M2 Internship – Data Scientist
Development of a Visualization Tool
## for Intracellular Organelle Movements in Developing Tissues

Turing Center for Living Systems

The Turing Center for Living Systems (CENTURI) is seeking a passionate data scientist intern with a keen interest in image data analysis and artificial intelligence and their application to biology. The intern will work on an academic research project within an interdisciplinary team.
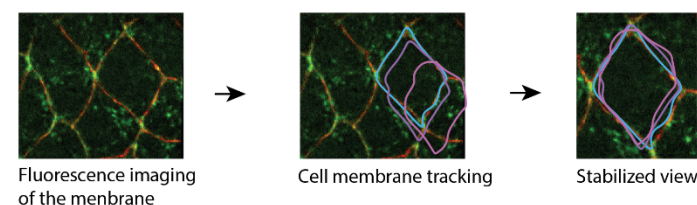
Internship project Description

Morphogenesis is the process through which new shapes emerge in tissues and organisms during development. Understanding this process is crucial for studying embryonic development, related pathologies, and tumor formation. This internship aims to develop a tool to analyze volumetric image sequences, focusing on tracking the movements of intracellular organelles in a Drosophila embryo using fluorescence imaging data. This project builds upon very promising work carried out during the CENTURI Hackathon 2024

Cellular and molecular motions challenge interpretation

Developing fly embryo

Fluorescence imaging of endocytic events (still)

Color codes for time
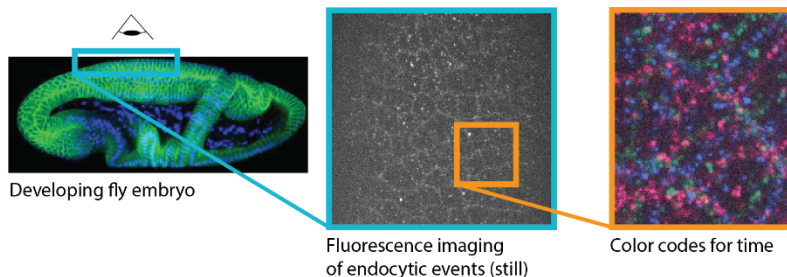
Goal: building dynamic region of interest in 2D and 3D

Fluorescence imaging of the menbrane

Cell membrane tracking

Stabilized view

hackaton project (EndoTrack project) that leveraged leading-edge deep learning approach for segmentation, tracking and explicability. The specific objectives of the internship project includes:

- Benchmarking our CellPose-based proof-of-concept for 3D cell membrane segmentation.
- Human-interpretable error detection using tools readily developed at CENTURI.
- Comparison of interpretable Hidden Markov Modeling with Transformer approach for tracking
- A 3D visualization pipeline for the interactive observation of intracellular process in living embryo

Responsibilities
The intern will be responsible for:
- Conducting computational analyses and implementing algorithms.
- Researching methods for 3D cell segmentation and tracking.
- Designing analytical reports to communicate results to collaborators.
- Setting up an analysis pipeline to ensure reusability and reproducibility of results.

Desired Profile

We are looking for a Master's level student or an Engineering School student specializing in Data Science, Bioinformatics, or Imaging. Experience in image data analysis and proficiency in Python/R programming languages are required. An interest in developmental biology and (intra)cellular movement analysis would be a plus.

Internship Details

The internship will take place within the CENTURI multi-engineering platform, supervised by Philippe Roudot (Institut Fresnel) and researchers from the Institute of Developmental Biology of Marseille, including Claudio Collinet (IBDM). The intern will be trained in image analysis tools and 3D visualization tool development.

Contact:

If interested, please send a CV and cover letter to philippe.roudot@univ-amu.fr.