AGV OUTDOOR NAVIGATION USING REAL TIME KINEMATIC GLOBAL NAVIGATION SATELLITE SYSTEM

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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The purpose of this thesis is to implement real-time kinematic global navigation satellite system to an existing AGV with ROS. The navigation system of the AGV is designed specifically for outdoor purposes. RTK GNSS modules plays an important role in navigating the AGV. The RTK GNSS modules used are a pair of Emlid: Reach GNSS receivers. Additionally, two ultrasonic sensors, HC-SR04, are added for safety reason. One GNSS receiver act as the base station of the RTK system, placed on a separate stand from the AGV. And the other GNSS receiver act as the rover, placed on the AGV itself. These receivers form an RTK system where the base station informs the rover its position error. Accordingly, the rover will calculate its corrected position based on the error. Communication between these two receivers is through serial communication using a radio link system. Then, the rover communicates with the AGV through TCP/IP communication system. The communication system of the AGV utilizes ROS, which provides multiple communication methods. Besides TCP/IP communication for the GNSS receiver, ROS is capable of communicating with the Arduino microcontroller board that control the ultrasonic sensors and the h-bridges of the AGV through serial communication. The entire outdoor navigation system has been tested and is able to navigate automatically at outdoor environments with some restrictions, especially GNSS signal quality.

Keywords: AGV, ROS, GNSS, RTK, GPS, GLONASS, GALILEO, Navigation

DEDICATION

I dedicate this works to my family

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