



CONFERENCE PROGRAMS AND ABSTRACT

**The 3rd FIRST 2019 INTERNATIONAL CONFERENCE
FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY
OCTOBER 09-10, 2019
*Palembang, Province of South Sumatera
Indonesia***

Organized by :



Collaborate With :



PREFACE

The 3rd FIRST 2019 (Forum in Research, Science, and Technology) International Conference was initiated and organized by State Polytechnic of Sriwijaya in collaboration with Management and Science, University (MSU), Malaysia and National Chin-Yi University of Technology, Taiwan. The theme of the conference was “Integration of Advanced Technology to Enhance Social Welfare”. The 3rd FIRST 2019 International Conference facilitated the participants from all over the world to meet face to face to open chances in establishing connection and collaboration among them. It was not only for the researchers in academics, but also in industries and governments. This conference became an effective media to link the researchers from many parts of the world conference, for exchanging, sharing, following up and discussing the results of the latest research, industry’s needs, and government regulatory policies. The 3rd FIRST 2019 International Conference became worthwhile platform for researchers to present their finding in the areas on multidisciplinary of Engineering and Science (Track 1), Computer Science and ICT (Track 2), and Social Science (Track 3). It has also provided an opportunity for the professionals and researchers to learn and share about the latest development and research in those 3 tracks.

The 3rd FIRST 2019 International Conference attracted so many authors not only from Indonesia but also from other countries, such as Japan, Taiwan, and Malaysia. There were 180 papers were accepted in the 3rd FIRST 2019 International Conference, including 89 papers for Track 1 (Engineering and Science), 46 papers for Track 2 (Computer Science and ICT), and 45 papers for Track 3 (Social Science). In The 3rd FIRST 2019 International Conference, there were 4 keynote speakers and 2 invited speakers. As the keynote speakers, there were Prof. Yasushi Kiyoki, Ph. D from KEIO University, Japan, Prof. Nurul Taufiqu Rochman, M. Eng, Ph. D, From LIPI, Indonesia, Prof. Tjiptohadi Sawarjuwono, M. Ec., Ph. D., Ak, from Universitas Airlangga, Indonesia, and Prof. Win-Jet Luo, from National Chin-Yi University of Technology, Taiwan. As the invited speakers, there were Dr. R. Wisnu Nurcahyo, DVM from Universitas Gadjah Mada, Indonesia, and Assoc. Prof. Dr. Intan Zaurah binti Mat Darus from Universiti Teknologi, Malaysia. The 3rd FIRST 2019 International Conference committee would like to say thank you very much for all the participants and their respected institutions that have supported for the success of the 3rd FIRST 2019 International Conference, and also for all of the guess and sponsors of the 3rd FIRST 2019 International Conference.

General chair

Dr. Rita Martini, S.E., M.Si., Ak.

Secretary of Research Unit of State Polytechnic of Sriwijaya, Indonesia

Program chair

Dr. Desloehal Djumrianti

State Polytechnic of Sriwijaya, Indonesia

Dr. Ade Silvia Handayani

State Polytechnic of Sriwijaya, Indonesia

Organizing committee

Prof. Erry Yulian Triblas Adesta

International Islamic University, Malaysia

Prof. Win-jet Luo, Ph.D.

National Chin-Yi University of Technology, Taiwan

Prof. Yasushi Kiyoki

Keio University, Japan

Prof. Eddy Yusuf, Ph.D

Management Science University, Malaysia

Prof. Dr. Werner Rammense

Cologne University, Germany

Assoc. Prof. Dr. Augustus E. Osseo-Asare

University of Sunderland, United Kingdom

Technical committee

Prof. Muhammad Nizam, Ph.D

Universitas Sebelas Maret, Indonesia

Prof. Dr. Mohammad Yeakub Ali

International Islamic University Malaysia

Dr.drh R. Wisnu Nurcahyo, DVM

Universitas Gadjah Mada, Indonesia

Dr. Untung Santoso, M.S

Universitas Muhammadiyah Malang, Indonesia

Assoc. Prof. Ahmad Hoirul Basori

King Abdulaziz University, Saudi Arabia

Prof. Dr. Ir. Siti Nurmaini

Universitas Sriwijaya, Indonesia

Prof. Aldes Lesbani S.Si,M.Si,Ph.D

Universitas Sriwijaya, Indonesia

Yu-Lieh Wu, Ph.D.

National Chin-Yi University of Technology, Taiwan

Dr. Zuhadi Zakaria

Politeknik Seberang Perai, Malaysia

Dr. Ing. Ahmad Taqwa, M.T

State Polytechnic of Sriwijaya, Indonesia

Dr. RD. Kusumanto, MM

State Polytechnic of Sriwijaya, Indonesia

Irsyadi Yani, ST., M.Eng. PhD

Universitas Sriwijaya, Indonesia

Dr. Yuli Yetri, M.Si
Politeknik Negeri Padang
Dr. Eng. Tresna Dewi, M.Eng.
State Polytechnic of Sriwijaya, Indonesia
Dr.Ir.Rusdianasari, M.Si,
State Polytechnic of Sriwijaya, Indonesia
Dr. Yohandri Bow, M.Si
State Polytechnic of Sriwijaya, Indonesia
Ir. Indra Chandra Setiawan, M.T.
PT. Toyota Motor Manufacturing, Indonesia

Editor

Deris Stiawan, Ph.D
Universitas Sriwijaya, Indonesia
Dr. Nyayu Latifah Husni
State Polytechnic of Sriwijaya, Indonesia
Dr. Rita Martini, S.E., M.Si., Ak.
State Polytechnic of Sriwijaya, Indonesia
Dr. Ade Silvia Handayani
State Polytechnic of Sriwijaya, Indonesia
Dr. Marieska Lupikawati
State Polytechnic of Sriwijaya, Indonesia

Authors

Affandi, Muhammad Irfan
Marketing Efficiency of Organic Rice in Lampung Province

Afrizawati
The Effect of Organization Climate on Performance with Job Satisfaction as an Intervening Variable

Akbar, Muhamad
E-Government Policy, Leadership Commitment, Apparatus Resources Development, and Their Implications on Public Service Performance

Aladin
Industrial Clusterization to Improve the Competitiveness of Small and Medium Industries in the City of Palembang

Alhadi, Esya
Impact of Customer Orientation and Quality of Service on Trust and Customer Loyalty

Alhamdari, Lailita
Analysis Method Economic Value Added of Cosmetics Companies Listed on Indonesia Stock Exchange

Amalia, Rizki Fitri
Political Connection, Profitability, and Capital Intensity Against Tax Avoidance in Coal Companies on the Indonesia Stock Exchange

Amran, Ali
Relationship Between GPA, Length of Study, and Competency with the Length of Time to Get a Job

- Amri, Darul
Determinant of Development Strategies and Leadership Styles on Organizational Commitment and Their Implications for MSMEs Performance in Palembang
- Andriani, Titi
Impact of Customer Orientation and Quality of Service on Trust and Customer Loyalty
- Anshari, Muhammad
Human Resource Role and Online Strategy
- Aprianti, Siska
The Effect of Capital Readiness and E-Commerce Utilization on the Competitiveness of Micro, Small, and Medium Enterprises Woven, Palembang
- Ardiani, Susi
The Effect of Hospital Image and Service Quality on Customer Loyalty Through Customer Satisfaction
- Arifin, Kiagus Zainal
Determinants of Village Financial Management Accountability
- Armaini, Rosy
The Impact of Village Fund Program Implementation Toward Society Welfare in Indonesia
- Aryani, Yuli Antina
Industrial Clusterization to Improve the Competitiveness of Small and Medium Industries in the City of Palembang
- Badri, Markoni
The Environmental Compliance Management of Palm Oil Plantation in Ogan Komering Ilir Regency, Sumatera Selatan, Indonesia
- Bustan, Jusmawi
Analysis Method Economic Value Added of Cosmetics Companies Listed on Indonesia Stock Exchange
- Bustan, Jusmawi
The Effect of Culinary Knowledge and Culinary Experience on Local Culinary Attractiveness
- Carlos, RS
Criminal Law Policy on the Crime of Abuse to the Orang Rimba in the Bukit Duabelas National Park
- Choiruddin
Determinants of Village Financial Management Accountability
- Darfin, Deri
The Public Service Quality of Library Service at the Library Unit Polytechnic State of Sriwijaya
- Darlies, Meiyi
Criminal Law Policy on the Crime of Abuse to the Orang Rimba in the Bukit Duabelas National Park
- Darmaliana
The Development of Teaching Material Speaking 2 Based on Communicative Approach
- Desiani, Anita
Relationship Between GPA, Length of Study, and Competency with the Length of Time to Get a Job

- Dewata, Evada
Industrial Clusterization to Improve the Competitiveness of Small and Medium Industries in the City of Palembang
- Divianto
The Effect of Organization Climate on Performance with Job Satisfaction as an Intervening Variable
- Djumrianti, Desloehal
Online Transportation Technology and Women's Driver Communication Skills
- Dwitayanti, Yevi
The Impact of Village Fund Program Implementation Toward Society Welfare in Indonesia
- Effendi, Ridwan
The Public Service Quality of Library Service at the Library Unit Polytechnic State of Sriwijaya
- Elisa
Evaluation of Sales Price Within Calculation Cost of Good Production SMEs Pempek Ilir Barat I and Bukit Kecil District, Palembang
- Ermatita
The Clustering of Paddy Fields Using Machine Learning Algorithms in the Province of South Sumatera
- Erwin, Muhamad
Criminal Law Policy on the Crime of Abuse to the Orang Rimba in the Bukit Duabelas National Park
- Evawati, Nian Masna
Language Experience Approach in Teaching Reading Comprehension to the Engineering Students
- Fadila, Dewi
Impact of Learning, Socialization, and Financial Lifestyle of Students' Intention to Invest in Capital Market
- Faridah
The Effect of Taxpayer Awareness and Tax Sanctions on Compliance in Paying Land and Building Taxes
- Firdaus, Yusnizal
The Environmental Compliance Management of Palm Oil Plantation in Ogan Komering Ilir Regency, Sumatera Selatan, Indonesia
- Fithri, Eka Jumarni
Determinants of the Quality Regional Financial Statement
- Frimansyah
Determinant of Development Strategies and Leadership Styles on Organizational Commitment and Their Implications for MSMEs Performance in Palembang
- Gustiani, Sri
The Effectiveness of Blended Learning Approach on Essay Writing Subject
- Hamid, Abd.
The Effect of Culinary Knowledge and Culinary Experience on Local Culinary Attractiveness
- Handayani, Sri
Marketing Efficiency of Organic Rice in Lampung Province
- Handayani, Sri
Comparison Analysis of Added Value of Organic Rice and Inorganic Rice

- Hanifati
Online Transportation Technology and Women's Driver Communication Skills
- Hardiyansyah, Hardiyansyah
E-Government Policy, Leadership Commitment, Apparatus Resources Development, and Their Implications on Public Service Performance
- Hartati, Sukmini
Dimension of Village Expenditure in Development Sector
- Hartaty, Sri
Determinants of the Quality Regional Financial Statement
- Herawati, Yusleli
Evaluation of Sales Price Within Calculation Cost of Good Production SMEs Pempek Ilir Barat I and Bukit Kecil District, Palembang
- Herman
The Effect of Directed Reading—Thinking Activity on Students' Critical Thinking Abilities
- Husori, Al
The Environmental Compliance Management of Palm Oil Plantation in Ogan Komering Ilir Regency, Sumatera Selatan, Indonesia
- Indriasari, Desi
Determinants of Village Financial Management Accountability
- Irmeilyana
Relationship Between GPA, Length of Study, and Competency with the Length of Time to Get a Job
- Jauhari, Hadi
Human Resource Role and Online Strategy
- Koesharijadi, Koesharijadi
E-Government Policy, Leadership Commitment, Apparatus Resources Development, and Their Implications on Public Service Performance
- Koryati
Language Experience Approach in Teaching Reading Comprehension to the Engineering Students
- Kusmartini, Sri Endah
The Development of Teaching Material Speaking 2 Based on Communicative Approach
- Lisnini
Model of Empowerment as Strategies for Women SMEs Entrepreneurs Competitiveness in Palembang
- Lupikawaty, Marieska
Analysis Method Economic Value Added of Cosmetics Companies Listed on Indonesia Stock Exchange
- Lupikawaty, Marieska
Evaluation of Sales Price Within Calculation Cost of Good Production SMEs Pempek Ilir Barat I and Bukit Kecil District, Palembang
- Mahendrati, Hermina Agustina
Individual Readiness for Change and Affective Commitment to Change: The Mediation Effect of Technology Readiness on Public Sector
- Mandiangan, Pridson
Online Transportation Technology and Women's Driver Communication Skills

- Mangundjaya, Wustari
Testing the Role of Charismatic Leadership, Psychological Climate, and Organizational Citizenship Behavior on Resilience
- Mangundjaya, Wustari L.
Leader–Member Exchange and Affective Commitment to Change: Mediating Role of Change Self-Efficacy
- Mangundjaya, Wustari
Testing the Impact of Organizational Justice on Affective Commitment to Change with Work Engagement as Mediator
- Mangundjaya, Wustari
Individual Readiness for Change and Affective Commitment to Change: The Mediation Effect of Technology Readiness on Public Sector
- Mangundjaya, Wustari L.
Testing Mediation of Psychological Empowerment, Work Engagement to Affective Commitment to Change
- Maretha, Fetty
Model of Empowerment as Strategies for Women SMEs Entrepreneurs Competitiveness in Palembang
- Maria
The Impact of Village Fund Program Implementation Toward Society Welfare in Indonesia
- Mariskha, Z
Impact of Learning, Socialization, and Financial Lifestyle of Students' Intention to Invest in Capital Market
- Martini, Rita
Dimension of Village Expenditure in Development Sector
- Marwa, Taufiq
Exploring Linkage Among Experiential Value, Image of Destination, and Intention to Revisit in Nature Tourism
- Masnila, Nelly
The Effect of Taxpayer Awareness and Tax Sanctions on Compliance in Paying Land and Building Taxes
- Maulana, Riska
Impact of Learning, Socialization, and Financial Lifestyle of Students' Intention to Invest in Capital Market
- Miskiyah, Neneng
Human Resource Role and Online Strategy
- Mubarok, Muhammad Husni
The Effect of Taxpayer Awareness and Tax Sanctions on Compliance in Paying Land and Building Taxes
- Nadjmuddin, Muhammad
The Effect of Directed Reading—Thinking Activity on Students' Critical Thinking Abilities
- Natoen, Ardiyan
The Influence of Commitment on State Civil Apparatus in the Governor Office of South Sumatera
- Nirmagustina, Dwi Eva
Comparison Analysis of Added Value of Organic Rice and Inorganic Rice

- Nurhasanah
The Impact of Village Fund Program Implementation Toward Society Welfare in Indonesia
- Oktarian, Rido Prawira
Relationship Between GPA, Length of Study, and Competency with the Length of Time to Get a Job
- Oktarida, Anggeraini
Determinants of the Quality Regional Financial Statement
- Paisal
The Effect of Organization Climate on Performance with Job Satisfaction as an Intervening Variable
- Pangestu, Bramntyo Muhamad
The Effect of Capital Readiness and E-Commerce Utilization on the Competitiveness of Micro, Small, and Medium Enterprises Woven, Palembang
- Pebrianti, Yulia
Model of Empowerment as Strategies for Women SMEs Entrepreneurs Competitiveness in Palembang
- Periansya
The Influence of Commitment on State Civil Apparatus in the Governor Office of South Sumatera
- Purwati
Evaluation of Sales Price Within Calculation Cost of Good Production SMEs Pempek Ilir Barat I and Bukit Kecil District, Palembang
- Puspitasari, Dwi Andriani
Leader–Member Exchange and Affective Commitment to Change: Mediating Role of Change Self-Efficacy
- Rahma, Munaja
Students' Perception of English Blended-Learning in State Polytechnic of Sriwijaya
- Riama, Lambok Vera
Determinants of the Quality Regional Financial Statement
- Ridho, Sari Lestari Zainal
Human Resource Role and Online Strategy
- Ridhwan, Moehammad
Students' Perception of English Blended-Learning in State Polytechnic of Sriwijaya
- Rini
Model of Empowerment as Strategies for Women SMEs Entrepreneurs Competitiveness in Palembang
- Risa
The Development of Teaching Material Speaking 2 Based on Communicative Approach
- Risnawati
The Development of Teaching Material Speaking 2 Based on Communicative Approach
- Robinson
The Public Service Quality of Library Service at the Library Unit Polytechnic State of Sriwijaya

- Rusnadi, Irawan
Criminal Law Policy on the Crime of Abuse to the Orang Rimba in the Bukit Duabelas National Park
- Sandrayati
The Effect of Hospital Image and Service Quality on Customer Loyalty Through Customer Satisfaction
- Sanmorino, Ahmad
The Clustering of Paddy Fields Using Machine Learning Algorithms in the Province of South Sumatera
- Sari, Evi Agustina
The Effectiveness of Blended Learning Approach on Essay Writing Subject
- Sari, Yuliana
Industrial Clusterization to Improve the Competitiveness of Small and Medium Industries in the City of Palembang
- Sari, Kartika Rachma
Determinants of Village Financial Management Accountability
- Sarikadarwati
The Effect of Hospital Image and Service Quality on Customer Loyalty Through Customer Satisfaction
- Sastrawinata, Hendra
Impact of Learning, Socialization, and Financial Lifestyle of Students' Intention to Invest in Capital Market
- Satriawan, Indra
The Influence of Commitment on State Civil Apparatus in the Governor Office of South Sumatera
- Seprianto, Dicky
Criminal Law Policy on the Crime of Abuse to the Orang Rimba in the Bukit Duabelas National Park
- Setiawan, Heri
The Effect of Culinary Knowledge and Culinary Experience on Local Culinary Attractiveness
- Setiawan, Heri
Exploring Linkage Among Experiential Value, Image of Destination, and Intention to Revisit in Nature Tourism
- Shihab, Muchsin Sagaf
Exploring Linkage Among Experiential Value, Image of Destination, and Intention to Revisit in Nature Tourism
- Simanjuntak, Tiur
The Effectiveness of Blended Learning Approach on Essay Writing Subject
- Sopian, A.R
The Influence of Commitment on State Civil Apparatus in the Governor Office of South Sumatera
- Sulaiman
The Effect of Capital Readiness and E-Commerce Utilization on the Competitiveness of Micro, Small, and Medium Enterprises Woven, Palembang
- Sunani
The Effect of Directed Reading—Thinking Activity on Students' Critical Thinking Abilities

- Suryati
The Clustering of Paddy Fields Using Machine Learning Algorithms in the Province of South Sumatera
- Susilo
Testing Mediation of Psychological Empowerment, Work Engagement to Affective Commitment to Change
- Thoyib, M.
Determinant of Development Strategies and Leadership Styles on Organizational Commitment and Their Implications for MSMEs Performance in Palembang
- Tompunu, Alan Novi
Criminal Law Policy on the Crime of Abuse to the Orang Rimba in the Bukit Duabelas National Park
- Ummasyroh
The Effect of Culinary Knowledge and Culinary Experience on Local Culinary Attractiveness
- Wahab, Zakaria
Exploring Linkage Among Experiential Value, Image of Destination, and Intention to Revisit in Nature Tourism
- Wahyudi, Riza
Determinant of Development Strategies and Leadership Styles on Organizational Commitment and Their Implications for MSMEs Performance in Palembang
- Widyastuti, Endah
Dimension of Village Expenditure in Development Sector
- Windarti, Gst Ayu Oka
Impact of Customer Orientation and Quality of Service on Trust and Customer Loyalty
- Yahya
The Effect of Organization Climate on Performance with Job Satisfaction as an Intervening Variable
- Yeny, Eli
The Effect of Directed Reading—Thinking Activity on Students' Critical Thinking Abilities
- Yulina, Bainil
The Effect of Capital Readiness and E-Commerce Utilization on the Competitiveness of Micro, Small, and Medium Enterprises Woven, Palembang
- Yulsiati, Henny
The Effect of Hospital Image and Service Quality on Customer Loyalty Through Customer Satisfaction
- Yurnalis
Testing the Impact of Organizational Justice on Affective Commitment to Change with Work Engagement as Mediator
- Yusri
The Effectiveness of Blended Learning Approach on Essay Writing Subject
- Yusuf, M.
The Environmental Compliance Management of Palm Oil Plantation in Ogan Komering Ilir Regency, Sumatera Selatan, Indonesia
- Zahara, Elvia
Impact of Customer Orientation and Quality of Service on Trust and Customer Loyalty

Zakaria

Students' Perception of English Blended-Learning in State Polytechnic of Sriwijaya

Zamheri, Ahmad

Criminal Law Policy on the Crime of Abuse to the Orang Rimba in the Bukit Duabelas National Park

Zulkarnaini

The Public Service Quality of Library Service at the Library Unit Polytechnic State of Sriwijaya

Zulkifli

Language Experience Approach in Teaching Reading Comprehension to the Engineering Students

Zulkifli, Zulkifli

Dimension of Village Expenditure in Development Sector



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Srijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



TABLE OF CONTENTS

TRACK 1.....	1
ELECTRICAL ENGINEERING.....	1
A GLOBAL KNOWLEDGE SHARING AND SEMANTIC COMPUTING SYSTEM WITH 5-DIMENSIONAL WORLD-MAPFOR NATURAL AND SOCIAL ENVIRONMENT-ANALYSIS AND VISUALIZATION	1
5G Channel Model for 28 GHZ Frequency in Palembang	2
B Alfaresi , Z Nawawi , R F Malik, K Anwar.....	2
Wireless Sensor Network Data Communication and Information System to Regulate Water Volume and Turbine Rotation	3
Suzan Zefi ¹⁾ , Eka Susanti ²⁾ , R.A Halimahtussa'diyah ³⁾ , Sholihin ⁴⁾	3
Tomato Harvesting Arm Robot Manipulator; a Pilot Project.....	4
Yurni Oktarina ¹ ,Tresna Dewi ¹ , Pola Risma ¹ , and Muhammad Nawawi ¹	4
Performance Evaluation Solar Charge Controller on Solar Power System Home-Based SPV Amorphous 80 Watt-Peak.....	5
Armin Sofijan ¹ , Zainuddin Nawawi ² , Bhakti Yudho Suprpto ³ , Riman Sipahutar ⁴ , Irwin Bizzy ⁵	5
The Implementation of YateBTS Based GSM Using Raspberry PI.....	6
Sopian Soim ¹⁾ , Suroso ²⁾ , Ade Silvia Handayani ³⁾ , Ahmad Taqwa ⁴⁾ , Nur Shadrina ⁵⁾	6
Optimization of Own Electricity Usage with Electricity Supply from Solar Cells at Darajat Geothermal Power Plant.....	7
Brendy Chandra Supian Atmodjo ¹ and Rinaldy Dalimi ¹	7
Ultrasonic Sensor Application as a Performance Enhancement of Robot Two Wheels.....	8
Yeni Irdyanti ⁽¹⁾ , Rd. Kusumanto ⁽²⁾ , Masayu Anisah ⁽³⁾ , Niksen Alfarizal ⁽⁴⁾ , Zarmariesyah Erman ⁽⁵⁾ ...	8
Operation 3 Phase Induction Motor 1 KW Star Delta System Using HP (Smart Phone).....	9
Nofiansah ¹ , M. Noer ² , Nurhaida ³ , M. Hafidz Aulia ⁴	9
PLC Omron CJ1M CPU-21 Control Modification for Drill Oil Hole Machine in an Automotive Company	10



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Srijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



Lin Prasetyani 1, Bayu Ramadhan1 , Tresna Dewi2 , William Sarfat1	10
Characteristics of Battery Use in Electric Car.....	11
Yessi Marniati*, Andri Suyadi, Herman Yani, Sutan Marsus**	11
Learning Module of Analog Electronics Practice	12
Sabilal Rasyad, Evelina, Amperawan, Dewi Permata Sari, Nyayu Latifah Husni.....	12
DIFFERENT METRIC DISTANCES ON THE K-MEANS METHOD IN BUILDING A CANS WASTE CLASSIFICATION SYSTEM USING THE CMYK COLOR MODEL	13
Implementation of Facial Feature Extraction Using Viola-Jones Method for Mobile Robot System ...	14
Ahmad Zarkasi ^{1,2} , Siti Nurmaini, Deris Setiawan, Ahmad Kuswandi, Sri Desy Siswanti.....	14
Effect of Load on BLCD Motor.....	15
Rumiasih, Carlos R. Sitompul, Anton Firmansyah, Indah Susanti	15
Implementation of DSK TMS320C6416T Module in Designed of Sound Detection	16
D A Pratama, N L Husni, E Prihatini, S Muslimin	16
Automatic Cooling of a PV System to Overcome Overheated PV Surface in Palembang.....	17
Ahmad Taqwa ^{1,2} , Tresna Dewi ^{1,2} , RD. Kusumanto ^{1,2} , Carlos R Sitompul ^{1,2} , Rusdianasari ¹	17
Analysis of Performance Test and Consumption of BLDC 350 W Motor Power to Mechanical Vibration with Variation of Speed and Load Variation	18
Hairul, Markori, Indrawasih dan Sudirman Yahya	18
The Influence of Change of an Angle of Illuminance on Solar Power Generating Capacity 30 Watts in Laboratory of Electrical Engineering Polytechnic of Sriwijaya.....	19
Zainuddin Idris, M. Yunus, Siswandi, Bambang Guntoro.....	19
The Effect of Drying Airflow Rate on H ₂ O MASS Evaporated for Banana Chips Drying Using Photovoltaic Solar Panel	20
Yohandri Bow ¹ , Adi Syakdani ² , Muhammad Taufik ² , Rusdianasari ³	20
Development and Feasibility Analysis of Floating Solar Panel Application in Palembang, South Sumatra.....	21
Benny Junianto ¹ , Tresna Dewi ² , Carlos Sitompul ²	21
Effects of Grid Frequency Drop on The Dynamic Performance of Full Converter Wind Turbine Generator.....	22
A. M. Shiddiq Yunus ¹ ,Makmur Saini ² , Sri Suwasti ¹ , dan Purwito Purwito ³	22



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Srijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



Modified Design for Water Metering System.....	23
Nyayu Latifah Husni ¹ , Dampito ² , Abdurrahman ³ , Evelina ⁴ , ade Silvia Handayani ⁵ , Sabibal Rasyad ⁶ , Adella Rialita ⁷¹⁻⁷ Electrical Department, Politeknik Negeri Sriwijaya	23
Implementation of Fuzzy Logic Type-2 On Mobile Robot Navigation System.....	24
Ade Silvia Handayani, Jefri Alkausar, Sarjana Sarjana, Nyayu Latifah Husni, Siti Nurmaini, Irsyadi Yani.....	24
INTELLIGENT CONTROLLER FOR FLEXIBLE ROBOT ARM	25
The Analysis of Wear on Artificial HIP Joint with Dimple on Femoral Surface	26
Hasan Basri ^{1,*} , A. Syahrom ^{2,3} , Amir Putra Md Saad ² , A. T. Prakoso ¹ , D. Wicaksono ¹ , M. I. Amarullah ¹ , Tri Satya Ramadhoni ¹	26
Optimal Design of Plasticizing Screw Using Artificial Intelligent Approach.....	27
Fatahul Arifin ^{1, 2(*)} , Min-Wen Wang ¹ , Jhen-Wei Kuo ³ , Tzong-Horng Dzw ⁴	27
Mechanical Degradation Model of Porous FE Scaffold: Simulation Approach.....	28
Akbar Teguh Prakoso ¹ , Ardiyansyah Syahrom ^{2,3} , Amir Putra Md Saad ^{2,3} , Abdul Hadi Abdul Wahab ⁴ , M. A. Sulong ^{2,3} , Achmad Rendiko Ichsan ¹ , Apreka Diansyah ¹ , Risky Utama Putra ¹ , Muhammad Imam Ammarullah ¹ , Hasan Basri ^{1*}	28
Scoopy Blade for Low Current River Waterwheel Supporting The Energy Needs in The Rural Areas of Indonesia.....	29
Darmawi ¹ , Riman Sipahutar ² , Irwin Bizzy ³	29
SELT Design as a source of renewable electricity using the Flywheel Generator and Photodiode Sensor	30
Indra Maulana, Dicky Seprianto, Yossy Yudhianto, Muhammad Najib, Muhamad Azwar.....	30
Analysis of Upgrading Process Of South Sumatera Low Rank Coal	31
Riman Sipahutar ¹ , Diah Kusuma Pratiwi ¹ , Darmawi Bayin ¹ , Irwin Bizzy ¹ , Baiti Hidayati ^{1,2}	31
The Effect of Parameters on The Process of Making Objects With Rapid Prototyping Digital Light Processing Technology on The Bending Stress	32
Romli ¹ , D Seprianto ¹ , DP Putra ¹ , M Rasid ¹ and A. Zamheri ¹	32
The Effect of Rectangular Parallel Key Manufacturing Process Parameters Made With Stereolithography DLP 3D Printer Technology against Impact Strength.....	33
D Seprianto ¹ , R Sugiantoro ¹ , Siproni ¹ , Yahya ¹ and M Erwin ²	33
Simulation of the Effect of Cutting Angle in Lathe Process on Distribution of Cutting Temperature ..	34



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Sriwijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



Ismail T ¹ , Amrifan SM ² , Irsyadi Y ³ , Riman S ⁴ , Rahmad H ⁵	34
Conduction Heat Rate Analysis of Tool in Titanium Turning Process	35
Ismail T ¹ , Amrifan S M ² , Riman S ³ , Irsyadi Y ⁴ , Sandro O ⁵ , Fatiandari A ⁶	35
Cooling Channel Design for a Built-In Spindle of a Machine Tool.....	36
Kun-Ying Li ^{1,2} , Win-Jet Luo ^{2*} , Shih-Jie Wei ¹ , and Yan-sin Liao ¹	36
Design of Automatic Control Systems at Loader Output of Snap Gauge Machine in Manufacturing Industry	37
Syahril Ardi ¹ and Rahardian Faizal Zuhdi ²	37
The Influence of Change of an Angle of Illuminance on Solar Power Generating Capacity 30 Watts in Laboratory of Electrical Engineering Polytechnic of Sriwijaya.....	38
Zainuddin Idris, M. Yunus, Siswandi, Bambang Guntoro.....	38
The Effect of Drying Airflow Rate on H ₂ O MASS Evaporated for Banana Chips Drying Using Photovoltaic Solar Panel	39
Yohandri Bow ¹ , Adi Syakdani ² , Muhammad Taufik ² , Rusdianasari ³	39
Development and Feasibility Analysis of Floating Solar Panel Application in Palembang, South Sumatra.....	40
Benny Junianto ¹ , Tresna Dewi ² , Carlos Sitompul ²	40
Effects of Grid Frequency Drop on The Dynamic Performance of Full Converter Wind Turbine Generator.....	41
A. M. Shiddiq Yunus ¹ , Makmur Saini ² , Sri Suwasti ¹ , dan Purwito Purwito ³	41
Modified Design for Water Metering System.....	42
Nyayu Latifah Husni ¹ , Dampito ² , Abdurrahman ³ , Evelina ⁴ , ade Silvia Handayani ⁵ , Sabilal Rasyad ⁶ , Adella Rialita ^{7,1-7} Electrical Department, Politeknik Negeri Sriwijaya	42
Implementation of Fuzzy Logic Type-2 On Mobile Robot Navigation System.....	43
Ade Silvia Handayani, Jefri Alkausar, Sarjana Sarjana, Nyayu Latifah Husni, Siti Nurmaini, Irsyadi Yani.....	43
The Analysis of Wear on Artificial HIP Joint with Dimple on Femoral Surface	44
Hasan Basri ^{1*} , A. Syahrom ^{2,3} , Amir Putra Md Saad ² , A. T. Prakoso ¹ , D. Wicaksono ¹ , M. I. Amarullah ¹ , Tri Satya Ramadhoni ¹	44
Mechanical Degradation Model of Porous FE Scaffold: Simulation Approach.....	46



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Srijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



Akbar Teguh Prakoso ¹ , Ardiyansyah Syahrom ^{2,3} , Amir Putra Md Saad ^{2,3} , Abdul Hadi Abdul Wahab ⁴ , M. A. Sulong ^{2,3} , Achmad Rendiko Ichsan ¹ , Apreka Diansyah ¹ , Risky Utama Putra ¹ , Muhammad Imam Ammarullah ¹ , Hasan Basri ^{1*}	46
Scoopy Blade for Low Current River Waterwheel Supporting The Energy Needs in The Rural Areas of Indonesia.....	47
Darmawi ¹ , Riman Sipahutar ² , Irwin Bizzy ³	47
SELT Design as a source of renewable electricity using the Flywheel Generator and Photodiode Sensor	48
Indra Maulana, Dicky Seprianto, Yossy Yudhianto, Muhammad Najib, Muhamad Azwar.....	48
Analysis of Upgrading Process Of South Sumatera Low Rank Coal	49
Riman Sipahutar ¹ , Diah Kusuma Pratiwi ¹ , Darmawi Bayin ¹ , Irwin Bizzy ¹ , Baiti Hidayati ²	49
The Effect of Parameters on The Process of Making Objects With Rapid Digital Prototyping Light Processing Technology on The Bending Stress	50
Romli ¹ , D Seprianto ¹ , DP Putra ¹ , and M Rasid ¹	50
The Effect of Rectangular Parallel Key Manufacturing Process Parameters Made With Stereolithography DLP 3D Printer Technology against Impact Strength.....	51
D Seprianto ¹ , R Sugiantoro ¹ , Siproni ¹ , Yahya ¹ and M Erwin ²	51
Simulation of the Effect of Cutting Angle in Lathe Process on Distribution of Cutting Temperature ..	52
Ismail T ¹ , Amrifan SM ² , Irsyadi Y ³ , Riman S ⁴ , Rahmad H ⁵	52
Conduction Heat Rate Analysis of Tool in Titanium Turning Process	53
Ismail T ¹ , Amrifan S M ² , Riman S ³ , Irsyadi Y ⁴ , Sandro O ⁵ , Fatiandari A ⁶	53
Cooling Channel Design for a Built-In Spindle of a Machine Tool.....	54
Kun-Ying Li ^{1,2} , Win-Jet Luo ^{2*} , Shih-Jie Wei ¹ , and Yan-sin Liao ¹	54
Design Control Systems of Marking Machine and Total Length Check Damper Assembly Based on Programmable Logic Controller.....	55
Syahril Ardi ¹ and Juliantito Ardianto ²	55
Experimental Vibration Study in Milling Thin-Walled TI6AL4V Under MQL Using Coconut Oil As Cutting Fluid.....	56
M Yanis ^{1*} , A S Mohruni ¹ , S Sharif ² , I Yani ¹ , M Zahir ¹	56
Determination Overlap Ratio on Savonius Twisted Water Turbine Using Numeca Software.....	57
Dr. Carolus Bintoro ¹ , Vicky Wuwung MT ¹ , Fathurrohman Nurdin ²	57



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Srijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



Optimization Electricity Supply for Thousand Island Jakarta Province by Using Hybrid Photovoltaic-Wind Turbine-Diesel Generator-Crude Palm Oil (CPO) Power Plant-Battery System	58
Dharma Manurung ¹ and Rinaldy Dalimi ¹	58
Study on Using Casting Simulation Software for Design and Analysis Gate and Riser in Small Foundry Industries	59
Irawan Malik ¹ , A S Almadora ² and M Ali ³	59
Application of Vacuum Valve Technology as AFR Settings in 3500 Watt Operated by Methane Gas .	60
Tri Widagdo ¹ , Ella Sundari, Eka Satria martomi ¹	60
Innovation Utilization of Nitridation Method in Improving Hardness and Corrosion Resistance of Blacksmiths Crafts.....	61
Muhammad Rasid, S.T., MT. ¹	61
Performance Analysis of a Sludge Drying	62
Win-Jet Luo ¹ Nai-Feng Wu ² Cheng-Yan Lin ² Deri Suhaeji ²	62
Study on Ventilation Performance in Operating Room with Variation Ventilation Design.....	63
Yan-Lin Wu, Yu-Lieh Wu, Azka Hasya Hanifan	63
D Santoso ¹ , Z Abidin ¹ , J Yanto ²	64
Analysis Model for Orifice Flow Meter Correction Factor in Measuring in-Pipe Natural Gas Flow based on Numerical Simulation	65
Bunyamin ¹ , Kaprawi ¹ , Dewi Puspitasari ¹ , Sugianto ² , Nyayu Latifah Husni ³	65
The Analysis of Biogas Fermentation Time from Cow Manure on Biodigester Fixed Dome Batch Systems	66
Sajaruddin ¹ , Leila Kalsum ¹ , Zainuddin Muchtar ²	66
The Effect of Surface Modification on Heat Transfer of Heat Exchanger.....	67
Hong-Yi Lin, Yu-Lieh Wu, Kai-Siang Yang, Chih-Yung Tseng.....	67
Prototype of Biodiesel Processors Using Waste Oil (Study of The Effect of The Number of CAO Catalyst (Blood Shell Shells) and Reaction Time of The Biodiesel Rendemen).....	68
Ida Febriana ^{1,2} , Anerasari M ¹ , KA Ridwan ¹ , Taufik Jauhari ¹	68
Production of Ethyl Ester with The Influence of Electrode Type, Reaction Time And Electric Voltage from Waste Cooking Oil	69
Rosdiana Moeksin [*]), Farida Ali, Susila Arita.....	69



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Srijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



Biscuit Product Development Using Moringa Oleifera Flour as an Additional Source of Nutrition	70
Hilwatullisan ^{1(a)} , M. Zaman ¹ , A.Husaini ¹ and Siti Chodijah ¹	70
The Physical Characteristics of Cracked Plastic Waste	71
Selpiana ¹ , Prahady Susmanto ¹ , Lia Cundari ¹ , Dedek Oktari ² , Omar Ibrahim ²	71
The Analysis of The Use Calcium Oxide from Waste Cockle Shells (<i>Anadara Granosa</i>) and Sodium Hydroxide Catalyst on Prototype Biodiesel Processors Using Waste Cooking Oil Reviewed on Yield of Biodiesel.....	72
Sahrul Effendy, Tahdid, Lety Trisnaliani, Sandy A Putra, dan Alifah R Hefyani.....	72
Effect of Temperature and Starter Concentration on The Fermentation Process in Making MOCAF .	73
Muhammad Yerizam ¹ , Suri Andayana ¹ and Utari Oktavia ¹	73
Adsorption of Synthetic DYE by Betel Nuts Activated Carbon in a Fixed-Bed Column, Experiments And Prediction of Breakthrough Curves.....	74
L Cundari*, M N Fakhri, M Z Rizki	74
Effect of Catalysts on The Quality of Biodiesel from Waste Cooking Oil by Induction Heating	75
Rusdianasari ¹ , Aida Syarif ¹ , Muhammad Yerizam ² , M. Syahirman Yusi ³ , Leila Kalsum ¹ , Yohandri Bow ²	75
Characterization of Red Beetroot Soft Jelly Candy with Guava Extract and Gel Colloid Added.....	76
Meilianti* ¹ , Marta Aznury ¹ , Yuniar ¹ , Sofia ¹ , Ismy Farhan ¹ , Lidia Agustina ¹	76
Flow Rate Effect and NAOH Concentration to CO ₂ Reduction in Biogas Products Using Absorber	77
Lety Trisnaliani ¹ , Dina Eka Pranata ² , Fatria ³ , Tahdid ⁴ , KA Ridwan ⁵ , M. Nurizzman Alfarizi ⁶ , Mangihut Pandapotan Lumbantoruan ⁷	77
Prototype of Tray Dryer Unit for Silica Gel Drying Based on Bagasse	78
Selastia Yuliaty ^{1(a)} , Fadarina ¹ , Mustain Zamhari ¹ , and Ibnu Hajar ¹	78
Modification of Starch from Yam Taro with Hydrolysis Acid as The Adhesive	79
Yuniar ^{1,2} , Martha Aznury ¹ , Sofiah ¹ , Meilianti ¹	79
The Performance of Reverse Osmosis (RO) Membrane in Producing Pure Water.....	80
Robert Junaidi ¹ , Abu Hasan ² , dan Muhammad Yerizam ³ , Indah Purnamasarii ⁴	80
Concentrations of Dissolved Oxygen in Drinking Water	81
Erwana Dewi ^{1(a)} , Aisyah Suci N ¹ and Elina M ¹	81
Growth Kinetics of <i>Saccharomyces Cerevisiae</i> and Tape Yeast on the Cassava Pulp Fermentation	82



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Srijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



Beni Hidayat, Udin Hasanudin, Muhamad Muslihudin, Syamsu Akmal, Siti Nurdjanah, Neti Yuliana	82
Distillation of Patchouli Oil Using Firewood and Liquefied Petroleum Gas as Fuel: Effects of Yield, Quality and Cost Analyses.....	83
Mahlinda and M. Dani Supardan	83
Evaluation of Main Parameter Process of Anaerobic Digestion of Cow Dung in Fixed Dome Biogester on Methane Gas Quality	84
Leila Kalsum, Abu Hasan, Rusdianasari, A.Husaini Yohandri Bow	84
Re-Design Pyrolysis Reactor Prototype for The Conversion of Plastic Waste into Liquid Fuel.....	85
Arizal Aswan, IrawanRusnadi, Fatria, Zurohaina, Rima Daniar	85
Value Added Analysis of Beef Floss with Fillers of Papaya Fruits And Banana Blossom's.....	86
Sri handayani, Chandra utami wirawati, Saroni saroni, Dwi eva nirmagustina.....	86
Marketing Efficiency of Organic Rice in Lampung Province	87
Sri Handayani, Dwi Eva Nirmagustina, Muhammad Irfan Affandi.....	87
Simple design of pyrolysis tool for making liquid smoke from shells and rubber seeds as a food preservative	88
Farida Ali, ¹ Roval Al Fiqri ²	88
Industrial Mapping in Java-Kalimantan-Nusa Tenggara Corridor	89
M A Berawi ¹ , P Miraj ^{2,3} , H Sidqi ² , G R Gaffara ^{2,4} and Gunawan ²	89
Revenue Analysis of Port-City Conceptual Design	90
M A Berawi ¹ , P Miraj ^{2,3} , E R Islamiah ² , and Gunawan ²	90
The Utilization of Plastics Waste in Flexible Pavement Hot Rolled Sheet and Asphalt Concrete Wearing Course With Marshall Immersion and Cantabro Test.....	91
Adhitya B B ¹ , Pataras M ² , and Kadarsa E ³	91
Characteristics Comparison of Refinery Asphalt, Rubberized Asphalt, and Buton Asphalt in Stone Matrix Asphalt Pavement with Marshall and Cantabro Method.....	92
Kurnia A Y ¹ , Dewi R ² , Permata D Y ³ , and Pataras M ⁴	92
The Effect of Polycarboxylate Addition towards The Workability and High Strength Concrete	93
Sumiati ¹ , Mahmuda ² , Andi Herius ³ dan Agus Subrianto ⁴	93



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference



Jl. Srijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918

Stabilization of Peat Soils Using Petrasoil with Cement Viewed from CBR Value and Free Compressive Strength Value of Soils	94
Ibrahim, S.T.,M.T. ¹ , Andi Herius, S.T.,M.T. ² , Julian Fikri, S.S.T., M.Sc. ³ , M. Shaid Ramadhinata ⁴ , Maryani ⁵	94
The Utilization of Crushed Clay Brick as Coarse Aggregate on Eco-Green Lightweight Foamed Concrete.....	95
Sumiati ¹ , Mahmuda ² , Sukarman ³ , Siswa Indra ⁴ , and Darma prabudi ⁵	95
Performance analysis of Patal - Pusri Intersections after underpass operated	96
Arfan Hasan ¹ , Indrayani ¹ , Ridho Adrian ¹ , Dwiki Syamanda ¹ , Darma Budi ¹ , and Akhmad Mirza ¹ .	96
Utilization of Coconut Shells as a Replacement of Some Coral Stone in Concrete Making	97
Raja Marpaung, Kosim, Zainuddin, Darma Prabudi	97
Public Transportation Service Bus Rapid Transit (BRT) Trans Musi Sustainable in Palembang City.....	98
A. Latif, Yusri, Moch.Absor, A. Fuad Z.	98
Transportation Needed of Bus Rapid Transit (BRT) Corridor in Palembang	99
Herlinawati, Puryanto, Sudarmadji, Sazili	99
Effect of Groundwater Table on Slope Stability and Design of Retaining Wall	100
R Ahmad ^{1*} , A B Mardhanie ¹ , P Suroso ¹ , T E Sutarto ¹ and R Alfajri ²	100
Falisa ^{1*} , Hendri Chandra ^{2*} , Harnani ^{3*}	108
^{1,3} Teknik Geologi, Universitas Sriwijaya, Indralaya.....	108
² Teknik Mesin, Universitas Sriwijaya, Indralaya	108
* <i>Corresponding author</i> : falisa@unsri.ac.id.....	108
Information System of Small And Medium Business in Palembang City	112
Hetty Meileni, Cindy Indah Pratiwi, Ienda Meiriska, and Desi Apriyanty	112
Inventory of Goods Data Processing Using The Economic Order Quantity (EOQ) Method	113
Hetty Meileni, Diky Juniansyah Putra, Desi Apriyanti, Indra Satriadi, Sony Oktapriandi	113
Internet of Thing for the Command Robot Command System.....	114
Emilia Hesti ¹ , Sholihin ² , Adewasti ³ , Sarjana ⁴	114
The Effect Of Addition Of High Density Poly Ethylene (Hdpe) As Binder On Hebel Light Brick (Celcon)	115



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Sriwijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



The Effect Of Addition Of High Density Poly Ethylene (Hdpe) As Binder On Hebel Light Brick (Celcon)	116
Implementation of Fingerprint Control in Majors Electrical Engineering Using Arduino	117
Ibnu Ziad ¹⁾ , Ali Nudin ²⁾ , Jon Endri ³⁾ , Ciksadan ⁴⁾	117
Biodiesel Production From Bintaro (Cerbera Manghas L) Seeds With Potassium Hydroxide As Catalyst	118
The Copper Fiber On Compressive Strength And Elastic Modulus On Concrete Fc'25	119
Information System Feature Development Of Telecommunications Engineering Study Program To Support The New Accreditation And The New Curriculum System	120
Grip Tool Cnc Mill 3a To Get 12 Sides Of The Elbow On Results Induction Electrical Furnance Casting	121
Implementation Of Parking Portal Door Security System Using Rfid And Password Based On Microcontrollers In Sriwijaya State Polytechnic	122
Technique Automatic For Detection And Segmentation Of Optic Disc Area In Retinal Image	125
Erwin ¹ , B Cania ² , I K Larasati ³	125
New Techniques For Segmentation And Extraction Retinal Blood Vessels	126
Erwin, A Rohman, L A Nurjanah, Yurika, D Sinta, Q Al'afwa	126
Optimization of City Bus Routes in Surabaya Using Memetic Algorithm as a Solution to Solve Orienteering Problem	127
Fauzi Rakhmad Firdausi, Arif Djunaidy, Ahmad Muklason	127
A Form of Preprocessing For Social Media Data Extraction	128
Dodo Zaenal Abidin, Siti Nurmaini, Reza Firsandaya Malik, Jasmir Jasmir	128
Factors Affecting Knowledge Sharing Capability of Doctors in Palembang	129
Nining Ariati, Dana Indra Sensuse, Putu Wuri Handayani	129
Serious Game Supply Chain Management Agribusiness as a Production Planning using Cournot Model	130
Saiful Bukhori	130
Smart Cup for Visual Impaired People Based on Arduino	132
Aryanti Aryanti ¹² , Lin Wei-cong ¹ , Lin chih-yi ¹ , Billy Brian Henriquez ⁴ , Ikhtison Mekongga ³ , Aaron Raymond See ^{1*}	132
Challenges of Teaching in Massive Open Online Course	133



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Srijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



M A Ahmad ¹ , A R C Hussin, H M Dahlan ¹ , J Mahmood	133
Analysis of Service Oriented Architecture and Enterprise Architecture Alignment for Loan Financing System.....	134
Ahmad Nurul Fajar	134
Analysis of Service Oriented Architecture and Enterprise Architecture Alignment for Loan Financing System.....	135
Ahmad Nurul Fajar	135
Analysis of Server Virtualization Service Performance Using Citrix Xenserver”	136
Surahmat, Alfred Tenggono	136
The Pattern of The Marketing Ground Coffee Beans Using Decision Support System	137
Suparto Darudiato, Eliando Eliando	137
The Pattern of The Marketing Ground Coffee Beans Using Decision Support System	138
Suparto Darudiato, Eliando Eliando.....	138
The Utilization of Ontology in Association Rule.....	139
Dewi Wardani, Achmad Khusyaini	139
The Evaluation of Semantic Mapping	140
Dewi Wardani ¹	140
Measurement of User Satisfaction Level on Implementation of SISKEUDES Application	141
¹ Mardiana and ² Eka Hartati	141
Garbage Collector Robot (GACOBOT) Design for Dry Waste Distribution.....	142
Aditya P. P. Prasetyo, Rendyansyah, Sri Desy Siswanti, Siti Nurmaini, Abdurahman.....	142
Use of Haversine Formula in Finding Distance Between Temporary Shelter and Waste End Processing Sites.....	143
Rezania Agramanisti Azdy, Febriyanti Darnis.....	143
Geographic Information Systems Search Test Location For Admission Of New Students In Sriwijaya State Polytechnic Using Location Based Service (LBS) Method.....	144
Book Catalog Information System in The Reading Room (Library) Web-Based at Informatics Management Department in State Polytechnic of Sriwijaya.....	145
Henny Madora ¹ , Yusniarti ² , Ida Wahyunigrum ³ , Muhammad Noval ⁴	145
Pull-down Fitness Technique Analysis using Motion Capture	146



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Srijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



R Passarella, A S Nugroho, and F N Arsyad	146
Analysis of EDFAT Methods in Photography Techniques	147
Meiyi Darlies, Ema Laila, Ali Firdaus, Muhamad Erwin.....	147
Predicting Cost Recovery Rate of Ischemic Stroke Patients: A Potential Application of Big Data Analysis in Hospital	148
^{1*} Heru Fahlevi, ² Teuku Roli Ilhamsyah Putra and ³ Rina Suryani Oktari.....	148
Development Analysis For Numbers And Colors Learning Media	149
Yesi Sriyeni and Maria Veronica.....	149
Animation Design as an Educational Media of Adolescents’ Social Behavior Deviation” has been accepted with major revision	150
Heki Aprianto and Alan Saputro	150
Designing Mobile Based User Interface for Promotion of Lakeur Craft Art Application at Balaputra Dewa State Museum.....	151
Syahrul, Pertiwi	151
Prototype of RFID –Based Parking Slot Availability Detection System	152
Lindawati ¹ , I Salamah ¹ , Asriyadi ¹ , M Fadhli ¹	152
Mobile Robot Motion Control Based on Static Hand Gesture.....	153
DS Sri , FP Rian , Z Ahmad	153
Object-Based Design and Modeling Batik Nusantara Catalog Wibatara.com	154
Adelin Adelin, Febria Sri Handayani.....	154
Genetic Algorithm Based Feature Selection With Ensemble Methods For Student Academic Performance Prediction	155
Al Farissi, Halina Mohamed Dahlan, Samsuryadi.....	155
Information System Strategy Planning In The Private Universities Of South Sumatera.....	156
Engine Replacement Scheduling Optimization Using Data Mining	158
Farizal1 and Albert Joelian	158
User Experience Analysis on Class I LPKA Palembang Filial E-School	159
D. Tri Octafian, Febrianty, Hendra Hadiwijaya	159
Information System of Student’s Final Report And Final Assignment At State Polytechnic of Sriwijaya with Android Based.....	160



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Sriwijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



Rika Sadariawati, A. Ari Gunawan, Meivi Kusnandar.....	160
Design of Semester Exam Scheduling at The State Polytechnic of Sriwijaya Application	161
Nita Novita, M. Aris Ganiardi, Indri Ariyanti, Delta Khairunnisa.....	161
Augmented Reality in the Registration Flow for Entrance Examination at State Polytechnic of Sriwijaya Based on Android	162
Rike Sucihati,Ahmad Bahri Joni Malyan, Ervi Cofriyanti	162
Design and Build Application of Campus Parking Area for State Polytechnic of Sriwijaya Based on Smartphone	163
Leni Novianti, Devi Sartika , Dewi Irmawati, Ienda Meiriska	163
Implementation of Biometric Fingerprint Barbasis Security Doors with Attendance Database on Sriwijaya State Polytechnic	164
A.Bahri Joni M , Herlambang Saputra , Ahyar Supani , Indarto	164
Designing and Applying Flood Early Warning System with Fuzzy Logic Based on Rainfall and Water Level for Special of Palembang City	165
Ahyar Supani, Yuli Adriani.....	165
Performance of RUS and SMOTE Method on Twitter Spam Data Using Random Forest.....	166
Huda Ubaya and Ria Siti Juairiah	166
Mobile Android Based Geographic Information System (GIS) Software Development for Tourist Destination Seekers in Palembang City Using RASCH Model Measurements.....	167
Sanjaya, Kurniawan, Saputra, Azhar	167
GIS Android Mobile Based Software Development for Tourism Objects, Public Places List, Transportations List, and Culinary Places List Using Usability Measurement	168
M. Rudi Sanjaya, Dedy Kurniawan, Ariansyah Saputra, Iman Saladin B Azhar	168
TRACK 3	172
MANAGEMENT ECONOMICS, BUSINESS ADMINISTRATION, ACCOUNTING	172
Impact of Learning, Socialization and Financial Lifestyle on Student' Intention to Invest in Capital Market.....	172
Dewi Fadila, Hendra Satrawinata, Mariskha Z, Riska Maulana.....	172
The Effect Of Capital Readiness And E-Commerce Utilization On The Competitiveness Of Micro Small And Medium Enterprises (Msmes) Woven Palembang.....	173
Dimensions of Village Expenditure in Development Sector	174



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Srijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



Zulkifli Zulkifli, Rita Martini, Sukmini Hartati, Endah Widyastuti.....	174
Comparison Analysis of Organic Rice and an Organic Rice Added Value Approach.....	175
Dwi Eva Nirmagustina, Sri Handayani and Luluk Irawati	175
Analysis of Political Connection, Profitability and Capital Intensity Against Tax Avoidance in Coal Companies on The Indonesia Stock Exchange.....	176
Rizki Fitri Amalia.....	176
Human Resource Role and Application of Technology in the Fourth Industrial Revolution	177
Relationship Model among Employee Engagement, Organizational Commitment and Employee Performance	178
Munparidi, L.Suhairi Hazizma & A.Jalaludin Sayuti.....	178
The Effect of Customer Orientation and Service Quality on Trust and Customer Loyalty	179
Gst Ayu Oka Widarti, Esya Alhadi, Elvia Zahara, Titi Andriani.....	179
Fetty Maretha, Yulia Pebrianti, Rini, Lisnini.....	180
E-government Policy, Leadership Commitment, Apparatus Resources Development, and Their Implications on Public Service Performance.....	181
Koesharijadi, Hardiyansyah and Muhamad Akbar.....	181
Industrial Clasterization to Improve The Competitiveness of Small and Medium Industries in The City of Palembang	182
Evada Dewata, Yuli Antina Aryani, Yuliana Sari, Aladin	182
The Influence Of Competence, Leadership, Motivation Work Impact On The Commitment Of Civil State Apparatus In The Office Of The Governor South Sumatera Province	183
Sopian.A.R, Periansya, Ardiyan Natoen, Indra Satriawan.....	183
Analysis Method Economic Value Added (EVA) of Cosmetics Companies Listed on the Stock Exchange Period 2013-2017.....	184
Lupikawaty, Alhamdari, Bustan	184
Anggeraini Oktarida, Eka Jumarni Fithri, Lambok Vera Riama, Sri Hartati	185
The Effect of Hospital Image And Service Quality on Customer Loyalty Through Customer Satisfaction as Intervening Variables in Siti Khadijah Hospital in Palembang City.....	186
Susi Ardiani, Sarikadarwati, Henny Yulsiati, Sandrayati.....	186
The Impact of Village Fund Program Implementation towards Society Welfare in Indonesia	187



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Sriwijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



Yevi Dwitayanti, Maria Maria, Nurhasanah Nurhasanah, Rosy Armaini	187
Determinants of Village Financial Management Accountability (Study of Villages in Pampangan Sub-District, OKI Regency and Rambutan Sub-District, Banyuasin Regency)	188
Desi Indriasari, Kartika Rachma Sari, Kiagus Zainal Arifin, Choiruddin	188
Evaluation of Sales Price within Calculation Cost of Good Production SMEs Pempek Ilir Barat I and Bukit Kecil District Palembang	189
Elisa, Marieska Lupikawaty, Yusleli Herawati, Purwati.....	189
The Effect of Taxpayer Awareness and Tax Sanctions on Compliance In Paying Land And Building Taxes in Bukit Kecil Sub-District of Palembang.....	190
M. Husni Mubarak, Faridah, Nelly Masnila.....	190
The Environmental Compliance Management of Palm Oil Plantation in Ogan Komering Ilir Regency, Sumatera Selatan, Indonesia	191
M. Yusuf, Yusnizal Firdaus, Markoni Badri, AlHusori	191
Attitude, Motivation, and Parental Involvement towards Students' Reading Comprehension Achievement	192
Nurul Aryanti, Welly Ardiansyah, Murwani Ujihanti	192
Relationship between GPA, Length of Study, and Competence with The Length of Time to Get A Job at Alumni of The Mathematics and Natural Sciences, University of Sriwijaya.....	193
Ali Amran ¹ , Irmeilyana ^{1*} and Anita Desiani ¹	193
Testing the Role of Charismatic Leadership, Psychological Climate, and OCB on Resilience	194
Wustari L. Mangundjaya	194
Individual Readiness For Change and Affective Commitment To Change: The Mediation Effect Of Technology Readiness On Public Sector	195
Hermina Agustina Mahendrati, Wustari Mangundjaya.....	195
Leader-Member Exchange and Affective Commitment to Change: Mediating Role of Change Self-Efficacy	196
Dwi Andriani Puspitasari, Wustari L Mangundjaya.....	196
Testing Mediation of Psychological Empowerment, Work Engagement to Affective Commitment to Change	197
Susilo ¹ , Wustari L. Mangundjaya ²	197
Aim, Concept, and Objectives of Education in Islam	198



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Sriwijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



Suroso ¹ , Wasitoh Meirani ² , Muhammad Erwin ³ , Ayu Puspasari ⁴	198
Testing the Impacts of Organizational Justice on Affective Commitment to Change with Work Engagement as Mediator.....	199
Yurnalis, Wustari Mangundjaya	199
The Effect of Directed Reading - Thinking Activity on Students' Critical Thinking Abilities.....	200
Eliyeny, Herman, Sunani, Muhammad Nadjmuddin	200
The Development of Teaching Material Speaking 2 Based on Communicative Approach for Students in English Department of State Polytechnic of Sriwijaya.....	201
Darmaliana, Risnawati, Risa, Sri Endah Kusmartini.....	201
Exploring Linkage among Experiential Value, Destination Image and Revisit Intention in Natural-based Tourism.....	202
Heri Setiawan, Taufiq Marwa, Zakaria Wahab, Muchsin Sagaf	202
Students' Perception of English Blended Learning in State Polytechnic of Sriwijaya.....	203
Munaja Rahma, Zakaria, Moehammad Ridhwan.....	203
Online Transportation Technology and Women's Driver Communication Skills.....	204
Pridson Mandiangan, Desloehal Djumrianti, Hanifati	204
The Importance of The Language Experience Approach (LEA) in Teaching Reading Comprehension to The Third Semester of Engineering Students in State Polytechnic of Sriwijaya	205
Zulkifli zulkifli, nian evawati, koryati koryati.....	205
The Effect of Organization Climate on Performance with Job Satisfaction as an Intervening Variable	206
Paisal Paisal, Afrizawati Afrizawati, Divianto Divianto, Yahya	206
The Clustering of Paddy Fields in The Province of South Sumatera as an Input for The Government in Determining Policy.....	207
Suryati, Ahmad Sanmorino	207
The Public Service Quality of The Library Services at The Library Unit of State Polytechnic of Sriwijaya	208
Deri Darfin, Zulkarnaini, Ridwan Effendi, Robinson,.....	208
The Effectiveness of Blended Learning Approach on Essay Writing Subject.....	209
Sri Gustiani, Yusri, Tiur Simanjuntak, Evi Agustinasari.....	209



The 3rd FIRST 2019
(FORUM IN RESEARCH, SCIENCE, AND TECHNOLOGY)
International Conference

Jl. Srijaya Negara Bukit Besar Palembang 30139 South Sumatera – Indonesia
phone +62711 353414 Fax: +62711 355918



Analysis of Student Services at State Polytechnic of Sriwijaya	210
Hadi Winarko, Zaliah, Aimi.....	210
The Effect of Culinary Knowledge and Culinary Experience on Local Culinary Attractiveness.....	211
Heri Setiawan ¹ , Abd. Hamid ² , Ummasyroh ³ & Jusmawi Bustan ⁴	211
Criminal Law Policy In The Crime Of Persecution Carried Out By People Who Come From Outside Orang Rimba Group Against Members Of Orang Rimba Tribe Around The Bukit Duabelas National Park, Jambi Province, Indonesia	212

Converting Waste Cooking Oil into Biodiesel using Microwaves and High Voltage Technology

RA Nurul Moulita¹, Rusdianasari², and Leila Kalsum²

¹Applied Master of Renewable Energy Engineering, Politeknik Negeri Sriwijaya, Jalan Srijaya Negara, Palembang, 30139, Indonesia
email: ranurulmoulita@gmail.com

²Chemical Engineering Department, Politeknik Negeri Sriwijaya, Jalan Srijaya Negara, Palembang, 30139, Indonesia

Corresponding authors: rusdianasari@polsri.ac.id

Abstract. Increasing fuel demand has an impact on decreasing fossil energy reserves. One of the solution to solve this problem is by increasing the production of biomass fuels, for example, biodiesel. Biodiesel can be produced from waste cooking oil through transesterification stage that reacts oil molecules with alcohol and catalyst to produce methyl esters. Heating method that can be used is combined of microwaves and high voltage technology. Microwaves technology utilizes wave emission which is absorbed and reflected by the sample to make sample's temperature being higher than surface's temperature of reactor's wall. In the process of producing biodiesel, reaction temperature is one of the several factors that is affected for heating process. From this research, we had optimum reaction temperature to get good quality product is at 60°C with 88.88% yield, 0.88 gr/ml for density, 2.52 cSt for viscosity, 102.5°C for flash point, 0.27% for water content, and 0.33 mg-KOH/gr-sample.

Keyword: Biodiesel, microwaves, high voltage, transesterification, waste cooking oil, quality

1. Introduction

Increasing fuel oil can reduce fossil energy reserves. For solving this problem, the government utilizes domestic energy by increasing biomass fuel production. Utilization of biomass material as diesel fuel (biodiesel) is one of the solutions that can be applied. Biodiesel is one of an alternative fuels that can be obtained from plant and animal fats [1]. Biodiesel is a monoalkyl ester from fatty acids that is contained in vegetable oils or animal fats for using as diesel engine fuel. Biomass resources in Indonesia is amount to 32,654 MW while installed capacity currently is only around 92,726 MW [2].

One of biodiesel raw materials that often used is waste cooking oil. Total amount of waste cooking oil from various sectors in Indonesia is 3.88 million tons per year [3]. Waste cooking oil can be converted into biodiesel through transesterification that reacts oil with alcohol and catalyst. For converting it into biodiesel, we need a method that can convert into high yield and has accordance with Indonesian National Standards (SNI). The main factors that can affect the number of conversions in transesterification are ratio between triglycerides and alcohol, type of catalyst, reaction temperature, water and free fatty acids content, and speed of stirring [4]. Alcohol must be in excess condition from its stoichiometric needed in order to get a reaction that shifts towards the product. Activation energy



can be reduced using catalyst that we used so the reaction will run easily. The temperature during transesterification can be carried out in temperature range of 30-65°C. Temperature will make molecule's movement be faster. The amount of water content in raw material can make saponification that allows to reduce catalyst efficiency level while higher value of free fatty acid will require a lot of base catalysts. High stirring speed makes increasing the number of molecule collisions and reaction speed.

Method that commonly used to convert oil into biodiesel is conventional method. Heating process with this method is very slow because energy transfer to the material depend on convection current and thermal conductivity of reaction mixture [5]. Various alternative methods have been developed to produce biodiesel with high yield in a short time. Hartono, et al. in 2013 develop biodiesel synthesis using an interesterification method to optimize the formation of biodiesel yield [6]. However, this method is not efficient because the time to process biodiesel is quite long, which is 60 minutes for 87.63% yield. In 2015, Kalsum et al. using a reactor membrane to produce biodiesel from waste cooking oil [7]. However, this study is not efficient because it takes 2.5 hours to produce biodiesel of 94.81% yield. Moeksin, et al. (2017) has done research on biodiesel production process using electrolysis method. However, the highest yield produced using this method is only 38.3% at 12 V electricity voltage [8]. Another method that has been applied is using the Continuous Microwave Biodiesel Reactor (CMBR) [9]. This method can produce biodiesel in a shorter time. However, the highest yield of triglycerides is still relatively low, which is 65.5%. So, the authors done a research of producing biodiesel using a combination of microwaves and high voltage.

Microwaves utilizes heating process that occurs directly without contact to the reactor's wall so the reaction can be mixed homogenly. This makes time needed to carry out the process significantly reduced [10]. Microwave utilization can make reaction be more efficient with reaction time and separated process in a shorter time, reduce the number of side product, and energy consumption [11]. The separated process of biodiesel with glycerol can be carried out using high voltage. High voltage utilization can make the saturation of glycerine being faster [12]. Previous research shows that 9 kV has a percentage 98% in 25 seconds [13]. In this research, six experiments were done by reaction temperature variation to get a high yield and quality that is in accordance with SNI.

2. Methods and Materials

The procedure for producing biodiesel from waste cooking oil using microwaves and high voltage utilization is presented in Figure 1.

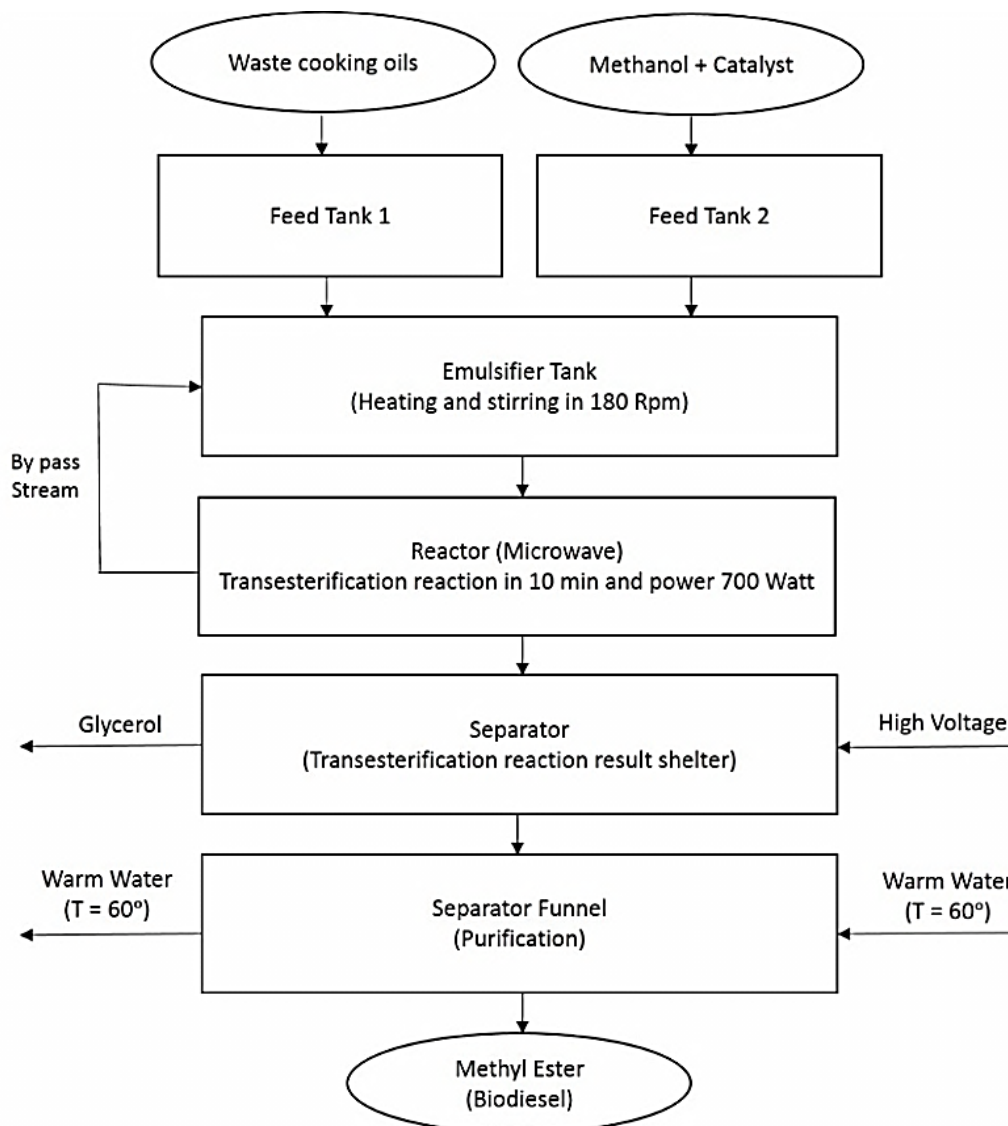


Figure 1. Biodiesel Production Process Diagram

Raw material that used is waste cooking oil from crackers factory in Kenten, Palembang, Indonesia. Catalyst as a support material in this process is sodium methoxide from reaction of 1% sodium hydroxide and methanol from weight basis of oil. Emulsifier tank has function as a place to pre-heat materials that we used. The tank is also equipped with a propeller so the result will be a homogeneous mixture between oil, methanol, and catalyst. In this process, transesterification occurs in a microwave reactor. The power used is 700 watts with reaction time of 10 minutes. In this section, the mixture will absorb and reflect wave radiation that emitted by microwave. Separator as a place of separation utilizes high voltage from cathode and anode plate that is located on the right and left sides of the tank. The number of each electrode is 3 pieces with 1 cm of distance between anode - cathode and voltage used is 10 kV. Instrumentation that used in producing biodiesel with microwaves and high voltage utilization is shown in Figure 2.

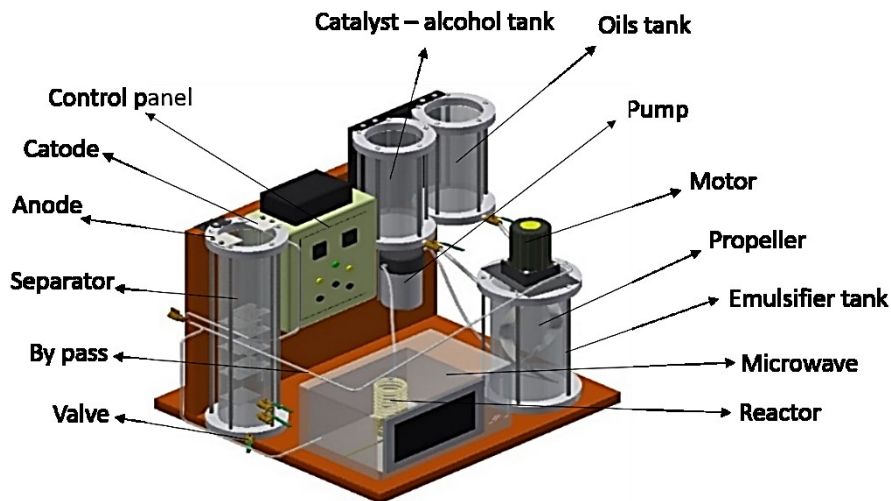


Figure 2. Biodiesel Production using Microwaves and High Voltage Instrumentation

2.1 Product Quality Analysis

2.1.1 Density Determination

Density is one of the important parameters that must be known from an oil fuel product. The density that allowed for biodiesel according to SNI is 850-890 kg/m³ at 40°C. According to Hadrah, et al. (2018), the value of density that in accordance with SNI can produce a perfect combustion reaction on engine while density value that exceeds the standard will cause the combustion reaction to be imperfect so it will increase emissions and wear on the engine [14]. In 2018, Mustariani, et al. has done research in biodiesel production from waste cooking oil using conventional methods. Heating process that carried out at 55°C will produce biodiesel with density value that still in permitted range, which is 880 kg/cm³.

2.1.2 Viscosity Determination

Viscosity determines thickness level of an oil fuel. Viscosity can be determined using falling ball method. Based on SNI, range that allowed for biodiesel viscosity value is 2.3-6.0 cSt at 40°C. High viscosity value will make it difficult to flow, pumping process, and fuel ignition while if it is too runny, fuel will be difficult to burn and can cause leaks in the injection pipe [15]. According to research that done by Kartika and Widyaningsih in 2012 that using 60°C as reaction temperature, the value of viscosity was 3.06 cSt and still in the range of values that is permitted by SNI [16].

2.1.3 Flashpoint Determination

Biodiesel flash point was determined by using Pensky-Martens closed cup instrument. Flash point need to be known because it will affect storage process of biodiesel fuel. Flash point that is lowest will make storage process of biodiesel fuel being more difficult because it will be flammable while highest flash point will complicate fuel during the ignition process. In SNI, flash point value has been set with minimum value 100°C. Research by Zulhardi, et al. shows that in the temperature range of 60-70°C, flashpoint of biodiesel will be at 227°C [17].

2.1.4 Water Content Determination

Water content in biodiesel will affect the formation of soap as an unwanted product in process of biodiesel production. High water content will allow hydrolysis of triglycerides become free fatty acids and glycerol [17]. Water content that is permitted by SNI is not more than 0.05%. Based on the journal Chhetri, et al., by using 60°C as reaction temperature will produce biodiesel with 0% water content so it is still in permissible range [18].

2.1.5 Acid Number Determination

Low acid number indicates content of free fatty acids that contained in biodiesel fuel has decreased. High acid number can complicate the process of separation between biodiesel and glycerol so net result obtained will decrease [14]. The number of acids that permitted by SNI is not more than 0.5 mgKOH/gr. Meng, et al., research in 2008 showed that the reaction using temperature 50°C for 90 minutes produced biodiesel with an acid number of 0.48 mg KOH/gr [19].

3. Result and Discussion

3.1 Effect of Reaction Temperature for Biodiesel Yield

Reaction temperature will affect transesterification that is occurred. Reaction temperature that used in this study are 35, 40, 45, 50, 55, and 60°C. Relationship between reaction temperature and percent of biodiesel yield can be seen in Figure 3.

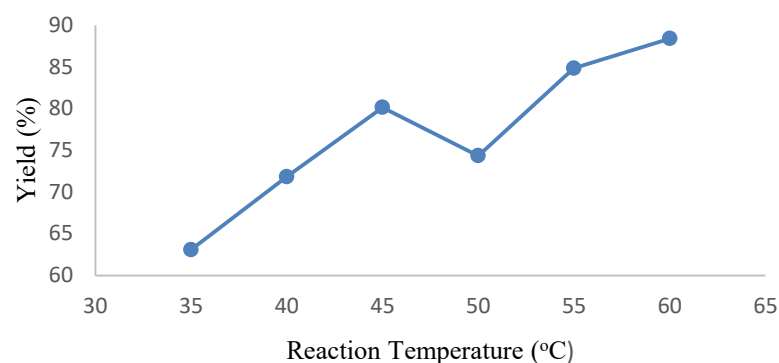


Figure 3. Effect of Reaction Temperature for Biodiesel Yield

Based on Figure 3, increasing reaction temperature will cause increasing in percent yield of biodiesel. High percentage of yield is due to faster movement of reactant molecules. This is in accordance with Wahyuni et al. (2015) that higher temperature causes faster molecular movement or kinetic energy by reacting molecules increased, so collisions between reacting molecules also being increased [20]. The collision between these reacting molecules will produce heat which is used to convert oil into biodiesel. Increasing temperature will increase the rate of reaction that occurs due to an increasing in kinetic energy system [21]. The lowest yield percentage at 50°C is due to imperfect transesterification which results in low conversion due to a shift in reaction towards saponification which produces more soap than biodiesel.

3.2 Effect of Reaction Temperature for Biodiesel Density

Density analysis has a function to find out how combustion reaction that occurs in diesel engine combustion chamber. High density value will cause combustion reaction to be imperfect so it can increase engine emissions and wear [14]. Higher conversion was gained when biodiesel density decreased into lower value [22]. Effect of reaction temperature on biodiesel density is shown in Figure 4.

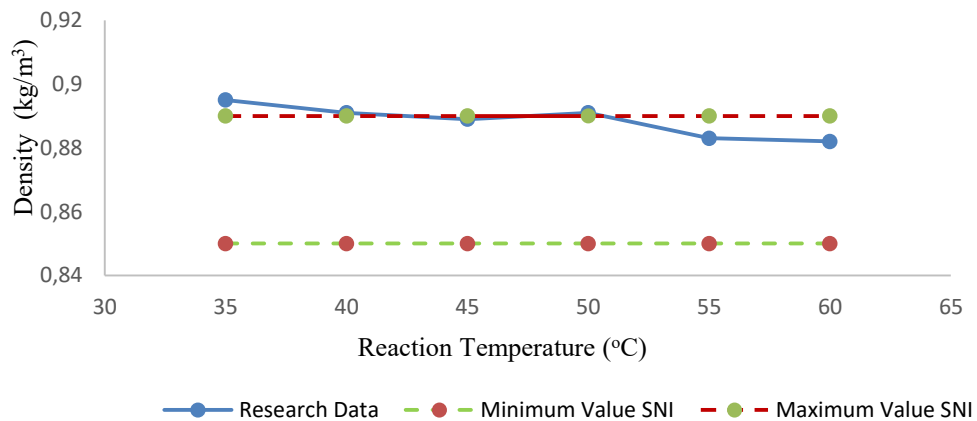


Figure 4. Effect of Reaction Temperature for Biodiesel Density

Figure 4 shows higher reaction temperature will decrease biodiesel product density. Decreasing biodiesel density is caused by faster movement of molecular substances due to an increasing temperature which causes the molecules to collide with each other [23]. This movement makes molecules of the substance stretch and decreases density of the substance. Lowest density is in biodiesel with a reaction temperature of 60°C.

3.3 Effect of Reaction Temperature for Biodiesel Viscosity

Viscosity will affect fuel injection process on the engine. High viscosity will hamper vehicle pump system and make engine hard to turn on [12]. Based on analysis of product characteristics, reaction temperature affects viscosity of biodiesel. Effect of reaction temperature on biodiesel viscosity can be seen in Figure 5.

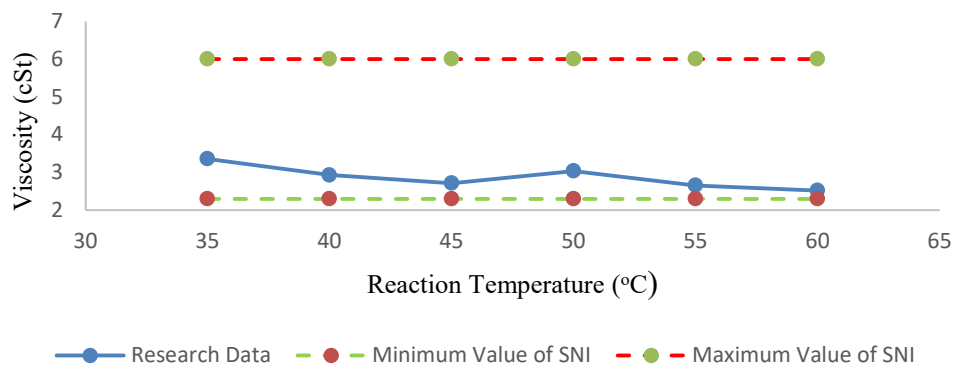


Figure 5. Effect of Reaction Temperature for Biodiesel Viscosity

Figure 5 shows that higher reaction temperature will get lower viscosity of biodiesel product. Decreasing viscosity value is caused by faster movement of substance molecules due to an increasing temperature. This faster movement will increase pressure so the molecules will expand and wide the distance between molecules [24].

3.4 Effect of Reaction Temperature for Biodiesel Flash Point

Flash point will affect the treatment of biodiesel product storage. Lowest flash point will complicate storage process because of its flammability, but when its too high, it will make difficulty for engine to ignite the fuel [13].

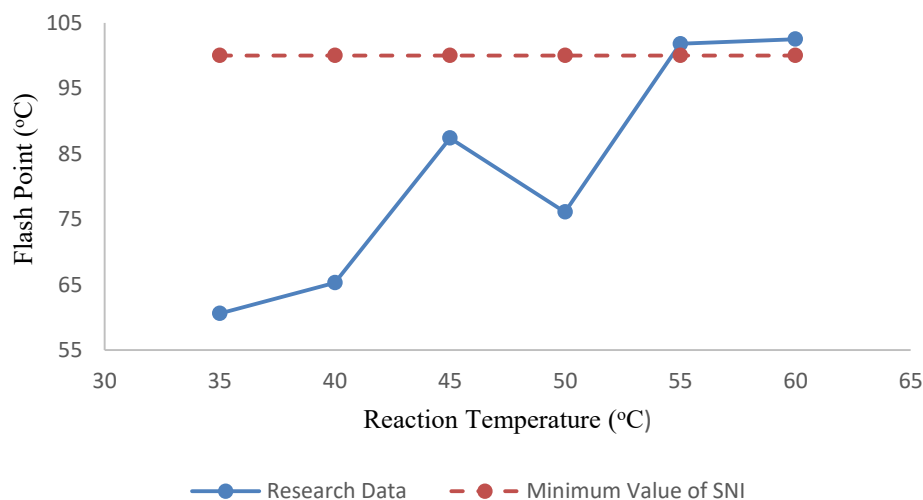


Figure 6. Effect of Reaction Temperature for Biodiesel's Flash Point

Based on the result of product characteristics analysis, it is known that reaction temperature affects biodiesel flash point. Analysis result shows that higher reaction temperature was used, flash point will be lower. High reaction temperature will make converted triglyceride molecules into methyl esters being higher in shorter time [25].

In Figure 6, biodiesel products with reaction temperature 55 and 60°C are in accordance with SNI standards. Biodiesel products with reaction temperatures 55 and 60°C have higher flash point due to the process of converting triglycerides and methanol to methyl esters being perfect enough, so methanol which does not react with triglycerides, residual catalysts, and pollutants being less. However, flash point of biodiesel products with a reaction temperature of 35, 40, 45, and 50°C are not in accordance with SNI. This value shows that impurity compounds contained in biodiesel products such as methanol which does not react is still quite large at these temperatures. This is because reaction is not perfect, so the conversion of triglycerides to methyl esters being low.

3.5 Effect of Reaction Temperature for Biodiesel Water Content

Based on Figure 7, it is known that reaction temperature affects water content in biodiesel. Higher reaction temperature was used, lower water content will be get. Water content that is contained in biodiesel products is caused by presence of side product from production of sodium methoxide catalyst. This water content will affect and inhibit the reaction because water will hydrolyze methyl esters that were produced [14]. If water content is lower, possibility of a saponification that forms soap due to reaction with catalyst, waste cooking oil, and residual water contained has been minimal [26]. The highest water content is found in biodiesel with reaction temperature 50°C which is 0.4335 while the lowest is found in 60°C which is 0.265%. High water content is caused by shift of the reaction towards saponification so some of the reaction turns into soap and will reduce percentage of biodiesel yield [4].

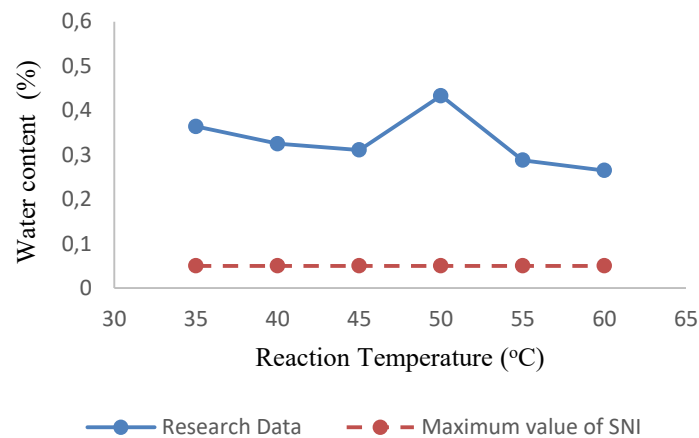


Figure 7. Effect of Reaction Temperature for Biodiesel's Water Content

Based on Figure 7 above, biodiesel products does not including SNI. All of the products still have water content that exceeds permitted limit. High water content of the product is caused by amount of water remaining in product. Existence of water can be caused by the presence of remaining water produced by purifining biodiesel. The remaining water will make machine being difficult to ignite because it will inhibit delivery of fuel to the piston.

3.6 Effect of Reaction Temperature for Biodiesel Acid Number

Based on the analysis of biodiesel characteristics, reaction temperature affects acid number of biodiesel. Acid number is an indication of the number of fatty acids that is contained in biodiesel products [27]. Acid number indicates that biodiesel product is not corrosive so it will not cause damage to the engine injector [28]. The higher reaction temperature was used, the lower acid number will be get. The highest acid number is in biodiesel with reaction temperature 35°C which is 0.981 mg-KOH/gr-sample while the lowest acid number is in 60°C which is 0.330 mg-KOH/gr-sample.

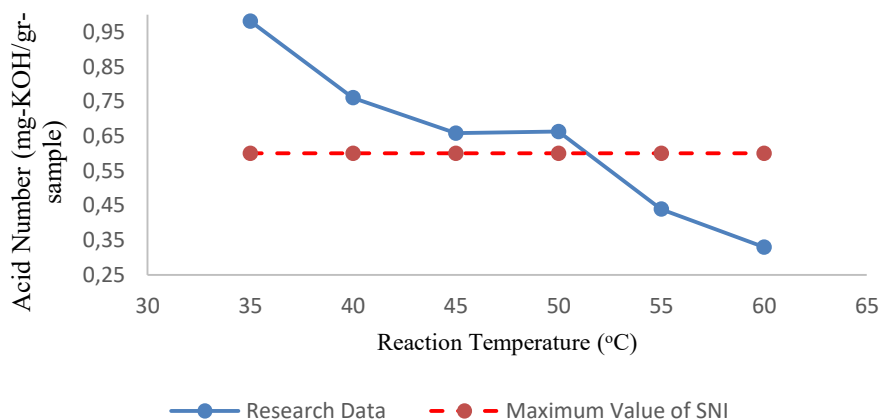


Figure 8. Effect of Reaction Temperature for Biodiesel's Acid Value

Figure 8 shows that biodiesel products with reaction temperatures 55 and 60°C are in accordance with SNI. These results indicate that the product is not corrosive to the engine injector. Meanwhile, other biodiesel products have not been in accordance with SNI. This is possible due to incompleteness of the process for converting triglyceride molecules into methyl esters so acid numbers are still quite high that is contained in product.

4. Conclusions

Utilization of biomass material as diesel fuel is one of the solutions that has potential to be applied in order to keep energy needed. Microwaves and high voltages can be combined to produce biodiesel from waste cooking oil in a short time and get high yield. Heating process using microwave method utilizes wave radiation absorbed and reflected by the mixture so contact does not occur with reactor wall. The optimum reaction temperature for getting good quality product is 60°C with 0.88 gr/ml density, 2.52 cSt viscosity, 102.5°C flash point, 0.27% water content, and 0.33 mg-KOH/gr-sample acid number. Water content has not accordance with SNI, but this can be handled by adding a refining process by heating biodiesel products so the water that contained in the product can be reduced.

Reference

- [1] H B Perkasa Riviani and Zahidah 2011 *Biodiesel Marine Fish Oil from Side Catching Result's Fish* (Bogor: Institut Pertanian Bogor)
- [2] A Sugiyono, Anindhita, L M A Wahid and Adiarso 2016 *Outlook Energi Indonesia 2016* (Jakarta: Pusat Teknologi Sumber Daya Energi dan Industri Kimia dan Badan Pengkajian dan Penerapan Teknologi)
- [3] Saraswati Purbo Kayun 2007 *Study of Biodiesel Industry Development Strategy Based on Waste Cooking Oil in Indonesia* (Bogor: Institut Pertanian Bogor)
- [4] A A Susilo 2010 *Pre Design of Biodiesel Plant from CPO (Crude Palm Oil) and Methanol With Capacity of 500,000 Tons/Year* (Surakarta: Jurusan Teknik Kimia Fakultas Teknik Universitas Muhammadiyah Surakarta)
- [5] A A Refaat and El Sheltawy S T 2008 *Time Factor in Microwave-Enhanced Biodiesel Production* (Kairo: Jurusan Teknik Kimia Fakultas Teknik Universitas Kairo)
- [6] R Hartono, A P Listiadi and I M Bayupramana P 2013 *Biodiesel Intensification from Waste Cooking Oil using Interesterification and Dry Washing Purification Method* (Cilegon: Jurusan Teknik Kimia Fakultas Teknik Universitas Sultan Ageng Tirtayasa)
- [7] Ummi Kalsum, Syarfi and Syamsu Herman 2015 *Biodiesel Production from Waste Cooking Oil using Membrane Reactor (Variation of Feed and Catalyst Concentration Molar Ratio)* *Jom FTEKNIK* Vol 2 No 2
- [8] Moeksin, Rosdiana, M Zaki Shofahaudy and Dyah Pratiwi Warsito 2017 *Methanol and Electrolysis Current Voltage Ratio Influence for Biodiesel Yield from Waste Cooking Oil* (Indralaya: Jurusan Teknik Kimia Fakultas Teknik Universitas Sriwijaya)
- [9] Galih P and Yudi A 2017 *Biodiesel Production from Waste Cooking Oil using Continuous Microwave Biodiesel Reactor Simultaneously* (Seminar Nasional Cendekiawan 3)
- [10] A Santoso 2008 *Utilization of Microwaves to Improve The Efficiency of Biodiesel Synthesis as Renewable Energy* (Malang: Universitas Muhamadiyah)
- [11] Hernando, J Leton P, Matia M P, Novella J L and Alvarez-Builla J 2007 *Biodiesel and FAME Synthesis Assisted Microwave: Homogenous Batch and Flow Processes* *Fuel* **86** p 1641-1644
- [12] Jaya Utama P, Leila K and Yohandri B 2018 *Effect of DC Voltage on Prototype of Biodiesel Electrostatic Separator with Glycerin from Waste Cooking Oil* *Indonesian Journal of Fundamental and Applied Chemistry* **3** p 89-93
- [13] Andi Mulya A, Syaiful B and Zuchra H 2016 *Hydrodeoxygenation of Pyrolysis of Ketapang Wood (Terminalia catappa L) Becoming Bio-Oil Using Mo/Clay Catalyst* *Jom Fteknik* Vol 3 [3] No 1
- [14] Hadrah, Monik K and Fitria Mayang S 2018 *Analysist of Waste Cooking Oil as Biodiesel Fuel Using Transesterification Process* *Jurnal Daur Lingkungan* Vol 1 [1] p 16-21
- [15] Evy S and Fatmir E 2012 *Technology Processing of Biodiesel from Used Cooking Oil by Microfiltration and Transesterification Techniques as an Alternative Fuel of Diesel Engine.* *Jurnal Riset Industri* Vol 6 No 2 p 117-127

- [16] Dwi K and Widyaningsih S 2012 *Catalyst Concentration and Optimum Temperature of Esterification using Activated Natural Zeolite (ZAH) for Biodiesel Production from Waste Cooking Oil* Jurnal Natur Indonesia **14** [3] p 219-226
- [17] Rizky Z, Fajar R and Yelmira Z 2018 *The Addition of Methanol in Making Biodiesel from Waste Cooking Oil with Ash Catalyst* Jurnal UR Vol **5** [1]
- [18] Arjun B Chhetri, K Chris Watts and M Rafiqul Islam 2008 *Waste Cooking Oil as an Alternate Feedstock for Biodiesel Production* Energies Vol **1** p 3-18
- [19] Xiangmei Meng, Guanyi Chen and Yonghong Wang 2008 *Biodiesel Production from Waste Cooking Oil via Alkali Catalyst and Its Engine Test* Fuel Processing Technology **89** p 851-857
- [20] Silvira W, Ramli and Mahrizal 2015 *Effect of Process Temperature and Deposition Time for Biodiesel from Waste Cooking Oil Quality* (Padang: FMIPA Universitas Negeri Padang)
- [21] Irwan Fauzi 2013 *Effect of Methanol Ratio, Temperature, and Reaction Time of Biodiesel Rendement in Bintaro Seeds In Situ Transesterification*. (Bogor: Departemen Kimia, Fakultas Matematika dan Ilmu Pengetahuan Alam Institut Pertanian Bogor)
- [22] Susumu, Rusdianasari and Syahirman Yusi 2018 *Biodiesel Production from Waste Cooking Oil using Electrostatic Method* Indonesian Journal of Fundamental and Applied Chemistry **3** [3] p 71-76.
- [23] Ni Luh Arpiwi 2015 *Bioenergi: Biodiesel and Bioetanol* (Malang: Fakultas Matematika dan Ilmu Pengetahuan Alam Universitas Udayana)
- [24] Andi Sanata 2012 *Optimization of Gasoline Engine Performance Using Temperature Variations of Premium Fuel and Ethanol Mixtures* Jurnal Rotor Vol **5** No 2
- [25] Maharani N H and Zuliyana 2010 *Methyl Ester (Biodiesel) Production from Bran Oil and Methanol Using Esterification and Transesterification Process* (Semarang: Jurusan Teknik Kimia Fakultas Teknik Universitas Diponegoro)
- [26] Septi Puji H 2010 *Biodiesel Production from Fish Oil Using Microwaves Radiation* (Surakarta: Fakultas Matematika dan Ilmu Pengetahuan Alam Universitas Sebelas Maret)
- [27] Arva S P, Z Helwani and E Saputra 2016 *Synthesis of Impregnated Fly Ash Using Na_2O as Catalyst in Transesterification Process of Off-Grade Palm Oil into Biodiesel* (Riau: Jurusan Teknik Kimia Universitas Riau)
- [28] Eka Sri Y and Rusdianasari 2016 *Separation Process Biodiesel from Waste Cooking Oil Using Ultrafiltration Membranes* Proceeding Forum in Research, Science, and Technology (FIRST)



CERTIFICATE OF APPRECIATION

Present to

LEILA KALSUM

in recognition & appreciation of the contribution as

CO AUTHOR

FIRST International Conference
"Integration of Advanced Technology to Enhance Social Welfare"
Held On October, 09-10, 2019
The Excelton Hotel Palembang, Indonesia



Dr. Ing. Ahmad Taqwa, M.T.
Director of State Polytechnic of Sriwijaya



Dr. Rita Martini, S.E., M.Si., Ak., CA.
Chair of the 3rd FIRST 2019

Organized :



Collaborate With :

