Abstract

Research in Simultaneous Localization and Mapping (SLAM) has been progressing for almost two decades. Although several researchers attempted recently to investigate its observability (mostly without proofs for the general cases) the established facts have often been left unnoticed or ignored by the research community. In this paper rigorous proofs have been provided as an enlightenment for the observability properties of the general two dimensional SLAM problem incorporating a car like kinematic model in the context of piece-wise constant systems theory and non-linear Lie derivative theory. Observable and Unobservable states of the general *n* landmark SLAM problem have been established with proofs. A comparison of linear and non-linear techniques to evaluate the observability of SLAM is provided using simulations.