

**MONITORING TEMPERATURE HYDRAULIC CYLINDER EXCAVATOR
TO PREDICTIVE FAILURE USING IOT**

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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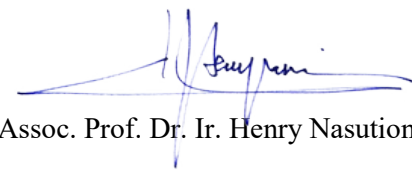
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ABSTRACT

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Unscheduled hydraulic cylinder replacements in Komatsu PC2000-8 excavators, reaching 75% between 2021–2024, have disrupted operations due to the lack of early warning. This study develops an Internet of Things (IoT)–based system for real-time temperature monitoring to support predictive maintenance. Using the DMAIC framework, the prototype integrates DS18B20 sensors, an ESP8266 microcontroller, and the Blynk 2.0 dashboard to provide alerts when abnormal temperature differences occur. Conventional decision-making required 6–7 days, and up to 14 days under anomalies, while the IoT system enables detection within seconds, significantly reducing cycle time. User Acceptance Qualification (UAQ) results show 85% of users rated the system user-friendly and 80% validated alert accuracy, highlighting its practicality. The findings demonstrate that IoT monitoring can reduce unscheduled replacements, enhance decision-making efficiency, and support scheduled maintenance strategies for heavy equipment.

Keywords: Predictive Maintenance, IoT, Hydraulic Cylinder, Real-Time Monitoring, DMAIC



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DEDICATION

This work is dedicated to my beloved parents for their endless prayers and support. To my wife and children, thank you for your love and patience, which have been my greatest source of strength in completing this research.



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