



## Thesis Project Form

**Title (tentative):** A Comparative Study of Radar- and Vision-Based Approaches for Human Pose Estimation

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### Description

#### Motivation and application domain

Human motion tracking and pose estimation are fundamental technologies in several application domains, including biomechanics, rehabilitation, human-computer interaction and sports analysis. Traditionally, optical motion capture systems based on markers have been considered the gold standard due to their high accuracy. However, these systems are expensive, require controlled environments, and are intrusive for the user.

Recent advances in markerless vision-based systems and radar-based sensing technologies offer promising alternatives. Video based approaches reduce preparation time and improve usability, while radar-based systems provide advantages in terms of privacy preservation, robustness to lighting conditions, and operation in visually occluded environments. This thesis aims to perform a systematic and comparative analysis of radar and markerless technologies for human tracking and pose estimation, especially to understand their trade-offs in terms of accuracy, robustness, usability, and applicability in real-world scenarios.

#### General objectives and main activities

The main objective of this thesis is to compare and evaluate different human tracking technologies.

The study aims to provide an exploratory and comparative assessment of these technologies, focusing on pose estimation performance and practical deployment aspects

More specifically, the activities will include:

Literature review on human tracking and pose estimation technologies, with particular attention to radar-based approaches and recent markerless methods.

Technical development and setup of the technological framework

Definition of an experimental protocol

Data acquisition with healthy subjects

Data and statistical analyses

#### Training Objectives (technical/analytical tools, experimental methodologies)

The student will learn:

- signal processing techniques
- setting up different technologies
- performing experiments with human participants in a clinical environment
- data analysis on performance metrics
- statistical analyses

**Place(s) where the thesis work will be carried out:** Unige - Movendo technology

### Additional information

**Maximum number of students:** 1