Supplemental materials for KinÊtre: Animating the World with the Human Body

Jiawen Chen Shahram Izadi Andrew Fitzgibbon
Microsoft Research Cambridge

These supplemental materials detail the KinÊtre system pipeline and presents a number of additional results and usage scenarios.

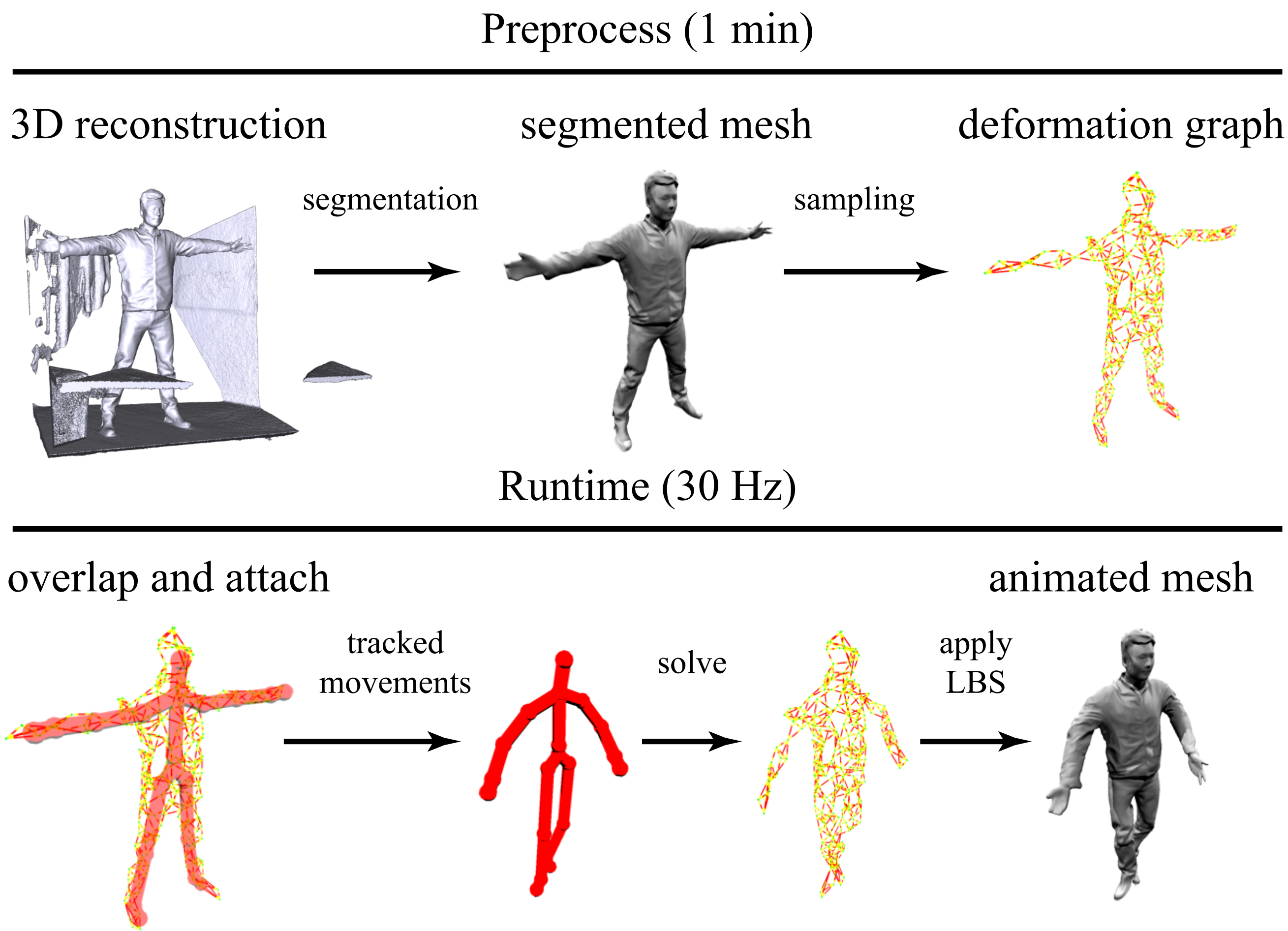

Figure 1: *The KinÊtre processing pipeline is comprised of two phases,* preprocessing *and* runtime*. During preprocessing, the user waves a Kinect camera around her friend and a 3D mesh is rapidly generated. When the friend moves out of the way, his avatar is segmented from the background. We perform orientation-aware sampling to obtain a sparse deformation graph. At runtime, the user embeds her skeleton inside the avatar and says the word "possess", which attaches her current pose to the graph. As she moves, her joints are tracked and used as constraints in the Embedded Deformation model. We solve for the deformation on the graph every frame and apply the transformations to the mesh using linear blend skinning.*

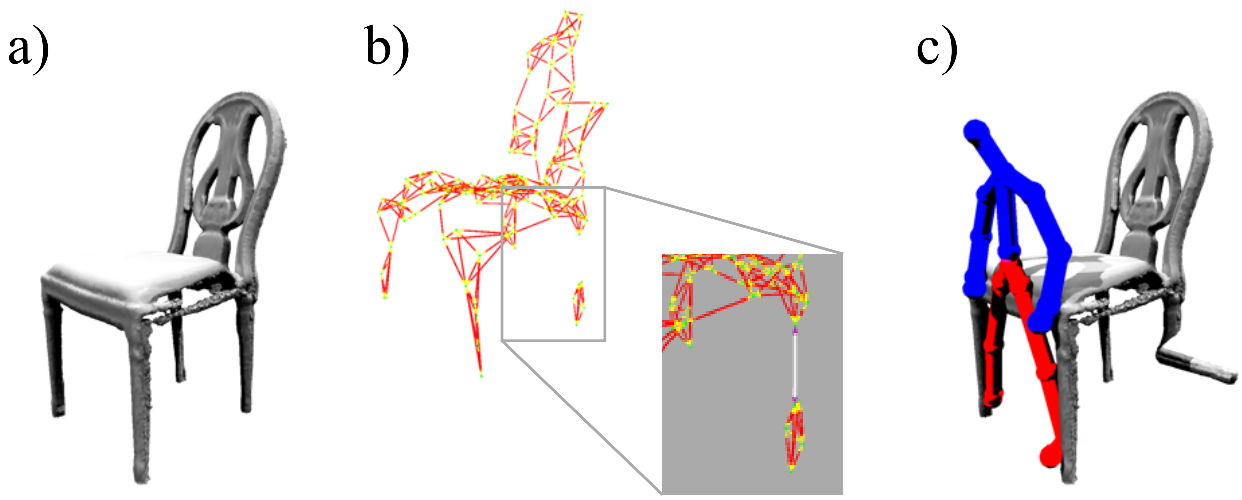

Figure 2: *The importance of mesh connectivity. a) Incomplete 3D scan of chair. Due to low sample density, the nearest neighbor graph (b) has two connected components. We add a rigidity constraint between cut vertices (inset). Without the rigidity constraint, the optimization is underconstrained, which causes the chair leg to turn upwards (c).*

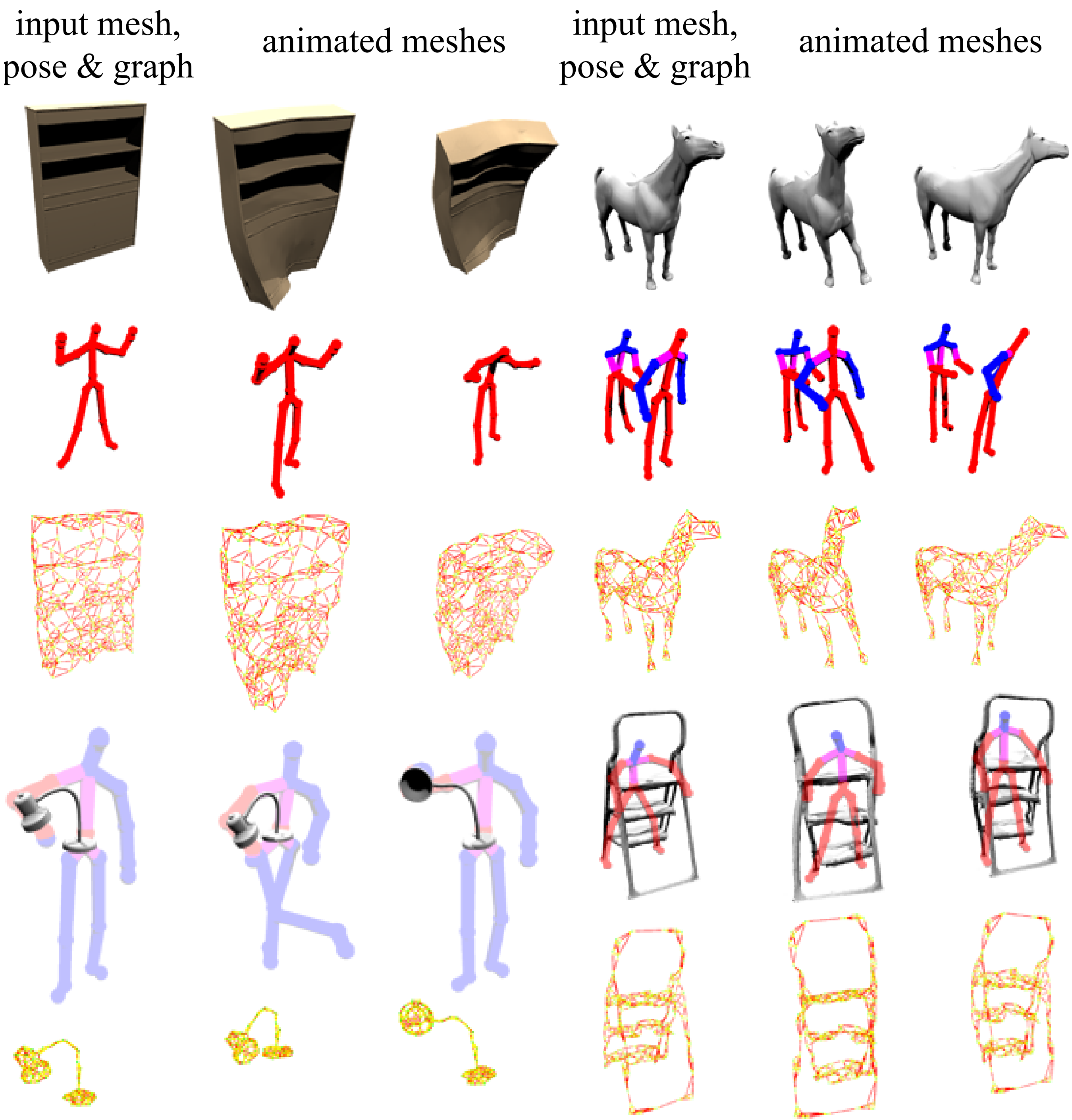

Figure 3: *Gallery of non-humanoid animations. Clockwise from top left: making a modeled bookcase walk, two users controlling a horse, a jumping stepladder, and using only the hip and right arm to reenact Pixar's Luxo Jr.*

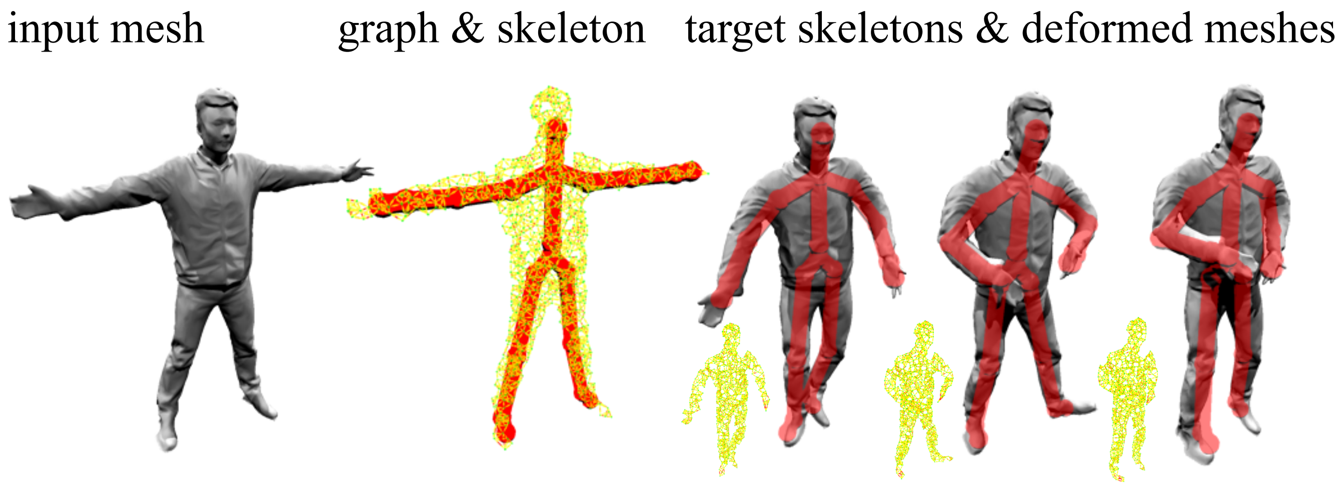

Figure 4: *Animating a human avatar. User acquires a static 3D mesh of another human (left). The user can directly embed his skeleton inside the scanned mesh(center). Tracked skeletal motions produce realistic mesh deformations (right).*

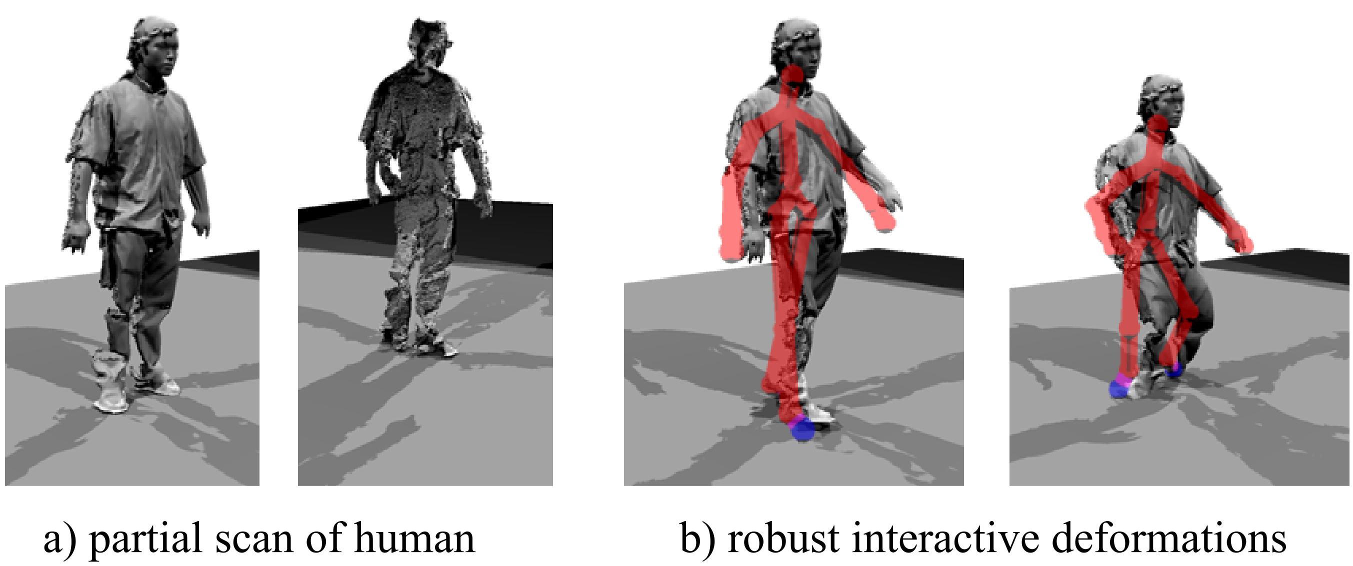

Figure 5: *A partial scan of a human. The scan was taken from the front and the back of the mesh is completely missing (a). User embeds herself and can still animate the mesh in realistic ways (b).*

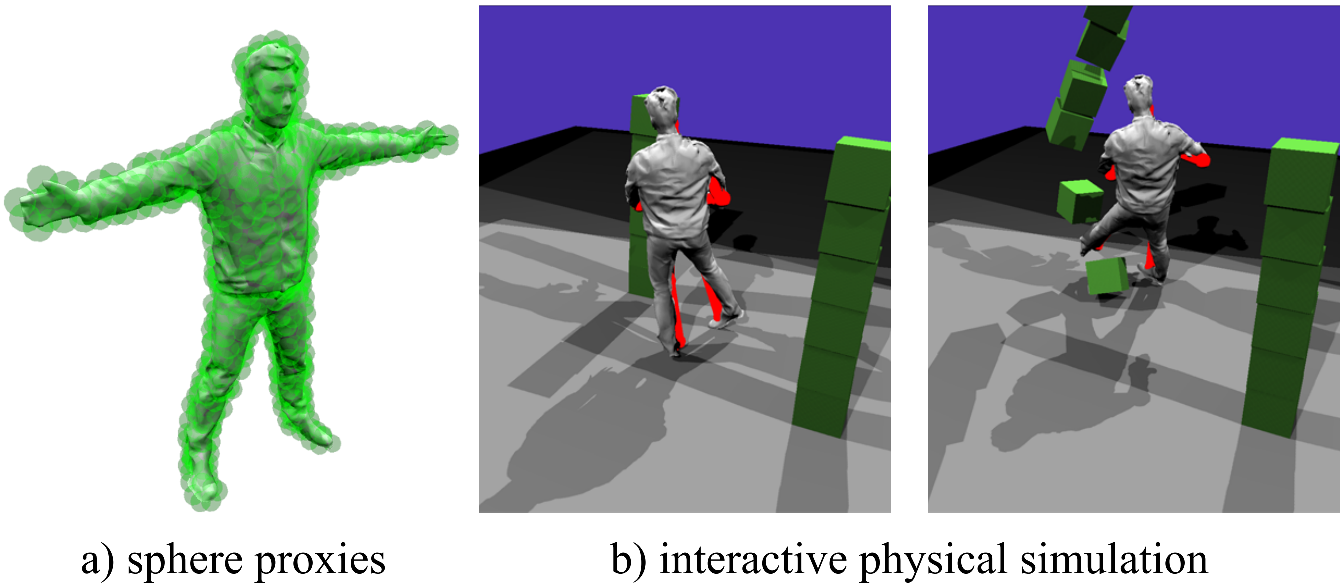

Figure 6: *A user mesh approximated as a series of physics-enabled kinematic spheres (a). This representation allows open ended interactions between the mesh and a virtual physics enabled scene (b).*

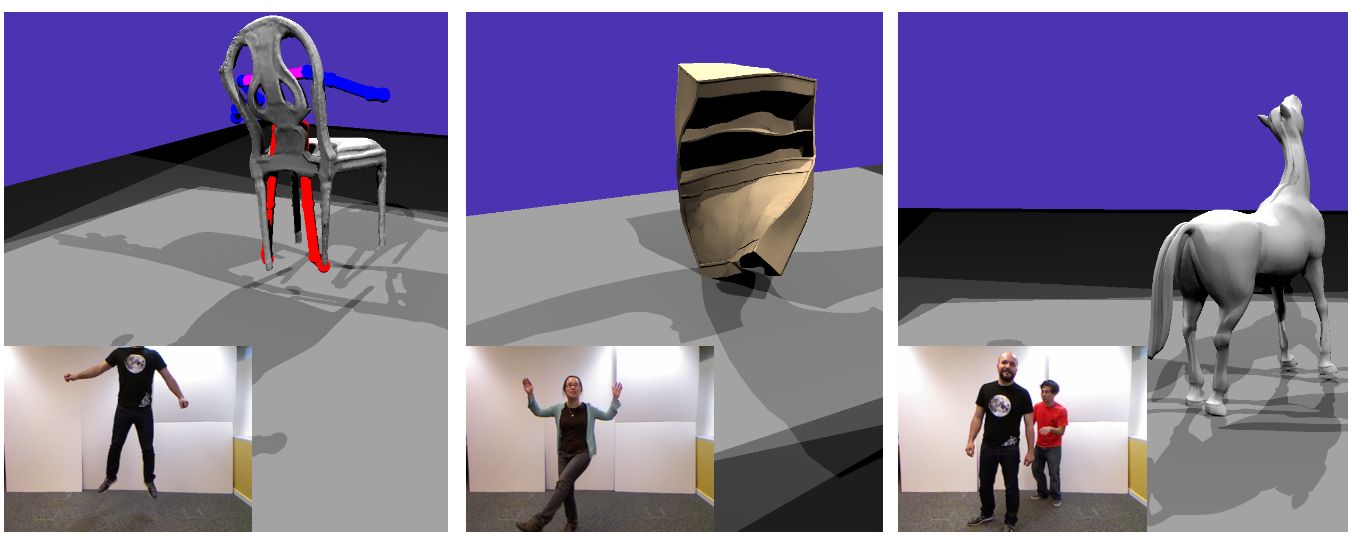

Figure 7: *Users interacting with KinÊtre during informal qualitative sessions. From left: user controls a chair to jump. A user animates the bookcase. Two users coordinate to control the motions of a virtual horse.*