PROCEEDINGS
The 9th Annual International Conference 2019
on Sciences and Engineering
Universitas Syiah Kuala

In conjunction with:
The 2nd English Education International Conference
The 2nd Aceh International Symposium on Civil Engineering
and
The International Conference on Experimental and Computational Mechanics in Engineering

Banda Aceh,
September 18-19, 2019

"Strengthening Academic and Industrial Collaborations to Enhance Research and Innovation"

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The 9th AIC 2019 on Sciences & Engineering (9thAIC-SE)

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## Conference Information

| Conference Name            | The 9th Annual International Conference (AIC) 2019 |
|----------------------------|--------------------------------------------------|
| Conference Logo            | ![AIC 2019 Conference Logo](image)                |
| Host and Organizer         | Universitas Syiah Kuala                         |
| Venue                      | Academic Activity Center (AAC) Prof. Dayan Dawood, Universitas Syiah Kuala |
| Official Language          | English                                         |
| Secretariat                | Lembaga Penelitian and Pengabdian Masyarakat (LPPM), Syiah Kuala University |
|                            | Phone +62 651 7555262                           |
|                            | Fax. +62 651 7555261                            |
|                            | Website https://aic.unsyiah.ac.id               |
|                            | Email aic@unsyiah.ac.id                         |
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The 9th AIC on Sciences and Engineering 2019

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About Unsyiah

Syiah Kuala University (Unsyiah) is the oldest public university in Aceh. Standing on September 2, 1961 by Decree of the Minister of Higher Education and Science Number 11 of 1961, dated July 21, 1961. The establishment of Unsyiah confirmed by Decree of the President of Republic Indonesia, number 161 of 1962, dated April 24, 1962 in Kopelma Darussalam, Banda Aceh. Unsyiah domiciled in the capital of Aceh province with the main campus located in the city of Students (Kopelma) Darussalam, Banda Aceh. Currently, Unsyiah has more than 30,000 students studying in 12 faculties and the Graduate Program.

About AIC

The Annual International Conference (AIC) is not only to share the scientific knowledge but also an important to open the network among the participant and also an open-door event to promote Unsyiah for the researchers in national and International level.

The 9th AIC 2019 provide an excellent forum for sharing knowledge and research findings among academicians, professionals, and governments. Topics of interests cover all theoretical and practical aspects of Sciences and Engineering, Health and Life Sciences, and Social Sciences. The primary goal AIC 2019 is organized to promote multidisciplinary understanding of the latest research and innovations through discussion, exchange, and sharing among researcher, practitioners, academicians and students.
WELCOME SPEECH FROM RECTOR OF UNIVERSITAS SYIAH KUALA

Assalamualaikum Wa Rahmatullahi Wa Barakatuh,

In the name of Allah, the Most Beneficent and the Most Merciful. May peace, mercy, and blessings of Allah be upon you.

Dear colleagues, professors, lecturers, researchers, ladies and gentlemen. On behalf of Universitas Syiah Kuala, I would like to express my sincere gratitude and welcome you to the 9th Annual International Conference (AIC) 2019. The AIC 2019 is held in conjunction with the 2nd English Education International Conference (EEIC), the 2nd Aceh International Symposium on Civil Engineering (AISCE), and the 1st International Conference on Experimental and Computational Mechanic in Engineering (ICECME).

Moreover, I honorably welcome our keynote speakers Prof. Moses Tade from Curtin University, Australia, Dr.-Ing. Joewono Prasetijo from Universiti Tun Hussein Onn, Malaysia, Prof. Diana Elizabeth Waturangi from Atma Jaya Catholic University, Indonesia, and Assoc. Prof. Dr. Rob Amery from University of Adelaide, Australia. We also have with us invited speakers Dr. Luciana from Universitas Katolik Indonesia Atma Jaya, Indonesia, and Dr. Is Helianti from Pusat Teknologi Bioindustri, Indonesia.

It is my hope that the 9th AIC 2019 would be able to achieve its objective in providing an effective forum for academician, researchers, and practitioners to strengthen academics and industrial collaborations to enhance research and innovation. We believe that academics and industry must not work alone but must collaborate. Because with collaboration, the goals become easier, more effective, and efficient to achieve. And, we can change to a better environment and life.

We also believe knowledge, research and technology are for all people, for minorities, people with disabilities, and to help anyone. No matter how much we can accomplish by ourselves, whether it be research or development, it is never sufficient in this world of knowledge. Therefore, the focal drive of this conference is to exchange ideas, and by participating in this exchange, it is hoped that all parties who may benefit from the conference can apply it in managing activities in their areas. It is pleasing to note that the agenda of this conference covers a wide range of interesting topics related to all theoretical and practical aspects. There are Sciences and Engineering, Social Sciences, and Health and Life Sciences.

Last but not least, my deepest gratitude goes to the Advisory Board, Organizing Committee, International Scientific Committee, institutions, companies, and volunteers who have directly and indirectly supported the success of this seminar. The committee has organized a vibrant scientific program and is working hard to present highly respected and internationally notorious speakers to lead it. Although we try our finest to be professional, on behalf of Syiah Kuala University, please accept our sincere apologies should there be inconveniences that occur before, during, or after the event. I wish you a very productive conference with exciting and encouraging discussions and exchange of knowledge so that together we can anticipate a future by strengthening academics and industrial collaborations to enhance research and innovation.

May God bless us all with good health to make this event a successful and enjoyable one!

Best Regards,

PROF. DR. IR. SAMSUL RIZAL, M.ENG
Rector of Universitas Syiah Kuala
WELCOME SPEECH FROM THE GENERAL CHAIR OF THE 9TH AIC 2019

Assalamualaikum Wa Rahmatullahi Wa Barakatuh,

On behalf of the organizing committees, I would like to welcome all of you to Banda Aceh, Indonesia for the 9th Annual International Conference (AIC) 2019, Universitas Syiah Kuala. The AIC is an annual international conference carried out regularly by the university since 2011.

This year, we organize the AIC in conjunction with the 2nd English Education International Conference, the 2nd Aceh International Symposium on Civil Engineering 2019 and the 1st International Conference on Experimental and Computational Mechanic in Engineering.

Under the theme of the conference “strengthening academics and industrial collaborations to enhance research and innovation”, this conference features rich programs, including Universitas Syiah Kuala Innovation Expo 2019, four keynote speeches delivered by Prof. Moses Tade from Curtin University, Australia, Dr.-Ing. Joewono Prasetijo from Universiti Tun Hussein Onn, Malaysia, Prof. Diana Elizabeth Waturangi from Atma Jaya Catholic University, Indonesia, and Assoc. Prof. Dr. Rob Amery from University of Adelaide, Australia. Our invited speakers this year are Dr. Luciana from Universitas Katolik Indonesia Atma Jaya, Indonesia, and Dr. Is Helianti from Pusat Teknologi Bioindustri, Indonesia. The 9th AIC 2019 offers a special opportunity to bring together professors, researchers and scholars around the globe, and serves as a platform to deliver innovative research results and latest trends and development in the fields of sciences and engineering, social sciences, and health and life sciences.

All accepted papers in this conference have the opportunities to be published in various reputable publications such as IOP Material Science and Engineering Proceedings, Key Engineering Materials, Journal of Serangga, Microbiology Indonesia, Humanities and Social Sciences Reviews, International Journal of Language Studies, among others.

The conference has received more than 400 submitted papers, whereby 330 papers have been accepted by the committees for presentation and to be included in the proceedings or selected for journals. To all members of the organizing committees, the international scientific committee, the reviewers, and the collaboration partners, we would like to thank all of them for their tremendous efforts to organize this conference successfully.

We look forward to having a successful conference, and we hope that all the attendees enjoy and benefit from this conference.

Best Regards,

DR.-ING. RUDI KURNIAWAN
General Chair of the 9th AIC 2019
KEYNOTE SPEAKERS

Professor Moses O. Tadé

John Curtin Distinguished Professor, Faculty of Science & Engineering

Curtin University, Perth, Western Australia

Brief Biography of Professor Moses O. Tadé

Professor Moses Tadé received his Bachelor degree in Chemical Engineering with first class honours from University of Ife (now Obafemi Awolowo University), Ile-Ife, Nigeria. He won the prestigious Commonwealth Scholarship for his Masters and PhD in Chemical Engineering at Queen’s University, Kingston, Ontario, Canada. Professor Tadé has been an academic at Curtin University for over 3 decades. He was awarded a John Curtin Distinguished Professor at Curtin University in 2011 for his significant contributions to Chemical Engineering research at the highest level in the field of Process Systems Engineering. He has received substantial funding from both industry and the Australian Research Council (ARC) for his projects. He has successfully supervised over 50 PhD students, several Masters' students and research fellows. He has published 5 books on various aspects of his work as well as over 400 research papers in refereed international journals and conference proceedings with an H-index of 55 and over 9,500 citations (excluding self-citations). He is the founding Editor-in-Chief of Asia-Pacific Journal of Chemical Engineering (www.apjChemEng.com), a Fellow of IChemE and an Honorary Fellow of Engineers Australia. He was listed in the Top 100 Australia’s most Influential Engineers in 2008 and was the Chair of IChemE in Australia in 2012 and 2013. He was the President of the Australian Council of Engineering Deans (in 2015 and 2016) and a member of the ARC College of Experts (from 2014 to 2017) where he chaired the ARC Panel for Mathematics, Physics, Chemistry and Earth Sciences (MPCE) for the Discovery and DECRA grants in 2016. Professor Tade has been a plenary and keynote speaker at several conferences worldwide. He continues to evolve his leadership and management skills to harness the capabilities of the new generation of leaders.
ABSTRACT

Applications of Data Mining in Chemical Engineering

The ever-increasing size and complexity of chemical and process industry introduces several difficulties in their monitoring and optimization. On the other hand, the decreasing cost and widespread availability of the measurement instrumentation has resulted in heavily instrumented and digitalized industrial processes. This has resulted in the abundant availability of generated process data for profitably used on process improvement. In addition, industries are constrained to minimize operating costs due to economic pressures and increased competition. Traditional methods for process improvement are time and cost intensive. The availability of relatively cheap data offers the possibility of utilizing it for a broad range of purposes resulting in economic and efficiency gains. The digitalization of the chemical industry is the new revolution that is currently ongoing and it is expected to improve their productivity substantially. In this talk, the applications of data mining methods to the chemical process industry for realizing a wide range of objectives will be addressed. The applications of data mining in the chemical industry includes predictive analytics, data reconciliation, process monitoring, fault detection and diagnosis, root cause analysis, process improvement and optimization, controller performance monitoring and improvement, abnormal situation management and alarm management. This is made possible by the availability of several mature and established methods ranging from simple regression analysis to deep learning using neural networks.
Dr.-Ing. Joewono Prasetijo
Head of Department of Transportation Engineering Technology
Faculty of Engineering Technology
Universiti Tun Hussein Onn Malaysia
Pagoh Higher Education Hub
KM 1, Jalan Panchor 84600 Panchor, JOHOR
Tel: Cell: +6 011-1774 3911, Office: +6 06 974 2043, Fax: +6 06 974-2193 E-mail: joewono@uthm.edu.my, Joewono.Prasetijo@alumni.ruhr-uni-bochum.de

Brief Biography of Dr.-Ing. Joewono Prasetijo

Dr.-Ing. Joewono Prasetijo is the Head of Department of Rail Transportation Engineering Technology, Faculty of Engineering Technology, Universiti Tun Hussein Onn Malaysia. He is also the Head of Focus Group of Sustainable Transport and Safety Studies (STSS) and Chairman of the Tactical Committee of Road Safety Strategic Plan (NBOS Cluster) in Batu Pahat (MySafe Road @ Batu Pahat), Road Safety Department, Ministry of Transport Malaysia. He has contributed several research papers in traffic engineering; capacity and conflict analysis and road safety engineering; development of accident prediction models.

Dr.-Ing. Joewono Prasetijo is Dr.-Ing/PhD graduated from Ruhr Universität Bochum, Germany. He is member of American Society of Civil Engineers (ASCE), U.S.A. and World Conference on Transport Research (WCTRS), U.K. He has just awarded by the Minister of Transport Malaysia for the Best Project ASEAN NCAP (New Car Assessment Program) in 2018.
ABSTRACT

The Most Relevant Contributory Factors for Road Accidents: Experiences From Johor Federal Roads (F001, F023 & F050)

Road accidents are one of the most relevant issues in today's society. It causes hundreds of accidents every year from over the world. Every year 1.2 million of people are killed and between 20 and 50 million people are offended due to the road accidents. Three main types of accidents in Malaysia is collision with passenger cars, collisions with other motorcycles and single-motorcycle accidents. F0050 is ranked the district with the highest road fatalities in Johor for five consecutive years. Motorcyclists and their pillion riders were the highest contributors - 60% or 648 fatalities, followed by car drivers and passengers numbering 266 fatalities. One reason of accident occurrence can be lack of road design consistency which most drivers make fewer errors in the vicinity of geometric features. Geometric design consistency is emerging as an important component in highway design relate to the safety performance. This study explore the use of Poisson regression with excess zero outcomes on the response variable. A generalized linear modelling technique such as Poisson regression model and Negative Binomial model was found to be insignificant in explaining and handle over dispersion which due to high amount of zeros thus Zero Inflated model was introduced to overcome the problem. The application work on the number of road accidents on F001 Jalan Johor Bahru – Segamat, F023 Segamat – Tangkak – Muar and F050 Kluan – Ayer Hitam – Batu Pahat. Data on road accident were collected for five-year period from 2010 through 2014. The result from analysis show that ZINB model performed best, in terms of the comparative criteria based on the P value less than 0.05.