

Project 1 – Optimizing Infrared Imaging and Lighting for Tracking Flying Insects

Tracking flying insects depends strongly on camera position, infrared lighting, background, and polarization—but these choices are rarely optimized quantitatively. Your mission: find out what really works best. You will build an experimental setup with a tethered flying insect and systematically map how camera angle, infrared illumination, background reflectance, and polarization affect image quality and signal-to-noise ratio. You will analyze the data using clear quantitative metrics and simple physical models, with the goal of defining practical design rules for insect tracking experiments. If successful, the project is expected to result in a publishable methods paper.

You will learn:

- Infrared imaging and optical design for biology
- Experimental methods for studying insect flight
- Image analysis and signal-to-noise optimization
- How physics constraints shape biological measurements

Requirements: interest in experimental biology and quantitative analysis; basic programming skills.

Duration: 2-6 months, preferentially starting spring 2026.

Contact: antoine.cribellier@wur.nl, [Experimental Zoology Group](#) (Wageningen University)

Project 2 – Building a User-Friendly 3D Tracking Interface for Insect Flight Experiments

Our lab studies mosquito flight and swarming using a high-resolution 3D tracking system. The system works, but only for users with good programming skills. Your mission: make it accessible to everyone.

You'll develop a **Python-based graphical interface** for the open-source tracking software [BRAID](#) and our custom multi-camera setup. The GUI will guide users step-by-step through camera configuration, calibration, and data collection, integrating live documentation. You'll also add tools for quick visualization and analysis of large 3D trajectory datasets.

You will learn:

- GUI design and usability for scientific tools
- 3D tracking and multi-camera calibration
- Data visualization and biological applications

Requirements: good Python and Git skills, interest in GUI design and user experience.

Duration: 2-6 months, preferentially starting spring 2026.

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