SWISSGERMANUNIVERSITY

Surat Tugas/*Letter of Appointment*

Nomor/ *Number* ST/THS2/0225/AAO/II/2022 – DiP

Tanggal/ *Date* 25 Februari 2022/*25 February 2022*

Penugasan Sebagai Pembimbing Utama/Pendamping Skripsi Mahasiswa S2 Semester Genap 2021/2022
Appointment of Thesis Advisor/Co-Advisor for Master's Degree Student(s) in Even Semester 2021/2022

Fakultas Teknik & Teknologi Informasi/Faculty of Engineering & Information Technology

Dekan Fakultas Teknik dan Teknologi Informasi, Universitas Swiss German/
The Dean of Engineering and Information Technology Faculty of Swiss German University,

Menimbang/*Considering:*

1. Perkuliahan S2 semester 2 yg telah berakhir/*The lectures for semester 2 have finished.*
2. Persyaratan untuk mencapai gelar pasca sarjana/*Requirements for Master's Degree graduation.*

Memperhatikan/*Referring to:* Hasil penunjukan Dekan Fakultas Teknik dan Teknologi Informasi/*The appointment by the Dean of Engineering and Information Technology Faculty.*

Memutuskan/Has Reached the Decision:

1. Dengan ini menugaskan kepada dosen yang tercantum pada lampiran, sebagai Pembimbing Utama/Pendamping skripsi program Strata Dua (S2) mahasiswa yang tercantum pada lampiran dengan masa penugasan 1 Maret 2022 sampai dengan 20 Juni 2022/*Herewith gives the task to the lecturers as listed on the attachment to become Thesis Advisor/Co-Advisor for the Masters student(s) listed on the attachment with period of task starting from 1 March 2022 until 20 June 2022.*
2. Dosen yang bersangkutan harus melaksanakan tugas dan tanggung jawab sebaik-baiknya, sesuai dengan petunjuk pembimbingan skripsi dari SGU/*The appointed lecturer shall accomplish the task in responsible ways in line with the thesis guidelines and other regulations given by SGU.*

Terima kasih atas perhatian dan kerjasama Saudara/ *Thank you for your attention and cooperation.*

Dekan/*Dean,*

SWISS GERMAN UNIVERSITY SGU ACADEMIC ADMINISTRATION OFFICE

Dr. Maulahikmah Galinium, S.Kom, M.Sc.
Dekan Fakultas Teknik dan Teknologi Informasi/
Dean of Engineering and Information Technology Faculty

Lampiran/*Attachment:*
Daftar Nama Pembimbing Utama, Pendamping dan Mahasiswa pada Semester Genap 2021/2022
List of Thesis Advisor, Co-Advisor and Student in Even Semester 2021/2022.

1. Lampiran 1/*Attachment 1*: Program Studi Magister Teknik Informatika/*Study Program of Master of Information Technology*
2. Lampiran 2/*Attachment 2*: Program Studi Magister Teknik Mesin/*Study Program of Master of Mechanical Engineering*

Swiss German University
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Lampiran 2 Surat Keputusan: ST/THS2/0225/AAO/II/2022 – DiP

Attachment 2 to the Decree: ST/THS2/0225/AAO/II/2022 – DiP

Daftar Nama Pembimbing Utama/Pendamping Skripsi Pada Program Magister,
Program Studi Magister Teknik Mesin, Fakultas Teknik dan Teknologi Informasi, pada Semester Genap 2021/2022
(Februari - Juni 2022)

List of The Thesis Advisor/Co-Advisor Master's Degree Program,
Study Program of Mechanical Engineering, Faculty of Engineering & Information Technology, in Even Semester 2021/2022 (February – June 2022)

Daftar Pembimbing Utama/List of Advisor

Nr.	Nama Pembimbing Utama/*The Advisor's Name*	Status Dosen/*Lecturer's Status*	Nama Mahasiswa/*Student's Name*	NIM/*Student's ID*	Judul Skripsi/*Thesis Title*
1	Dena Hendriana, BSc., S.M., Sc.D.	Dosen Tetap/ Homebase Lecturer	Samuel Onasis Keliat	22152003	VACUUM DISTILLATION OIL PURIFICATION SYSTEM TO EXTENT LIFE TIME OF TURBINE LUBE OIL IN STEAM POWER GENERATION PLANTS
			Syaifuddin Zuhri	22152006	LAPPING MACHINE AUTOMOTION SYSTEM FOR OVERHOUL HYDRAULIC PUMP SMALL HYDRAULIC EXCAVATOR
			Yudhistira Nizar	22152008	AUTOMATIC WARNING SYSTEM FOR PREVENT COLLISIONS AND PROVIDE SAFE DISTANCE BETWEEN HEAVY DUTY-TRUCKS
2	Dr. Hanny J. Berchmans	Dosen Tetap/ Homebase Lecturer	Hafidz Akbar	22052011	WATER LEVEL CONTROL PID TUNING BY FUZZY-BASED METHOD FOR A BOILERSTEAM DRUM
3	Dr. Ir. Gembong Baskoro, M.Sc.	Dosen Tetap/ Homebase Lecturer	Rustanto	22152009	MTBF IMPROVEMENT SCANIA R580 BY USING FMEA ANALISYS IN FULL MAINTENANCE CONTRACT PT SIS ADARO
			Firdaus Agung Syafutra	22152010	IMPACT OF CUSTOMER EXPERIENCE CHANGE MANAGEMENT WITH ADKAR MODELS TO IMPROVE PERFORMANCE MAINTENACE SCHEDULE AND EXECUTION AT CUSTOMER PT UNITED TRACTORS SITE JEMBAYAN - INDONESIA
4	Dr. Ir. Henry Nasution, M.T.	Dosen Tetap/ Homebase Lecturer	Hery Cahyadi	22152007	DROWSINESS DETECTION WITH COMPUTER VISION FOR HEAVY EQUIPMENT HAULER
			Himawan Kunto Dewoto Aji	22152004	DESIGN AND DEVELOP VEHICLE ANTI COLLISION SYSTEM
			Nelson Purba	22152002	APPLICATION OF COMPUTER VISION TO DETECT DEFECTS ON COPPER WIRE
5	Dr. Tanika D Sofianti S.T., M.T.	Dosen Tetap/ Homebase Lecturer	Anggi Febrianto	22152005	OPTIMIZING PARTS AVAILABILITY SCANIA PRODUCT THROUGH PREVENTIVE MAINTENANCE IN LEADING INDONESIAN HEAVY EQUIPMENT COMPANIES CASE SITE SUPPORT KUTAI BARAT
			Willian Septianuggraha M	22152011	IMPROVING MAINTENANCE QUALITY ON HYDRAULIC SYSTEMS OF GD825A-2 TO REDUCE UNSCHEDULE BREAKDOWN IN INDONESIA HEAVY EQUIPMENT LEADING DISTRIBUTOR COMPANY

Daftar Pembimbing Pendamping/List of Co-Advisor

Nr.	Nama Pembimbing Pendamping/*The Co-Advisor's Name*	Status Dosen/*Lecturer's Status*	Nama Mahasiswa/*Student's Name*	NIM/*Student's ID*	Judul Skripsi/*Thesis Title*
1	Dena Hendriana, BSc., S.M., Sc.D.	Dosen Tetap/ Homebase Lecturer	Himawan Kunto Dewoto Aji	22152004	DESIGN AND DEVELOP VEHICLE ANTI COLLISION SYSTEM
2	Dr. Aditya Tirta Pratama, S.Si, M.T.	Dosen Tetap/ Homebase Lecturer	Rustanto	22152009	MTBF IMPROVEMENT SCANIA R580 BY USING FMEA ANALISYS IN FULL MAINTENANCE CONTRACT PT SIS ADARO
			Firdaus Agung Syafutra	22152010	IMPACT OF CUSTOMER EXPERIENCE CHANGE MANAGEMENT WITH ADKAR MODELS TO IMPROVE PERFORMANCE MAINTENACE SCHEDULE AND EXECUTION AT CUSTOMER PT UNITED TRACTORS SITE JEMBAYAN - INDONESIA
3	Dr. Eng. Cuk Supriadi Ali Nandar	Dosen Tidak Tetap/ Part Time Lecturer	Hery Cahyadi	22152007	DROWSINESS DETECTION WITH COMPUTER VISION FOR HEAVY EQUIPMENT HAULER

Daftar Pembimbing Pendamping/List of Co-Advisor

Nr.	Nama Pembimbing Pendamping/*The Co-Advisor's Name*	Status Dosen/*Lecturer's Status*	Nama Mahasiswa/*Student's Name*	NIM/*Student's ID*	Judul Skripsi/*Thesis Title*
4	Dr. Hanny J. Berchmans	Dosen Tetap/ Homebase Lecturer	Samuel Onasis Keliat	22152003	VACUUM DISTILLATION OIL PURIFICATION SYSTEM TO EXTENT LIFE TIME OF TURBINE LUBE OIL IN STEAM POWER GENERATION PLANTS
			Yudhistira Nizar	22152008	AUTOMATIC WARNING SYSTEM FOR PREVENT COLLISIONS AND PROVIDE SAFE DISTANCE BETWEEN HEAVY DUTY-TRUCKS
5	Dr. Ir. Gembong Baskoro, M.Sc.	Dosen Tetap/ Homebase Lecturer	Anggi Febrianto	22152005	OPTIMIZING PARTS AVAILABILITY SCANIA PRODUCT THROUGH PREVENTIVE MAINTENANCE IN LEADING INDONESIAN HEAVY EQUIPMENT COMPANIES CASE SITE SUPPORT KUTAI BARAT
			Willian Septianuggraha M	22152011	IMPROVING MAINTENANCE QUALITY ON HYDRAULIC SYSTEMS OF GD825A-2 TO REDUCE UNSCHEDULE BREAKDOWN IN INDONESIA HEAVY EQUIPMENT LEADING DISTRIBUTOR COMPANY
6	Dr. Ir. Henry Nasution, M.T.	Dosen Tetap/ Homebase Lecturer	Syaifuddin Zuhri	22152006	LAPPING MACHINE AUTOMOTION SYSTEM FOR OVERHOUL HYDRAULIC PUMP SMALL HYDRAULIC EXCAVATOR
			Hafidz Akbar	22052011	WATER LEVEL CONTROL PID TUNING BY FUZZY-BASED METHOD FOR A BOILERSTEAM DRUM
7	Dr. Widi Setiawan	Dosen Tetap/ Homebase Lecturer	Nelson Purba	22152002	APPLICATION OF COMPUTER VISION TO DETECT DEFECTS ON COPPER WIRE

Jumlah Pembimbing Utama Skripsi Studi Program Magister Teknik Mesin pada Semester Genap 2021/2022 adalah 5 orang
The Thesis Advisor of Study Program of Master of Mechanical Engineering Even Semester 2021/2022 in total are 5 persons

Jumlah Pembimbing Pendamping Skripsi Studi Program Magister Teknik Mesin pada Semester Genap 2021/2022 adalah 7 orang
The Thesis Co-Advisor of Study Program of Master of Mechanical Engineering Even Semester 2021/2022 in total are 7 persons

Dekan/*Dean*,

SWISS GERMAN UNIVERSITY
SGU
SWISS GERMAN UNIVERSITY
ACADEMIC ADMINISTRATION OFFICE

Dr. Maulahikmah Galinium, S.Kom, M.Sc.
Dekan Fakultas Teknik dan Teknologi Informasi/
Dean of Engineering and Information Technology Faculty

STATEMENT BY THE AUTHOR

Name of Student	:	Syaifuddin Zuhri
Student ID	:	22152006
Faculty	:	Engineering & Information Technology
Study Program	:	Mechanical Engineering – Mechatronics Concentration
Date of Defense	:	05 July 2022
Thesis Title	:	Lapping Machine with Arduino for Overhaul Hydraulic Pump At Small Hydraulic Excavator Komatsu

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.

Syaifuddin Zuhri
(Name of Student)

Approved by:
Date: 18 July 2022

Dena Hendriana, B.Sc, S.M., Sc.D
(Thesis Advisor)

Dr. Ir. Henry Nasution, M.T
(Thesis Co-Advisor)

Acknowledged by:
Date: 18 July 2022

Dr. Maulahikmah Galinium, S.Kom, M.Sc.
(Dean of Faculty of Engineering & Information Technology)

LAPPING MACHINE WITH ARDUINO FOR OVERHOUL HYDRAULIC PUMP AT SMALL HYDRAULIC EXCAVATOR KOMATSU

By

Syaifuddin Zuhri

2-2152-006

MASTER'S DEGREE

in

MASTER OF MECHANICAL ENGINEERING

FACULTY OF ENGINEERING & INFORMATION TECHNOLOGY

SWISS GERMAN UNIVERSITY

The Prominence Tower

Jalan Jalur Sutera Barat No. 15, Alam Sutera

Tangerang, Banten 15143 - Indonesia

Juni 2022

ABSTRACT

LAPPING MACHINE WITH ARDUINO FOR OVERHOUL
HYDRAULIC PUMP AT SMALL HYDRAULIC EXCAVATOR

By

Syaifuddin Zuhri
Dena Hendriana, B.Sc, S.M., Sc.D, Advisor
Dr. Ir. Henry Nasution, M.T Co-Advisor

SWISS GERMAN UNIVERSITY

Hydraulic excavators are generally used in the construction, forestry, agricultural and mining sectors for activities such as land clearing, cut & fill in road, bridge, and dam construction, spreading material in road construction, maintenance, pipe installation, canalling, loading onto trucks, and as a rock breaker/building. The treatment that is considered good is the treatment that produces the minimum possible down time but of course with the lowest possible maintenance cost. About 70% of damage to hydraulic equipment is caused by problems in maintenance and in the selection of hydraulic oil.

During the hydraulic pump overhoul work there are several work processes including the lapping cylinder block process with valve plate which takes a long time of about 16 hours this is because the lapping process is done manually by a mechanic. The lapping machine with arduino that is installed & operated properly in the hydraulic pump overhaul process can reduce lead time in the lapping process to be faster and more precise than the manual methode.

Keywords : Lapping Machine, Excavator, Overhoul, Hydraulic Pump, Piston Pump, Arduino

DEDICATION

I dedicated this research for My Family & UT School – PT United Tractors Tbk. Cabang Banjarmasin

ACKNOWLEDGEMENTS

I Would like to thank to Mr. Dena Hendriana B.Sc, S.M., Sc.D and Dr. Ir. Henry Nasution, M.T and all Lecturers who have guided me while studying in Swiss German University. And also to Mr. Edhie Sarwono, Mr. Muhammad Hamdan Aziz, Mr. Donny Krestanto and the management of PT United Tractors Tbk who gave me the opportunity to take a master's degree.

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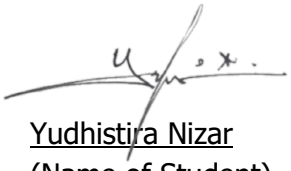
STATEMENT BY THE AUTHOR

Name of Student	:	Yudhistira Nizar
Student ID	:	22152008
Faculty	:	Engineering & Information Technology
Study Program	:	Master of Mechanical Engineering – Mechatronics concentration
Date of Defense	:	05 July 2022
Thesis Title	:	Automatic Warning System to Prevent Collisions and Provide a Safe Distance between Heavy Duty-Trucks

I hereby declare that this submission is my own work and to the best of my knowledge, it contains no material previously published or written by another person, nor material which to a substantial extent has been accepted for the award of any other degree or diploma at any educational institution, except where due acknowledgement is made in the thesis.



Yudhistira Nizar
(Name of Student)

Approved by:
Date: 18 July 2022

Dena Hendriana, B.Sc., S.M., Sc.D.
(Thesis Advisor)

Dr. Ir. Hanny J. Berchmans M.T., M.Sc.
(Thesis Co-Advisor)

Acknowledged by:
Date: 18 July 2022

Dr. Maulahikmah Galinium, S.Kom, M.Sc.
(Dean of Faculty of Engineering & Information Technology)

AUTOMATIC WARNING SYSTEM TO PREVENT COLLISIONS AND PROVIDE A SAFE DISTANCE BETWEEN HEAVY DUTY-TRUCKS

By

Yudhistira Nizar
22152008

MASTER'S DEGREE
in

MASTER OF MECHANICAL ENGINEERING
FACULTY OF ENGINEERING & INFORMATION TECHNOLOGY

SWISS GERMAN UNIVERSITY
The Prominence Tower
Jalan Jalur Sutera Barat No. 15, Alam Sutera
Tangerang, Banten 15143 - Indonesia

June 2022

ABSTRACT

AUTOMATIC WARNING SYSTEM TO PREVENT COLLISIONS
AND PROVIDE A SAFE DISTANCE BETWEEN HEAVY DUTY-TRUCKS

By

Yudhistira Nizar
Dena Hendriana, B.Sc., S.M., Sc.D., Advisor
Dr. Ir. Hanny J. Berchmans M.T. M.Sc., Co-Advisor

SWISS GERMAN UNIVERSITY

Heavy equipment operating in mining areas is heavy duty-trucks, which function as a means of transporting material over short to long distances. Operating and producing on target is the core goal, but safety is a key factor in achieving it. See the safety performance statistics on one of the customers of PT United Tractors Tbk. the data obtained that work accidents due to unsafe conditions and unsafe acts continue to increase every year, including collisions between heavy duty-trucks caused by the operator's lack of anticipation in maintaining a safe distance while driving. This causes a loss of production time due to the collision accident investigation process and the emergence of the need for impromptu equipment repair costs. If the accident causes the fatality, the government can revoke the mining operation permit and harm many parties. Based on this, researchers need to develop technology-based tools that can prevent collision accidents in mining areas. In general, the working mechanism of the developed tool uses a GPS (global positioning system) to read the position of the heavy duty-trucks against the satellite, and then translate it into a location on the earth's surface in the form of longitude, latitude, and altitude data. This data is sent to other heavy duty-trucks using radio frequency signals via LoRa (Long Range). The operator can see the distance between heavy duty-trucks while driving and a warning sound will activate automatically when an unsafe distance between heavy duty-trucks is detected. Distance data will be stored in a memory card and can be downloaded wirelessly using a web server to be followed up in the coaching process by supervisors regularly.

Keywords: heavy equipment, heavy duty-trucks, unsafe acts, anticipation, collision, safe distance, global positioning system, long-range, wireless

DEDICATION

I dedicate this study to my beloved family, UT School, and PT United Tractors Tbk.

Allah gives me everything.

ACKNOWLEDGEMENTS

I would like to thank Mr. Dena Hendriana, B.Sc., S.M., Sc.D. and Mr. Dr. Ir. Hanny J. Berchmans M.T. M.Sc. as advisors and co-advisors and to all lecturers who always provide support and guidance during the learning process and the preparation of this research. I would also like to thank Mr. Edhie Sarwono, Mrs. Endang Tri Handajani, Mr. Hamdan Aziz, Mr. Bayu Iman Sentosa, Mr. Achmad Muslimin, Mr. Wahono as well as the entire management of PT United Tractors Tbk., My Best Partner in Corporate University Berau who always support me, and UT School who have given the opportunity to join the master degree program.

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