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# Development of a done-based evaluation tool for motion analysis in athletics long jump

**Studienarbeit**

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von


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**GUI** Graphical User Interface

# 1 Introduction

Long jump is an athletic discipline that is renowned for its technical complexity and the precise movement patterns it demands from athletes. Even apparently small technical insecurities can significantly impact an athlete's performance. Therefore it is crucial to understand and continueously improve these movement patterns in training. However, taken the high approach velocity[1] into account, this can quickly become a difficult task. Especially the take-off phase can be very short and therefore hard to analyze.

Professional athletes employ expensive high speed camera systems together with body pose markers to capture and analyze every single step they make.
Yet, such techniques come with some limitations. Due to their stationary installation, such camera systems are restricted to a fixed location. Moreover, they often combine multiple cameras in order to be able to capture the whole movement from the beginning of the approach until the landing. This again leads to complex post-processing software requirements. Additionally, fixed markers need to be attached to an athletes body to be able to track the body position.

While these mothods provide exact and reliable results, they are usually not accessible for hobby- and semi professional athletes.
To address this lack of opportunities in analyzing training performances a mobile alternative is developed within this work. It relies on a drone to capture the athlete and later employs a neural network to analyze the body position throughout the whole jump. Both, the drone and the evaluation software will be developed within this work.

[1] around 10 m/s in male semi proffessional long jump

# 2 Fundamentals

The following chapter provides an overview over the relevant development components that are used in this project. Therefore the used software packages are introduced before a short outline of the utilized drone hardware is given.

## 2.1 Software fundamentals

As the project will be used with an