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Computational Design of Animated Mechanical Characters
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— A factor key to the appeal of modern CG movies and video-
games is that the virtual worlds they portray place no bounds on what can be
imagined. Rapid manufacturing devices hold the promise of bringing this type of
freedom to our own world, by enabling the fabrication of physical objects whose
appearance, deformation behaviors and motions can be precisely specified. In or-
der to unleash the full potential of this technology however, computational design
methods that create digital content suitable for fabrication need to be developed. In
recent work, we presented a computational design system that allows casual users
to create animated mechanical characters. Given an articulated character as in-
put, the user designs the animated character by sketching motion curves indicating
how they should move. For each motion curve, our framework creates an optimized
mechanism that reproduces it as closely as possible. The resulting mechanisms are
attached to the character and then connected to each other using gear trains, which
are created in a semi-automated fashion. The mechanical assemblies generated with
our system can be driven with a single input driver, such as a hand-operated crank
or an electric motor, and they can be fabricated using rapid prototyping devices.

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