Internship Offer – Development of an RGB-D Image Manipulation Tool for Multi-Temporal 3D Reconstruction in Viticulture

Internship Description

CONTEXT

The IMS Laboratory - UMR 5218 CNRS (MOTIVE team, Signal and Image group) develops research activities focused on embedded imaging solutions and artificial intelligence for precision agriculture.

In collaboration with LaBRI UMR 5800 CNRS (Image & Sound team), the team is working on the 3D reconstruction of vineyard rows using embedded sensors (RGB-D cameras, GPS/RTK) mounted on a scouting robot. The goal is to track the evolution of the vine over time to analyze the growth and health status of the vineyard.

Problem Statement

Current reconstructions rely on the complete processing of acquired sequences, which results in a high computational load. The objective now is to select and organize relevant data targeting, for example, a specific number of vine stocks, a post, or a specific geographic area to enable targeted and efficient 3D reconstruction.

Objectives

Design and develop a modular software tool to enable:

- ✓ **Selection and organization** of extracted data (RGB images, depth, point clouds)
- ✓ **Automatic preparation** of datasets required for the 3D reconstruction of a defined zone (vine stock, row segment, etc.).
- ✓ **Seamless integration** into existing reconstruction and analysis pipelines.
- ✓ **Compatibility** with different types of cameras (Intel RealSense initially, followed by other RGB-D sensors).
- ✓ **Scalability** toward a real-time version of the processing chain, connected to **ROS2**, for deployment on the scouting robot.
- ✓ **Integration of neural algorithms** for the automatic detection and positioning of objects of interest (grape clusters, vine stocks, etc.) within the 3D reconstructions.

Work Plan

- ➢ Analyze and structure existing datasets (RGB-D images, point clouds, metadata).
- ➢ Design the filtering and selection logic based on various criteria (time index, GPS coordinates, vine stock ID).
- ➢ Develop the main data selection and preparation tool (offline version).

- Test and validate performance across multiple acquisition sessions.
- Document the operations and propose an open architecture for future real-time extension.

Candidate Profile

Level

Master 2 or final year of Engineering School in Computer Science, Robotics, Vision, or Signal Processing.

Skills and Knowledge

Technical Skills:

- Python programming and software best practices.
- Image & Point Cloud Processing: OpenCV, Open3D, PCL.
- Sensors: Knowledge of RGB-D sensors (Intel RealSense, Orbbec, etc.).
- Data Management: Structuring and synchronizing multi-sensor data.
- Extras**:** Knowledge of ROS2 is appreciated. Experience implementing embedded vision models (YOLO, object detection, or segmentation) is a plus.

Qualities: Rigor, autonomy, scientific curiosity, and a taste for practical applications

Practical information

Location

IMS Laboratory (Integration from Material to System),
351 Cours de la Libération, 33405 Talence, France.

Period

6 months – starting from March 2026.

Supervisors:

Jean-Pierre DA COSTA: IMS Laboratory - UMR 5218 CNRS, Signal group / MOTIVE team
Mohamed MABROUK: IMS Laboratory - UMR 5218 CNRS, Signal group / MOTIVE team

Gratification:

According to current French regulations (approx. €600 per month)

How to Apply

Please send your application (CV + cover letter) via email to:
mohamed.mabrouk@ims-bordeaux.fr
Please specify the internship title in the subject line.

Interviews will be organized as applications are received.