MONASH
ENGINEERING

MONASH University

Faculty of Engineering
Summer Research Program 2023-2024

Project Title: Measuring Responses of Brain Cells to Natural Images

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Objective

This project aims to (1) create a program that can load and rapidly display a series of thousands of natural images on a monitor with timing reliable within ~8 ms (e.g. the temporal resolution of one frame flip at 120 Hz). (2) evaluate the responses of brain cells (neurons) contingent on the properties of the images being displayed.

Project Details

In order to understand how biological sensory systems process information about the physical world, we record the bioelectrical impulse responses from brain cells (called “spikes”) while tightly controlling the sensory input. Spikes are important because they are one of the primary means of information transmission in biological neural circuits. A lot of what we know about the relationship between spiking and sensory information is based on simplistic stimuli that reflect specific features of interest (e.g. oriented bars), not the rich information of the visual world.

In this project, you’ll contribute to two ends of an experimental setup designed to measure how a barrage of natural images shapes neural responses: creating a program that can be used to control visual information in future experiments and testing analysis techniques on previously collected data.

Prerequisites

Students should be competent in at least one programming language, the project will be in MATLAB.

Additional Information

Applicants may be required to attend an interview.