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### COMPARISON OF FUZZY LOGIC AND CLASSIC CONTROLLERS' PERFORMANCE IN GUIDING OF A GREENHOUSE APPLICATIONS ROBOT

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**ABSTRACT** In recent years many studies have been carried out to develop robots for agricultural applications. The aim of this research was to build a mobile robot for greenhouse applications. Many of the studies used from fuzzy logic control (flc) to navigate the robots. But it is possible to use a form of classical control functions for agricultural robots guidance. The question is which type of control has better performance? The objectives of this research were: 1) To find the best controller type for the robot 2) To find the best position for installing the driver wheels. A fuzzy logic-based and a proportional type controller were developed and tested for guiding a prototype mobile robot inside a real greenhouse through a straight aisle with 115 cm width using three speeds (15, 25 and 35 cm/sec) on a concrete surface. At first the robot performance was evaluated based on the driver wheels at front (dwf) mode with two types of controllers and the best controller was determined. After that the robot performance was evaluated in driver wheels at rear (dwr) mode with the best controller, and the best position for the driver wheels was determined. Experiments results showed that the proportional controller performed better than the fuzzy logic-based controller at all speeds. The average rmse of the robot position were 6.42, 8.35, 10.80 cm using proportional controller and 8.94, 11.14 and 14.96 cm using fuzzy logic-based controller at speed of 15, 25 and 35 cm/sec, respectively. So the proportional controller was selected as final controller of the robot. By increasing the speed, rmse of the robot position increased. Results showed that the dwr mode performed better than the dwf mode in all speeds. There was an average rmse of the robot position between 6.42 and 10.80 cm in the dwf mode but the average of rmse of the robot position was between 6.55 and 7.66 cm in the dwr mode at different speeds. So the dwr mode was selected as the best structure of the robot.

**Keywords:** Mobile robot; Proportional control; Fuzzy logic control; Driver wheels position; Greenhouse.