

AUTOMATION OF MAINTENANCE SCHEDULING FOR A FLEET OF HEAVY VEHICLES

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Degree of Master of Science

Department of Electrical Engineering

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Declaration

I hereby declare that this dissertation entitled “Automation Maintenance Scheduling for a Fleet of Heavy Vehicles” is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person and no material which has been accepted for the award of any other degree or diploma of a university or any other institute of higher learning, except where due acknowledgment has been made in the text.

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Signature

1st March 2014

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Certificate

This is to certify that the thesis entitled “Automation Maintenance Scheduling for a fleet of Heavy Vehicles” submitted by Mr Chathura Kanishka Sirimanna to the University of Moratuwa towards partial fulfillment of the requirements for the award of the Degree of Master of Science in Industrial Automation is a bona fide record of the work carried out by him under my supervision and guidance.

University of Moratuwa

Professor Nalin Wickramarachchi

Date



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Dedication

*Dear Mother & Father,
Do not stand ahead of me
for I may not follow
Do not stand behind me
for I may not lead
Just stand beside me
and be my friend!
Loving son*



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Abstract

Statistically, 8.29% of total number of vehicles seen on the Sri Lankan road network is heavy vehicles [5]. India dominates the Sri Lankan heavy vehicle market with a share of 50% followed by other vehicle manufacturing countries [11]. When compared with its European, Japanese or German counterpart these Indian vehicles are specially designed for developing countries such as Sri Lanka.

Most heavy vehicle manufactures do not give adequate consideration to provide an early warning system to help maintain heavy vehicle engines in good condition. Thus this research proposes such an early warning system which include fan belt condition indicator, alarm controlled engine cooling temperature indicator, vehicle loading weight indicator and automated method in keeping records of the engine oil changing period.

The study has been carried out over one year period with selected vehicles from the Sri Lanka Navy, which possesses a massive heavy vehicle fleet and operates them frequently all over the Island. The proposals have been made by gathering information and analyzing data obtained from this fleet during its operation.

The fan belt condition indicator provides an early warning by measuring the level of wear and tear of the fan belt. The conventional engine temperature indicator has been replaced with an electronic temperature sensor to provide real time engine temperature indicator. It also incorporates an alarm to warn of dangerously high temperatures to the vehicle operator. The weight of cargo loaded to the vehicle is measured through shock-absorber mounted displacement sensors, providing the operator with an accurate indication of the load on the vehicle prior to starting the journey. Further, an engine running hours counter provides an indication of actual engine running period, making it easy to identify proper time for oil changing.

All the above features are consolidated in to a single display unit on the dashboard using electronic communication system. This unit called “Engine Quality Monitoring Unit” will greatly help the maintenance crew to prepare a proper maintenance schedule, fine tuned for each vehicle in the fleet.

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List of Abbreviations

Abbreviation	Description
AC	Alternative Current
CAN	Controller Area Network
CTI	Coolant Temperature Indicator
CW	Curb Weight
DC	Direct Current
ECT	Engine Cooling Temperature sensor
GVW	Gross Vehicle Weight
IC	Internal Combustion
LCD	Liquid Cristal Display
LIN	Local Interconnect Network
LSU	Load Sensing Unit
PIC	Peripheral Interrogated Circuit
POT	Potential Meter
QMU	Quality Measuring Unit
Svc Int	Service Interval
T	Tension
μ	Coefficient of friction



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