

# **A fuzzy-tabu real time controller for sampling-based motion planning in unknown environment**

## **ABSTRACT**

Sampling-based path planning methods for autonomous agents are one of the well-known classes of robotic navigation approaches with significant advantages including ease of implementation and efficiency in problems with high degrees of freedom. However, there are some serious drawbacks like inability to plan in unknown environments, failure in complex workspaces, instability of results in different runs, and generating non-optimal solutions; which make sampling-based planners less efficient in practice. In this paper, a fuzzy controller is proposed which utilizes the heuristic rules of Tabu search to improve the quality of generated samples. The main contribution of this work is the ability of the proposed sampling-based planner to work effectively in unknown environments and to plan efficiently in complex workspaces by letting the fuzzy-Tabu controller check the quality of the generated samples before any further processing. The efficiency of the proposed planner is tested in several workspaces and the comparison studies show significant improvement in runtime and failure rate. Furthermore, the decision variables of the proposed controller are discussed in detail to determine their effect on the performance of the algorithm.

**Keyword:** Sampling-based; Motion planning; Tabu search; Fuzzy logic; Sensor-based navigation