The term virtual human (VH) generally refers to a human-like entity comprised of computer graphics and/or physical body. In the associated research literature, a VH can be further classified as an avatar—a human-controlled VH, or an agent—a computer-controlled VH. Because of the resemblance with humans, people naturally distinguish them from non-human objects, and often treat them in ways similar to real humans (RHs). Sometimes the people develop a sense of co-presence or social presence with the VH—a phenomenon that is often exploited for training simulations where the VH assumes the role of a human.

Prior research associated with VHs has primarily focused on the realism of various visual traits, e.g., appearance, shape, and gestures. However, our sense of the presence of other humans is also affected by other physical sensations conveyed through nearby space or physical objects. For example, we humans can perceive the presence of other individuals via the sound or tactile sensation of approaching footsteps, or by the presence of complementary or opposing forces when carrying a physical box with another person.

In my research, I exploit the fact that these sensations, when correlated with events in the shared space, affect one’s feeling of social/co-presence with another person. In this dissertation, I introduce novel methods for utilizing direct and indirect physical-virtual interactions with VHs to increase the sense of social/co-presence with the VHs—an approach I refer to as mediated physicality. I present results from controlled user studies, in various virtual environment settings, that support the idea that mediated physicality can increase a user’s sense of social/co-presence with the VH, and/or induced realistic social behavior. I discuss relationships to prior research, possible explanations for my findings, and areas for future research.