Motion capture systems to preserve dance forms

Understanding the subconscious techniques behind a dance form can accelerate the learning process for a novice learner through real-time feedback by motion capture systems.

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Nuances of classical Indian dance forms have been passed on from older generations. However, there are several peculiar angles, postures, balance tactics and movement progression that are difficult to pass on manually.

Pranjali Kulkarni, a bharatanatyam dancer for 15 years and a PhD scholar at the Centre for Cognitive Science, IIT Gandhinagar, analysed complicated bharatanatyam moves using motion capture system aiming to preserve the art. “While studying dance literature and experiential processes of dance forms, I realised most dancers develop expertise through a subconscious process. I started looking at the challenges of preserving Bharatanatyam movements from a cognitive science perspective,” she says.

“The subconscious process gives a mesmerising touch to one’s performance. But, this is something that cannot be easily taught to another person,” says Pranjali, who conducted the two-month experiment at the Knowledge

Pranjali Kulkarni wearing her motion capture system

Science Lab at Japan Advanced Institute of Science and Technology (JAIST) as part of her foreign internship. In this internship, she designed the experiment using the vicon nexus 2.0 motion capture system to unearth the subconscious techniques that an expert dancer puts to use in achieving finess in dance movements.

The whole experiment was based on five bodily parameters – posture, balance, speed control, accuracy and synchronisation. “I used high precision cameras and algorithms to decode micro movements through a technology called the motion capture system (Mocap). These unseen and unrecorded skilled moves have been defined as ‘dance primitives’ and considered the fundamental building blocks of any dance step,” adds Pranjali.

She translated the parameters of learning bharatanatyam from Natyashastra and used them as inputs in virtual reality (VR) format in the motion capture system. This exercise helped to create a real-time virtual expert dance teacher through capturing finest movements of a real expert dancer. The VR model revealed how dancers use transition techniques at fast speeds. The balance between posture and movement maintained at peculiar angles is traditionally achieved through meticulous practice. During the experiment, Mocap allowed capturing angles at all speeds and helped learners correct their steps using real-time feedback.