

Real-time automated tracking of moving cells imaged by high resolution microscopy

Project Overview

Cell movement is essential for a wide variety of biological processes and plays a central role in the development of an embryo, in the immune system and in cancer metastasis. Cell movement involves the coordinated action of numerous molecular building blocks that self-organize into a moving cell. We are trying to uncover the principles underlying this remarkable self-organization using skin cells from fish as a relatively simple model system. These cells move at speed of up to 1 micron/s, so that they move a distance equal to their size in about a minute. An important part of our research involves following individual cells by high-resolution video-microscopy and tracking changes in their morphology, their speed as well as in the distribution of various molecular components within the cell. Following cells over long times (minutes to hours) at high magnification yields a wealth of important information about their behavior. However in order to keep the moving cells within the imaging region (typically ~100 micron field) one has to move the microscope stage often. Automating this step will allow us to acquire many more movies as well as longer movies, and will thus lead to a substantial improvement in our experimental capabilities.

The goal of this project will be to develop and realize an interface that will allow tracking of moving cells and feedback to the microscope stage to move it so that the cells remain within the imaging region.

Requirements

A course in image processing

Good knowledge in Matlab

High motivation and good experimental skills.

Duration: 1 semester (with an option to extend to 2 semesters)

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