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

Judul Karya Ilmiah	:	WSN infrastructure for green campus development		
Jumlah Penulis	:	4 Orang (Eko D. Widianto, **Adian F. Rochim,** Oky D. Nurhayati, Sumardi)		
Status Pengusul	:	Penulis ke-2		
Identitas Prosiding	:	a. Judul Prosiding	:	2015 International Conference on Information Technology Systems and Innovation (ICITSI)
		b. ISBN/ISSN	:	978-1-4673-6664-9
		c. Thn Terbit, Tempat Pelaks.	:	2015, Bandung, Indonesia
		d. Penerbit/Organiser	:	IEEE Xplore Digital Library
		e. Alamat Repository/Web	:	https://ieeexplore.ieee.org/document/7437731
		Alamat Artikel	:	https://doc-pak.undip.ac.id/1668/1/widianto2015.pdf
		f. Terindeks di (jika ada)	:	Scopus

Kategori Publikasi Makalah (beri ✓pada kategori yang tepat) : [√] *Prosiding* Forum Ilmiah Internasional
[ ] *Prosiding* Forum Ilmiah Nasional

Hasil Penilaian *Peer Review* :

Komponen Yang Dinilai	Nilai Reviewer		Nilai Rata-rata
	Reviewer I	Reviewer II	
a. Kelengkapan unsur isi prosiding (10%)	2,20	2,40	2,30
b. Ruang lingkup dan kedalaman pembahasan (30%)	7,10	7,35	7,23
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	7,20	7,30	7,25
d. Kelengkapan unsur dan kualitas terbitan/prosiding(30%)	7,35	7,20	7,28
Total = (100%)	**23,85**	**24,25**	**24,05**
Nilai Pengusul = (40% x 24,05)/3 = 3,21			

Semarang, 10 Januari 2021

Reviewer 2

Dr. Iwan Setiawan, S.T., M.T.
NIP. 197309262000121001
Unit : Dept. Teknik Elektro FT UNDIP

Reviewer 1

Dr. Ir. R. Rizal Isnanto, S.T., M.M., M.T., IPM
NIP. 197007272000121001
Unit : Dept. Teknik Komputer FT UNDIP

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Kategori Publikasi Makalah (beri ✓pada kategori yang tepat) : [√] *Prosiding* Forum Ilmiah Internasional
[ ] *Prosiding* Forum Ilmiah Nasional

Hasil Penilaian *Peer Review* :

Komponen Yang Dinilai	Nilai Maksimal Prosiding		Nilai Akhir Yang Diperoleh
	Internasional [25]	Nasional [ ]	
a. Kelengkapan unsur isi prosiding (10%)	2,50		2,20
b. Ruang lingkup dan kedalaman pembahasan (30%)	7,50		7,10
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	7,50		7,20
d. Kelengkapan unsur dan kualitas terbitan/prosiding(30%)	7,50		7,35
Total = (100%)	**25,00**		**23,85**
Nilai Pengusul = (40% x 23,85)/3 = 3,18			

Catatan Penilaian Paper oleh Reviewer :

1. **<u>Kesesuaian dan kelengkapan unsur isi paper:</u>**
   Prosiding ICITSI 2015 memiliki kelengkapan yang cukup. Makalah yang dipublikasikan dalam conference ini sesuai dengan cakupan topik dari International Conference ICITSI 2015.
2. **<u>Ruang lingkup dan kedalaman pembahasan:</u>**
   Topik dari makalah adalah infrastruktur WSN pengembangan kampus hijau (green campus). Pembahasan sudah dilakukan secara mendalam, dilengkapi dengan gambar, tabel, dan rancangan tampilan sistem yang dikembangkan.
3. **<u>Kecukupan dan kemutakhiran data/informasi dan metodologi:</u>**
   infrastruktur WSN pengembangan kampus hijau (green campus) yang digunakan sebagai objek penelitian telah dilaporkan berhasil dirancang. Hal ini telah mencukupi untuk digunakan dalam pengambilan kesimpulan penelitian pada paper ini. Kesimpulan yang diambil sudah sesuai dengan metodologi yang dipakai.
4. **<u>Kelengkapan unsur dan kualitas terbitan:</u>**
   Terbitan dari Prosiding ICITSI 2015 sudah cukup lengkap dalam aspek pemenuhan persyaratan sebagai prosiding seminar internasional, serta kualitas terbitan online di IEEE Xplore Digital Library sudah bagus karena memang sudah terstandarisasi format/template-nya.

Semarang, 9 Januari 2021

Reviewer 1

Dr. Ir. R. Rizal Isnanto, S.T., M.M., M.T., IPM
NIP. 197007272000121001
Unit : Dept. Teknik Komputer FT UNDIP

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[ ] *Prosiding* Forum Ilmiah Nasional

Hasil Penilaian *Peer Review* :

Komponen Yang Dinilai	Nilai Maksimal Prosiding		Nilai Akhir Yang Diperoleh
	Internasional [25]	Nasional [ ]	
a. Kelengkapan unsur isi prosiding (10%)	2,50		2,40
b. Ruang lingkup dan kedalaman pembahasan (30%)	7,50		7,35
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	7,50		7,30
d. Kelengkapan unsur dan kualitas terbitan/prosiding(30%)	7,50		7,20
Total = (100%)	**25,00**		**24,25**
Nilai Pengusul = (40% x 24,25)/3 = 3,23			

Catatan Penilaian Paper oleh Reviewer :

1. **Kesesuaian dan kelengkapan unsur isi paper:**
   Makalah telah sesuai dengan dan memiliki kelengkapan konten mengikuti aturan penulisan dan format dari IEEEXplore, mulai dari penulisan penulis dan afiliasinya, abstrak, pendahuluan, penelitian yg telah dilakukan, metode, dan analisa hasil pengujian.
2. **Ruang lingkup dan kedalaman pembahasan:**
   Makalah memiliki kedalaman sedang. Metode usulan cukup signifikan kontribusinya pada ruang lingkup Internet of Things yg saat ini sedang mulai digunakan dan diimplementasikan.
3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:**
   Literatur yg digunakan cukup rapi dan uptodate dengan tingkat sedang. Metodologi yang dipakai komparasi dengan metode-metode yang telah ada.
4. **Kelengkapan unsur dan kualitas terbitan:**
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Semarang, 10 Januari 2021

Reviewer 2

Dr. Iwan Setiawan, S.T., M.T.
NIP. 197309262000121001
Unit : Dept. Teknik Elektro FT UNDIP

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WSN infrastructure for green campus development (Conference Paper)

Widianto, E.D. ✉, Rochim, A.F. ✉, Nurhayati, O.D., Sumardi ✉

Department of Computer Engineering, Diponegoro University, Semarang, Indonesia

Abstract

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A system providing accurate environmental data for campus stakeholders to formulate and evaluate policies of the sustainable campus development is needed. This paper presents the design of WSN infrastructure capable of providing accurate, real-time and reliable environment data, namely PM2.5, SO2, CO, O3, NO2, temperature, humidity, soil moisture and light intensity to be analyzed and presented by servers. This infrastructure is composed of fixed sensor nodes, mobile sensor nodes, display nodes and server nodes. The sensor node provides environment raw data to the server using an RF transceiver. The server processes, stores and presents environment information to public users through Internet and mobile network. This infrastructure can be used as a platform to provide environmental data to decision support system for campus stakeholders, so that a recommendation can be made. © 2015 IEEE.

SciVal Topic Prominence

Topic: Stream Processing | Semantic Network | SPARQL

Prominence percentile: 97.344

Author keywords

decision support system | environment information system | green campus development | remote sensing system | WSN

Indexed keywords

Engineering controlled terms: Artificial intelligence | Nitrogen compounds | Radio transceivers | Remote sensing | Sensor nodes | Soil moisture | Space optics

Engineering uncontrolled terms: Environment data | Environment information | Environment information systems | Environmental data | Green campus | Mobile sensor node | Remote sensing system | Sustainable campus

Engineering main heading: Decision support systems

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PREFACE

Welcome to the Proceeding of 2nd International Conference on Information Technology Systems and Innovation (ICITSI) 2015. The international conference was held in Bandung, 16-17 November 2015 and continued in Bali, 18 – 19 November 2015. ICITSI 2015 is hosted by School of Electrical Engineering and Informatics, Institute of Technology Bandung, and sponsored by IEEE Indonesia Joint Chapter of Control System Society/Robotics & Automation Society (CSS/RAS), and IEEE Indonesia Join Chapter of Education Society/Electron Devices Society/Power Electronics Society/Signal Processing Society.

We invited world renowned academics and Industries for keynote speech, namely Ralf Opierzynski (Fraunhofer IFF ASEAN Regional Office), Low Tick Yong Eric (Huawei Technologies), Prof. I Ketut Gede Darma Putra (Udayana University), Prof. Armein Z.R. Langi (Institute of Technology Bandung), Dr. Morshed U. Chowdhury (Deakin University) Dr. Arry Akhmad Arman (Institute of Technology Bandung), and Dr. Basuki Yusuf Iskandar (Head of ICT Research and Human Resources Development Agency).

We received **307** submissions for the ICITSI 2015. After thorough reviews by reviewers, our Program Committee accepted **75** papers (acceptance rate: **24 %**) for the conference. Afterwards, **73** from **75** accepted papers were officially registered for the conference noted by camera-ready submission for IEEExplore publication and conference proceeding. We would like to thank all invited speakers, authors, reviewers, participants, committee members, and sponsors for their supports and contributions in this conference.

General Chair of ICITSI 2015

Associate Professor Dr. -Ing. Ir. Suhardi, MM.

School of Electrical Engineering and Informatics (SEEI)
Institute of Technology Bandung, Indonesia

General Chair

Suhardi - Institute of Technology Bandung

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- Suhardi
- Armein Z. R. Langi
- Yudi Satria Gondokaryono

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WSN Infrastructure for Green Campus Development

Eko D. Widianto, Adian F. Rochim, Oky D. Nurhayati
Department of Computer Engineering
Diponegoro University
Semarang, Indonesia
didik@live.undip.ac.id, adian@ieee.org

Sumardi
Department of Electrical Engineering
Diponegoro University
Semarang, Indonesia
sumardi.undip@gmail.com

***Abstract*— A system providing accurate environmental data for campus stakeholders to formulate and evaluate policies of the sustainable campus development is needed. This paper presents the design of WSN infrastructure capable of providing accurate, real-time and reliable environment data, namely PM2.5, SO2, CO, O3, NO2, temperature, humidity, soil moisture and light intensity to be analyzed and presented by servers. This infrastructure is composed of fixed sensor nodes, mobile sensor nodes, display nodes and server nodes. The sensor node provides environment raw data to the server using an RF transceiver. The server processes, stores and presents environment information to public users through Internet and mobile network. This infrastructure can be used as a platform to provide environmental data to decision support system for campus stakeholders, so that a recommendation can be made.**

Keywords—WSN; green campus development; decision support system; remote sensing system; environment information system

I. INTRODUCTION

Recently, the major environmental issues faced by campus stakeholders is climate change mitigation and durability/ sustainability of the campus. Universities around the world, including in Indonesia, have had efforts to reduce carbon emissions, manage and improve the development of their sustainable campus[1][2][3][4].

The development scheme of sustainable campus involves three indicator aspects, namely the environment, the economy (research), and education (society)[5]. These aspects has been the pillar, that are interconnected and multidimensional, to realize environmentally sustainable campus. It includes the use and management of energy-efficient and environmentally research activity, and the caring of campus community on their output and outcome through education[6][7].

Metrics used to evaluate the development of environmental campus are Environmental and Social Responsibility (ESR), UI Green Metric and Princeton Review [1][8][9]. ESR index has five criteria, which are campus strategy, integration of the environmental issues, environment management, environment performance and impact, and the accurate data measurement

II. REPRESENTATIVE WORKS

There are several studies on environmental information system to describe the impact of the environment on public

used to determine the index. UI Green Metric has five criteria, which are environment regulation, climate change mitigation and energy conservation, waste management, water conservation and environment-friendly transportation [10]. Princeton Review has 10 criteria, one of which is the mitigation planning of greenhouse gas emissions.

The metrics evaluate campus strategies, policies and their efforts to realize the green campus. The indicators show the performance results of campus environment and infrastructure planning associated with the use of electricity, the number of cars or motorcycles and the number of bicycles, use of energy-saving devices, use of renewable energy policies, policies to reduce emissions and transport policy to limit the number of vehicles within the campus. Currently, evaluation scoring of those above metrics is done using descriptive and qualitative method with a specific weighting.

The data used to determine the index or score for each indicator must be accurate. The impact of these policies also need to be measured accurately. Gas emission level at points within the campus location and other environmental quantities need to be measured in real-time. The energy (electricity) usage and the use of renewable energy and its efficiency level also need to be measured. These measurements can provide accurate environmental data for campus decision/policies makers to formulate and evaluate their policies in order to develop the sustainable green campus.

In this paper, we present the design of WSN (wireless sensor network) infrastructure capable of providing accurate, real-time and reliable environmental data, such as CO, NO2, density of dust particles, temperature, humidity, light intensity and electric energy consumption and its sources, from many location points in campus area. This infrastructure can be used as a platform to supply environmental data for decision support system of campus development and to present environmental information to campus and green research community. Using these accurate data, campus stakeholders can evaluate and redefine their strategies, policies and efforts to realize the green campus.

health and its prevention efforts. One of targeted issues is threat countermeasures to air quality as a result of human activity and nature, such as industry, transport, fires, volcanic eruptions and others, through the development of environmental information

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A Speech Emotion Recognition Method in Cross-languages corpus Based on Feature Adaptation

Xinran Zhang
Key Laboratory of Underwater Acoustic signal Processing of Ministry of Education, Southeast University, Nanjing, 210096, China.
zxrzxr87324@126.com

Gang Xiao
The 20th Research Institute of CETC, Xi'an, 710068, China.
xg1986519@163.com

Cheng Zha
School of Information Science and Engineering, Southeast University, Nanjing, 210096, China.
zcheng5@163.com

Li Zhao
Key Laboratory of Underwater Acoustic signal Processing of Ministry of Education, Southeast University, Nanjing, 210096, China.
zhaoli@seu.edu.cn

***Abstract*—For speech emotion recognition on cross-corpus, we study the problem of speaker feature adaptation. First, we discuss the existing approaches in adaptive emotional classification from speech signals. Second, the speaker feature adaptive approach is further studied in view of additive emotion feature distortion. Finally we verified our approaches using different cross-languages corpus, including German, English, Chinese and Vietnamese. The experimental results demonstrate an improved speaker feature adaptive ability especially when a large number of unknown speakers are presented. Therefore, in this speaker independent scheme we can demonstrate the ability of incremental learning character of the proposed method.**

Keywords- Cross-corpus analysis, Speech emotion recognition, Gaussian mixture model, Feature adaptation.

I. INTRODUCTION

A general speech emotion training and recognition procedure are given in our work. The recognized emotion class is compared with the human perception result, and the error rate is computed. However, due to the complexity in human emotion, the testing data which are collected in real time are often quite different from the training sample which is collected in advance. There are a number of factors that caused this mismatch. Among them the feature variance is an important cause. Therefore the feature dependent emotion recognition is usually more reliable than the speaker independent systems. The purpose of this paper is to overcome the gap between the speaker dependent system and the speaker independent system. We propose to solve this challenge by a speaker feature adaptation method for speech emotion recognition on cross-language corpus.

Speaker feature adaptation method can be grouped into two types: feature extract adaptation and model adaptation[1]. The extraction section is carried out in the feature optimization stage. The speech signals are mapped into feature space before modeling and recognition. The feature model adaptation takes place in the later step, when the optimized features fall into a wider region near the target model. The model needs to be modified to maintain an acceptable classification accuracy. In the past research, various efforts have been made to improving speech emotion recognition performance with feature adaptation [2, 3]. Burkhardt et al. [4] introduce a widely used German emotional speech data base. It is originally designed for emotional speech synthesis and based on the acted emotions. Voice quality features are introduced to speech emotion recognition by several previous research[5, 6], aside from the prosodic features[7, 8]. A few methods have been proposed for continuous and dimensional emotion modelling in naturalistic speech[9-12]. Falk et al.[13, 14] studied speech signal enhancement, and Zhou et al.[15] also studied the noise problem in speech emotion recognition. Gunes et al[16], reported a bi-modal fusion system for emotion recognition, and Scherer et al.[17] also studied classifier fusion in emotion recognition. Zhou et al.[18] proposed to use non-linear features for stress emotions analysis. Vlasenko et al.[19] used both frame and turn-level features.

II. FEATURE ANALYSIS

Across different speech emotion databases with cross-language corpus, the speech signals are recorded under various recording conditions. Some of the real world applications need a robust speech processing front-end to reduce noise and distortions in speech signals. Therefore, in this paper, we investigate a robust front-end emotional feature extractor that takes noise and distortions into consideration.

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Implementation of Dendritic Cell Algorithm as an Anomaly Detection Method for Port Scanning Attack

Silvia Anandita[1], Yusep Rosmansyah[2], Budiman Dabarsyah[3]
School of Electrical Engineering and Informatics
Institut Teknologi Bandung
Bandung, West Java, Indonesia
silvianandita@gmail.com[1]

Jong Uk Choi[4]

[4]Sangmyung University
Seoul, South Korea

***Abstract*—One of the problems in the computer security system is port scanning attack. There are several detection systems have been developed to find out the occurrence of port scanning attack, one of them is anomaly detection method. A mechanism on how to implement the detection process in a more simple and effective way is a real serious challenge. In this paper, we design a simple implementation of anomaly detection system based on dendritic cell algorithm, which is the part of danger theory on artificial immunology system. To determine a reviewed process tends to be anomalous, anomaly threshold coefficient is defined. The calculated value of anomaly threshold, 0.4759933 is quite valid and representative in order to determine the nature of anomaly of a process. Based on the test result, Nmap process which has 0.6164136 as the average MCAV value can be classified as an anomaly process within the host computer. Meanwhile, the three other reviewed processed, i.e. Bash, SSH, and SCP always have the average MCAV values below the defined anomaly threshold value, so these can be classified as normal processes.**

Keywords— Port scanning attack, anomaly detection, artificial immunology systems, danger theory, dendritic cell, anomaly threshold, MCAV

I. Introduction

Along with the development of computer technology, the need for protection of information and data stored inside the computer is increasing highly. Mainly, the protection is needed on the condition where the use of the system as a mean of sharing, for instance data network such as the public internet. There is a security system designed to protect data and information from various kinds of attacks, referred to as computer security. According to NIST SP 800-12 [1], computer security is defined as the protection afforded to an automated information system in order to attain the objectives of applicable preserving the integrity, availability, and confidentiality of information system resources (includes hardware, software, firmware, information or data, and telecommunication.

From the various types of attack, one of the most common is port scanning. Port scanning is a technique often used by system administrator to monitor the active hosts within the computer network. This technique is often misused by unauthorized parties to obtain information of potential hosts as the targets of their attack. One way to do the port scanning is by utilizing Nmap tool which works by sending ICMP request information to the targeted host addresses.

In order to identify unauthorized port scanning activity performed by irresponsible parties, there are two most frequently used methods, namely signature detection and anomaly detection. While the signature detection has drawbacks, i.e. could not able to detect attacks which have different patterns from the known attacks, the anomaly detection could be the solution to this weakness. The anomaly detection analyzes the condition of computer based on the normal activity occurs inside the system and computer network as the core of detection process.

Basically, one of the best danger detection system is the human immune system. This system can be applied into the computer system by utilizing artificial immunology system concept. From this concept, there is a method which implements the mapping of artificial immunology system into the computer security, based on the existence of dangerous signals, by utilizing anomaly detection, known as dendritic cell algorithm. This method was introduced by Uwe Aickelin and Julie Greensmith [2]. The dendritic cell algorithm works by processing two types of input, i.e. signals and antigen. These two inputs will further be processed so three phases of dendritic cell related to the anomalous process can be determined. In addition, there is a threshold value defined to determine the categorization of reviewed processes as anomalies which indicated the existence of port scanning attack.

The previous research did by Jamie Twycross and Uwe Aickelin resulted the implementation of computer security system which is inspired by human immune system, namely libtissue [3]. Libtissue is a library composed of integrated modules to implement the dendritic cell algorithm. This library is now inaccessible even though it can be used freely at first. In addition, there is not much technical documentation on implementation and use can be found. Also, this library has a

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Assembly of Tin Oxide Nanowires for Dielectrophoretic Response Modeling

Ahmad Sabry Mohamad[1]
Section of Medical Engineering Technology
Universiti Kuala Lumpur British Malaysian Institute,
53100 Selangor, Malaysia
sabry@unikl.edu.my

Michael Pycraft Hughes[2]
Centre for Biomedical Engineering
Department of Mechanical Engineering Sciences
University of Surrey, Guildford, GU2 7XH, UK

***Abstract*—In this present work, the authors demonstrated a assembly method of nanowires applying Dielectrophoresis (DEP) in non-water based solvent. Tin(IV) Oxide (SnO_2) nanoparticles dissolved in N,N-DIMENTHYLFORMAMIDE (DMF) liquid. Dielectrophoretic impedance measurement of self assembly nanowires can be determined with the aid of MATLAB programming. It was experimentally proved that dielectrophoretic response modeling was used to evaluate nanoparticles for predicting the conductivity and permittivity properties of the nanowires. A DMF liquid of medium conductivity has been imposing the movement of SnO_2 nanoparticles which are assembled at the gap region; based on alternating current flow on microelectrodes designed.**

***Index Terms*— Dielectrophoresis, impedance measurement, nanowires, DMF, SnO_2**

I. Introduction

N,N Dimethylformamide is a polar aprotic solvent, colourless to slightly yellow, high-boiling rate, polar liquid with a faint odour typical of amines. It is capable of being mixed with water and many organic compounds. The characterization of DMF is particularly attractive because of the high dielectric constant, low votalities and wide liquid range. Recent work has been published on SWNTs nanomaterials using DMF able to manipulate assembly of nanowires [1]. This study presents the consolidations of dielectrophoresis and impedance quantitative measurement of dielectrophoretic acquisition of nanomaterials. The experimental of micro scale electrodes with 8 µm gap was designed by photolithography process at Advanced Technology Institute and Centre for Biomedical Engineering, University of Surrey, United Kingdom. A new designed of microelectrodes allow the dielectrophoretic indication using nonuniform alternating current of electric potential [2]. In 2014, Mohamad et al. using DEP technique to characterized nanoparticles size of DNAs respectively [3,4].

Tin Oxide (SnO_2) is Tin(IV) is a wide band gap n-type transistor characteristics, which crystallizes in the rutile structure, similar to Titanium(IV) oxide (TiO_2), Cerium(IV) oxide (CeO_2), or Germanium(IV) oxide (GeO_2) [5,6]. The SnO_2 consist of six atoms, four oxygen and two tin atoms structures as shown in Figure 1.

This unique material has a low conductivity at room temperature. It also has an optical band gap of 3.6 eV, but their electricity can be raised by implementing dopants or optical properties of the substance. SnO_2 able to manipulate for gas-sensor based to achieve a higher sensitivity gases. According to Dai et al. Indium Tin Oxide (ITO) has high conductivity and transparency, making it an ideal material for producing transparent electrodes. In addition, it is also widely used in gas sensor production because of its chemical stability and its semiconducting properties to reduce and oxidise gases. A systematic study has been made in empirical optimization of this material by varying the dopants, amount of doping, sintering condition, grain size and operating temperature [7].

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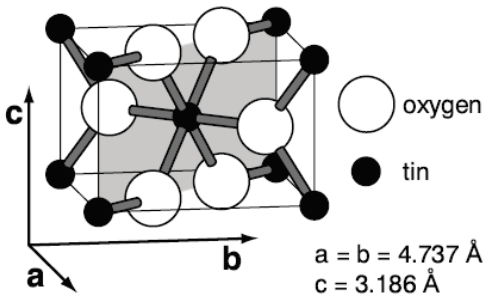

Fig. 1. The atomic of SnO_2. The shaded area represents the (110 - homogeneous coordinate) surface

II. MATERIALS PREPARATION

The DEP experimental of nanoparticle run by microelectrodes of gold, laid on glass standard substrates. The electrodes gap size is 8 µm. SnO_2 with type nanopowder with size range of 80-100 nm, were purchased from Sigma-Aldrich in England. The N,N-Dimenthylformamide or chemical formula (HCON(CH3)2) has been applied as a electrical conductivity medium for the nanowires experiment. This liquid was obtained from the Sigma Aldrich respectively. The

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Consolidating Service Enginering Perspectives

PurnomoYustianto
School of Information Technology
Deakin University
Geelong, Australia
pyustian@deakin.edu.au

Suhardi
School of Electrical Engineering
&InfomaticsInstitutTeknologi Bandung
Bandung, Indonesia
suhardi@stei.itb.ac.id

Robin Doss
School of Information Technology
Deakin University
Geelong, Australia
robin.doss@deakin.edu.au

***Abstract*—Similar with definition of 'service', the term 'service engineering' (SE) can be broadly defined based on the context and the referring domain. This paper explores the evolutionary definition of SE, with later emphasis on IT/IS perspective. The paper begin with general definition of service and service engineering before elaborating IT perspectives on IT. A review on service orientation, Service Oriented Architecture (SOA) and Service Oriented Methodology (SOM) is also provided in the final part, before concluded with conclusion and suggested future work. In a more general perspective of Service Science, SE is defined as a process of developing newly specified business service, while in IT perspective SE alternately defined as applying service-orientation approach in an enterprise and its IT infrastructure, closely related with SOA approach. Therefore, to consolidate both perspectives, SE can be applied for designing specific business services, as the original definition, combined with bottom up, or meet-in-the-middle approach in the conception of software services during the analysis.**

Keywords—Service Engineering, Service Oriented Methodology, IT Alignment, SOA

I. INTRODUCTION

Information Technology (IT) has become an important component in the growth of the service industry. It also takes a central role in new services innovations. New and improved business services have been deployed with the help of electronic services, often labeled as e-service. In these new and improved businesses service, IT based components serve both during service processing and service delivery. These service components take form either as a channel of user interface or as background software services.

A growing motivation to innovate and improve services is also felt in the public sector, i.e. in government organization. Various popular concepts have been proposed on improving services to citizens, e.g. e-Government, Open Government and SmartCity. These three concepts basically propose the use of IT inside government business process and during service delivery. The classic problem of organization and data silos in the government can potentially be remedied with an analysis based on service-orientation.

This paper is a review from a literature survey of Service Engineering (SE) definitions and methodologies from existing research articles to identify possibilities for future research works.

II. SERVICE DEFINED

The term 'service' carries a broad connotation according to each domain and context. In the most generic level, service can be broadly defined as 'an act of beneficial activity' [1]. From this definition a service can be characterized as having at least four components: Service producer, service consumer, act of service, and benefit produced. A unique property of a service from other activity is its third component, the actual act of service.

During an act of service, a transformative task is performed by the service producer for the service consumer, with a certain degree of involvement from the consumer. The performed task typically requires or consumes producer resources. A unique characteristic of service sector, that differentiates it with manufacturing sector, is that the resource can either be a physical resource, such as a traded good, or non-physical resource, such as knowledge, skill, or information. The task performed by itself will produce a transfer of value for the benefit to the consumer.

In the context of SE, the term 'service' ise usually used in three different meanings: Business Service, electronic service, and software service [2].

- **Business Service**. In this context the term 'service' is referred to a generic definition of the service as a business activity provided by a service provider to a service consumer to create a value for the consumer
- **Electronic Service**, or shortened as e-service is a term used to denote any service that can be conducted via computer networks, i.e. the Internet. E-Service can be viewed as a subset of a business service, i.e. a business service that employs IT during service encounter.
- **Software Service**, is a type of e-service that can be accessed via web-based protocols or web-based programs from the consumer side. Web service, or a collection of it, can serve as a component of an electronic service.

The three definitions forms a hierarchy abstraction of the service concept from its highest abstraction, the business service, to its most detailed and technical form, software service. A higher abstraction can be partly composed from the lower abstraction. In an IT technical context, especially in the Service Oriented Architecture perspective, the term 'service' usually referred to the third definition as a set of process logic implementable as software service, consumable by other services [3].