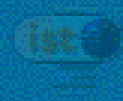
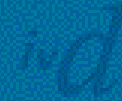
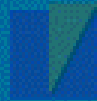


Synthetic animation of deaf signing

Richard Kennaway
University of East Anglia



VISICAST

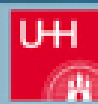
VISICAST

Automated deaf signing of
broadcast television

- Translation of text to sign
- Animation of signs
- Transmission over broadcast channel
- Rendering of avatar



VISICAST



Motion capture

- Very lifelike animation
- Time-consuming to set up
- Blending of signs
- Combining signs from different signers

Hand-crafted animation

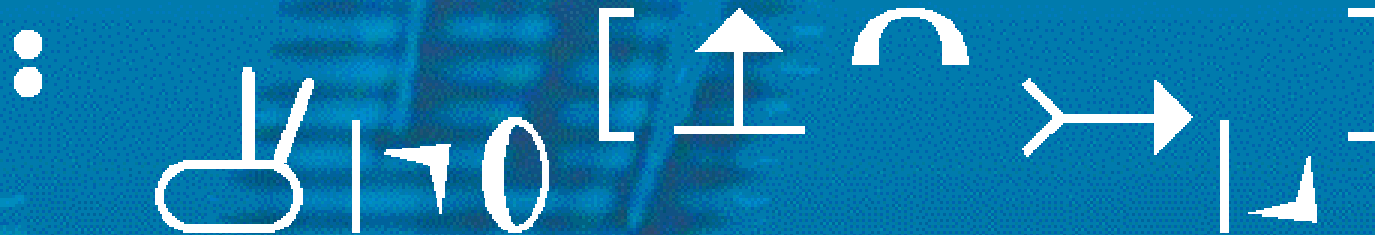
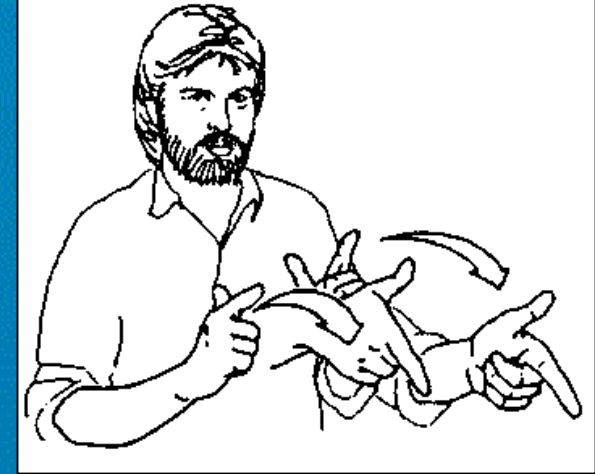
- Can give good animation
- Time-consuming (1/2 hour per sign)
- Blending of signs still required

Synthesis from semi-abstract transcription

- Quick to create lexicon (a few minutes to transcribe a sign)
- Instantly retargettable to any avatar with humanoid topology
- Automatic blending
- Low bandwidth

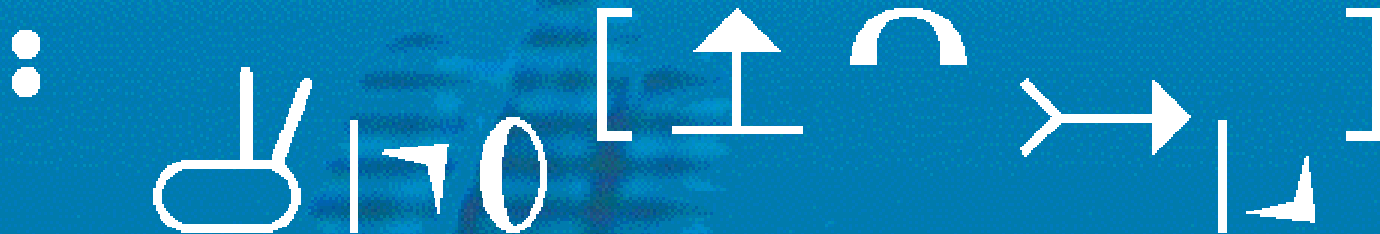
HamNoSys:

Hamburg Notation System



DGS “GO-TO (by car)”

SiGML: an XML-isation of HamNoSys



```
<sign_manual both="true">  
  <handconfig extfidir="uo" palmor="l"  
    handshape="finger2" thumbpos="open"/>  
  <tgt_motion>  
    <directed_motion direction="o" curve="u"/>  
    <handconfig extfidir="do"/>  
  </tgt_motion>  
</sign_manual>
```

Animation of HamNoSys

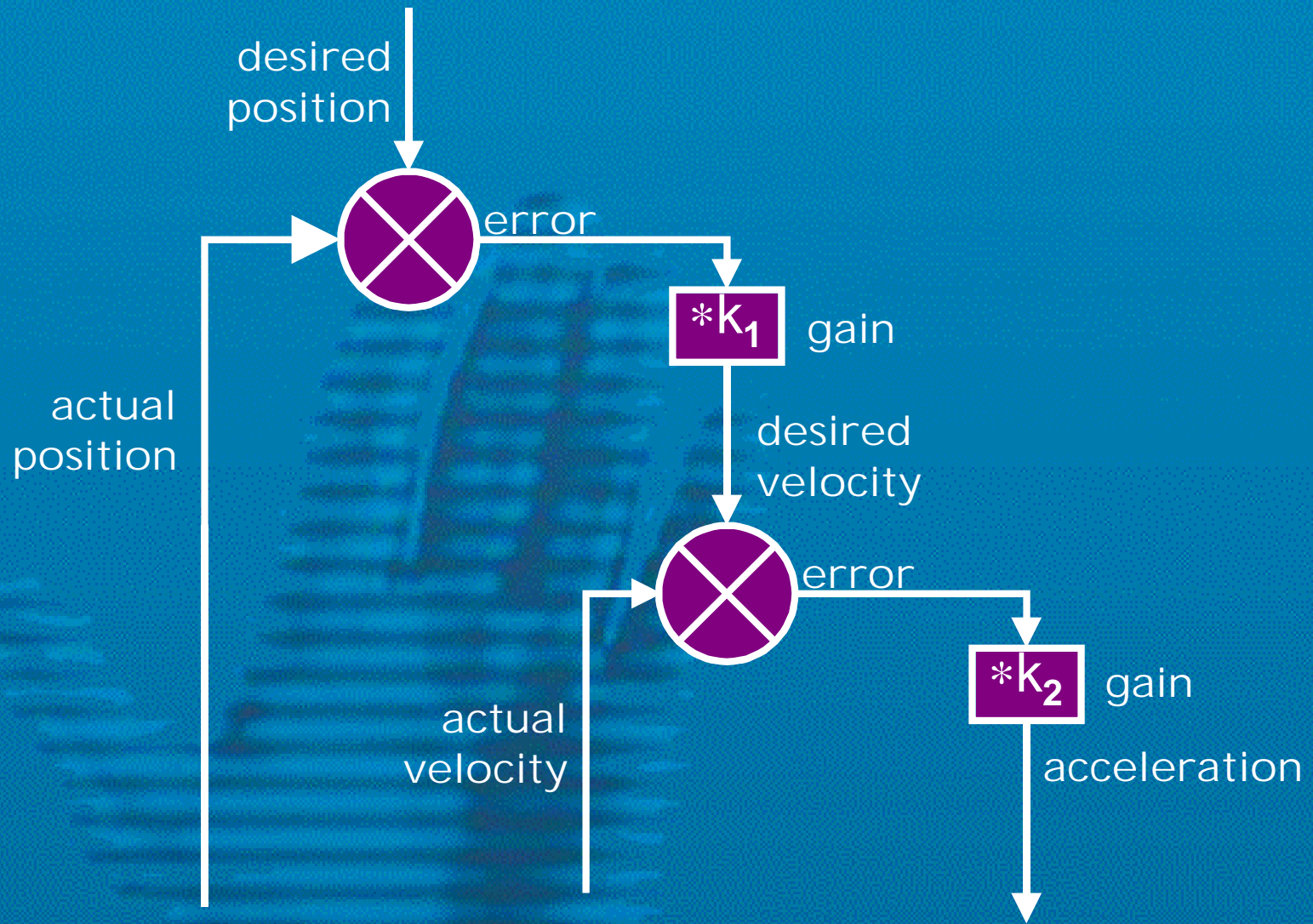
Make explicit everything HamNoSys leaves implicit or fuzzy:

- position
- elbows and shoulders
- speed
- trajectories

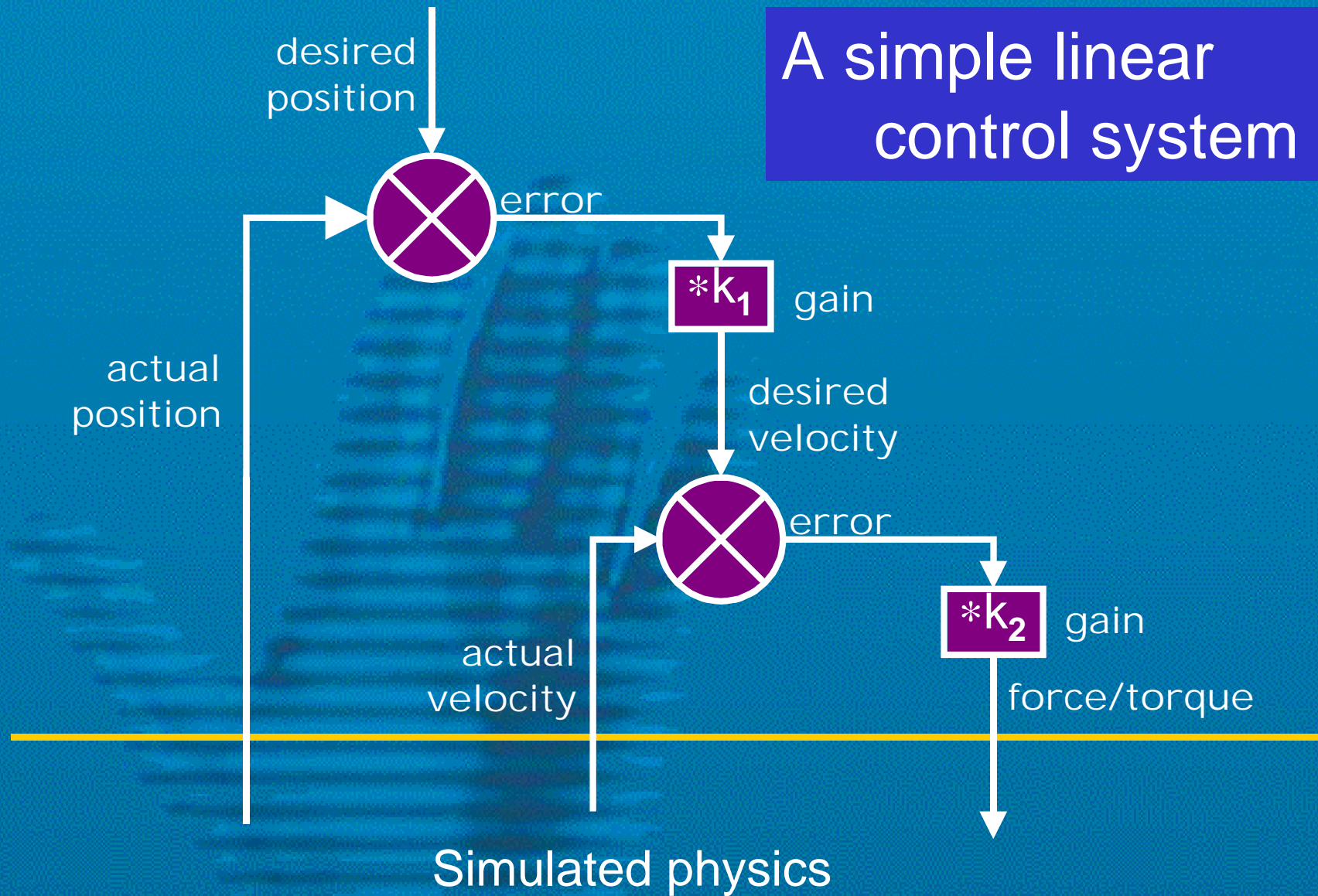
Naturalistic animation

A hard problem in general (e.g. walking).

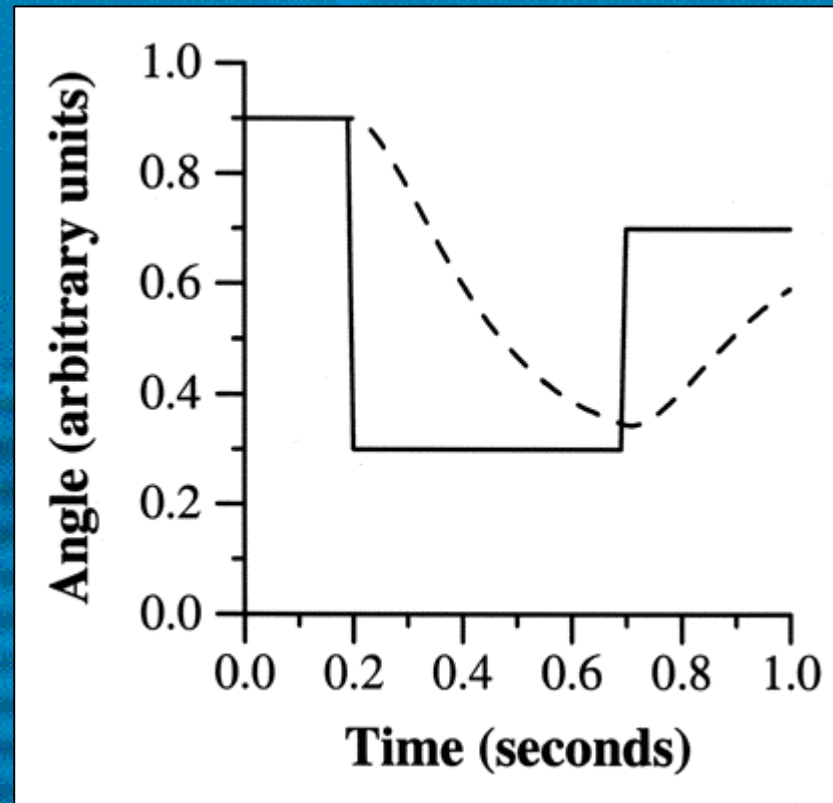
Easier for signing: no interaction with environment, ignore gravity.



A simple linear control system



Controller response



Inverse kinematics

Hand position and orientation given by HamNoSys

From these, compute joint angles from clavicle to wrist (*inverse kinematics*).

3 degrees of freedom per arm left undetermined:
respect the limits of the joints
avoid the arm passing through the body

Stick-figure avatars

Useful for developing animations:

- easier to render, so more frames per second
- skeleton gives clearer view of motion
- prototyping tool only, not intended for end user!

VRML for prototyping

Virtual Reality Modelling Language

Textual description language for 3D animated scenes.

H-Anim standard for articulated humanoid figures.

H-Anim incorporated into MPEG-4.

Ambient motion

If only arms, hands, and face are animated, the result is stiff.

Mix synthetic animation with motion-captured “ambient motion” for the spine and head.

Next steps

Implement the whole of SiGML/HamNoSys

Facial animation:

blend motion-capture data

implement HamnoSys 4

Tests