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

Judul Karya Ilmiah	:	Vehicle Distance Measurement Tuning using Haversine and Micro-Segmentation		
Jumlah Penulis	:	6 orang (**Aghus Sofwan**, Yosua Alvin Adi Soetrisno, Natalia Putri Ramadhani, Amiko Rahmayani; Eko Handoyo, M. Arfan)		
Status Pengusul	:	Penulis Ke-1		
Identitas Prosiding	:	a. Judul Prosiding	:	**International Seminar on Intelligent Technology and Its Application (ISITIA 2019)**
		b. ISBN/ISSN	:	978-172813749-0
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Semarang,

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Reviewer 1

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NIP. 197112181995121001
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LEMBAR
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LEMBAR
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	Internasional [15]	Nasional [ ]	
a. Kelengkapan unsur isi prosiding (10%)	1,50		1,25
b. Ruang lingkup dan kedalaman pembahasan (30%)	4,50		3,50
c. Kecukupan dan kemutahiran data/informasi dan metodologi (30%)	4,50		3,50
d. Kelengkapan unsur dan kualitas terbitan/prosiding(30%)	4,50		3,75
Total = (100%)	**15,00**		**12,00**
Nilai Pengusul = (60% x 12,00) = 7,20			

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a) **Kesesuaian dan kelengkapan unsur isi paper:** Unsur makalah lengkap yang berisi introduction, related work, methodology, evaluation procedure, dan conclusion and future work, serta dengan references.

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c) **Kecukupan dan kemutakhiran data/informasi dan metodologi:** Metoda haversine banyak digunakan untuk pemetaan dan cukup relevan metoda tersebut digunakan untuk pengukuran jarak yang ditempuh suatu kendaraan yang dipaparkan dalam makalah. Referensi tidak cukup banyak namun hampir semuanya kurang dari 10 tahun.

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Creating Impact through Intelligent Devices and Systems

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Vehicle Distance Measurement Tuning using Haversine and Micro-Segmentation

Joint Conference of
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and
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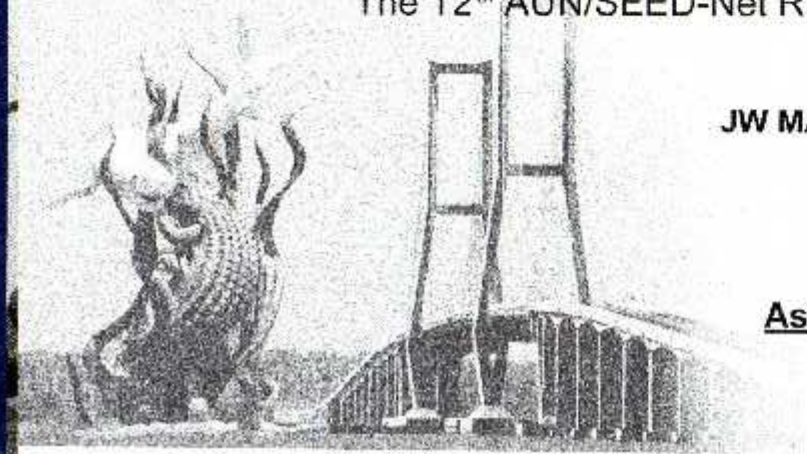

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Vehicle Distance Measurement Tuning using Haversine and Micro-Segmentation

Sofwan A. , Soetrisno Y.A.A. , Ramadhani N.P. , Rahmayani A. , Handoyo E. , Arfan M.

Save all to author list

Diponegoro University, Department of Electrical Engineering, Semarang, Indonesia

Abstract

In the globalization era, the vehicle tracking system is important and it is needed in the fleet asset management system. This management system has a significant role in good logistics distribution in order to measure mileage of truck traveling. Therefore, the existence of the global positioning system

(GPS), information system, and network technology can help to monitor the fleet system. GPS devices, from anywhere and anytime, send JSON information by POST method in HTTP to the information system server through internet connection. Furthermore, the stakeholders, the customer and the company of fleet service, can measure the real distance which is gathered from GPS. Contribution of this research is to find the best distance measurement gathered by micro-segmentation technique and summarization of each segment by Haversine formula. Micro-segmentation in this research is performed by modification of how often data sent to the server. Furthermore, we use RMS value that shows correlation, which is obtained by comparing our system result to the real odometer, Google Maps, and GPS data measurement. The obtained RMS of our system exceeds 0.9005 which compared to GPS data. From the result we obtain most optimal repeat duration for sending data by tuning duration with value of every 30 seconds.

Author keywords

fleet; GPS; Haversine; micro-segmentation

Indexed keywords

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PROCEEDINGS

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KEYNOTE LECTURE

Prof. Ryohei Kanzaki

Director, Research Center for Advanced Science and Technology,
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Learning from Senses and Intelligence of Insects: Convergent Future Technology for Sustainable Society

To elucidate the dynamic information processing in a brain underlying adaptive behavior (or biological intelligence), it is necessary to understand the behavior and corresponding neural activities. This requires animals which have clear relationships between behavior and corresponding neural activities. Insects are precisely such animals and one of the adaptive behaviors of insects is high-accuracy odor source orientation. Insects are valuable model systems in neuroscience due to the balance between the moderate complexity of their nervous systems, a rich behavioral repertoire, and the cost of maintenance as experimental animals. Insect brains contain on the order of 105 to 106 neurons. The concept of individually identifiable neurons and small networks composing functional units have been vital for understanding insect brains. Moreover, insects are uniquely suited for multidisciplinary studies in brain research involving a combined approach at various levels, from molecules over single neurons to neural networks, behavior, modeling, and robotics, owing to their seamless accessibility to a wide variety of methodological approaches, in particular genetic engineering, neuroanatomy, electrophysiology, and functional imaging.

To examine the neural basis of the odor-source orientation behavior, we implemented a model of the neural circuit reconstructed from single neurons, and integrated it with a mobile robot. Moreover, in order to understand the dynamics of the neural circuitry, we have developed an "insect-robot hybrid system" in which the insect or an insect brain controls a robot.

Our interdisciplinary research will enable us to use the full potential of the features of insect sensors and brains as model systems for understanding the dynamical sensory and neural substrates of adaptive behaviors (or bilogical intelligece) for the first time. Our interdisciplinary research is predestined to contribute to develop new avenues for applications affecting safety, security, and everyday life.

Ryohei Kanzaki received his B.S., M.S. and D.Sc. degree in Neurobiology from the Institute of Biological Sciences, University of Tsukuba in 1980, 1983 and 1986, respectively. From 1987 to 1990 he was a postdoctoral research fellow at the Arizona Research Laboratories, University of Arizona. From 1991 to 2003 he was a at the Institute of Biological Sciences, University of Tsukuba. From 2004 to 2006 he was a full professor at Department of Mechano-Informatics, Graduate School of Information Science and Technology, the University of Tokyo. Since 2006 he is a full professor at the Research Center for Advanced Science and Technology (RCAST), the University of Tokyo. Since 2016 he has been a director of RCAST. He was a president of the Japanese Society for Comparative Physiology and Biochemistry (JSCPB) from 2012 to 2015. Ryohei Kanzaki is also contributing greatly to science education of children through children's science and technology development projects by Japan Science and Technology (JST) as chairs of the projects.

KEYNOTE LECTURE

Assoc. Prof. Dr. Supavadee Aramvith

Department of Electrical Engineering
Chulalongkorn University, Thailand
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Video Analytics for Surveillance IoT Applications

In this talk, we will present and discuss the current trends and researches in video analytics. As surveillance cameras have been widely installed worldwide, although the main purpose of those cameras is for monitoring, but the most important task is to be able to analyze video contents and extract useful information. Several on-going researches such as image super resolution, real-time multiple face recognition system, video anomaly detection and several implementations of embedded video analytic system on FPGA and Single Board Computers will be discussed.

Supavadee Aramvith (IEEE S'95-M'01-SM'06, IEICE M'04) received the B.S. (first class honors) degree in Computer Science from Mahidol University, Bangkok, Thailand, in 1993. She received the M.S. and Ph.D. degrees in Electrical Engineering from the University of Washington, Seattle, USA, in 1996 and 2001, respectively. She joined Chulalongkorn University in June 2001. Currently, she is currently an Associate Professor at Department of Electrical Engineering, Chulalongkorn University, Bangkok, Thailand. Currently, she is an Associate Professor at Department of Electrical Engineering, Chulalongkorn University, Bangkok, Thailand. She was Associate Head in International Affairs (2007-2016), Head, Communication Engineering Division (2013-2016), Head, Digitial Signal Processiong Laboratory (2017-2018).

KEYNOTE LECTURE

Assoc. Prof. Dr. Tara Julia Hamilton

Macquarie University, Australia

tara.hamilton@mq.edu.au

Silicon Intelligence

In this presentation I will introduce you to the wonderful world of neuromorphic engineering. I will discuss some of my past, present, and future projects in neuromorphic engineering including modelling the nervous system, developing bio-neuro-inspired artificial intelligence, and applications of neuromorphics to designing better analog integrated circuits.

Tara Julia Hamilton (S'97–M'00) received the B.E. degree (Hons.) in electrical engineering and the B.Com. degree from The University of Sydney, Australia, in 2001, the M.Sc. degree in biomedical engineering from The University of New South Wales, Australia, in 2003, and the Ph.D. degree from The University of Sydney in 2009. She is currently an Associate Professor with the School of Engineering, Macquarie University, Australia. She has authored over 100 journal papers, conference papers, and book chapters, and holds patents in integrated circuit design, neuromorphic systems, and biomedical engineering. Her current research interests include neuromorphic engineering, mixed-signal integrated circuit design, and biomedical devices.

KEYNOTE LECTURE

Dr. Muhammad Rivai

Department of Electrical Engineering,
Institut Teknologi Sepuluh Nopember, Indonesia
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The artificial olfactory system

We have five senses including physical senses (sight, hearing and touch) and chemical senses (smell and taste). Science and technology have developed rapidly, so we can find the three physical senses in various electronic devices. However, the sense of smell and taste is still not much developed. The researchers tried to make an alternative approach by imitating the working principle of the mammalian olfactory system which is the best chemical detector capable of detecting various volatile chemical compounds or odors. This approach uses a sensor array which each element has a response that partially overlaps with the others. Although the identification process cannot be achieved by a single sensor element, the pattern of the sensor array will produce a unique fingerprint for each odor. An artificial olfactory system or electronic nose composed of sensor array, signal conditioning, and pattern recognition that corresponds to the olfactory receptors, olfactory bulb, and olfactory cortex of the mammalian nose, respectively. Chemical sensors commonly used in this method are semiconductor devices, composite conducting polymers, quartz resonators, surface acoustic wave devices, and optical gas sensors. Preprocessing is signal conditioning of sensor signals, which removes irrelevant information to make it more supportive to the next phase, which can include normalization, noise reduction, compression, baseline manipulation, etc. Feature extraction from sensor response is needed to produce several significant features selected for the classification process. This method includes principal component analysis, Fourier transform, wavelet transformation, linear discriminant analysis, etc. Classification methods can be categorized into supervised and unsupervised methods, which include back propagation neural networks, support vector machines, k-nearest neighbors, k-means clustering, self-organizing maps, etc. An efficient chemical sensing system combined with a robust pattern recognition method to achieve accurate quantitative and qualitative information about chemical compounds is a challenging mission in the future, especially applied in the food, medical and environmental fields.

Muhammad Rivai received BE degree from Institut Teknologi Sepuluh Nopember in 1993, ME degree from University of Indonesia in 1997, PhD degree from University of Airlangga in 2006. He is currently a lecturer at Electrical Engineering Department, Institut Teknologi Sepuluh Nopember, Surabaya, Indonesia. His research interests include odor sensors, electronic circuits, and neural network applications.

KEYNOTE LECTURE

Nicolas Husny Tjioe, M.Sc.
Business Development Manager, Infineon Technologies
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Trusted Security for Smart Home

Internet of Things (IoT) are affecting our daily lives significantly. A smart home is a home that provides increased user convenience and energy efficiency based on smart and secured devices, functionalities and services which can be controlled remotely or interact or provide data automated based on intelligent sensing and situational awareness. The key building blocks to enable smart homes are made up of sensors, controllers, actuators and security. This means they can collect, interpret and process data and then trigger appropriate actions or responses, all within a secure environment. In this presentation, we will go over several use cases such as Home Appliances and Smart Lighting.

Mr. Nicolas Husny is currently with Infineon Technologies as an experienced Business Development Manager with a demonstrated history of working in the semiconductors industry, specializing in embedded security solutions, IoT, and smart card. Mr. Nicolas Husny obtained his Masters degree in Computer Science from Arizona State University (2008 - 2010), and his Bachelor in Computer Engineering from the Arizona State University (2004 - 2007).

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TABLE OF CONTENTS

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Artificial Intelligence and Machine Learning Applications

Vehicle Distance Measurement Tuning using Haversine and Micro-Segmentation

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***Abstract*—In the globalization era, the vehicle tracking system is important and it is needed in the fleet asset management system. This management system has a significant role in good logistics distribution in order to measure mileage of truck traveling. Therefore, the existence of the global positioning system (GPS), information system, and network technology can help to monitor the fleet system. GPS devices, from anywhere and anytime, send JSON information by POST method in HTTP to the information system server through internet connection. Furthermore, the stakeholders, the customer and the company of fleet service, can measure the real distance which is gathered from GPS. Contribution of this research is to find the best distance measurement gathered by micro-segmentation technique and summarization of each segment by Haversine formula. Micro-segmentation in this research is performed by modification of how often data sent to the server. Furthermore, we use RMS value that shows correlation, which is obtained by comparing our system result to the real odometer, Google Maps, and GPS data measurement. The obtained RMS of our system exceeds 0.9005 which compared to GPS data. From the result we obtain most optimal repeat duration for sending data by tuning duration with value of every 30 seconds.**

Keywords—fleet, GPS, Haversine, micro-segmentation,

I. INTRODUCTION

In the current era of globalization, transportation is a very important need of our live. Delivery of goods, which are part of transportation services, increases business competition in the logistics and IT area. In terms of shipping goods, both abroad and domestically, trucking services play a very important role. The trucking service companies calculate the cost of the delivery by considering the goods weight capacity, distance of delivery, and also some hidden cost. Many companies and individuals have used trucking services to deliver many goods in large quantities. Trust in utilization of trucking services in good delivery has made rapid development of fleet management field. It is an important need for increasing the efficiency of communication between the truck driver, control centers, and customers, which run smoothly [1].

Tracking system using GPS, which is based on Internet of Things (IoT) provides effectiveness, vehicle location in real time, mapping, and real-time information report to the control center, so that it will improve the quality of services [2]. The information system in this research provides the customer with information of the current location of the truck, traveled route, and real-time vehicle speed using the latitude and longitude movement estimation and geographical time information from the GPS.

This research provides a truck tracking information system in two forms, which are a web-based application and the Android environment. The hardware system consists of GPS, which is permanently installed in the vehicle and connected to vehicle accumulator. It is a GPS tracking device with GT06-A protocol. The GPS device continuously obtains the vehicle location in real time and then sends updates in JSON format to the server. The output of this information system can be accessed not only by fleet service customers to get the exact current location of the delivery truck but also by the management of fleet system in the admin section side. The both stakeholders can track the vehicle according to its path.

The remainder of this paper is organized as follows. In Section II, some related works of the same fields are provided. In Section III, we exhibit the conducted methodology. In the next section, we describe evaluation procedure of our system performance. Finally, in the last section, the conclusion and future work are provided.

II. RELATED WORK

There are many types of research that harvesting GPS data and do some calculation to ensure the data is properly representing track or route of the vehicles, as follows.

In [1], the authors studied about harvesting point of interest from GPS trajectories data. Point of interest could be formed by sharing GPS logs among some peoples. Point of interest is used to find some places that attract user, based on another user route. Their research uses Haversine formula to calculate the distance between the start position of the user and the end position of user. The end position of the user at some latitudes or longitudes show that user visits some interesting place such as tourism destinations. The system can make a recommendation of tourism place based on region closeness between user current location and point interest that gathered and clustered by the system.

Different from [1], in our research, the Haversine formula is combined with micro-segmentation from GPS data record to measure distance of the truck route. Furthermore, in [1], the distance is directly measured between two points. Meanwhile, in our research the distance is summarizing a little distance from each point of the GPS data received.

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Optimal Planning of Solar PV Using Simple Model for New Feed-in Tariff in Indonesia

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***Abstract*— Indonesia is still struggling to attract the investor to involve in solar photovoltaic (PV) project. There is a rapid transformation in PV regulation by the government. Four regulation related to solar PV is delivered from 2016 until 2018. In 2018, the feed-in tariff regulation was established. The feed-in tariff aims the electricity customer to install the PV system and inject the excess energy to the grid. However, this rapid regulation changing is not yet attracting developer nor customer to invest in the solar PV. This paper proposes a simple model to calculate the optimal size of PV for new feed-in tariff regulation in Indonesia. Feed-in tariff regulation allows the customer to inject the energy produced by PV to the grid. The regulation provides 65% compensation of electricity price from energy sent to the grid with several limitations. There is difficulty to estimate daily energy data. Then, a technical calculation is proposed by using a simple model so that it can help the customer in sizing the solar PV system. Adding to the proposal of the methodology, this research also develops an application to help customers in calculating the optimal size of solar PV and its profitability. The new feed-in tariff rule will be an attraction for the customer. However, it needs a comprehensive calculation so that solar PV can be profitable. Oversized PV systems can cause financial losses with the large investment and limitation on the calculation of energy injected into the grid. The result shows that the PV simple model is successfully developed to help the consumer obtain the optimal PV size.**

Keywords—photovoltaic, feed-in tariff regulation, simple model.

I. INTRODUCTION

Indonesia successfully increased the electrification ratio to 95.35%, beyond 2017 target of 92.75%. However, two out of thirty-four provinces still have electrification ratio below 70%. Besides this situation, Indonesia is also struggling to increase the value of investments in the electricity sector, especially in the Renewable Energy (RE) sector. In 2017, investment was accounted for only 9.06 billion USD from the target 19.4 billion USD [1], [2].

Some regulations have been established to attract the investor. In solar-based renewable energy, four regulations are published in 2 years. Feed-in tariff regulation and local tariff regulation were formulated for solar power plants. Feed-in tariff was postponed after several years of enforcement and was followed with a new policy at the end of 2018. Local tariff regulation was started in 2016 and revised in 2017. Many changes in regulation show regulator`s enthusiasm to encourage the growth of renewable energy in the current system [3].

As Indonesia is an equatorial country, Indonesia gets solar irradiation throughout the whole year. However, the irradiation is reduced in the rainy season due to the intermittent weather conditions. The average sun peak hour is varying from 4.5 to 6.5 kWh/m^2. Indonesian has of 207.9 GW solar power in potential with the existing 78.5 MW solar power [2].

Several efforts have been done by the government of Indonesia for promoting renewable energy, especially for solar power, but had not given a satisfactory result. Some regulation changes are also applied by the government to stimulate investment in renewable energy. However, the regulation still cannot provide good stimulation to the energy developer [3]–[5].

The feed-in tariff policy Ministry for Energy and Mineral Resources (MEMR) Reg. 49/2018 is established to enable the consumer to install the PV to their system. This regulation tries to attract not only for consuming the electricity but also for supplying the electricity by using a PV. This research investigates whether new regulations can attract consumer.

The feed-in tariff regulation includes several limitations. The first limitation provides 65% compensation of electricity price from energy sent to the grid. The second limitation concerned with the excess energy that accumulated in one quarter to be neglected. These limitations require daily energy calculation to ensure higher accuracy.

Several methods in optimal planning of the PV system is focused on the yearly solar potential to provide a good result. Several papers use the average value of the sun peak hour (SPH) for the PV sizing. This method is suitable for the system that has no limitation on their regulation [7]–[9]. However, the average SPH method cannot use in the feed-in tariff policy (MEMR Reg. 49/2018) due to lack of details on the export and import energy.

This paper proposes a simple model to calculate the optimal size of PV for new feed-in tariff regulation in Indonesia. In this paper, rooftop solar PV calculator (*Kalkulator Listrik Surya Atap*, "KalLisa") application is also developed to help customer to calculate the suitable size of PV and estimate the profit of the PV system. The calculation of the PV power is based on the solar data provided by NASA

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Implementation of cross correlation with stochastic computation in FPGA

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***Abstract*—Stochastic computation is an alternative method for computing where numbers are encoded as probabilistic values. In this paper, we investigate the use of stochastic computation in the general cross corellation operation which finds various applications such as in interaural time difference in sound localization algorithms. In this work, we evaluate the performance of stochastic computation in performing cross correlation between two phase-shifted signals through experimental results on an FPGA. The two analog signals are converted into binary format using an on-board ADC of the Altera DE-10 Nano board, while all conversion into stochastic form and cross-correlation are performed within the FPGA. The system has been implemented in an Altera Cyclone V FPGA and able to distinguish signal phase delays in the audio frequency range.**

***Index Terms*—Analog-digital conversion, field programmable gate arrays, mixed analog digital integrated circuits, stochastic processes.**

I. Introduction

Stochastic computing is an alternative computing technique where numbers are represented as probabilistic values, specifically the probability of the occurence of a one in a fixed bit-stream length, in order to allow the use of simple logic gates to perform mathematical operations such as multiplication or addition. The resolution in which a number is represented in stochastic computing therefore grows to the power of 2 with each increase in bit resolution requirement. Furthermore, conversion circuits are required to convert normal radix-2 numbers into their stochastic representations. While its core computing circuit may be very simple, this longer bit-stream to represent numbers as well as the existence of conversion circuit overhead have limit the use of stochastic computing in the past.

There is quite a lot of research on sound direction detection using several microphone arrays has been published. One of them is a robot with 3 microphones which are installed with a triangle configuration to detect sound direction. Various methods have been applied to this application, and all of these methods use conventional binary computing systems. In this study, an alternative computing system will be used which will be suitable with the conditions of the signal and data that will be acquired by the sensor. With this alternative system, the signal that contains data with noise , is expected to be processed by utilizing the characteristics of the alternative computing system which is considered more resistant to errors that arise in the process of data acquisition and pre-processing carried out on related data.

In this study, audio processing utilizes stochastic computational methods. A method that had been abandoned for more than 50 years, but was re-calculated because of the simplicity of the circuit and its ability to survive in conditions that had quite a lot of noise [1]. In addition, the simplicity of the circuit using simple logic gates to compute multiplication and addition allows the calculation operation process to be processed faster. In contrast to binary computing systems that require processes that can be said to be far more complicated than stochastic computing systems. The system applied is expected to have a positive impact on the complexity of the circuit. One study that has become a reference is a system that uses a high-speed microcontroller to calculate the cross-correlation system [2]. The system that will be created is expected to improve efficiency both in terms of the size of the circuit and the resources used and from power consumption and speed. In our work, we perform the implementation on an reconfigurable digital IC technology, FPGA [3].

II. Theoretical Background

In this section, we provide a review on the basic principles of stochastic computing as well as its conversion circuits.

A. Stochastic computation

Stochastic numbers are alternative digital number formats from conventional binary number formats. Generally, every bit of the stochastic N-bit number, X is chosen as 1 randomly chosen with a probability of p(x), and X is a number made from a conventional logic circuit. To convert binary numbers into stochastic numbers, random number source (RNS) and comparator will be needed as a comparison tool for both values.

The stochastic number system is one alternative that was used in the 1960s. This number system is again considered due to its potential following the development of nanotechnology and its applications such as ECC decoding and biomedical image processing. But along with this potential, there are many challenges and obstacles that must be overcome before this number system can be fully utilized.

The value of a stochastic number is determined by how many digits 1 appear in a series of N-bit stochastic numbers. This kind of coding is also often found in the biological

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