced a set of phase rotations. [9].

Implementing this phase rotations set to the preamble of VHT WLAN IEEE802.11ac 80MHz before generating the OFDM symbol, significantly reduces the PAPR of the preamble. It is lower than that of HT WLAN IEEE802.11n 40MHz and it's conventional extension to 80MHz ones. [10].

Continuing research in improving the performance of VHT WLAN IEEE802.11ac, this paper presents backward compatibility examination performance of the proposed low PAPR MF preamble. The scenario is built as follows: The proposed low PAPR MF preamble is transmitted by VHT WLAN IEEE802.11ac to 5GHz frequency band with 80MHz of bandwidth. Two type of receivers were set. Four HT WLANs IEEE802.11n with 20MHz of bandwidth and two HT WLANs IEEE802.11n with 40MHz of bandwidth. Run test simulation is taken under channel model B and D of the Task Group n to verify whether the transmitted preamble can be decoded correctly by the former WLANs.

978-1-7281-2689-0/19/$31.00 ©2019 IEEE

Using Minimum Distance to Classify Uttered Arabic Words into Subject - Object Name

Salam Hamdan, Arafat Awajan, Akram Al-kouz
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***Abstract*— due to the improvement in technology, smart devices and smart applications are included in most of human life aspects, and in order to make the interconnection between human and these applications and devices simpler, making these devices and applications understand the spoken language is essential. Speech recognition is the field that is meant to analyze and understand the spoken language. In this paper a new model is proposed to classify the Arabic words into two classes: subject name class or object name class. The Mel Frequency Cepstral Coefficient transformation is used to extract the features from the uttered words, and finally a MAHALANOBIS DISTANCE is used to classify the words using MATLAB tool. The data set that is used contained of 100 Arabic words 50 are subject names and 50 are object names. The results show that the accuracy of detecting subject and object name is 96%. (Abstract)**

Keywords*— *Arabic speech recognition, pattern recognition, signal processing

I. INTRODUCTION

Pattern recognition is an attracting research area [1], examples of pattern recognition applications are: speech recognition and face recognition [2]. For the time being, a massive improvement on technology is leading to great demand on making digital applications understand the natural spoken language. Multi stages should be done to achieve this; following are the steps that should be done [3], the speech signal must be converted from analogue form to digital form then it must be preprocessed because it is infeasible to work with a speech signal inasmuch the size of speech signal is very large [4], in order to be ready for features extraction step from the spoken language. After extracting features, preprocessed words will be entered into the machine learning model to be learned. Afterwards, the model will be trained according to these uttered words. The trained model will be tested using the test dataset. Thus, the speech Recognition is the process of converting the signal of the speech into a sequence of words, using an algorithm implemented in the computer.

Most of Arabic language is constructed according to predefined patterns. The most used and useful patterns in Arabic language are those related to subject name (اسم الفاعل) as (ضارب). Sense (اسم الفاعل) carries information about the action and who made the action like (آكل,ضارب). And object name(اسم المفعول) carries the information about on whom the action is done on. This makes the identification of the word build according to this pattern important in many applications. In this paper a new model is proposed to recognize the spoken words belonging to these categories.

Speech recognition systems can be separated into several different classes by describing what types of utterances they have the ability to recognize. These classes are classified as the following:

- Isolated Words: in this type of speech recognition the training data set and tested data set are separated words, in which the speaker will uttered the sample word then pause [5].
- Connected Words: it is as the same as the isolated words but it is a Connected word systems (or more correctly 'connected utterances') are similar to isolated words, but allows separate utterances to be 'run-together' with a minimal pause between them [6].
- Continuous Speech: in this type of the recognition the speakers speak naturally and the computer will recognize the words, this type of the recognition is considered the hardest one in order that the computer must determine the boundaries of the words [7].

Most of subject names are constructed from specific patterns which is Fa'el (فاعل) and most of object name are constructed from specific pattern which is Mafoal (مفعول). In this paper a new model is proposed to classify the uttered words into subject name (اسم فاعل) and object name (اسم مفعول), in which the subject name will be in a specific pattern which is (فاعل) and object name will be also on a specific pattern which is (مفعول). The uttered words are preprocessed using the Mel Frequency Cepstral Coefficient MFCC transformation then a function called Mahalanobis distance [8, 9] which computes the difference between the samples to find the class that the sample belong to.

This paper is organized as follows, section 2 will describe the techniques that have been proposed so far, section 3 describes the dataset used in this paper, section 4 describes the proposed technique, section 5 evaluate the performance, and finally section 6 conclude the paper.

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Spark Gap System of Electrical Discharge Machining (EDM)

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***Abstract* - EDM is a process of machining electrically conductive materials by precisely controlled electrical discharge through a small clearance gap that occur between an electrode and a workpiece in the presence of a dielectric fluid. Through EDM process, the material of workpiece are melted and gap distance will increase. In order to maintain a stable spark, the gap must be controlled. This paper presents control spark gap system of EDM using PID controller with voltage and position feedbacks. The results show Time Rise (Tr) of PID control with voltage feedback has a value about 75 seconds and Time Rise (Tr) of PID control with voltage and position feedbacks has a value about 18.6 seconds. The average error of gap distance in PID control with voltage feedback is 55.56 and the average error of gap distance in PID control with voltage and position feedbacks is 48.53. Addition of the position feedback is used to increase the rise time and stabilize distance the electrode and the workpiece.**

Keywords –Electrical Discharge Machining, PID Control; Position Feedbacks

I. Introduction

EDM is a process of machining electrically conductive materials by precisely controlled electrical discharge (sparks) through a small clearance gap (approximately 10 to 50 µs) that occur between an electrode and a workpiece in the presence of a dielectric fluid [1-4]. EDM system consists of power generator, workpiece positioning system and flushing system[1-3].

Through EDM process, the material is melted and gap distance decreases. In order to maintain a stable spark, the gap must be controlled[5,6]. The gap distance is adjusted by DC motor linear system and controlled by a digital control system. This control system uses voltage sensor to sense the voltage and encoder sensor to sense the distance. The information from the sensor is related to voltage gap and waveform of the pulse.

Andromeda, T [7] explained the control of electrode gap in EDM with encoder to monitor the electrode position. The system limits the position of the electrode, so that it is within the distance control of the workpiece. The additional position sensor increases the Material Removal Rate (MRR). Jawaad, S. A. A [8] discussed the control of servo system with digital PID controller and close loop to control the speed and position of DC Motor using ARM mbed microcontroller.

This paper presents a gap control of Electrical Discharge Machining servomechanism system using RC-Generator as a power generator. A PID control with voltage and position feedbacks is used to control the gap.

II. Spark Gap System Model and Simulation

The spark gap system is accomplished by the servo mechanism system. The PID control uses a two types loop feedback consisting of a voltage gap loop and position loop as shown in block diagram of figure 1.

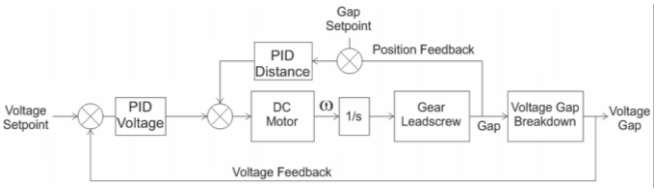

Fig 1. Block diagram of PID controller for spark gap

The DC motor consists of electrical equivalent components: resistive (R), inductive (L), supply voltage (v) and motor voltage (e), mechanical equivalent components: torque (T), inertia (J) and friction constant (K_f). The parameters for the model DC motor are obtained from manufacturer's datasheet are listed in table 1.

Table 1. Parameters of DC Motor

Parameter	Symbol	Value
Armature Resistance	R	6.8 Ω
Armature Inductance	L	4.2 mH
Back EMF constant	K_e	0.01434 V.s/rad
Torque constant	K_t	0.01434 N.m/A
Friction coefficient	K_f	1.08×10^{-5} N.m.s/rad
Inertia of Rotor	J	2.1×10^{-6} Kg.m^2
Gear (G)	N_{gm}/N_{gl}	1/300
Leadscrew (L)	d_{ls}	8×10^{-3} m

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Proc. of 2019 6th Int. Conf. on Information Tech., Computer, and Electrical Engineering (ICITACEE), Sep 26-27, 2019, Semarang, Indonesia

Power Consumption Analysis in Resonant Converter

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***Abstract*— Resonant converter equipped with single switch and resonant bank is the simplest converter to generate alternating higher voltage at high frequency. This topology is suitable to convert a considerable lower voltage such as battery or photovoltaic to higher voltage in order of kilo Volt, so that it crucial to estimate the power consumption inside the resonant converter. Most of previous records revealed only the work mechanism of the resonant converter, but explicit records present their power consumption. This paper describes the power consumption for single switch resonant converters as direct to alternating current converter. The converter is combined with parallel bank converter, piezoelectric transformer and ferrite transformer. As the results of formulation the power consumption of resonant converters with three variation of bank, the efficiency of three kind of converter is obtained.**

Keywords—resonant converter, dc to ac converter, piezoelectric transformer, ferrite transformer.

I. INTRODUCTION

Among several topologies in power electronics dedicated to generate higher voltage than its input, the resonance converter power supply is the most interesting to investigate. Previous resonance topologies used more than one switch to generate the desired output, such as half bridge and full bridge topology [1, 2]. Resonant converter equipped with only one switch is more interesting to study because of its simplicity and low part count [3, 4]. It also has a small footprint, and consumes very low power, which is suitable to convert portable power supply in which the main source is battery or photovoltaic [5, 6]. In previous records [3, 7-9] the work mechanism of the resonant converter become the main focus of work, but explicit records present the power consumption is few. As the topology of converter using only one switch, it crucial to estimate the power consumption inside resonant converter. In this paper, power consumption of a resonant converter using one switch as direct to alternating current converter is studied. The converter is investigated by combine the circuit with parallel bank converter, piezoelectric transformer and ferrite. Three circuits are studied in detail calculation and implemented using hardware to verify the power formulation.

II. POWER COMPUTATION FOR RESONANT CONVERTER WITH PARALLEL BANK

Resonant converter with parallel bank consists of direct current side (dc side) and alternating current side (ac side) as it is described in Fig. 1 and this topology is called circuit-1. The single switch M_1 plays the main role to convert dc voltage to pulse voltage. The inductor L_f as a choke provides electrical energy as it is charged during switch M_1 is off. The internal resistance of L_f is named as r_{Lf}. The ac side consist of several passive i.e. inductor, capacitor and resistor as a load. The passive element acts as parallel bank to create alternating current during resonant mode.

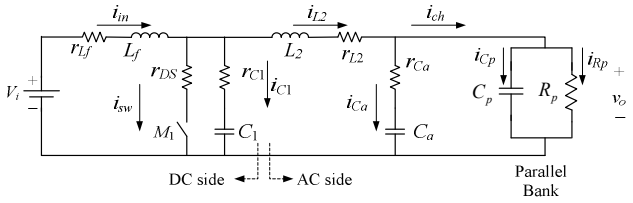

Fig. 1. Schematic circuit for resonant converter with parallel bank.

The total active power (P_{tot}) consumed by the SSRC with PLR circuit (based on Figure 5.1) can be estimated using the following expression:

$$P_{tot} = P_{out} + P_{r_{Lf}} + P_{r_{DS}} + P_{r_{C1}} + P_{r_{L2}} + P_{r_{Ca}} \quad (1)$$

where

$P_{r_{Lf}}$ is power losses at inductor L_f,

$P_{r_{DS}}$ is power losses at switching device,

$P_{r_{C1}}$ is power losses at shunt capacitor C_1,

$P_{r_{L2}}$ is power losses at inductor L_2, and

$P_{r_{Ca}}$ is power losses at C_a.

Its efficiency is given by

$$\eta = \frac{P_{out}}{P_{tot}} = \frac{P_{out}}{P_{out} + \left(P_{r_{Lf}} + P_{r_{DS}} + P_{r_{C1}} + P_{r_{L2}} + P_{r_{Ca}}\right)} \quad (2)$$

where P_{out} is the ac power measured at the input of the load. At the ac side during resonant mode, the sinusoidal voltage (v_o) appears across C_p at the parallel bank and C_a. Consequently, the sinusoidal resonant current flows through the parallel bank can be written in phasor form as

$$i_{ch} = \frac{I_{chm}}{\sqrt{2}}\sin(\omega t + \theta_{ch}) = \frac{I_{chm}}{\sqrt{2}}\angle\theta_{ch} \quad (3)$$

If I_{Cam} is the maximum current flowing through C_a., the power dissipated by the internal at resistance of C_a can be formulated as:

$$P_{r_{C_a}} = r_{C_a}\frac{I_{C_{am}}^2}{2} \quad (4)$$

978-1-7281-2689-0/19/$31.00 ©2019 IEEE

Proc. of 2019 6th Int. Conf. on Information Tech., Computer, and Electrical Engineering (ICITACEE), Sep 26-27, 2019, Semarang, Indonesia

Intelligent Multiple-Vehicular-Attributes (iMVA) Broadcast Protocol for VANETs

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***Abstract*— Any vehicular network attributes in VANETs (e.g., sender-receiver distance and number of neighboring vehicles) can be used to determine candidate rebroadcast vehicles. The use of only limited number of attributes, however, may rule out potential broadcast candidates. For example, a counter-based scheme broadcast will never take specific nodes (vehicles) into consideration even though they have great sender-receiver distance. This research employs multiple vehicular attributes to tackle such an issue. The use of naïve-Bayes probability in our protocol combines the individual strengths of the incorporated vehicular attributes to obtain a broadcast decision. The results suggest that the proposed method is intelligent to the variation of node density and its performance outperformed both the distance-based scheme and the Efficient Counter-based Scheme (ECS) broadcast scheme at any network densities experimented. Our broadcast method contributes to the increase of 1.8% average reachability, 30.3% saving on rebroadcast tries, 5% reduction on delivery cost and shortens the total delay time by about 19.6% over the ECS scheme. An analytical model justifies the simulated reachability and saved-rebroadcast results showing similar trends over network density experimented.**

Keywords—Broadcast-storm, naïve-Bayes, VANET attributes, network density, back-off

I. Introduction

Simple broadcast in a dense network may result in a massive message redundancy, contention and collision, the so-called broadcast storm problem [1, 2, 3, 4]. Initial schemes for alleviating broadcast storm problem are either by redundant broadcast reduction or timing differentiation. Probabilistic schemes use probability to inhibit some hosts from rebroadcast; therefore, the number of redundant messages transmitted are reduced. A counter-based scheme reduces message redundancy by listening for duplicates that arrive during the back-off time. If similar messages are received multiple times and reach a specific number before the expiry of the timer, the message will be dropped. A distance-based scheme uses distance between the sending and receiving vehicles to make rebroadcast decision based on a set threshold as the greater the distance, the larger the additional coverage can be obtained. A location-based scheme provides more precise information on a vehicle's contribution to the new coverage. If the additional coverage exceeds the set threshold, the vehicle will immediately rebroadcast the message after the back-off time expires. In a cluster-based system, reduction of duplicates is by assigning few vehicles as cluster-heads and gateway vehicles while letting the other vehicles as members that are not responsible for message rebroadcast. Details on such schemes can be found in [2, 4].

Our approach to the broadcast-storm problem is to employ a more comprehensive set of VANET's vehicular attributes to make rebroadcast decision. Whilst, to the best of our knowledge, the available solutions to the broadcast-storm problem employ only a limited number of attributes, e.g., the distance-based and the counter-based broadcast. The reason behind our proposed method was that selectively picking the rebroadcast vehicles will give a better performance than merely picking them blindly. For example, the distance-based broadcast offers better overall performance compared to the probabilistic-based broadcast. In addition, the inclusion of various vehicular attributes of VANETs means a better and more selective mechanism for choosing more accurate rebroadcast vehicles. As an advantage of our protocol, the attributes employed in this study require only one-hop information. No two-hop or global knowledge are employed.

Discussion on this research will be as follows. Section 2 discusses the broadcast-storm problem mitigation from literature. Section 3 presents the selected attributes and performance measures of VANETs and section 4 discusses our intelligent multiple-vehicular-attributes (iMVA) broadcast scheme. Following this, results and discussions and conclusion can be seen in Section 5 and 6.

II. Literature Review

As vehicle's radio coverage is limited, routing is deemed fundamental for messages delivered to other vehicles beyond the radio coverage. Broadcasting is a common operation for delivering messages over networks. It is also useful for route finding as the underlying mechanism for unicast and multicast routing protocols. When dealing with broadcasting messages, the broadcast-storm problem is most likely to arise when a simple-flooding scheme is used. Available solutions to such a problem available in literature usually employ one or more (local or global) attributes/entities that selection on rebroadcast vehicles or cancellation on an assigned rebroadcast can be relied with. This incurs less accurate selection of broadcast candidates, hence the performance offered might not optimal.

Literature [1, 2, 3, 4] provides legacy single-attribute broadcast schemes (e.g. distance-based, location-based, and counter-based) that demonstrate the sender-to-receiver distance or number of message copies can be used to select the broadcast candidates. The use of speed differential between the sender and the receiver is also proposed. In [5], the speed is considered as a representation of vehicle density. Lower speed implies higher vehicle density. Literature [6] combined the use of the counter-based and the probabilistic schemes. The number of message copies heard during the waiting period is used to determine the vehicle's broadcast probability. In [7], local node density is used in DECA protocol to select broadcast candidates. Vehicles will be selected to broadcast a message if they have the highest number of neighbors. Upon a message has been received, every node checks if it is the selected rebroadcast node. If so, it broadcasts the message, otherwise it stores the message for future needs.

Multiple-attributes based broadcast protocols are also available: Literature [8] uses neighbor density and the

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