

**DEVELOPMENT OF AUTONOMOUS MOBILE ROBOT IN UTILIZATION
OF RTK GNSS FOR OUTDOOR LOCALIZATION AND AUTONOMOUS
NAVIGATION WITH ROS2**

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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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As last mile delivery has increased in demand with the advancement of e-commerce, an automated method that eliminates the problems related to effective route planning and human error in delivery is beneficial. This research focuses on the development of an Autonomous Mobile Robot (AMR) for outdoor applications based on ROS2 with a u-blox ZED-F9P module, rotary encoders, and IMU for odometry and localization, Intel D415 camera for obstacle detection and avoidance, and IBT-2 motor drivers for motor actuation. The components mentioned above are successfully integrated with ROS2 packages such as robot_localization and nav2. The accuracy obtained through the utilization of NTRIP to achieve RTK-based GNSS configuration for position reading varies between 1-2 cm and generates a 1.53% maximum percentage error between real and computed odometry. With this, the robot is able to navigate to a user-given goal from RViz2 and follow a route through a series of GNSS waypoints containing latitude, longitude, and altitude.

Keywords: Autonomous Mobile Robot, NTRIP, GNSS Localization, Autonomous Navigation, ROS2



DEDICATION

I dedicate this work to God, my parents and sibling, my friend, my lecturers, and the development of the Mechatronics field.



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