

## Abstract

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The work reported in the thesis is towards the application of embedding evolutionary computation to the real world control problems. It includes the fundamental principles of designing stable fuzzy observer & controller using separation principle, using the mathematical foundation of fuzzy system design.

Development of Neural network controllers and fuzzy controllers for uncertain nonlinear systems is also discussed and implemented, which also forms the basis of comparison for evolutionary algorithms.

An adaptive fuzzy controller in the form of a fuzzy model reference learning controller is developed & implemented for the ship steering control and same is also implemented for critical real time application of an aircraft, to make it fault tolerant. An Evolutionary algorithm is also embedded for the ship steering problem for improving the learning process of the same.

Helicopter application is also implemented to show the application of evolutionary algorithm for optimal tuning of simple controller to make them effective at real time.