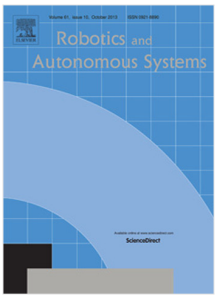


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# Probabilistic Ego-Motion Estimation Using Multiple Automotive Radar Sensors

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**Abstract**

For automotive applications, an accurate estimation of the ego-motion is required to make advanced driver assistant systems work reliably. The proposed framework for ego-motion estimation involves two components: The first component is the spatial registration of consecutive scans. In this paper, the reference scan is represented by a sparse Gaussian Mixture model. This structural representation is improved by incorporating clustering algorithms. For the spatial matching of consecutive scans, a normal distributions transform-based optimization is used. The second component is a likelihood model for the Doppler velocity. Using a hypothesis for the ego-motion state, the expected radial velocity can be calculated and compared to the actual measured Doppler velocity. The ego-motion estimation framework of this paper is a joint spatial and Doppler-based optimization function which shows reliable performance on real world data and compared to state-of-the-art algorithms.

*Keywords:* radar, navigation, localization, automotive application

## 1. Introduction

In order to operate vehicles or robots either partially or fully autonomously, numerous variables have to be determined. An important subset of these variables are

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