

**REAL TIME PRESSURE SENSOR MONITORING
TO DETECT WATER PIPE LEAKAGE**

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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ABSTRACT

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This study presents an IoT-based monitoring system for water distribution networks, integrating pressure sensors and cross-correlation analysis for real-time leak detection and operational efficiency. A T-junction design enables surface-accessible sensor installation, simplifying maintenance in underground pipelines. The system includes an ESP32 microcontroller, DS3231 RTC, and SD card module for synchronized data logging. Sensor calibration improved accuracy from 68.65% to 95.43%, ensuring reliable pressure measurements. EPANET simulations identified the system's sensitivity, detecting leaks as small as 0.52 liters per second with a 0.01-bar pressure drop. Cross-correlation analysis reliably detected pressure abnormalities by comparing signals from multiple sensors, with performance improving as more data was collected. The system provides real-time data visualization, leakage alerts via email, and monitoring dashboards for quick operator responses. The results demonstrate that combining IoT technology with cross-correlation enhances leak detection and water network management. Future recommendations include using collected data for

predictive maintenance and refining the cross-correlation algorithm to further optimize performance. This scalable solution offers significant potential for improving water distribution efficiency and reducing resource losses.

Keywords: water distribution, cross-correlation, pressure sensor, leak detection, real-time data visualization



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DEDICATION

I dedicate this work to for my family, my friends, my university, my country: Indonesia and the development of technology in Mechatronics field of study.



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