

RapidManikin™ R1.0

accurate full-body tracking solution for MockUp2000i2

RapidManikin™ provides a high-performance immersive full body tracked solution for DIVISION® MockUp that scales accurately to each immersed user, and for which the tracked body position can be recorded and replayed in real-time using the standard MockUp Sequencer capabilities. RapidManikin also leverages all of the existing MockUp capabilities such as file import and optimisation, interactive graphics, and its rich set of behavioral and analysis tools.

RapidManikin also integrates and leverages the Vicon MX body tracking system and Visual Advantage's RapidVRM™.



Application

RapidManikin is used in situations where the quick analysis, user embodiment, or presentation of real user interactions, are required. A user may be set up and calibrated very quickly and then asked to check out a series of issues within a range of MockUp digital models as required. The results can be recorded and replayed later for review or presentation.

These tasks typically form human factors exercises; checking ingress/egress, reach-ability, visibility, interaction between multiple users, and any collisions (interference) between the tracked RapidManikins and the digital model. However, full body tracking also helps to provide more realistic presentations and to help users collaborate in situations where multiple users need to work together in one virtual environment. Further applications include training and other user instruction.

Technical Overview

MockUp (with RapidVRM) supports basic body tracking (typically head, hands, and fingers), with inverse kinematics used to resolve some body segment positions such as the elbow and upper arm, and a visual representation called 'Fred'. Multiple 'bodies' can be dynamically added to the scene, and the root body position of the first user can be recorded. Visual Advantage's RapidManikin takes this further, enabling the full and accurate recording and replay of any tracked body segment and the management for complete RapidManikins within MockUp.

For an accurate full-body tracked solution, the position and orientation of bone landmarks (representing unique points within any limb or body segment) need to be determined accurately in real-time. From a landmark the correct rotations can be determined and the manikin body segment can be positioned correctly. Please note that it is very difficult and time consuming to manually determine this and an automatic and dynamic solution is required to maintain this accurately. If a body part is rotated around an incorrect rotation point, the resulting movement in the virtual environment would of course be incorrect.

However, it is possible to go further by dynamically determining the length of each body segment hence scaling the representation of the immersed user accurately in the virtual environment. As the RapidManikin is scaled in the graphics domain it will also be scaled in the collision (interference) domain so that interferences between the RapidManikin and the rest of the design assembly can be determined in real-time. These interferences can then be recorded correctly at run-time or during an animation replay, and can trigger more advanced real-time events.

The solution is fully integrated into MockUp so that RapidManikins can be fully managed as MockUp entities and can be used in conjunction with the full suite of MockUp tools. Many RapidManikin instantiations may be managed, replayed and recorded within one MockUp session and multiple users may be tracked by one Vicon MX tracking system and managed within MockUp. If required, one user may also record one role, then play this back while recording a second and further roles, all within one MockUp environment.

Product Key Features

Run-time capabilities

- Full body tracking of more than 20 body segments and up to 5 simultaneous users.
- Suitable for use with Head Mounted Displays and in Powerwall™ and CAVE™ type environments.
- Accurate dynamic scaling of body segments to match the tracked user.
- Accurately positioned and maintained joints.
- No need for inverse kinematics algorithms to determine approximate body segment positions/orientations.
- Support for fully and partially tracked users.
- Disengage live tracking for immediate replay and review from recording, while tracked user is still immersed.
- Simultaneous recording of one RapidManikin while another recorded RapidManikin is replayed in the same environment.
- Optimum performance management for large number of tracked body segments.
- MockUp Behavior and Interference tools can provide live feedback on body collisions etc.
- Enables minimally tracked users (conventionally tracked head and hands) to leverage the Sequencer, Interference, Movie, and Landmark functionality.



Multiple users

- Support for multiple simultaneous users – fully and partially tracked users can share one environment.
- Minimally tracked users can share a real-time environment with full body tracked users.
- Note: for multiple simultaneous users, multiple MockUp licenses are required if multiple displays are required.

Tracking

- Full body tracking requires a Vicon MX system.
- RapidManikin with one Vicon system can resolve the tracked body segments of several simultaneous users accurately and with low latency in one MockUp environment.
- Minimal body tracking can be provided by all MockUp and RapidVRM supported peripherals.
- Multiple simultaneous tracking systems are supported through RapidVRM™.
- Assembly object tracking (tools etc) may also be managed in the same environment through RapidVRM™.

Managing the environment

- RapidManikin instances are defined and fully maintained within the standard MockUp environment.
- Fully functional RapidManikins can be cloned (copied) and moved in the Assembly Structure.
- Users can define the complete RapidManikin body geometry and materials – face images can be applied to head.
- Several different RapidManikin definitions can be defined for each user; each one intended to focus on (capture, visualize, and record) a different part of the user.
- Simple template file format to define a RapidManikin and its segments.
- Template file can be modified and reloaded without exiting the MockUp session.
- Hotkeys and Action Functions are provided for RapidManikin creation and control.
- Solution is fully integrated with MockUp and MockUp tools;
 - Landmarks, Movie creation tool.
 - Sequencer, Interference tool etc.
- RapidManikins can be replayed in MockUp without RapidManikin, supporting the distribution of tracked results.

Solution Requirements

- DIVISION MockUp and the Motion Planning Option, or DIVISION Reality
- RapidVRM™ + Trackd. Please see [RapidVRM](#) for further information.
- Vicon MX tracking system.
- Display environment – Head Mounted Display, Powerwall™ or CAVE™.
- Optional: Additional interaction devices such as 3D mice/wands and gloves.

About Visual Advantage

Visual Advantage has had extensive experience with DIVISION and PTC products over the past 15 years. We offer an extensive range of products and services to extend the functionality and performance of the MockUp product for clients who aim to realise its full potential. Visual Advantage is a PTC PartnerAdvantage™ Gold level member.

Please contact us for further information >>

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