

**DEVELOPMENT OF AN AUTONOMOUS MAGNETIC CLIMBING ROBOT
FOR VISUAL AND NDT INSPECTIONS UTILIZING GWO-BASED PATH
PLANNING APPROACHES**

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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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The development of an Autonomous Magnetic Climbing Robot (AMCR) aims to address the challenges faced in industrial inspections, particularly in terms of safety, cost, and efficiency. This research focuses on designing and implementing an AMCR equipped with a visual inspection camera, lighting, and a multi-purpose arm capable of carrying various inspection tools, including a thickness gauge. The AMCR utilizes Grey Wolf Optimizer (GWO)-based path planning to navigate complex environments autonomously. The methodology involves a detailed analysis of the robot's static and dynamic forces, magnetic adhesion requirements, and the integration of Mecanum wheels for enhanced mobility. The findings demonstrate that the AMCR significantly improves the safety and efficiency of industrial inspections, reducing the need for human intervention in hazardous environments. This research concludes that the AMCR, with its advanced path planning and robust design, presents a viable solution for modern industrial inspection challenges, particularly in the oil and gas sector.

Keywords: Autonomous Magnetic Climbing Robot (AMCR), Visual Inspection, Non-Destructive Testing (NDT), Grey Wolf Optimizer (GWO), Robotics Technology.

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DEDICATION

I dedicate this work to advancing mechatronics and robotics technology in Indonesia,
my cherished homeland.

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