

Poster submitted to AIM 2023

Buried Snow Avalanche Victim Search: An ergodic-based approach

Chantel K. Lapins¹ and Kam K. Leang^{1,*}

¹University of Utah

*Corresponding author: kam.k.leang@utah.edu

This work focuses on exploiting the concept of ergodicity for motion planning to effectively guide emergency responders or emergency deployed unmanned autonomous systems (UAS) to search and locate a buried snow-avalanche victim. Statistics show that 90% survival rate occurs when an avalanche victim is located within 15 minutes of being buried. As interest in exploiting UAS for first response increases, effective search algorithms for autonomous robotics can help improve search and rescue. A new motion planning algorithm that utilizes ergodic exploration and information theory is developed where the optimization process considers robot dynamics. As the robot agent explores, sensor measurements are processed by a Bayesian filter for victim localization. Compared to existing similar approaches, the proposed search method systematically maximizes information gain and ensures that search trajectories are dynamically feasible. Simulation results are presented to demonstrate the performance of the algorithm for estimating and localizing a buried snow-avalanche victim.