**Exposé of Bachelor Project**

**Anomaly Detection Techniques for Cyclist Curb Recognition**

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1. Motivation

**Why is the work relevant to this research field?**

Anomaly detection plays a pivotal role because it helps improve safety and automation in lots of areas, not just in transport but also things like urban mobility. For cyclists, knowing where the dangers are on the road, like curbs or random obstacles, is really important, which make cycling in cities safer and smoother by using these high-tech methods. This project leverages anomaly detection techniques to address these challenges, contributing to the broader research field by focusing on real-world applications that ensure safer and more efficient urban cycling environments.

**What causes the subject of the work?**

The whole idea of this project came about because we need to make things safer for cyclists and make city transport better overall. More and more people are biking in cities, and this means we need smart systems that can spot problems on the road before they cause accidents. Curbs are a big deal because they're everywhere, and they're not all the same and are really risky for bikers. So, we're working on finding these curbs better so we can hopefully cut down on biking accidents and make riding through the city a better experience for everyone.

1. Goal of the work/Objectives

**Which steps have to be done in this work?**

1. The project will do a literature review to identify existing anomaly detection techniques relevant to road surface and curb recognition.

2. The most promising and practical 2 methods will be selected based on their applicability to our specific requirements.

3. Data collection will be conducted using a bicycle outfitted with the necessary sensors to systematically record various curb types alongside typical riding scenarios. This approach will enable a clear distinction between normal and abnormal riding conditions, essential for the effective implementation of anomaly detection techniques.

4. Finally, the collected data will be analyzed to evaluate the effectiveness of the implemented 2 methods, and adjustments will be made to enhance their accuracy and reliability.

**What are the planned objectives of the work?**

1. Conduct an extensive review of anomaly detection methodologies and relevant studies on road surface anomalies.

2. Select and adapt 2 suitable anomaly detection techniques for identifying curb types.

3. Gather empirical data through field measurements, capturing a diverse range of curb scenarios.

4. Implement and refine the chosen detection methods to ensure high accuracy and functionality.

**What are the goals of the work?**

The overall goal of this work is to develop some detection methods capable of identifying different curb types encountered by cyclists, thereby improving cyclist safety. The goal is to accurately distinguish significant curbs from minor irregularities in the road surface.

1. Plan of work/Milestones

**Which milestones can be found in this work?**

1. Literature Review:
   1. Comprehensive review of existing literature on anomaly detection and curb-related studies.
2. Method Selection and research of implementations:
   1. Method Selection:

Identification and selection of appropriate anomaly detection techniques for curb recognition.

* 1. Research of implementations:

Investigate and identify anomaly detection methods that are not only theoretically sound but also practical and feasible for implementation within the scope of this project.

1. Data Collection:
   1. Setup: Preparation and setup of the bicycle with the necessary sensors for data collection.
   2. Execution: Actual collection of data involving various curb scenarios and typical riding conditions.
2. Method Implementation, Data Analysis:
   1. Method Implementation:
      1. Development Environment Setup:

Setting up a development environment with the necessary software tools (e.g., Python, TensorFlow, Keras) and libraries to support the coding and testing of the selected algorithms.

* + 1. Algorithm Coding:

Writing the code for the adapted algorithms, ensuring that they can process the input data efficiently and output the desired classifications or anomalies.

* + 1. Documentation:

Comprehensive documentation of each method's implementation process will be maintained. This documentation will include details on the configuration settings, the reasoning behind method selection and adaptation choices, and insights gained from the testing and debugging phases.

* 1. Data Analysis:

Analysis of the collected data to assess the effectiveness of the chosen methods.

* 1. Final Evaluation:

Testing and final evaluation of the detection system.

1. Thesis Compilation and Submission:

Writing and submission of the final thesis document.

**Start and end time of milestones?**

1. Literature Review Completion: [06.05.2024 – 19.05.2024]
2. Method Selection and research of implementations: [20.05.2024 – 02.06.2024]
3. Data Collection Setup: [03.06.2024 – 16.06.2024]
4. Data Collection Execution: [17.06.2024 – 30.06.2024]
5. Method Implementation, Data Analysis: [01.07.2024 – 28.07.2024]
6. Thesis Compilation and Submission: [29.07.2024 – 04.08.2024]

**Set priorities! With which task do I start? What is the ending task?**

Starting Task:

The project will commence with the Literature Review, which is foundational for identifying the most relevant and effective anomaly detection techniques.

Ending Task:

The project will conclude with the Thesis Compilation and Submission, where all findings, analyses, and data will be compiled into the final document for evaluation and grading.