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Development of a low-cost automatic guided vehicle (AGV)

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Modern production systems utilize robotic and automation systems including automatic guided vehicles (AGVs) for a variety of material handling tasks. A low-cost AGV was initially designed for an assembly line at General Motors South Africa (GMSA). This paper presents the latest development and modifications of the AGV design. The main research focuses were to improve the AGV performance, simplify the operation and reduce the cost. The AGV is used as a tugger, which tows trolley between assembly stations in a pre-designed loop. However, it could also be employed to deliver unique or unusual parts between production lines in a more complex production environment. The improved AGV controller is based on a BeagleBone Black, which uses an ARM cortex-A8 processor for navigation, obstacle detection and logic processing. The navigation is achieved with a magnetic sensor that follows magnetic tape. The ultrasonic sensors are used to develop a safety zone ahead of the AGV to avoid obstacles. The proposed AGV design meets the criteria for an efficient and low-cost autonomous material handling system. The developed AGV is capable of transporting tasks in various industrial environments and it can be easily reprogrammed to cater for very specific scenarios.

Biography

Igor Gorlach has completed his PhD from North-West University in South Africa. He is the Chairperson at General Motors South Africa (GMSA) and Professor of Mechatronics at Nelson Mandela University.

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