

In the PerForM (Perception for Movement) Lab, we build upon state of the art methodologies for eye tracking in virtual reality so that we can investigate aspects of human visual and motor behavior that cannot be investigated using more conventional means. For example, when performing an action like catching a ball, one would expect a coupling between the eyes and the hand movement in which they are in service. This should be most apparent when eye/hand behavior is coordinated by a temporally discrete event, such as a transient occlusion of the ball-in-flight, as if it has passed behind a tree. Indeed, studies show that, if a subject is engaged in visual pursuit of a moving target that is transiently occluded, pursuit will initially decay during the blank, but will demonstrate a predictive velocity ramp in expectation of target reappearance that is roughly scaled to target velocity and acceleration. However, because models of predictive pursuit have been restricted to targets that move only in two dimensions, and in isolation of manual task, the degree to which the oculomotor and manual predictive systems are coordinated remains unclear. To investigate, we have designed a novel empirical paradigm in which subjects use a real-world racquet to catch virtual reality balls seen through a head mounted display. Movements of the eyes and hands are tracked using eye tracking and motion capture, and used to investigate coordination across motor systems. In this presentation, I will discuss our initial results, the current state of eye tracking in virtual reality, and the solutions we have devised to overcome these challenges.