SWISSGERMANUNIVERSITY

Draft: Surat Tugas/*Letter of Appointment*

Nomor/ *Number* ST/THS2/0120/AAO/II/2021 – FdI/Rev. 01 (1 March 2021) - DiP

Tanggal/ *Date* 1 Maret 2021/*1 March 2021*

Penugasan Sebagai Pembimbing Utama/Pendamping Skripsi Mahasiswa S2 Semester Genap 2020/2021
Appointment of Thesis Advisor/Co-Advisor for Master's Degree Student(s) in Even Semester 2020/2021

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 8 Maret 2021 sampai dengan 28 Juni 2021/*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 8 March 2021 until 28 June 2021.*
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,*

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 2020/2021
List of Thesis Advisor, Co-Advisor and Student in Even Semester 2020/2021.

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*

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Draft: Lampiran 2 Surat Tugas: ST/THS2/0120/AAO/II/2021 – FdI/Rev. 01 (1 March 2021) - DiP
Draft: Attachment 2 to the Letter of Appointment: ST/THS2/0120/AAO/II/2021 – FdI/Rev. 01 (1 March 2021) - DiP

Daftar Nama Pembimbing Utama/Pendamping Skripsi Pada Program Magister,
Program Studi Magister Teknik Mesin, Fakultas Teknik dan Teknologi Informasi, pada 8 Maret – 28 Juni 2021

List of The Thesis Advisor/Co-Advisor Master's Degree Program,
Study Program of Master of Mechanical Engineering, Faculty of Engineering & Information Technology,
in 8 March – 28 June 2021

Daftar Pembimbing Utama/*List of Advisor*

Nr.	Nama Pembimbing Utama/*The Advisor Name*	Status Dosen/*Lecturer's Status*	Nama Mahasiswa/*Student's Name*	NIM/ Student's ID	Judul Skripsi /Thesis Title
1	Dr. Edi Sofyan, B.Eng., M.Eng.	Dosen Tidak Tetap/ Non-Homebase Lecturer	Edmond Hendrik Jacob Ngantung	2-1752-041	AUTOMATED COURTESY AMOUNT RECOGNITION (CAR) AND LEGAL AMOUNT RECOGNITION (LAR) FOLLOWING WITH FAULT DETECTION BY USING UV ON BANK CHEQUE
2	Dr. Ir. Gembong Baskoro, M.Sc.	Dosen Tetap/ Homebase Lecturer	Hasanuddin	2-1952-043	IMPROVING SCRAP OF CEMENT A3CM-05 PROCESS BY USING THE QCC (QUALITY CONTROL CIRCLE) AND CAUSE AND EFFECT METHOD IN AN INDONESIA LEADING TIRE
3	Dr. Tanika D. Sofianti, ST, MT	Dosen Tetap/ Homebase Lecturer	Eunike Anastasia Evangelista	2-2052-001	IMPACT OF PROJECT MANAGEMENT SOFTWARE ON COLLABORATIVE WORKING PERFORMANCE: A CASE STUDY OF WORKING FROM HOME IMPLEMENTATION
4	Dena Hendriana, B.Sc., S.M., Sc.D	Dosen Tetap/ Homebase Lecturer	Mochamad Hamdan Aziz	2-2052-008	PERIODIC MAINTENANCE MONITORING SYSTEM USING IOT FOR KOMATSU BULLDOZER
			Robi Tubagus Yuni	2-2052-006	REDUCING ENGINE SPEED WHEN ABNORMAL INDICATIONS APPEAR IN THE COOLING SYSTEM TO REDUCE THE NUMBER OF UNSCHEDULED BREAKDOWNS
5	Dr. Hanny J Berchman	Dosen Tetap/ Homebase Lecturer	Alwi Abidin	2-2052-004	BEARING CONDITION MONITORING TO AVOID UNPLANNED BREAKDOWN IN CRITICAL EQUIPMENT
			Andri Prasetyo	2-2052-005	TRAVEL MISOPERATION PREVENTION USING AUTOMATIC WARNING SYSTEM FOR EXCAVATOR
6	Dr. Henry Nasution	Dosen Tetap/ Homebase Lecturer	Muhamad Lutfi Rachmat	2-2052-007	DESIGN CLUTCH WEAR MONITORING TO PROVIDE THE RIGHT TIME TO CHANGE THE CLUTCH AND PREVENT UNSCHEDULED BREAKDOWN ON HEAVY DUTY TRUCKS
			Salim Janto	2-2052-002	IMPROVING HVAC INDOOR AIR QUALITY FOR HEALTHY BUILDING

Daftar Pembimbing Pendamping/*List of Co-Advisor*

Nr.	Nama Pembimbing Pendamping/*The Co-Advisor Name*	Status Dosen/*Lecturer's Status*	Nama Mahasiswa/*Student's Name*	NIM/ Student's ID	Judul Skripsi /Thesis Title
1	Dena Hendriana, B.Sc., S.M., Sc.D	Dosen Tetap/ Homebase Lecturer	Edmond Hendrik Jacob Ngantung	2-1752-041	AUTOMATED COURTESY AMOUNT RECOGNITION (CAR) AND LEGAL AMOUNT RECOGNITION (LAR) FOLLOWING WITH FAULT DETECTION BY USING UV ON BANK CHEQUE
2	Dr. Aditya Tirta Pratama, S.T, M.T.	Dosen Tetap/ Homebase Lecturer	Hasanuddin	2-1952-043	IMPROVING SCRAP OF CEMENT A3CM-05 PROCESS BY USING THE QCC (QUALITY CONTROL CIRCLE) AND CAUSE AND EFFECT METHOD IN AN INDONESIA LEADING TIRE
3	Dr. Edi Sofyan, B.Eng., M.Eng.	Dosen Tidak Tetap/ Non-Homebase Lecturer	Salim Janto	2-2052-002	IMPROVING HVAC INDOOR AIR QUALITY FOR HEALTHY BUILDING

Daftar Pembimbing Pendamping/*List of Co-Advisor*

Nr.	Nama Pembimbing Pendamping/*The Co-Advisor Name*	Status Dosen/*Lecturer's Status*	Nama Mahasiswa/*Student's Name*	NIM/ Student's ID	Judul Skripsi /Thesis Title
4	Dr. Henry Nasution	Dosen Tetap/ Homebase Lecturer	Alwi Abidin	2-2052-004	BEARING CONDITION MONITORING TO AVOID UNPLANNED BREAKDOWN IN CRITICAL EQUIPMENT
5	Dr. Widi Setiawan	Dosen Tidak Tetap/ Non-Homebase Lecturer	Muhamad Lutfi Rachmat	2-2052-007	DESIGN CLUTCH WEAR MONITORING TO PROVIDE THE RIGHT TIME TO CHANGE THE CLUTCH AND PREVENT UNSCHEDULED BREAKDOWN ON HEAVY DUTY TRUCKS
6	Dr. Ir. Gembong Baskoro, M.Sc.	Dosen Tetap/ Homebase Lecturer	Mochamad Hamdan Aziz	2-2052-008	PERIODIC MAINTENANCE MONITORING SYSTEM USING IOT FOR KOMATSU BULLDOZER
			Eunike Anastasia Evangelista	2-2052-001	IMPACT OF PROJECT MANAGEMENT SOFTWARE ON COLLABORATIVE WORKING PERFORMANCE: A CASE STUDY OF WORKING FROM HOME IMPLEMENTATION
7	Dr.-Eng. Cuk Ali Nandar	Dosen Tidak Tetap/ Non-Homebase Lecturer	Andri Prasetyo	2-2052-005	TRAVEL MISOPERATION PREVENTION USING AUTOMATIC WARNING SYSTEM FOR EXCAVATOR
			Robi Tubagus Yuni	2-2052-006	REDUCING ENGINE SPEED WHEN ABNORMAL INDICATIONS APPEAR IN THE COOLING SYSTEM TO REDUCE THE NUMBER OF UNSCHEDULED BREAKDOWNS

Jumlah Pembimbing Utama Skripsi Program Studi Magister Teknik Mesin pada Semester Genap 2020/2021 adalah 6 orang/
The Thesis Advisor of Study Program of Master of Mechanical Engineering Even Semester 2020/2021 in total are 6 persons

Jumlah Pembimbing Pendamping Skripsi Program Studi Magister Teknik Mesin pada Semester Genap 2020/2021 adalah 7 orang/
The Thesis Co-Advisor of Study Program of Master of Mechanical Engineering Even Semester 2020/2021 in total are 7 persons

Dekan/*Dean,*

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	:	Mochamad Hamdan Aziz
Student ID	:	2-2052-008
Faculty	:	Engineering & Information Technology
Study Program	:	Master of Mechanical Engineering
Date of Defense	:	13 July 2021
Thesis Title	:	PERIODIC MAINTENANCE MONITORING SYSTEM USING IOT FOR KOMATSU BULLDOZER

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.

Mochamad Hamdan Aziz
(Name of Student)

Approved by:
Date: 27 July 2021

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

Dr. Ir. Gembong Baskoro, M.Sc.
(Thesis Co-Advisor)

Acknowledged by:
Date: 27 July 2021

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

PERIODIC MAINTENANCE MONITORING SYSTEM USING IOT FOR KOMATSU BULLDOZER

By

Mochamad Hamdan Aziz
22052008

MASTER'S DEGREE
in

MASTER OF MECHANICAL ENGINEERING
MECHANICAL ENGINEERING

SWISS GERMAN UNIVERSITY
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June, 2021

ABSTRACT

PERIODIC MAINTENANCE MONITORING SYSTEM USING IOT
FOR KOMATSU BULLDOZER

By

Mochamad Hamdan Aziz
Dena Hendriana., B.Sc, S.M., Sc.D.
Dr. Ir. Gembong Baskoro, M.Sc.

SWISS GERMAN UNIVERSITY

Each heavy equipment requires regular maintenance to maintain the lifetime of the component to reach recommended machine life by the manufacturer. By carrying out routine regular maintenance, we can prevent premature damage for every single part of the heavy equipment which is called Preventive Maintenance.

By design periodic maintenance monitoring and notification system using working hour data, engine oil analysis and send it through IoT, users and distributors will be able to get early warning and carry out the periodic maintenance as soon as possible, so that it will reduce the potential for delays in the implementation of periodic service and preventing damage of component.

Digital hour meter is created as a reference to monitor working hours and periodic service schedule notifications. Oil Property Sensor FPS2800 is also used to monitor oil quality. Both data are sent wirelessly using LoRa and received by the receiving device using NodeMCU. The Blynk app was used in this study as a viewer for data sent in real time through android devices.

Keywords: Periodic Maintenance Monitoring, Internet Of Things, Oil Property Sensor, LoRa, Blynk App.

DEDICATION

This study is wholeheartedly dedicated to my beloved wife, children and my mother who have been our source of inspiration and gave me strength when I thought of giving up.

And I dedicated also to PT United Tractors Tbk. amd UT School Member

ACKNOWLEDGEMENTS

I Would like to thank to Dena Hendriana., B.Sc, S.M., Sc.D. and Mr. Dr. Ir. Gembong Baskoro, M.Sc. and all Lecturers who have guided me while studying in Swiss German University. And also to Mr. Edhie Sarwono, Mrs. Endang Tri Handajani and the management of PT United Tractors Tbk who gave me the opportunity to take a master's degree.

And especially I would like to thank Allah Swt, for all the gifts that have been given to me

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STATEMENT BY THE AUTHOR

Name of Student	:	Robi Tubagus Yuni
Student ID	:	22052006
Faculty	:	Engineering & Information Technology
Study Program	:	Master of Mechanical Engineering – Mechatronics Concentration
Date of Defense	:	13 July 2021
Thesis Title	:	MONITORING HEAVY EQUIPMENT COOLANT TEMPERATURE TO PREVENT ENGINE OVERHEAT USING IOT

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.

Robi Tubagus Yuni
(Name of Student)

Approved by:
Date: 26 July 2021

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

Dr. Cuk Supriyadi Ali Nandar, ST., M.Eng.
(Thesis Co-Advisor)

Acknowledged by:
Date: 26 July 2021

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

MONITORING HEAVY EQUIPMENT COOLANT TEMPERATURE TO PREVENT ENGINE OVERHEAT USING IOT

By

Robi Tubagus Yuni
22052006

MASTER'S DEGREE
in

MECHATRONICS
MASTER OF MECHANICAL ENGINEERING

SWISS GERMAN UNIVERSITY
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Tangerang, Banten 15143 - Indonesia

June 2021

ABSTRACT

MONITORING HEAVY EQUIPMENT COOLANT TEMPERATURE
TO PREVENT ENGINE OVERHEAT USING IOT

By

Robi Tubagus Yuni
Dena Hendriana, B.Sc., S.M., Sc.D., Advisor
Dr. Cuk Supriyadi Ali Nandar, ST., M.Eng., Co-Advisor

SWISS GERMAN UNIVERSITY

All heavy equipment, including bulldozers, are expected to always be ready to operate and have maximum performance. However, there are still many bulldozers that have problems, one of which is engine overheating. This overheating can be caused by a reduced amount of coolant due to a leak or an inappropriate cooling fan rotation speed due to a loose fan belt. This study aims to monitor and provide early warning of rising coolant temperature along with the possibility of reducing the amount of coolant and decreasing the cooling fan rotational speed. This research was conducted by developing monitoring and warning devices, apart from being known by the operator, it can also be known by the maintenance department in a different place with the use of IoT. The result showed E18-D80NK proximity sensor can be used to read the cooling fan rotation speed. In addition, a contactless liquid water level sensor module XKC-Y25-V can be used to determine the coolant level in the sub tank/reservoir. On the other hand, NodeMCU V3 ESP8266 can be used with the Blynk application as an IoT platform, to be able to send information from sensors to Android.

Keywords: engine overheat, blynk, NodeMCU, E18-D80NK, contactless liquid level sensor.

DEDICATION

I dedicated this research for my family & PT United Tractors, Tbk.

ACKNOWLEDGEMENTS

I would like to thank to Mr. Dena Hendriana., B.Sc., S.M., Sc.D. and Mr. Dr. Cuk Supriyadi Ali Nandar, ST., M.Eng. and all Lecturers who have guided me while studying in Swiss German University. Thanks also to Mr. Eddhie Sarwono and the management of PT. United Tractors Tbk, who have given me the opportunity to pursue this master's program.

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