**Research Intro**

Our laboratory uses an integrative approach to study the relationship between the brain and the mind. The relationship between the brain and the mind, the body-mind problem, has fascinated scientists, philosophers, and artists for centuries. Thoughts, feelings, impressions, actions, sounds, and images, all correspond to patterns of electrical impulses in the brain, but we still don’t understand how, exactly, the brain produces mental activity.

To elucidate the relationship between the brain and the mind, our laboratory studies the neural basis of visual perception. Studying visual perception provides a platform to approach the body-mind problem with the rigor of science. Methods for studying visual perception have matured over centuries and enable quantitative measurements of perception during simplified tasks. To reveal relationships between perception and the brain, we record the electrical activity of populations of neurons in animals that perform perceptual tasks. To connect perception and the activity of neural populations to anatomical brain circuits, we genetically engineer brain circuits to control their activity with light.

**Projects**

Our current efforts are centered on understanding the neural mechanisms of visual object contour perception. Humans recognize objects primarily by computing the objects’ shape from their contours. Thus, to understand visual object recognition, a necessary step in visually guided intelligent behavior, we need to understand how the visual system processes object contours. Our long-term goal is to uncover the neural mechanisms of contour processing in primates at the level of cell-type-specific circuits. We are currently working on understanding how interactions between areas of the visual cortex contribute to object contour processing. To achieve this goal, we perform multielectrode array recordings and optogenetic perturbation experiments in awake, behaving marmosets.

**Tools**