

The emergence of technology, integrating Human-Computer Interaction (HCI) methods, has aided in shaping smart education. As traditional classrooms began to transform into virtual classes during and after the COVID 19 pandemic, there emerged some convoluted challenges that affected the overall quality of education. Firstly, in absence of active communication between the participants, the overall delivery and absorption of the course content got impacted. This could be correlated with the learner's cognitive aspects as online classes provided an increased scope for inattentiveness, caused by external disruptions or mind wandering. Secondly, with the vision of ensuring accessibility and inclusivity, it became essential to develop interactive systems that could make online education seamless for all learners. The traditional touch-based systems are often not suitable for users suffering from clinical conditions like Dactylitis, Sarcopenia, and so on. To address these problems, we present a set of novel assistive systems that can be categorized into (a) ubiquitous systems for estimating learners' attention and (b) touch-free interactive systems for facilitating seamless touch-free interactions between different users and devices. The pervasive assessment of learners' attention involves three major contributions where we first explore human gaze gesture as an indicator of visual attention and high level cognition in Massive Open Online Courses (MOOC). We then explore video-based facial expressions, vocal emotion, speech intent, head gesture and ambient light reflection as indicators of cognition and multitasking in online classes. Finally, we aim at eliminating the requirement of cameras by utilizing acoustic sensing for estimating users' engagement. Under novel interactive systems, we first explore blinks as the sole modality for controlling MOOC videos, and then design a nose-tip gesture-based writing system that operates on smartphones and can help the learners with clinical conditions.