

**IMPLEMENTATION OF IOT-BASED AUTOMATIC SYSTEMS FOR
ELECTRICAL ENERGY SAVING IN COMPRESSORS IN THE HEAVY
EQUIPMENT MANUFACTURING INDUSTRY**

By

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STATEMENT BY THE AUTHOR

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.



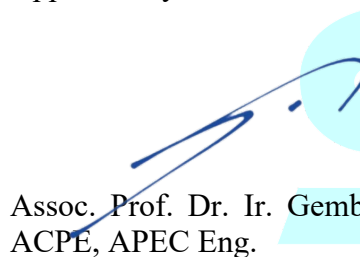
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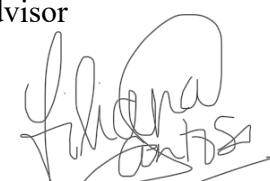


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ABSTRACT

IMPLEMENTATION OF IOT-BASED AUTOMATIC SYSTEMS FOR ELECTRICAL ENERGY SAVING IN COMPRESSORS IN THE HEAVY EQUIPMENT MANUFACTURING INDUSTRY

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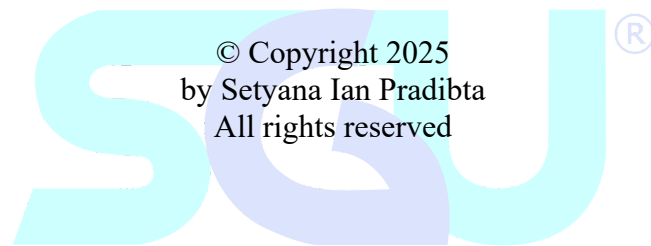
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This research focuses on implementing an IoT-based automated system for electrical energy savings in industrial compressor operations at PT. United Tractors Pandu Engineering, a leading heavy equipment manufacturer. The study identifies air compressors as significant contributors to energy consumption, accounting for approximately 23.2% of total electricity use. A real-time monitoring and pressure-based control system was developed using IoT components including PLCs, sensors, and HMI. Utilizing the DMAIC method, baseline measurements indicated daily energy waste due to manual operations and idle time. After implementing the automation system, a reduction of idle operation and energy consumption was achieved, with monitored results demonstrating up to 50% savings potential. This project not only contributes to corporate energy efficiency targets aligned with Astra Green Energy (AGEn) and ISO 50001 standards but also demonstrates the integration of smart technologies in sustainable manufacturing operations.

Keywords: IoT-based automation, compressor energy saving, real-time monitoring, DMAIC, industrial energy management, ISO 50001, heavy equipment manufacturing.



DEDICATION

With deep gratitude, I dedicate this work to my parents, who have provided me with endless prayers, love, and support throughout my life and studies.

My beloved family: my wife Retno, and my two young children, Zhafran and Zhafira, who are the source of inspiration and peace in every step I take, thank you for your invaluable patience and understanding.

To all my MME lecturers, I am deeply grateful for the knowledge and insights you have shared, which have greatly shaped my way of thinking. My classmates and the companies that have been part of my professional journey, thank you for the opportunity to pursue one of my goals and turn my dreams into reality.



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In the process of preparing this thesis, the author received significant support from various parties. Therefore, the author expresses his deepest gratitude and appreciation to:

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Finally, despite the limitations, the author hopes that this work can provide benefits for electrical energy saving strategies and the development of automation systems and make a real contribution to increasing the productivity of the manufacturing industry in Indonesia. The author also thanks all parties whose contributions cannot be mentioned individually.

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