| Costs for Hire | MOTION CAPTURE STUDIO |
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| Full Day  Body Capture Session including Senior Lab Technician | $1,800.00 per day ex GST (8 hours) |
| Half Day Body Capture Session including Senior Lab Technician | $1,200.00 per half day ex GST (4-6 hours) |
| Facial Capture | P.O.A. |
| Post Production Data Clean-Up | $40.00 per hour<br><br>Delivery of .trc MoCap data files |
| AUT Studio Assistants | Provided free of charge – all assistants are Digital Design students with a background in animation and Motion Capture. |

| Technical Specifications | The Lab includes a state of the art Motion Capture Camera System by Motion Analysis. |
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|  | There are 24 Raptor-4 digital cameras that operate up to 200 fps at a full resolution of 2352 x 1728 pixels, and up to 10,000 fps at reduced resolutions. |
|  | The cameras emit IR (infra-red) light and use passive reflecting markers placed on the actors/performers and any tracked objects. This provides a tool that assures reliable and accurate data capture of a body or shape. |
|  | The cameras are connected via a dedicated Gigabit network to a computer that runs Cortex, a proprietary software that converts the data from the 24 cameras into 3D positions of the markers, and then solves those markers into rigid body and skeleton positions and orientations. |
|  | Cortex provides an SDK interface which can be used to stream the data to other systems. However, this SDK is a closed source and exists only for Windows. Therefore, our staff have written a custom software called "MotionServer" which connects to Cortex and converts that closed source data stream to the more open NatNet protocol developed by OptiTrack (http://www.optitrack.com/products/natnet-sdk). |
|  | The studio camera rig is on a fixed track to record a pre-set volume area, it cannot be moved as normal camera set-ups might to fix or differentiate a shot. |
|  | An in-house visual referencing system can be set-up if required.  This provides live video reference footage of the session. |
| Room and Capture Specifications | Our studio has a floor area of 10m x 14m with a ceiling height approx. 5m with scaffold set around the perimeter for the camera rig. |
|  | The Motion Capture camera grid is aimed inwards to capture a volume of 5x5x3 meters, this is clearly marked on the studio floor with tape lines.   Actors must take care to remain within these boundaries to ensure successful data capture. |
|  | The more complex the capture, the more missing gaps, marker swapping and occlusion will happen, therefore successful data capture cannot be guaranteed outside the volume. |
|  | The cameras see only the individual markers, they do not identify anything else but shiny, reflective or refractive materials should be avoided as much as possible, including bottles, glass, shiny fabrics or objects, polished metal or plastic surfaces, as these contribute to a 'noise' which can affect the tracking. |
|  | The flooring is a non-reflective black rubber matting, all care must be taken not to scratch or damage the floor during your capture session.   This floor is laid over a concrete base so we recommend your performers wear soft sole flexible shoes, and take care to protect their knees and elbows as necessary, with warm-up practice, and by limiting harsh movements.  The Motion Capture technician will guide you on best practice |

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| **Pre-Production Meeting** | All clients must meet with the Colab Motion Capture Technician and Lab Administration Manager prior to the booking to discuss the proposed motion capture recording in detail.  This should take place at least 1 to 2 weeks prior to the proposed record date.

This meeting is an opportunity to discuss the physical, technical and creative requirements of the capture session, and clients should provide a detailed plan of what they want to achieve for their production.  A shot list and/or story board will be useful at this point.

Performers and directors should be familiar with the limitations of the technology, such as impeding occlusion caused by poor staging setups and/or performance movement and seek advice from the technician to determine best practice for a successful recording.

Production shoots typically require a team of at least 4 studio assistants to help during a production, they should be familiar with film, animation or studio practices, and be able to follow the technician's instructions.   AUT can provide trained studio assistants if required for your sessions, any other production staff should be at least familiar with studio procedures.

We request that a production book be provided for all production and AUT staff prior to the scheduled recording date.

This book must include:

- Job name/Production Title, agency and/or film company,
- Call times for all staff,
- Crew List (non-acting) with their roles and responsibility for the production,
- Any external camera equipment, or production equipment including props
- Cast list of performers including height and weight and body for suit sizing.
- Confirmation of indemnity insurance.

**For some productions that involve more complex use of Motion Capture technology a precise technical plan may be required, this would be completed in conjunction with the Motion Capture Technician.** |
| **Setting up for Motion Capture session** | Performers are required to wear a motion capture suit provided by the lab, we have various sizes to fit most body types.

Once in a suit markers are attached to the performer by the technician who places the markers in a specific layout. A marker is a single ball ranging from 5mm to 10mm in diameter. Its position is tracked in 3D space by the IR cameras.

When a prop or a performer has been marked, they need to be identified by Cortex by creating a markerset. The process is a manual procedure completed by the technician.

There are two kinds of markersets: RIGID BODIES and TEMPLATES.

A RIGID BODY refers to props, where markers do not change position over the body/object, nor does the body/object have any movable parts.

A TEMPLATE refers to props with movable parts, e.g. performers. These marker sets take more time to setup and identify on the body, and the marker position has to be planned accordingly to the data capture requirements of the shoot.

TEMPLATES can have skeleton systems solved by Cortex. In a skeleton, groups of makers define several "Bones" that are arranged in a hierarchy. Usually, the hip of a skeleton is the start of this hierarchy, and is connected to the spine and the legs. The head and shoulders are connected to the spine, and so on.   Although there are many systems, "Calcium Skeleton" is the system our lab uses.

All performers need to go through a basic Range of Motion (ROM), which is a set of physical movements, so Cortex can calculate how "variable" the marker set is, or in practical words, what's the kind of movements that the performer can do. The more flexible and more complex the movements are, the more ROMs need to be done. This can take up to 30-45 minutes per performer.

A "Scene" can contain several actors, e.g., two or more performers in the same space but the considerations of complexity e.g. occlusions of markers must be taken into account and discussed during your production meeting.

All Rigid bodies and templates have to remain inside the yellow marked area in order to be tracked by the cameras. |

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| | If any of those marker sets are not consistently tracked or shown up on the Cortex monitor in the studio, then the data is not captured. Production staff should always refer to the monitor. |
| Data Streaming | The captured data can be streamed on the AUT network using the proprietary Cortex data format. |
| | Cortex can stream positioning of rigid bodies and their centre, and their individual markers as well with their respective labelling. The same applies to templates, Cortex can stream the markers position, and the skeleton position as well. However, the Cortex data format is closed source and requires MotionAnalysis SDk libraries to work with. |
| | For that reason, we have created a software called "MotionServer" that connects to the Cortex server, and converts this closed source protocol to a more open motion capture protocol called NatNet. If your system can talk to a NatNet server, it should be able to acquire all necessary information from the motion capture system. |
| | Cortex can record everything that happens on the volume while simultaneously streaming the data on the network. This recording can be re-streamed (and looped) and the information will be identical to the real time stream. |
| Post Production – Data Capture and Clean-up | Our Motion Capture lab uses Cortex which is Motion Analysis' software for handling all phases of motion capture within a single program - initial setup, calibration, tracking and post processing. |
| | Once the data has been captured a post-production process is needed to 'clean-up' the data using the in-house Cortex software. This is chargeable work at $40.00 per hour excl GST. |
| | The volume of clean up to be undertaken will vary with each project, and depends on the relatively complexity of the movement capture and number of performers. |
| | Estimates for this work will be discussed with the client at all times but costs should be factored into production budgets. |
| Data Files Output | The cleaned MoCap data files will be provided to the client in the appropriate file formats to be agreed on by both parties. The use and adaptation of the capture data is the responsibility of the client and cannot be guaranteed by AUT. |
| | The Client will need to provide an external storage device to keep a copy of the raw data to be transferred immediately after the recording. This drive must be on NTFS or FAT. |
| Location & Delivery Access | The Mocap Lab or WG212 is located off the Level 2 foyer in the WG building, AUT city campus. Flat pedestrian access is available into the space with wheelchair access from Level 2 foyers. |
| | Delivery access can be arranged on request via Gate 3 or Gate 4 for larger items. |
| Car Parking | AUT cannot provide parking for all cast and crew. There is limited parking on street, or in any of the car parking buildings nearby (Wakefield St, Aotea Square, Kitchener St) |
| Health and Safety | AUT staff will provide a Health and Safety Run-through that all cast/performers and crew must attend. Production staff must take care to be mindful of their own Health and Safety at all times |
| Insurance and Liability Cover | AUT insurer's Marsh require that any party using AUT facilities be required to maintain public liability insurance to cover them for damage that the external party (or others for whom the external party has assumed responsibility for) cause to AUT property. Users of the space will need to provide AUT Colab with confirmation that they hold insurance cover for performers and for public liability. AUT Colab will need to know the assigned limit for public liability and what the excess is. |
| Food and Beverage | No food and/or beverage set-ups are allowed in the Motion Capture lab. Water bottles with secure lids are the exception. |
| | Production Companies can use the Green Room area to serve food and beverages. |

# TYPICAL MOTION CAPTURE PIPELINE

**PRE PRODUCTION**

**PRODUCTION**

**POST-PRODUCTION**

| DATA MANAGEMENT | → | SETUP | → | CALIBRATION | → | PLACE MARKERS | → | RANGE OF MOTION | → | CAPTURE DATA | → | POST PROCESSING | → | IMPORT TO MAYA |
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| Create Project | Switch on Cortex | Wand Wave | Put on suit (Top + bottom) | Define new character | Capture subject | Fill gaps/ clean-up data | Load Character |
|---|---|---|---|---|---|---|---|

| Create Day | Connect to cameras | Set Origin | Stretch suit tight + add velcro | T-Pose | | Solve Motion | Import Animation |
|---|---|---|---|---|---|---|---|

| Create Session | | | Put on hat, shoes, gloves | Capture ROM | | Save as FBX Export to TRC | |
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| | | | Place Markers | Reconstruct ROM | | Import to Motion Builder | |
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Label T-Pose

Re-target Actor

Export to rig