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# A LAYERED ARCHITECTURE FOR MOTION CONTROL OF VIRTUAL ASTRONAUT IN SPACE OPERATION TRAINING

**Abstract**

Motion control of virtual astronauts is one of the key problem of astronauts' space operation training relative to using Virtual Reality technologies, we describe a layered architecture to satisfy the virtual astronauts' real time control as well as the dynamic property in microgravity environment. The architecture is divided into three layers: at kinematic layer, we record input data from virtual reality devices such as position sensors and data gloves in real time and concurrently apply the same data to the kinematic model,then the virtual astronauts are avatars who reflect motions of their owners at this layer; at physical layer, we adopt physics engine such as ODE or Physix to develop the astronaut's dynamic model with multi-rigid body as well as a physical world, and the dynamic model is driven by the real time kinematic data to create the motion in microgravity environment; at display layer, we employ skinned mesh with skeleton for the final display on screen, and we can also edit frame animation to generate virtual astronaut motion at this layer. Finally, a case study of virtual space operation training,which use Flock of Bird and CyberGlove as motion capture device,PhysX as physics engine, is conducted and demonstrates the effectiveness of our methods.