

Microcontroller-based fuzzy logic controller for a small autonomous underwater robot

Abstract

Mobile systems traveling through a complex environment, like underwater environments, present major difficulties in determining accurate dynamic models. Autonomous underwater vehicle motion in these conditions requires investigation of competent control solutions that guarantee robustness against external parameter uncertainty. In this paper, a microcontroller-based fuzzy logic controller is introduced to stabilize balancing the robot while it is moving forward. This approach is applied to one onboard microcontroller which is inside small AUV and the control system is able to meet the required robustness. The significance of this work is because of using a microcontroller with its limited amount of on-chip memory rather than using commercial computer. It is implemented along with a fuzzy PI controller as the supervisor, and evaluated through experiments. It is shown that the characteristics of the fuzzy logic, such as flexibility of the I/O selection and saturation of the outputs, provide favorable performance to the control system for AUVs.