ABSTRACT

Autonomous Mobile Robot (AMR) is one of the technological developments of mobile robots. The problems faced by AMR include navigation problems. Navigation is defined as the process of planning the success of AMR through the path on a given mission, so that it can move without losing its desired direction by avoiding any obstacles in its vicinity.

The Control Lyapunov-Barrier Function (CLBF) method is a combination of the Control Lyapunov Function (CLF) and Control Barrier Function (CBF) methods. CLF method for system stability and CBF method for system safety. Stability in this method is defined when a plant (AMR) succeeds in reaching the desired coordinate point (equilibrium) and safety is defined as AMR has succeeded in knowing the unsafe state area and successfully avoided it. The application of the Hybrid Automaton in this study is used to change the value of lambda (λ) and the equilibrium point (waypoint). The value of is the multiplier gain of the CBF method which serves to make AMR move aggressively when avoiding the unsafe state and the equilibrium point is used as the waypoint coordinates.

The combined implementation of the Control Lyapunov-Barrier Function (CLBF) and Hybrid Automaton methods on a four-wheel mecanum AMR using two microcontrollers, one global sensor (Global Positioning Sensor), and two types of local sensors (four rotary encoder and four ultrasonic sensors). This study was reviewed from two successes, namely from the stability of navigation on the AMR to each waypoint coordinate by getting an accuracy value of 99.83% and each AMR experiment successfully avoiding moving obstacles in terms of the unsafe state distance. The experiment was carried out three times with the same three waypoint coordinates (x_1, x_2) and a constant moving obstacle speed.

Keywords: autonomous mobile robot moving with mecanum-driven, control lyapunov-barrier function, moving obstacle.