The striatum is a brain structure that is highly involved in motor action and reward-based behaviors, and its dysfunction is associated with many important neurological and psychiatric disorders such as Parkinson's and Huntington's disease. At the gross-anatomical level, the striatum is known to have several distinct sub-regions, each of which may play a different role in striatum-dependent behaviors. However, at the cellular level these sub-regions are similarly made up of striatal spiny projecting neurons, and are apparently indistinguishable. My project at Stanford aims to identify and characterize any molecular or functional differences between cells in these different striatal sub-regions. To do this, I will combine my knowledge of neuron gene profiling with Dr. Jun Ding's expertise in striatal circuitry and neurophysiological techniques, including optogenetics, electrophysiology and two-photon microscopy, to study region-specific differences in neurons' gene expression and their correlation with differences in behavior.

This project is a timely first step toward bridging the currently wide gap in neuroscience between molecular/cellular processes and behavior. In addition to contributing to basic scientific knowledge, it will also advance our understanding of striatal physiology in normal and diseased states, which will aide in the design of more effective and precise clinical interventions.