



MOTION ANALYSIS

Bournemouth University fosters the future of animation with Motion Analysis

Bournemouth University's Faculty of Media and Communication is no stranger to motion capture technology; Zhidong Xiao, Deputy Head of Department at the National Centre for Computer Animation, has explored mocap usage since 2003 to further his areas of expertise, namely character animation, virtual reality, and robotics.



Bournemouth is now recognized as one of the leading animation universities in the UK, and with the expansion of its physical facilities in the past few years, Zhidong's team looked to upgrade to a new mocap system to operate their specialized character animation within three main practice areas:

Education: The aim of the media department's mocap technology is to help students understand the full animation pipeline in practice - how to use cameras, marker sets, integrated post-production software and more - and discover the best methods for their own animation projects.

Research: The university receives funding from research councils to use motion capture technology for investigative projects.

Professional practice: Supported by local councils and trusts, the department helps artists, film creators and creative directors to create animations by giving them the studio time, resources, equipment, and guidance they need.

The university's advanced application of mocap

The department's original fixed capture space measured 3m³, and made use of Motion Analysis' Raptor 2 System, an active optical motion system. It worked well for the smaller space at the time, particularly for teaching character animation classes, up until 2010. Ultimately, Zhidong's team needed technology with quicker data processing and more advanced techniques for character motion retargeting, coinciding with the department's development of new studio facilities.

The team chose to expand its partnership with Motion Analysis to create a fully functional pipeline from pre-production motion capture, to editing capabilities, and integrations with animation software.

Motion Analysis' passive optical system was chosen not only due to its high accuracy when capturing the facial, body and hand movements required for **detailed and performance-like animation**, but also because it can track multiple objects and actors at once.

“The main advantage of the new MAC setup is the capturing of multiple interactions simultaneously, which was not possible with our former system. It has saved us a lot of time and effort in supporting student studies successfully from undergraduate to postgraduate.”

Zhidong Xiao



The university updated its system to accommodate 16 fixed 4K **Kestrel cameras** in a larger capture volume (measuring 5m x 8m x 3m). This new facility goes beyond character animation and education, acting as a virtual studio for TV shows, music videos and film special effects.

The original Raptor cameras are still used as a mobile mocap system in outdoor environments.

When calibrating the system, Zhidong's team found the system to work far better for building skeletons onto motion capture actors, facilitated far more easily by fast, shortened motion retargeting.



They also found any re-dos in post-production simpler due to the system's ability to capture motion and video at the same time; the synchronization between the markers and Cortex software builds an animated skeleton onto both the actor's motions and the animation rig. Having a reference for how accurately the data was captured in real-time has been noted as a great advantage for students and educators alike.

Groundbreaking animation in practice

In the past few years, the university has been heavily involved in many community projects to showcase mocap character animation and virtual reality in action, supported by the new Motion Analysis system.

Alongside Exeter Cathedral in the UK and Fougères Castle in France, **Project Vista AR** aimed to boost new visitor experiences through virtual and augmented reality using headsets and immersive rooms to bring historical figures and artifacts to vivid life. Elsewhere, film artists have implemented the team's mocap systems for character animation; for example, the dystopian short film **Children of the Null** by **John Butler**.

Bournemouth University has also held a research event for local businesses and councils, testing an **LED virtual production wall** at the studio. Having been utilized for Disney's television productions, the wall uses in-built motion capture to merge physical and virtual reality into one shot. Motion Analysis' marker sets can be seen on the TV camera rigs to render virtual environments onto the wall.



Video source: <https://www.bournemouth.ac.uk/news/2021-07-22/virtual-production-exploration-event-bournemouth-university>

Zhidong and his team have some exciting future plans, looking into machine learning techniques, virtual production and enhancing training for health services. Now with two motion capture setups, the university's provision of cutting-edge animation capabilities to students, artists and local organizations will continue to fuel creativity, exploration, and entertainment, expanding further to other industries that can benefit from mocap technology.

“Motion Analysis’ interoperable mocap system and synchronization tools provide the keys to educate the next generation of motion capture professionals, proving invaluable to further our academic teaching, research capabilities, and support of community projects.”

Zhidong Xiao



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Since inception, Motion Analysis has worked closely with renowned specialists to create continuously cutting-edge hardware and software solutions for a wide range of industries including video game design, studio broadcasting, AR, VR, biomechanics, product development, robotics and ergonomics.

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