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**Draft: Surat Tugas / Letter of Appointment**

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Nomor/  
Number  
Tanggal/  
Date

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

1 Maret 2021/ 1 March 2021

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**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**

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**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*

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

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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**

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			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*

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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  
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Approved by:  
Date: 27 July 2021

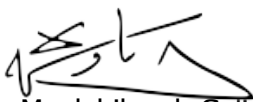


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Date: 27 July 2021



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**PERIODIC MAINTENANCE MONITORING SYSTEM USING IOT  
FOR KOMATSU BULLDOZER**

By

Mochamad Hamdan Aziz  
22052008

MASTER'S DEGREE  
in

MASTER OF MECHANICAL ENGINEERING  
MECHANICAL ENGINEERING



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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.

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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.*

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## **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. and 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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TABLE OF CONTENTS

STATEMENT BY THE AUTHOR.....	1
ABSTRACT.....	2
DEDICATION.....	4
A\KNOWLEDGEMENTS.....	5
LIST OF FIGURES.....	9
LIST OF TABLES.....	11
CHAPTER 1 – INTRODUCTION.....	12
1.1 Background.....	12
1.2 Research Problems.....	18
1.3 Research Objectives.....	18
1.4 Significance of Study.....	18
1.5 Research Questions.....	18
1.6 Hypothesis.....	18
2.1 Philosophy of Maintenance.....	19
2.1.1 Periodic Inspection.....	21
2.1.2 Periodic Service.....	21
2.2 Periodic Maintenance Komatsu Bulldozer D85ESS-2.....	22
2.3 Lubricating System of Komatsu D85ESS-2.....	24
2.4 Engine Oil.....	27
2.4.1 Viscosity of Engine Oil.....	28
2.4.2 Density of Engine Oil.....	29
2.4.3 Dielectric Constant of Engine Oil.....	29
2.5 Komatsu Monitoring & Tracking System.....	31
2.6 Internet of Things.....	32
2.7 Oil Property Sensor FPS2800.....	33
2.8 LoRa.....	35
2.8.1 Lora Antena.....	38
2.9 Arduino Uno.....	38
2.10 Node MCU.....	40
2.11 MCP2515 CANBUS Data Reader.....	40
2.12 RTC 1307.....	42

---

2.13	Nextion Display & Editor .....	43
2.15	Blynk Software .....	44
CHAPTER 3 - RESEARCH METHODS .....		47
3.1	Research Framework .....	47
3.2.	Periodic Service Monitoring through IoT Concept .....	48
3.3.	Aging Comparison of Characteristic SAE15W40 Oil.....	49
3.4	Block Diagram .....	51
3.5	Flow Diagram .....	52
3.6.	Wiring Diagram .....	53
3.6.1	Controller & Transmitter Block Diagram .....	53
3.6.2	Receiver & Controller Block Diagram .....	53
3.7	Materials and Equipment .....	54
3.7.1	Materials .....	54
3.7.2	Tools .....	56
3.8	Component and Circuit Testing .....	56
3.8.1	Hour Meter Generator.....	56
3.8.2	Oil Property Sensor FPS2800 Reader.....	58
3.8.3	LoRa Data Transmitter Modul.....	62
3.8.4.	LoRa Receiver Data Modul .....	64
3.8.4	Displaying Blynk App .....	65
CHAPTER 4 – RESULTS AND DISCUSSIONS.....		69
4. 1	Introduction.....	69
4.2	Prototype Development .....	69
4.2.1	Controller & Transmitter Modul.....	69
4.2.2	Oil Property Sensor Installation.....	71
4.3	Testing of Periodic Service Reminder System .....	73
4.3.1	Hour Meter Accuracy Testing .....	73
4.3.2	Reminder Function Testing.....	74
4.4	SAE15W40 Oil Characteristis .....	77
4.4.1	SAE15W40 Oil Viscosity Characteristic .....	79
4.4.2	SAE15W40 Density Characteristic.....	80
4.4	LoRa Transmitter Testing .....	83
4.5	LoRa Transmitter Distance Testing.....	85
4.6	Blynk Testing.....	87

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5. 1 Conclusions.....	88
5. 2. Recommendation .....	89
REFERENCES .....	90
CURRICULUM VITAE.....	92

## LIST OF FIGURES

<b>Figure 1.</b> Causes of unschedule breakdown.....	12
<b>Figure 2.</b> Wear on gear pump parts due to dirty hydraulic oil.....	13
<b>Figure 3.</b> Types of Komatsu Machine Monitor Panel.....	14
<b>Figure 4.</b> Komatsu Population Supported with Komtrax System.....	14
<b>Figure 5.</b> Komatsu Bulldozer D85ESS-2.....	16
<b>Figure 6.</b> General View of Bulldozer.....	16
<b>Figure 7.</b> Delay of Periodic Execution Komatsu Bulldozer.....	17
<b>Figure 8.</b> Diagram of the causes of damage to the machine.....	19
<b>Figure 9.</b> Classification of Maintenance.....	20
<b>Figure 10.</b> Lubrication Sistem of Komatsu Engine SAA6D125-2.....	25
<b>Figure 11.</b> Lubrication Control Valve of Komatsu Engine SAA6D125-2.....	26
<b>Figure 12.</b> Viscosity and Density over Temperature for SAE15W40 (wiki.anton,paar.com).....	28
<b>Figure 13.</b> Dielectric of Castrol Oil SAE 15W40 over Temperature (Fecek, 2017).....	30
<b>Figure 14.</b> Komtrax System Works Diagram.....	31
<b>Figure 15.</b> Komtrax Display Monitoring.....	32
<b>Figure 16.</b> IoT in DNA Effectiveness.....	33
<b>Figure 17.</b> Oil Property Sensor FPS 2800 and Sructure Diagram.....	34
<b>Figure 18.</b> Tuning Fork of Sensor.....	35
<b>Figure 19.</b> . LoRa SX1278 Module.....	36
<b>Figure 20.</b> LoRa SX1278 pinout.....	37
<b>Figure 21.</b> LoRa Anntena.....	38
<b>Figure 22.</b> Arduino Uno Pin Out.....	39
<b>Figure 23.</b> Pin Out of NodeMCU ESP8266.....	40
<b>Figure 24.</b> Componeny & Pin Out of MCP2515.....	41
<b>Figure 25.</b> Block Diagram of MCP2515.....	42
<b>Figure 26.</b> RTC.....	42
<b>Figure 27.</b> Nextion Display.....	43
<b>Figure 28.</b> Nextion Editor.....	44
<b>Figure 29.</b> Blynk Frameworks.....	45
<b>Figure 30.</b> Blynk Libraries.....	45
<b>Figure 31.</b> Research Flow.....	47
<b>Figure 32.</b> Periodical Maintenance Monitoring System Design.....	48
<b>Figure 33.</b> Viscosity Comparation (TE Connctivity, 2020).....	49
<b>Figure 34.</b> Density Comparation (TE Connctivity, 2020).....	49
<b>Figure 35.</b> Density Comparation (TE Connctivity, 2020).....	50
<b>Figure 36.</b> Block Diagram of System.....	51
<b>Figure 37.</b> Flow Diagram of System.....	52
<b>Figure 38.</b> Transmitter Block Diagram.....	53
<b>Figure 39.</b> Receiver Block Diagram.....	53
<b>Figure 40.</b> Atmega328P & EEPROM of Arduino Uno.....	58
<b>Figure 41.</b> Wiring Diagram of Sensor Reading.....	59
<b>Figure 42.</b> Output of Sensor Before Conversion.....	60

---

<b>Figure 43.</b> Sensor Output Configuration.....	60
<b>Figure 44.</b> Sensor Output Configuration from Arduino Uno.....	61
<b>Figure 45.</b> Way of CAN Data Conversion.....	61
<b>Figure 46.</b> Result of Data Conversion.....	62
<b>Figure 47.</b> LoRa Transmitter Modul.....	62
<b>Figure 48.</b> Receiver Circuit Diagram.....	64
<b>Figure 49.</b> Blynk Start Page.....	65
<b>Figure 50.</b> Blynk Widget.....	66
<b>Figure 51.</b> Blynk Widget Setting.....	67
<b>Figure 52.</b> Blynk Monitoring Display.....	68
<b>Figure 53.</b> Controller & Transmitter Modul.....	69
<b>Figure 54.</b> Transmitter & Controller Modul Installation.....	70
<b>Figure 55.</b> Sensor Installation on Bulldozer Machine.....	72
<b>Figure 56.</b> Sensor Installation Scheme on Lubricating Valve.....	72
<b>Figure 57.</b> Hour Meter Validation.....	73
<b>Figure 58.</b> Reminder function of periodic service every 250 hours display.....	74
<b>Figure 59.</b> Reminder function of periodic service every 500 hours display.....	75
<b>Figure 60.</b> Reminder function of periodic service every 1000 hours display.....	75
<b>Figure 61.</b> Reminder function of periodic service every 2000 hours display.....	76
<b>Figure 62.</b> Reminder Function Not Active display.....	76
<b>Figure 63.</b> Data Sampling Process.....	77
<b>Figure 64.</b> SAE15W40 New Oil Sample.....	78
<b>Figure 65.</b> SAE15W40 500 Working Hours Sample.....	78
<b>Figure 66.</b> SAE15W40 Viscosity Characteristic.....	79
<b>Figure 67.</b> SAE15W40 Density Characteristic.....	80
<b>Figure 68.</b> SAE15W40 Dielectric Characteristic.....	81
<b>Figure 69.</b> Gauge Setting Parameter on Blynk App.....	83
<b>Figure 70.</b> Data display from the sender device.....	84
<b>Figure 71.</b> Data display from the receiver device.....	84
<b>Figure 72.</b> Coverage Distance Testing.....	85
<b>Figure 73.</b> Wire Antenna.....	86
<b>Figure 74.</b> LoRa Distance testing process.....	86
<b>Figure 75.</b> Blynk Monitoring Results.....	87

## LIST OF TABLES

<b>Table 1.</b> Komatsu Bulldozer Population .....	15
<b>Table 2.</b> EEPROM Spesification on Arduino .....	39
<b>Table 3.</b> Spesification of Ardino Uno .....	57
<b>Table 4.</b> Setting of reminder.....	77
<b>Table 5.</b> SAE15W40 Viscosity Table Charateristic.....	79
<b>Table 6.</b> SAE15W40 Density Table Charateristic.....	80
<b>Table 7.</b> SAE15W40 Dielectric Table Charateristic .....	81
<b>Table 8.</b> Parameter table for reminder.....	82

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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)

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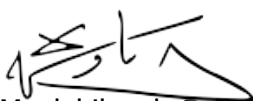


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Acknowledged by:  
Date: 26 July 2021



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(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



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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

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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.*

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## **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.

## TABLE OF CONTENTS

	Page
STATEMENT BY THE AUTHOR .....	2
ABSTRACT .....	3
DEDICATION .....	5
ACKNOWLEDGEMENTS .....	6
TABLE OF CONTENTS.....	7
LIST OF FIGURES .....	9
LIST OF TABLES.....	12
CHAPTER 1 – INTRODUCTION.....	13
1.1 Background .....	13
1.2 Research Problems .....	19
1.3 Objectives .....	19
1.4 Research Question .....	19
1.5 Hypothesis.....	19
CHAPTER 2 - LITERATURE REVIEW .....	20
2.1. Theoretical Perspectives .....	20
2.2. Previous Studies .....	36
CHAPTER 3 – RESEARCH METHODS .....	39
3.1. Research Framework .....	39
3.2. Scope of Study .....	40
3.3. Conceptual Design.....	40
3.4. Block Diagram .....	42

3.5. Materials and Equipment .....	44
CHAPTER 4 – RESULTS AND DISCUSSIONS .....	63
4.1. Initial Evaluation .....	63
4.2. Experimental Result .....	73
CHAPTER 5 – CONCLUSIONS AND RECCOMENDATIONS .....	80
GLOSSARY .....	82
REFERENCES .....	85
CURRICULUM VITAE .....	88

## LIST OF FIGURES

Figures	Page
Figure 1. Heavy equipment models or types (form left to right is dump truck, loader, grader, excavator, bulldozer).....	13
Figure 2. The largest population of Komatsu bulldozers in Indonesia.....	13
Figure 3. Komatsu bulldozers engine, powertrain, and attachment. ....	14
Figure 4. UT Techcare application. ....	14
Figure 5. Summary problem D85ESS-2 at UT-Techcare. ....	15
Figure 6. D85ESS-2 engine and cooling system summary problem at UT-Techcare. ....	15
Figure 7. Examples of components damage due to overheating. ....	16
Figure 8. Komatsu bulldozer D85ESS-2 engine coolant temperature monitor. ....	17
Figure 9. KOMTRAX Technology. ....	18
Figure 10. KOMTRAX D85ESS-2 feature.....	18
Figure 11. Diesel engine component. ....	20
Figure 12. Four stroke diesel engines. ....	21
Figure 13. S6D125-2 fuel system chart. ....	23
Figure 14. Cutaway view of a FIP.....	24
Figure 15. Metering action of plunger and cutaway of governor.....	25
Figure 16. Simplified governor operation.....	25
Figure 17. Komatsu D85ESS-2 engine speed control. ....	26
Figure 18. S6D125-2 cooling system chart.....	27
Figure 19. Radiator structure.....	28
Figure 20. Radiator Komatsu bulldozer D85ESS-2. ....	29
Figure 21. S6D125-2 fan drive.....	29
Figure 22. Komatsu D85ESS-2 Coolant temperature sensor and panel gauge.....	30
Figure 23. Komatsu D85ESS-2 troubleshooting chart. ....	31
Figure 24. Some operating procedures of Komatsu bulldozer D85ESS-2. ....	32
Figure 25. Coolant level check Komatsu bulldozer D85ESS-2.....	33



Figure 26. Fan belt tension check and adjustment Komatsu bulldozer D85ESS-2.....	34
Figure 27. Blynk application.....	35
Figure 28. ESP8266 microcontroller (a) V1 (b) V2 (c) V3.....	36
Figure 29. Research workflow.....	39
Figure 30. Input, process, and output diagram.....	41
Figure 31. Monitoring and warning flow diagram.....	42
Figure 32. Device block diagram.....	43
Figure 33. NodeMCU V3 Lolin.....	44
Figure 34. NodeMCU V3 pin's location and identification.....	45
Figure 35. NodeMCU V3 Lolin base board.....	47
Figure 36. Step-down module LM2596.....	48
Figure 37. Coolant temperature sensor.....	49
Figure 38. Coolant temperature sensor structure of circuit.....	49
Figure 39. Voltage divider circuit.....	50
Figure 40. Contactless liquid level sensor.....	51
Figure 41. Contactless liquid level sensor pin description and installation.....	52
Figure 42. Proximity sensor E18-D80NK.....	52
Figure 43. Proximity sensor E18-D80NK pin description and installation.....	53
Figure 44. Proximity sensor E18-D80NK logic output.....	53
Figure 45. OLED display 0.96 inch.....	53
Figure 46. Relay 1 channel 3.3 volt.....	54
Figure 47. Engine stop solenoid.....	55
Figure 48. Active buzzer.....	55
Figure 49. RTC DS3231.....	56
Figure 50. SparkFun openlog.....	56
Figure 51. Arduino IDE preference.....	58
Figure 52. Installing ESP8266.....	58
Figure 53. Successfully installed the board.....	59
Figure 54. Blynk login page.....	60
Figure 55. Selecting the microcontroller model and connection type.....	60
Figure 56. Create new project and send the auth token.....	61
Figure 57. Widget/command block selection page.....	61

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Figure 58. Setting pin widget .....	62
Figure 59. Temperature sensor working test.....	63
Figure 60. Temperature sensor reading compared to thermometer reading. ....	64
Figure 61. Level sensor working test and position setting.....	65
Figure 62. Setting fan belt tension to maximum deflection. ....	66
Figure 63. Measuring fan speed at maximum deflection of fan belt tension.....	67
Figure 64. Fan speed sensor reading.....	67
Figure 65. Box dimension, upper and side view. ....	68
Figure 66. Front and back box view. ....	69
Figure 67. Inside box view.....	69
Figure 68. Box location.....	70
Figure 69. Coolant temperature sensor location.....	70
Figure 70. Coolant level sensor location.....	71
Figure 71. Fan speed sensor location.....	71
Figure 72. Blynk application interface for monitoring coolant temperature. ....	72
Figure 73. Superchart data download menu display.....	73
Figure 74. First state simulation display result. ....	74
Figure 75. Second condition simulation display result.....	75
Figure 76. Third condition simulation display. ....	76
Figure 77. Fourth state simulation display result. ....	77
Figure 78. Cooling system abnormality notification. ....	78
Figure 79. Buzzer alarms, relays, and fuel solenoids experimental results. ....	79
Figure 80. Fuel solenoid placement requires consultation with the principal.....	79

## LIST OF TABLES

Table	Page
Table 1. Komatsu D85ESS-2 engine specification. ....	22
Table 2. Radiator type of Komatsu D85ESS-2. ....	28
Table 3. Abnormal conditions in the cooling system. ....	41
Table 4. List of materials and equipment.....	43
Table 5. Node MCU V3 Lolin specification.....	44
Table 6. Node MCU V3 Lolin GPIO pin description.....	46
Table 7. Node MCU V3 base board specification.....	48
Table 8. Step-down module LM2596 specification. ....	48
Table 9. Contactless liquid level sensor specification. ....	51
Table 10. Proximity sensor E18-D80NK specification. ....	52
Table 11. OLED display 0.96 inch specification. ....	54
Table 12. RTC DS3231 specification. ....	56
Table 13. SparkFun openlog specification.....	57
Table 14. Temperature reading. ....	64
Table 15. Result of coolant level sensor test.....	66
Table 16. Cooling fan speed reading .....	68
Table 17 . LED function on Blynk application. ....	72
Table 18. Simulation conditions.....	74
Table 19. First state simulation result.....	75
Table 20. Second state simulation result.....	76
Table 21. Third state simulation result. ....	77
Table 22. Fourth state simulation result.....	78