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

Judul Karya Ilmiah	:	Modeling and Analysis of Lateral Control System on Electronic Differential for 2-Independent-Wheel Drive Electric Urban Bus			
Jumlah Penulis	:	4 Orang (**Joga Dharma Setiawan**, Ismoyo Haryanto, Munadi, Indra Sutanto)			
Status Pengusul	:	Penulis ke-1			
Identitas Prosiding	:	a.	Judul Prosiding	:	5th International Conference on Electric Vehicular Technology, ICEVT 2018
		b.	ISBN/ISSN	:	ISBN: 978-153869164-9
		c.	Thn Terbit, Tempat Pelaks.	:	Surakarta, Indonesia, 30-31 Oktober 2018
		d.	Penerbit/Organiser	:	Institute of Electrical and Electronics Engineers Inc.
		e.	Alamat Repository/Web	:	https://www.ieee.org/
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Total = (100%)	**24,00**	**23,50**	**23,75**
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Semarang, 1 Juni 2021

Reviewer 2

Prof. Dr. Jamari, S.T., M.T.
NIP. 197403042000121001
Unit Kerja : Departemen Teknik Mesin FT UNDIP

Reviewer 1

Prof. Dr. rer.nat. Ir. A.P. Bayuseno, M.Sc
NIP. 1962052201989021001
Unit Kerja : Departemen Teknik Mesin FT UNDIP

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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		7,50
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1. **Kesesuaian dan kelengkapan unsur isi paper:**
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2. **Ruang lingkup dan kedalaman pembahasan:**
   Paper ini meneliti tentang analisa simulasi dari bus yang menggunakan motor listrik. Fuzzy logic control digunakan untuk mengatur putaran dua buah motor yang independent untuk menstabilkan bus listrik dan mengatur gerakan yaw dari bus listrik. Hasil dan pembahasan sudah lengkap dijabarkan dalam paper.
3. **Kecukupan dan kemutakhiran data/informasi dan metodologi:**
   Tingkat kemutakhiran dari paper ini sudah baik. Pemodelan dari dinamika bus listrik dimodelkan dalam pemodelan matematika dalam software MATLAB/Simulink. Hasil dari studi menunjukkan bahwa fuzzy logic control dapat mengendalikan gerakan yaw dari bus listrik. Turnitin similiarity score pada paper ini adalah 5%.
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   IEEE merupakan publisher conference yang kualitas terbitannya sudah baik. Prosiding yang ditulis sudah melalui proses peer-review dan terindeks oleh Scopus.

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Prof. Dr. rer.nat. Ir. A.P. Bayuseno, M.Sc
NIP. 1962052201989021001
Unit Kerja : Departemen Teknik Mesin FT UNDIP

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Hasil Penilaian *Peer Review* :

Komponen Yang Dinilai	Nilai Maksimal Prosiding: Internasional [√]	Nilai Maksimal Prosiding: Nasional [ ]	Nilai Akhir Yang Diperoleh
e. Kelengkapan unsur isi prosiding (10%)	2,50		2,00
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1. **<u>Kesesuaian dan kelengkapan unsur isi paper:</u>**
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2. **<u>Ruang lingkup dan kedalaman pembahasan:</u>**
   Papar ini membahas tentang pemodelan dari bus listrik yang digerakkan oleh dua buah motor listrik yang independent. Untuk mengontrok dua buah motor tersebut supaya sinkron dan stabil, FLC digunakan untuk system controlnya. Hasil dari FLC sudah disajikan dalam gambar plot yang mudah dipahami dan lengkap.
3. **<u>Kecukupan dan kemutakhiran data/informasi dan metodologi:</u>**
   Metode yang digunakan dalam paper ini sudah cukup mutakhir yaitu dengan menggunakan fuzzy logic control untuk menstabilkan gerakan jalan dari bus listrik. FLC telah berhasil mengendalikan gerakan yaw dari bus litrik. Metode yang diusulkan dapat meningkatkan kestabilan dinamik dari bus listrik.
4. **<u>Kelengkapan unsur dan kualitas terbitan:</u>**
   Kualitas dari penerbit IEEE explore sudah baik. Prosiding ini telah terindex Scopus.

Semarang, 1 Juni 2021
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Prof. Dr. Jamari, S.T., M.T.
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Proceeding - 2018 5th International Conference on Electric Vehicular Technology, ICEVT 2018
28 January 2019, Article number 8628428, Pages 36-40
5th International Conference on Electric Vehicular Technology, ICEVT 2018; Alila HotelSurakarta; Indonesia; 30 October 2018 through 31 October 2018; Category numberCFP18N65-ART; Code 144691

Modeling and Analysis of Lateral Control System on Electronic Differential for 2-Independent-Wheel Drive Electric Urban Bus (Conference Paper)

Setiawan, J.D., Haryanto, I., Munadi, Sutanto, I.

Mechanical Engineering, Diponegoro University, Semarang, Indonesia

Abstract

View references (8)

To optimize the propulsion performance and to reduce the mass of electric vehicles, an electronic differential subsystem might be preferred since the transmission shaft is removed and the motor is directly connected to wheels. In this research, two motors are used to move 2-Independent-Wheel-Drive of an electric urban bus. In the connection between the two motors, the control system is required to align the performance of both motors to keep the bus stable. This study used the fuzzy logic control in Matlab/Simulink to drive the dynamics of the vehicle modeled in TruckSim. Through calculation, it was found that the maximum lateral speed of the vehicle had the characteristic speed of 150.36 km/h, with wheel angle conditions and slip angle that occurs are 10 deg and 5 deg. However, the speed at which the simulation is used is the maximum speed of the bus with a full charge of 70 km/h. After the simulation, the difference between the yaw rate is ideal, and the actual yaw rate was compared with the yaw rate range derived from the calculation. In the fuzzy logic control, the difference must be less than the yaw rate range. Simulation results showed that the control system was able to align the 2-independent motors by considering the yaw rate; thus the method can improve the dynamic stability of the bus. © 2018 IEEE.

SciVal Topic Prominence

Topic: Electric vehicles | Wheels | Electronic differential

Prominence percentile: 55.340

Author keywords

electric bus | electronic differential | fuzzy logic control | yaw rate control

Indexed keywords

Engineering controlled terms: Buses | Computer circuits | Control systems | Electric machine control | Electric machine theory | MATLAB | Traction motors | Vehicle transmissions | Vehicle wheels

Engineering uncontrolled terms: Electric bus | Electronic differential | Fuzzy logic control | MATLAB /simulink | Model and analysis | Propulsion performance | Transmission shafts | Yaw rate control

Engineering main heading: Fuzzy logic

Funding details

Funding sponsor	Funding number	Acronym

Related documents

Fuzzy control for vehicle stability

Fan, X. , Wang, H. , Fan, B.
(2011) 2011 2nd International Conference on Artificial Intelligence, Management Science and Electronic Commerce, AIMSEC 2011 - Proceedings

Effect of aerodynamic resistance on car's acceleration | Efecto de la resistencia aerodinámica en la aceleración de automóviles

Di Rado, G.R. , Devincenzi, G.H.
(2009) Carreteras

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(2011) Advanced Materials Research

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References (8)

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1 Mahmoud, M., Garnett, R., Ferguson, M., Kanaroglou, P.
Electric buses: A review of alternative powertrains
(2016) *Renewable and Sustainable Energy Reviews*, 62, pp. 673-684. Cited 66 times.
doi: 10.1016/j.rser.2016.05.019
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2 Zhao, Y.E., Zhang, J.W., Guan, X.Q.
Modeling and simulation of electronic differential system for an electric vehicle with two-motor-wheel drive
(2009) *IEEE Intelligent Vehicles Symposium, Proceedings*, art. no. 5164454, pp. 1209-1214. Cited 37 times.
ISBN: 978-142443504-3
doi: 10.1109/IVS.2009.5164454
View at Publisher

3 Wong, J.Y.
(2001) *Theory of Ground Vehicle 3rd Edition*. Cited 2737 times.
New York: John Wiley and Sons

4 Ab. Rashid, R., Setiawan, J.D., Maharun, M., Baharom, M.B.
Investigations into the effects of maximum deflection in low stiffness resilient shaft of Semi Active Steering System
(2016) *ARPN Journal of Engineering and Applied Sciences*, 11 (22), pp. 13353-13358. Cited 2 times.
http://www.arpnjournals.org/jeas/research_papers/rp_2016/jeas_1116_5393.pdf

5 Rajamani, R.
(2012) *Vehicle Dynamics and Control*. Cited 2128 times.
Boston, M.A. Springer US

☐ 6 Hua, Y., Jiang, H., Geng, G.
Electronic differential control of 2WD electric vehicle considering steering stability
(Open Access)

(2017) *AIP Conference Proceedings*, 1820, art. no. 070005. Cited 2 times.
http://scitation.aip.org/content/aip/proceeding/aipcp
ISBN: 978-073541488-4
doi: 10.1063/1.4977347

View at Publisher

☐ 7 Dernoncourt, F.
(2013) *Introduction to Fuzzy Logic*, 21.

☐ 8 Tahami, F., Farhangi, S., Kazemi, R.
A fuzzy logic direct yaw-moment control system for all-wheel-drive electric vehicles

(2004) *Vehicle System Dynamics*, 41 (3), pp. 203-221. Cited 90 times.
doi: 10.1076/vesd.41.3.203.26510

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Institute of Transport Infrastructure , Universiti Teknologi Petronas, Malaysia

Prof. Abdul Rashid Abdul Aziz has been with Universiti Teknologi Petronas for the last 18 years and has held various management positions such as the Head of Mechanical Engineering Department and the Director of Green Technology.

(https://www.utp.edu.my/Research/Pages/Institute-of-Transport-Infrastructure.aspx)

Asc. Prof. Dr. Eng. Muhammad Aziz, M.Eng.

Institute of Innovative Research, Tokyo Institute of Technology, Japan

Asc. Prof. Muhammad Aziz is currently a professor at Institute of Innovative Research, Tokyo Institute of Technology, Japan. He is currently enrolled as the lecturer at Tokyo University of Agriculture and Technology. He is previously served as the planner and mechanical designer ar Seiko Epson Corp.

(http://aes.ssr.titech.ac.jp/aziz/)

Ir. Sigit Puji Santosa, MSME, Sc.D, IPU

National Center for Sustainable Transportation Technology, Indonesia

Dr. Santosa is the Director of the National Center for Sustainable Transportation Technology, he also currently serves as a lecturer in Faculty of Mechanical and Aerospace Engineering, Institut Teknologi Bandung. He obtained his master and doctoral degree from Massachusetts Institute of Technology in Mechanical Engineering.

(http://ncstt.itb.ac.id/personnel/detail/5/Sigit+Puji+Santosa.ncstt)

Dr. Eng. Agus Purwanto, S.T., M.T.

Department of Chemical Engineering, University of Sebelas Maret, Indonesia

Dr. Eng. Agus Purwanto currently serves as a lecturer in Chemical Engineering Department, University of Sebelas Maret, Indonesia and as a Principal Investigator in RESS Battery Characterization and Technology Development research cluster at National Center for Sustainable Transportation Technology.

(https://eis.uns.ac.id/simpeg/cari-staf/view?id=1628)

Herutama Trikoranto, Ph.D.

Senior Vice President of Research and Technology Center, PT. Pertamina (Persero)

Herutama Trikoranto have been serving as senior vice president of research and technology center at PT. Pertamina (Persero) since April 2017. Previously, he served as a Development Director, Vice President of Exploitation, and General Manager of Pertamina EP. He pursued his Ph.D. degree at Texas A&M University in Petroleum Engineering.

(https://www.linkedin.com/in/herutama-trikoranto-18b1bb45/)

Dr. Hubert Friedl

Senior Product Manager, Gasoline Engine Power System, AVL Austria

Hubert Friedl has been dedicated to AVL Austria as a senior product manager in gasoline engine power system. He focuses on improving automobile fuel efficiency and substantial reduction of pollutant emission. Extensive progress can be made by consequent utilization of advanced powertrain technology features combined with modern development methods and instrumentation.

(https://www.avl.com/-/electrification-solution-for-tractors)

Yui Hastoro Sapardyanto

Director, PT. Toyota Motor Manufacturing Indonesia

Joined TMMIN since 1989 and has been a Director since 2011, he has held various essential positions throughout his career, among others, Director of Technical (Purchasing, Engineering, Quality Assurance); Information System & Technology; Corporate Affairs (2011-2014); and now he is the Director of Technical and Project Planning & Management.

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Fakhrina Fahma, S.TP., M.T.
(http://ncstt.itb.ac.id/personnel/detail/58/Fakhrina+Fahma.ncstt)
Universitas Sebelas Maret

Gita Sulistia, MBA (http://ncstt.itb.ac.id/personnel.ncstt)
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Muhammad Farda, M.Sc.
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Institut Teknologi Bandung

Dita Novizayanti, S.Si. (http://ncstt.itb.ac.id/personnel.ncstt)
Institut Teknologi Bandung

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(http://ncstt.itb.ac.id/personnel/detail/54/Tatacipta+Dirgantara.ncstt)
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Prof. Mardjono S
(http://ncstt.itb.ac.id/personnel/detail/88/Mardjono+Siswosuwarno.ncstt)
Institut Teknologi Bandung

Prof. Iswandi Imran
(http://ncstt.itb.ac.id/personnel/detail/62/Iswandi+Imran.ncstt)
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PARALLEL SESSION 4–MEETING ROOM 10

2018 5th International Conference on Electric Vehicular Technology (ICEVT)
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Modeling and Analysis of Lateral Control System on Electronic Differential for 2-Independent-Wheel Drive Electric Urban Bus

Joga Dharma Setiawan
Mechanical Engineering
Diponegoro University
Semarang, Indonesia
joga.setiawan@ft.undip.ac.id

Ismoyo Haryanto
Mechanical Engineering
Diponegoro University
Semarang, Indonesia
ismoyo2001@yahoo.de

Munadi
Mechanical Engineering
Diponegoro University
Semarang, Indonesia
muna_096@yahoo.com

Indra Sutanto
Mechanical Engineering
Diponegoro University
Semarang, Indonesia
indrasutantoa211@gmail.com

***Abstract*— To optimize the propulsion performance and to reduce the mass of electric vehicles, an electronic differential subsystem might be preferred since the transmission shaft is removed and the motor is directly connected to wheels. In this research, two motors are used to move 2-Independent-Wheel-Drive of an electric urban bus. In the connection between the two motors, the control system is required to align the performance of both motors to keep the bus stable. This study used the fuzzy logic control in Matlab/Simulink to drive the dynamics of the vehicle modeled in TruckSim. Through calculation, it was found that the maximum lateral speed of the vehicle had the characteristic speed of 150.36 km/h, with wheel angle conditions and slip angle that occurs are 10 deg and 5 deg. However, the speed at which the simulation is used is the maximum speed of the bus with a full charge of 70 km/h. After the simulation, the difference between the yaw rate is ideal, and the actual yaw rate was compared with the yaw rate range derived from the calculation. In the fuzzy logic control, the difference must be less than the yaw rate range. Simulation results showed that the control system was able to align the 2-independent motors by considering the yaw rate; thus the method can improve the dynamic stability of the bus.**

***Keywords*—electric bus, electronic differential, fuzzy logic control, yaw rate control**

I. Introduction

Electric buses have the characteristics of zero emission and good economy [1]. Besides, the use of electric buses as public transportation has already widespread in the community, but the safety of the vehicles is one of the problems at this moment. One of the causes of accidents is the incapability of the vehicle when maneuvering. Therefore, the controlled powertrain system of the bus is developed. In this paper, a powertrain model which is used is 2-Independent-Wheel-Drive (IWD), which the bus has two motors on its powertrain.

To control two separate motors working on the bus require an electronic differential. The electronic differential has a role in regulating the voltage applied to the motor according to the given control system.

In the electronic differential, there is a fuzzy logic system that accepts parameters measured through sensors as motor speed, longitudinal speed of the bus, and steering angle. Through the designed control system, the system can determine the required torque as an output of both motors to reach stable conditions.

The using of the electronic differential is more profitable than gear differential because it is lighter and has a fast response. The transmission of the gear on the differential gear makes the time generated in the response become slower. So does the weight, on the differential gear, there is a heavy gearbox that causes its weight exceeds the electronic differential [2].

The main purpose of the electronic differential is to respond to the motor to stabilize the bus during maneuvering. To maintain the stability of the bus, the control in the lateral direction is built. The function of the lateral control system on the bus aims to regulate the torque of the motor in the bus so that the bus could maintain its position of the bus against the load or lateral force applied to the wheel.

Because the existence of two motors that are independent, there is a moment where the torque of both motors do not match with their positions and conditions while the bus maneuvers. To provide an appropriate torque in the maneuvering conditions, the control system on the bus is needed. By controlling the moment that occurs on the bus, the yaw rate of the bus is controlled. Therefore one of the observed parameters from bus condition to make stable in maneuvering is the yaw rate of the bus.

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Range Extender Technology for Electric Vehicles

Hubert Friedl
Product Manager Gasoline Engines
AVL List
Graz, Austria
hubert.friedl@avl.com

Christian Hubmann
Lead Engineer Motorcycles
AVL List
Graz, Austria
christian.hubmann@avl.com

Gerald Teuschl
Product Manager Electrification
AVL List
Graz, Austria
gerald.teuschl@avl.com

Günter Fraidl
Business Field Manager Passenger Cars
AVL List
Graz, Austria
guenter.fraidl@avl.com

Helfried Sorger
Technical Field Leader Design
AVL List
Graz, Austria
helfried.sorger@avl.com

Christian Martin
Product Manager Gasoline Engines
AVL List
Graz, Austria
christian.martin@avl.com

***Abstract* – The demand for improved fuel economy and the request for Zero Emission within cities require complex powertrains with an increasing level of electrification already in a short-termed timeframe until 2025. According to general expectations the demand for Hybrid powertrains will increase significantly within a broad range of implementation through all vehicle classes as well as on battery electric vehicles (BEV) mainly for use in urban areas.**

For a broad acceptance of battery electric vehicles, the trade-off between all electric range and battery cost respectively weight represents the most important challenge. The all electric range obtained under real world conditions most often deviates significantly from the nominal value which is measured under idealized conditions. Under extreme conditions – slow traffic and demanding requirements for cabin heating or cooling – the electrical range might become less a question of spatial distance but even more of total operation time.

As long as no sufficient charging infrastructure is available, measures for BEV have to applied to avoid "Range Anxiety" of the user. This may be additional battery capacity, which is increasing cost and weight proportionally to requested range. Alternatively, a so-called Range Extender (RE) with internal combustion engine (ICE) may be integrated, of course also increasing cost and weight, but independent from requested driving range.

In the last years AVL has developed several solutions for electrification of the powertrain as well as Range Extenders for battery electric vehicles. The different solutions cover REXs with Rotary engine, 2- and single cylinder engines derived from motorcycle applications. In the present paper the different solutions are described and the priorities for application as well as practical use are explained.

Keywords* – *Battery electric vehicle, range extender, serial hybrid, internal combustion engine

I. Introduction

In the next years electrification will have a major impact on the powertrain of passenger cars. The application spectrum will range from simple start/stop systems over various kinds of hybrids up to the pure electric vehicle (EV). Although market shares for battery electric vehicle are still growing slowly, but hybrid technology definitely will come on really large scale, in all vehicle segments and all around the world, Fig. 1.

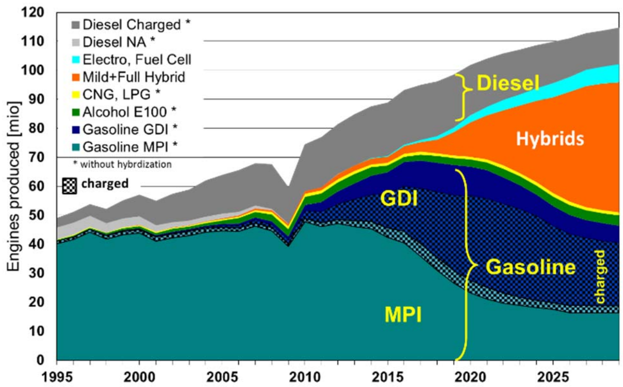

Fig. 1. Global production of passenger cars differentiated by propulsion technology [1]

For the pure battery electric vehicle, a severe trade-off has to be overcome, which is the conflict between requested mileage and battery weight on the other hand. Current electric vehicles usually have much wider nominal driving range compared to the real life average driving distance which usually is much shorter (e.g. in Germany 70-80% is below 50 km per trip). This means that for daily use additional battery weight is carried around in the vehicle without being used. Besides battery cost, the portion of battery capacity not utilized also is reducing efficiency of the complete vehicle. Apart from purely efficiency standpoint it has to be considered that BEV-batteries have to have a certain over-capacity to avoid the so-called "range anxiety" of the car users who want to complete their driving mission without any unexpected recharging.

A very simple and clever solution to overcome this conflict is the Range Extender by means of internal combustion engine. The most effective technical solution for such a Range Extender is largely determined by the ratio between pure battery operation and vehicle operation supported by an internal combustion engine. With primarily battery driven vehicles, the priorities for the RE combustion engine have to be set completely different compared to the conventional powertrain: NVH, package and weight are the most important items whereas the efficiency of the ICE is less important due to the low share of ICE operation. Hence, even ICE concepts, which are not optimal for pure ICE driven

Dimensional and Parametric Study on Thermal Behaviour of Li-ion Batteries

Poetro Lebdo Sambegoro[1,2]
[1]*Faculty of Mechanical and Aerospace Engineering*
Institut Teknologi Bandung
[2]*National Center for Sustainable Tranportation Technology (NCSTT)*
Bandung, Indonesia
poetro@ftmd.itb.ac.id

Evan Philander[1,2]
[1]*Faculty of Mechanical and Aerospace Engineering*
Institut Teknologi Bandung
[2]*National Center for Sustainable Tranportation Technology (NCSTT)*
Bandung, Indonesia
evan.philander.w@gmail.com

Bentang Arief Budiman[1,2]
[1]*Faculty of Mechanical and Aerospace Engineering*
Institut Teknologi Bandung
[2]*National Center for Sustainable Tranportation Technology (NCSTT)*
Bandung, Indonesia
bentang@ftmd.itb.ac.id

Muhammad Aziz
AES Center, Institute of Innovative Research
Tokyo Institute of Technology
Tokyo, Japan
maziz@ssr.titech.ac.jp

***Abstract* — Safety is the primary concern in developing Electric Vehicles (EVs). Recent accidents on electric vehicles involving thermal runaway event have set drawbacks in EVs deployment around the world. Battery thermal management needs to be considered carefully during the design process. This work uses an integrated model of Li-ion batteries starting from the electrochemical process in the electrodes. The model is used to analyze the effect of both dimensions and materials on thermal behavior of Li-ion batteries. The results demonstrate that different designs are prone to suffer from the distinct risk of thermal runaway event. The results are expected to be a guideline to design batteries for EVs.**

Keywords—Electric Vehicles, Battery, Lithium, Thermal runaway

I. INTRODUCTION

Climate change and global warming are the challenges of this generation [1], [2]. These challenges threat the existence of our species. This generation will have to come up with a solution to this threat to ensure the survival of our species. While anyone with a good common sense agrees that EV is one of the solutions to climate change and global warming, not everyone is convinced to purchase or even use it yet. Among the primary reasons are cost, practicality, and safety.

EV is still expensive relative to the Internal Combustion Engine (ICE) based vehicle [3]. The high cost is primarily due to the battery. The practicality is also a big issue. The battery storage capacity is still limited ranging from 33-100 kWh, depending on the manufacturers and the price. Although these numbers still need to be increased, these capacities are already translated to a good travel range, 180-530 km. However, the scarcity of the charging station and the long charging time still does not offset the advantage of using the ICE based vehicle.

In addition to those challenges, safety is another primary concern[4]. One would never consider using a vehicle which is not proven to be safe. Recent accidents involving EVs have set drawbacks in the expansion of EV deployment[5]. This is an issue as we try to expand EVs exposure to larger market as one of answers for climate change and global warming.

The vehicle safety is commonly related to the prevention from a crash and the crashworthiness[6], [7]. The prevention is satisfied by designing a vehicle with excellent maneuverability, different sensors to prevent the crash, and semi/full autonomous control correction. The crashworthiness is designed to avoid harm to the passengers when a crash happens. This task is satisfied by designing a strong structure yet light and easy to manufacture[8]. The vehicle design also includes a safety belt and airbag simulation during crash to minimize harm to the passengers.

Fire hazard is also a safety risk that needs to be eliminated in designing vehicles. Fire hazard is usually caused due to the batteries or gasoline as both serves as the energy storage in the vehicles. Different than ICE based vehicles which need to prevent fire hazard from the gas tank, EVs designers focus the effort to eliminate fire hazard from the batteries.

Fire hazard from batteries is due to a thermal runaway event[9]. The thermal runaway event is a spontaneous event in which the temperature of the batteries increases rapidly until it reaches the ignition temperature point of the electrodes. Short-circuited electrodes or high temperatures could cause the thermal runaway event. When the positive and negative electrodes are short-circuited, there is no resistance between them. This will cause large electric current flow through contact. The large current flow will generate heat at a very small location. This will increase the temperature rapidly until it reaches the ignition temperature. This phenomenon is called the thermal runaway event.

II. MODELLING AND SIMULATION

A battery model is created in this work. The model is simulated by integrating the electrochemical and heat transfer phenomena. [10]–[12]

A. Electrochemistry

A Newman Pseudo-2D model is used to study the discharge process of a Li-ion battery. This model is the most compressive model. However, it requires more complex parameter input and is considered as a computationally expensive compared to two others models available in ANSYS software [13].