Lightweight Solution to Generate Accurate Lanelet Maps

Gergo Ferenc Igneczi
University of Győr
Vehicle Research Center
Győr, Hungary
gergo.igneczi@ga.sze.hu

David Jozsa
University of Győr
Zalaegerszeg Innovation Park
Zalaegerszeg, Hungary
david.jozsa@ga.sze.hu

Matyas Mesics
University of Győr
Vehicle Research Center
Győr, Hungary
matyas.mesics@hallgato.sze.hu

***Abstract*—Automated Driving Systems technology, especially above level 3 automatization shift towards map-based solutions. This is a necessary step in the technical development lifecycle, as various functions (e.g., urban navigation and maneuvering) are simply not implementable without maps. In these usecases the local sensing (with cameras and radars) often fail to provide real time, accurate information. Map-based solutions require two main components: accurate localization of the vehicle and the map itself. Our paper is about the latter one. Various map formats (e.g., lanelets, ...) are available. The problem is, that currently the number and accuracy of available maps are insufficient. In our work we propose a toolchain, that can be used to generate lanelet maps with static information, such as lane edges and traffic signs, which are primarily needed to accomplish the usual driving tasks (lane following and speed control). We use only an accurate GNSS system and a conventional lane detection camera to generate the maps. We have shown that the position mean deviation of the maps is below 5 cm. The generated maps used to automatically drive through a lane and decelerate to speed limit change in a highway environment. The pipeline and the data used for the study is available publically. By these results we lay the ground for a distributed map generation system, increasing the coverage of the maps and hence enabling the map-based technologies to widely spread in the near future.**

***Index Terms*—Automatic Map Creation, Lightweight Static Maps, Lanelet Map Generation**

I. Introduction

Aim of the section is to define the problem we want to resolve, explain the problem relevance by showing examplary solutions from the literature, then formulate the problem. Literature uses most often the lanelet maps [1]. It is applied to various fields [2]. Other pipelines are partially available [3]. Also, related areas such as map validation is available [4].

II. Materials and Methods

The coordinate system and relevant physical signals can be seen in Figure 1. This is a sample equation (1).

$$\omega = \frac{v_x}{R} \tag{1}$$

III. Discussion

IV. Results

V. Conclusion

References

[1] Philipp Bender, Julius Ziegler, and Christoph Stiller. Lanelets: Efficient map representation for autonomous driving. pages 420–425, 06 2014.

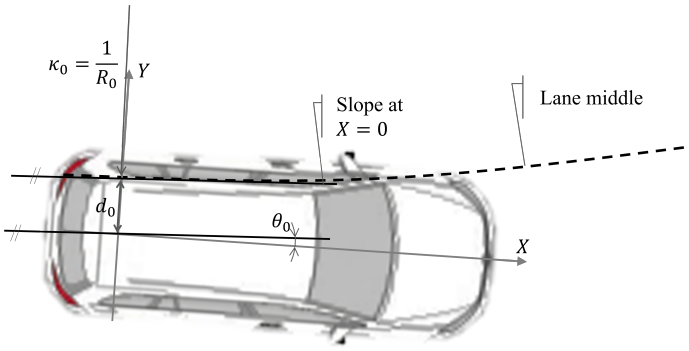

Fig. 1: Used coordinate system and relevant lane quantities.

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