

Detection and Tracking Experiments in Various Environments

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Abstract—This paper presents the details of several mobile robot experiment designs including indoor, outdoor and urban variants. The aim of the paper is to give insights to setting up these tracking experiments covering both the software and hardware components as well as the application details. Beside these aspects the references to the perception, tracking and estimation parts are also pointed out for a wheel based mobile robots, bicycles and auto vehicles in various scenarios.

I. INTRODUCTION

Although there are a great number of published papers about the mobile robot related measurements they often present only the results of the theoretical and practical investigations without putting too much emphasis on the experiment design details. However a well designed experiment setup is essential in order to have a good dataset on which further data processing can be carried out [?].

Several research works present the building steps for mobile robots, focusing mainly on the hardware components [?], [?]. On the other hand there is a great variety of publications dealing with the results of the performed experiments. The target domain for the mobile robots experiments in this case is related the ones dealing with environment perception, detection and tracking [?], [?].

The main aim of this paper is to detail those parts of a mobile robot experiment design which include the sensor integration, communication, data preprocessing and tracking algorithms. These modules vary according to the type of the performed measurements. In this paper a variety of designed experiments starting from indoor mobile robot experiments, covering outdoor and urban scenarios are presented.

The first steps in this design process should be the architecture definition of the experiment based on the available hardware and software components. According to this idea the first part of the paper covers the necessary hardware and software components for such an experiment.

The second part deals with the algorithms that were used for the target application part of the experiments including the perception, detection and tracking algorithms. Finally, there are presented the details regarding the experiment designs in various environments starting from indoor scenarios to urban and outdoor variants.

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