

# Creating Content with User-directable Human Actors

Jessica Hodgins  
CMU and Facebook

## The Dream

Virtual actors that can be directed at a high level by a domain expert:

Audio/Text to Facial Animation

Task/Behavior Specification to Action

Joystick control to Action

Video to Animation

Off-line and Realtime

## Audio or Text to Facial Animation



[https://www.youtube.com/watch?v=Kt9\\_1eyQE38](https://www.youtube.com/watch?v=Kt9_1eyQE38)

**A deep learning approach for generalized speech animation**

Sarah L. Taylor, Taehwan Kim, Yisong Yue, Moshe Mahler, James Krahe, Anastasio Garcia Rodriguez, Jessica Hodgins, and Iain Matthews

ACM Transactions on Graphics (Proc. ACM SIGGRAPH), August 2017

## Audio or Text to Facial Animation

A Deep Learning Approach for Generalized Speech Animation

Sarah Taylor (University of East Anglia)  
Taehwan Kim, Yisong Yue (Caltech)  
Moshe Mahler, James Krahe, Anastasio Garcia Rodriguez (Disney Research)  
Jessica Hodgins (Carnegie Mellon University)  
Iain Matthews (Disney Research)

© Disney

## Task Specification to Action



[https://www.youtube.com/watch?v=bKrAju\\_xqas](https://www.youtube.com/watch?v=bKrAju_xqas)

Synthesizing animations of human manipulation tasks  
K Yamane, JJ Kuffner, JK Hodgins  
ACM Transactions on Graphics (TOG) 23 (3), 532-539, 2004.

## Task Specification to Action



Our Approach

Sophie Jörg, Jessica Hodgins, and Alla Safonova  
**Data-driven Finger Motion Synthesis for Gesturing Characters**  
*ACM Transactions on Graphics (TOG) - Proceedings of ACM SIGGRAPH Asia*, November 2012, volume 31, issue 6, article no. 189.

## Behavior to Action



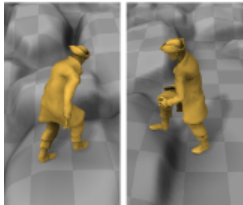
Libin Liu, Jessica Hodgins (2017). Learning to Schedule Control Fragments for Physics-Based Characters Using Deep Q-Learning. *ACM Transactions on Graphics*, 36(3).

## Behavior to Action

Learning Step 0.1 Million



## Joystick Control to Action



<http://theorangeduck.com/page/phase-functioned-neural-networks-character-control>

### Phase-Functioned Neural Networks for Character Control

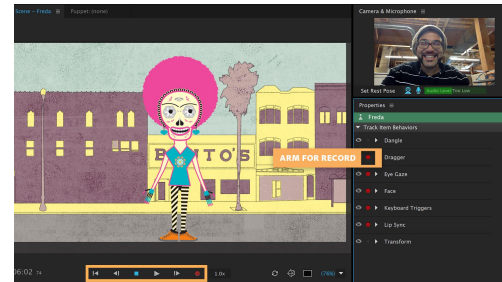
by Daniel Holden, Taku Komura, Jun Saito

*ACM Transactions on Graphics 36(4), 2017 (Proceedings of SIGGRAPH 2017)*

## Video to Faces

Character Animator:

<https://helpx.adobe.com/adobe-character-animator/how-to/adobe-character-animator.html>



## Video to Whole Body

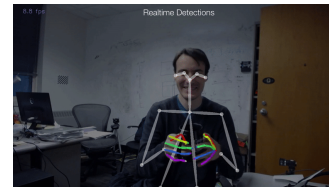
OpenPose:

<https://github.com/CMU-Perceptual-Computing-Lab/openpose>



## Video to Hands

OpenPose



Colored Glove:

<https://adage.com/creativity/work/color-glove-handtracking/20126>



## Video to Faces (real-time)

Wired:



<https://www.wired.com/story/facebook-oculus-codec-avatars-vr/>

## Evaluation

What level of realism is most effective for training?



## Evaluation

What level of realism is most effective for training?

