

APES & BLOCKS OF FOAM

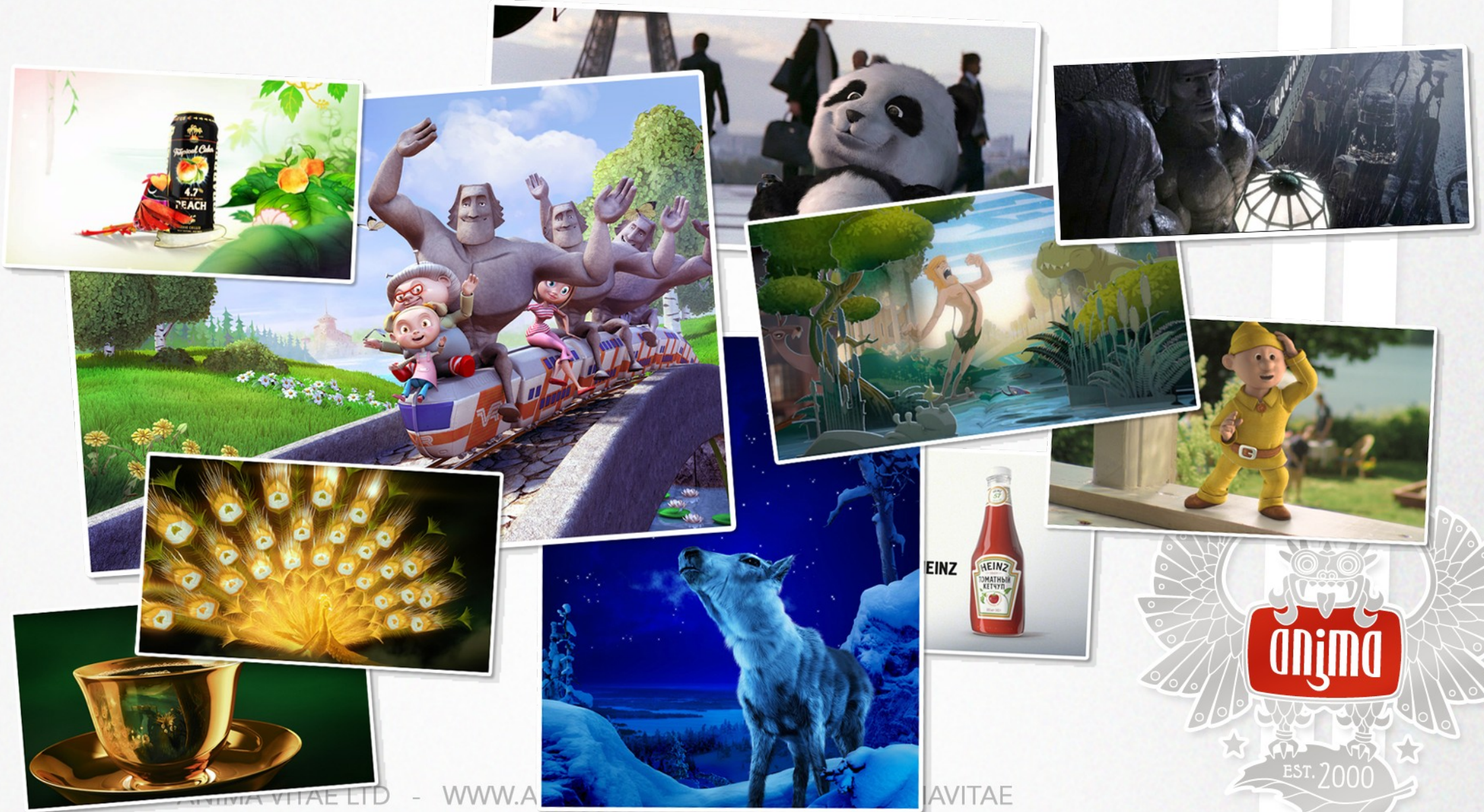
OLLI RAJALA / ANIMA VITAE



Feature Films



~250 High End Commercials



TV-Series



TV-Series

- Itse Valtiaat (The Autocrats)
 - 233 x 15min (14 seasons)
 - 7 x 45min specials
- Pasila (Police Station)
 - 54 x 25min (6 seasons)
- **Dialog driven shows**



Anima Lipsync

- First pieces of proprietary software at Anima (2000)
- Recognizes vowels by looking at **formants**
 - Formants = Peaks in frequency spectrum
 - Each vowel has a distinct peak
 - Create animation curves based on detected formants
- **Problems detecting consonants**
 - Mouth has tendency to stay open
 - Lacks rhythm



animaLipSync 2: AB01

File View

Play | Play Active Pattern | Play Active Channel | Info On Selection | Zoom Selection

31.108 s | 40.600 s | 0.997

0.000

31.108 s | 40.600 s

31.108 s | 40.600 s

aa | a | Detect

Formant | Override

Type: Vowel

New... | Rename... | Delete...

F3: 2355
F2: 922
F1: 610
Gain, val ^ 1/: 1.00
Output Ch Val: 1.00

Output Channel Values

Value	Channel Name	Active	BaseVal
1.00	all	X	0.00
0.00	iii	.	0.00
0.00	ooo	.	0.00
0.00	channel 4	.	0.00

Recalculate Channels

Annotations & High Level Override Patt.

Active

Base: 0.00

Rename Channel...

Place Annotation... | Edit Ann...
Create High Level Override Patterns | Freeze Annotations
Edit High Level Override Pattern... | Re-activate Annotations

EST. 2000



Goal #1 - “Create a lipsync device”

- “**Acting with hand**” natural for (some) animators
- Simply record open/close movement
- Combine with vowels from animaLipsync
- Add **stylized rhythm** to the lipsync solution
- Works in Muppets so why not for us!



PROTOTYPE #1 (aka "Hanska")



What's Out There?

- **Video/CV** based solution
 - Webcam
 - Performance in varying light conditions?
 - Stability?
- (kinect wasn't out yet)
- **Data gloves**
 - Remember virtual reality from the 90s :P
 - All really crap or really expensive
 - Only fingers vs all movements of hand





POWERPLAY.

The Power Glove. You plug it in like any joystick. But the similarity stops there. Because now you don't just guide the action. You're in the action.

As soon as you put on the Power Glove, its 3-D sensors track the position of your hand in space. You enter the program code. Calibrate the glove. Center it. And

feel the mechanical moves of a joystick give way to free-flowing, instant response. You actually knock out Mike Tyson. Grab the steering wheel of Rad Racer. Bank and fire your P-38 in 1943 "The Battle of Midway. All simply by moving your hand.

The Power Glove has a unique programmable keypad that gives the best

NES® players moves they've never had before—and never will have with a joystick. Twist your wrist for an immediate head butt in Double Dragon. Bend a finger for "Thrash Mode"—your character turns and shoots in all possible directions. Bend another for "One-Shot

Turnaround": you automatically change direction and fire faster than you ever could with a joystick.

With new moves at your disposal, it makes your joystick games especially vertical scroll games, new. Different. More exciting. And that's only the beginning.

ATARI SEGA NINTENDO VISUAL
OrphanVideoGames.com



Something Else!

- **Hack** something together
- Simpler and more flexible to try out ideas
- **Bend sensor + rotational sensor**












I-CubeX to the Rescue!





















- perfect prototyping platform
- MIDI = simple interface
- huge number of different kinds of sensors
- **~\$100 + sensors**

www.infusionsystems.com



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	Air v1.2 (see demo)	\$54.12US <input type="text" value="0"/>
		2 - 9 : \$51.41US 10 + : \$48.71US
	Bang v1.2 (see demo)	\$20.58US <input type="text" value="0"/>
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	BendMicro v2.0	\$29.46US <input type="text" value="0"/>
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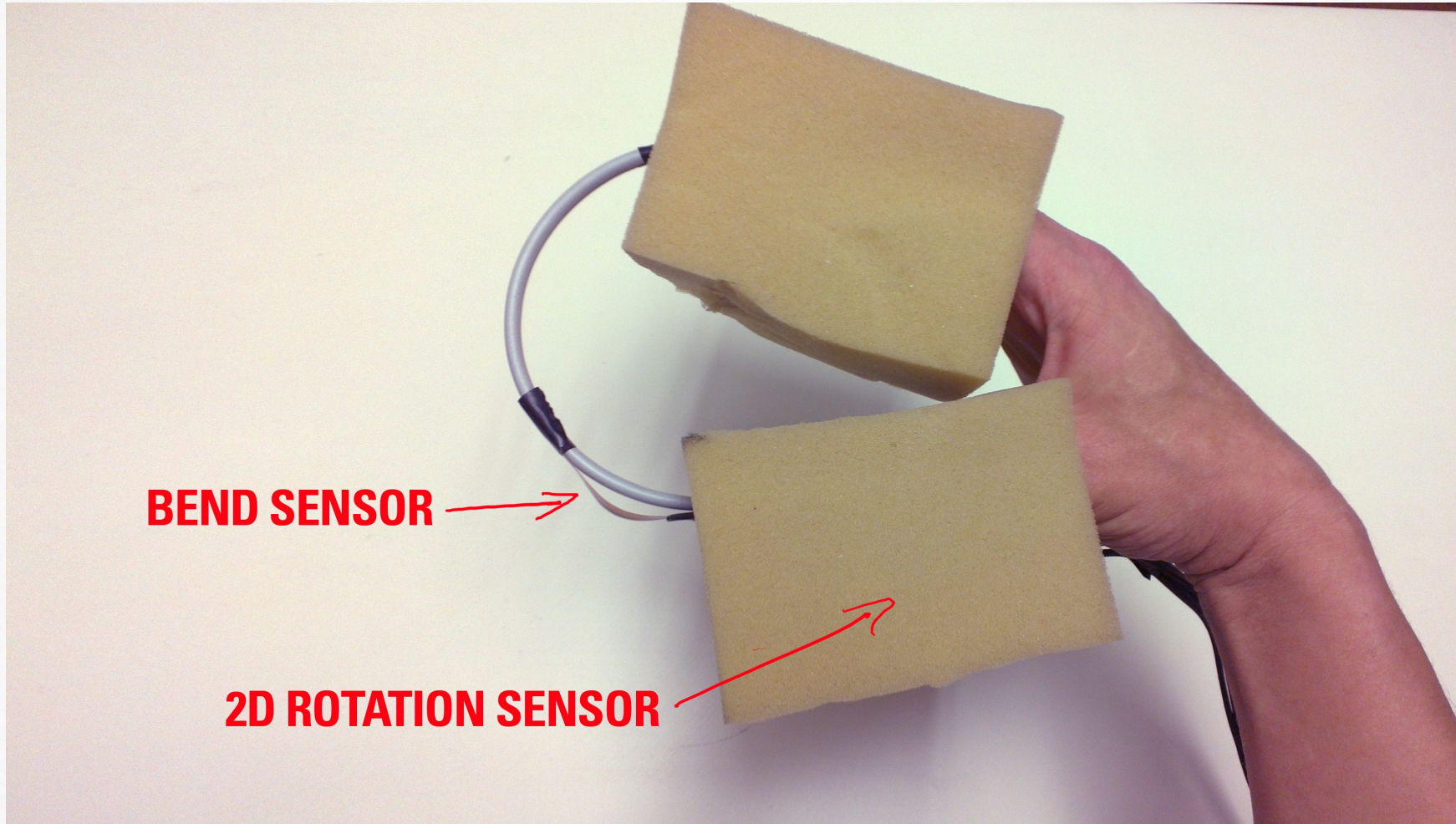
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	Reach v4.0 (see demo)	\$55.88US <input type="text" value="0"/>
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	ReachClose v2.2 (see demo)	\$35.17US <input type="text" value="0"/>
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Sensors



Prototype #1

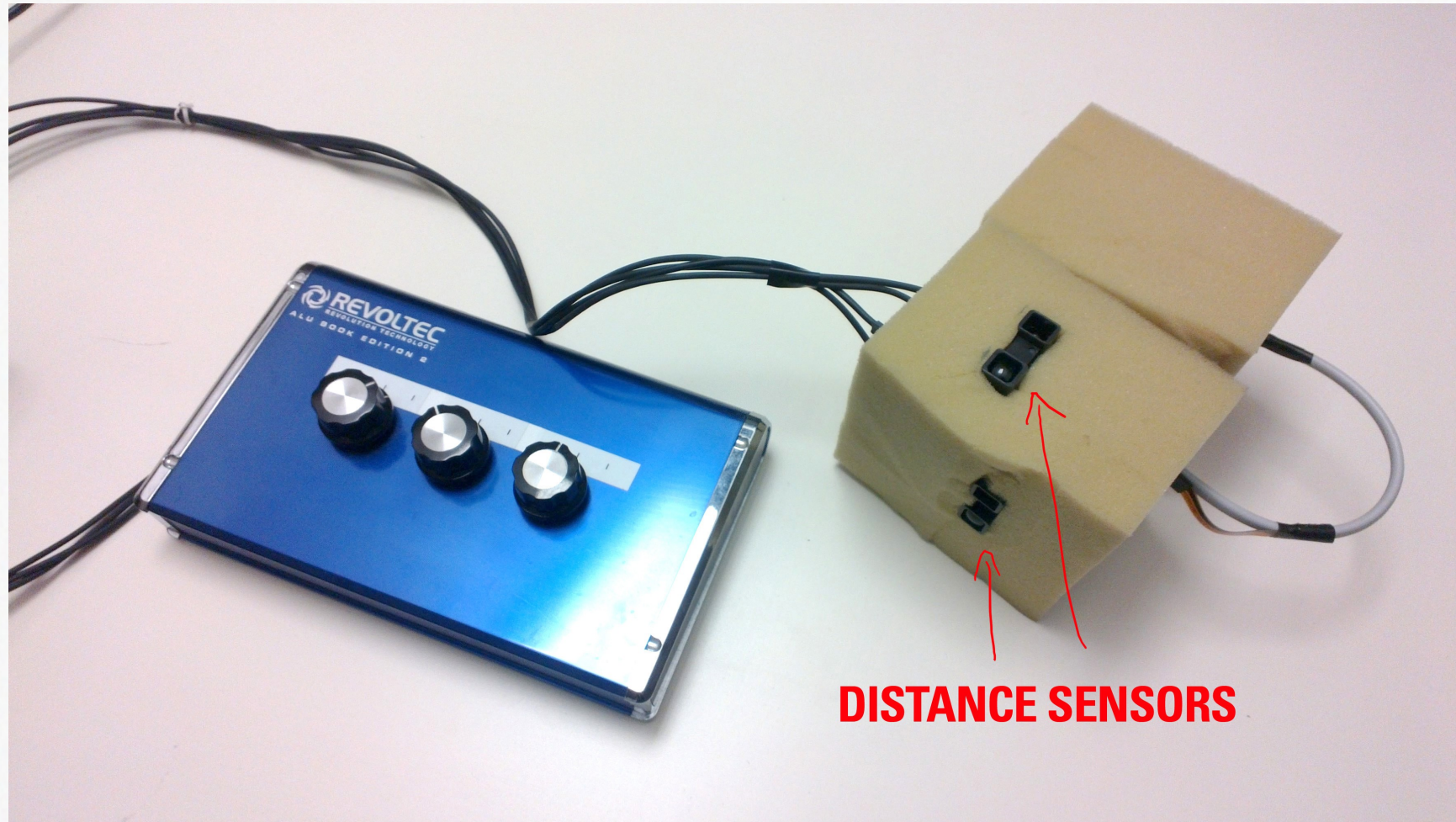


BEND SENSOR →

2D ROTATION SENSOR →



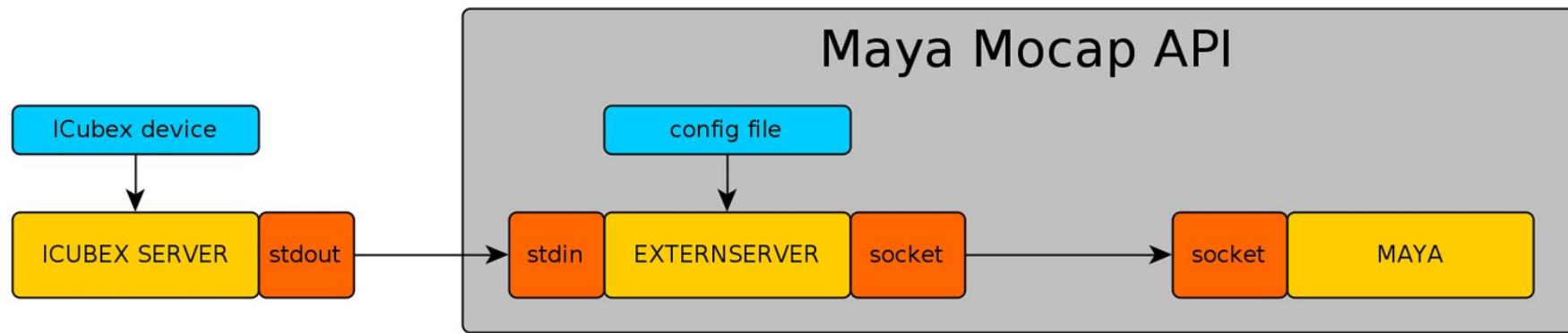
Prototype #1.1



DISTANCE SENSORS



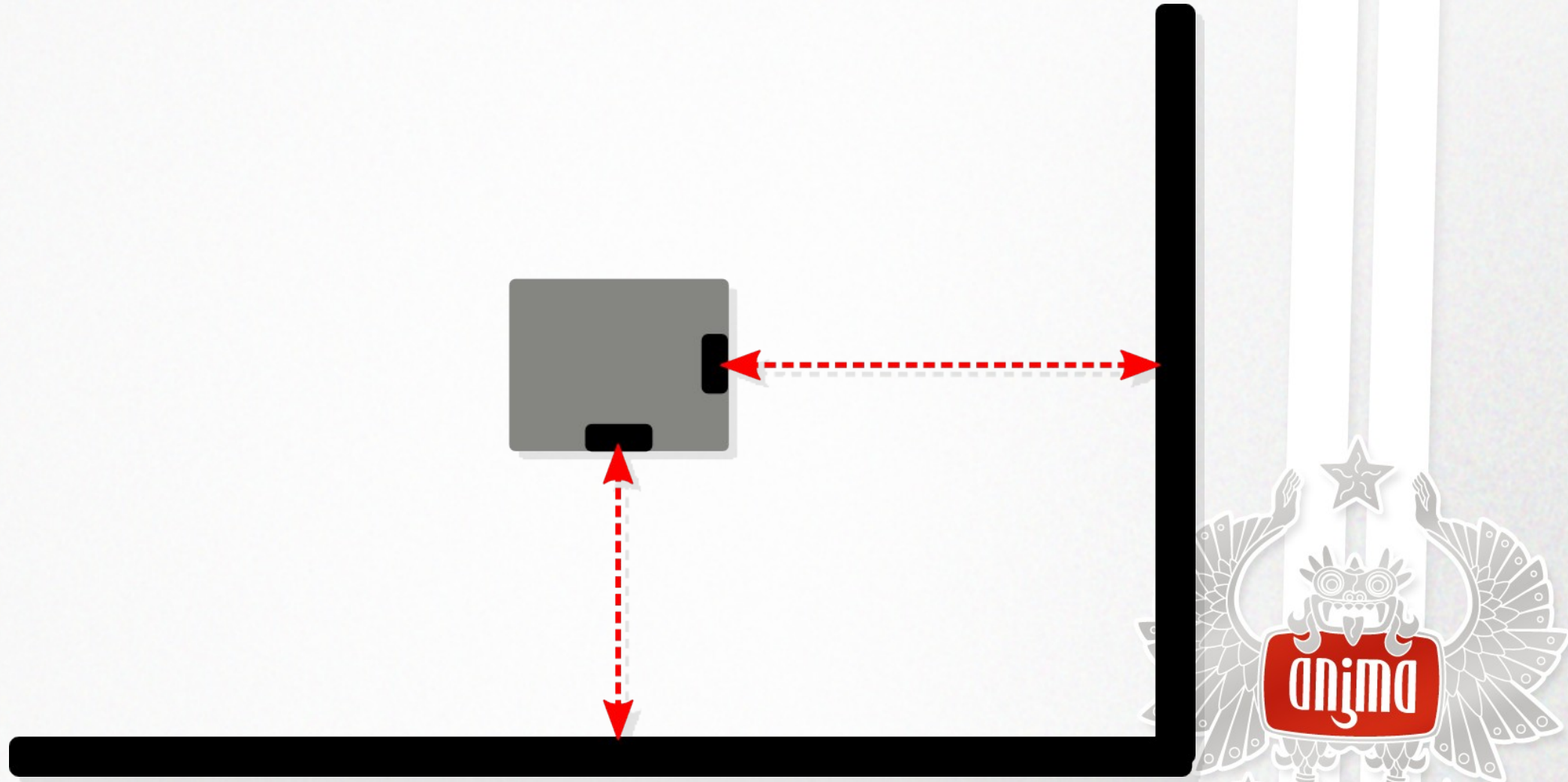
Connecting with Maya



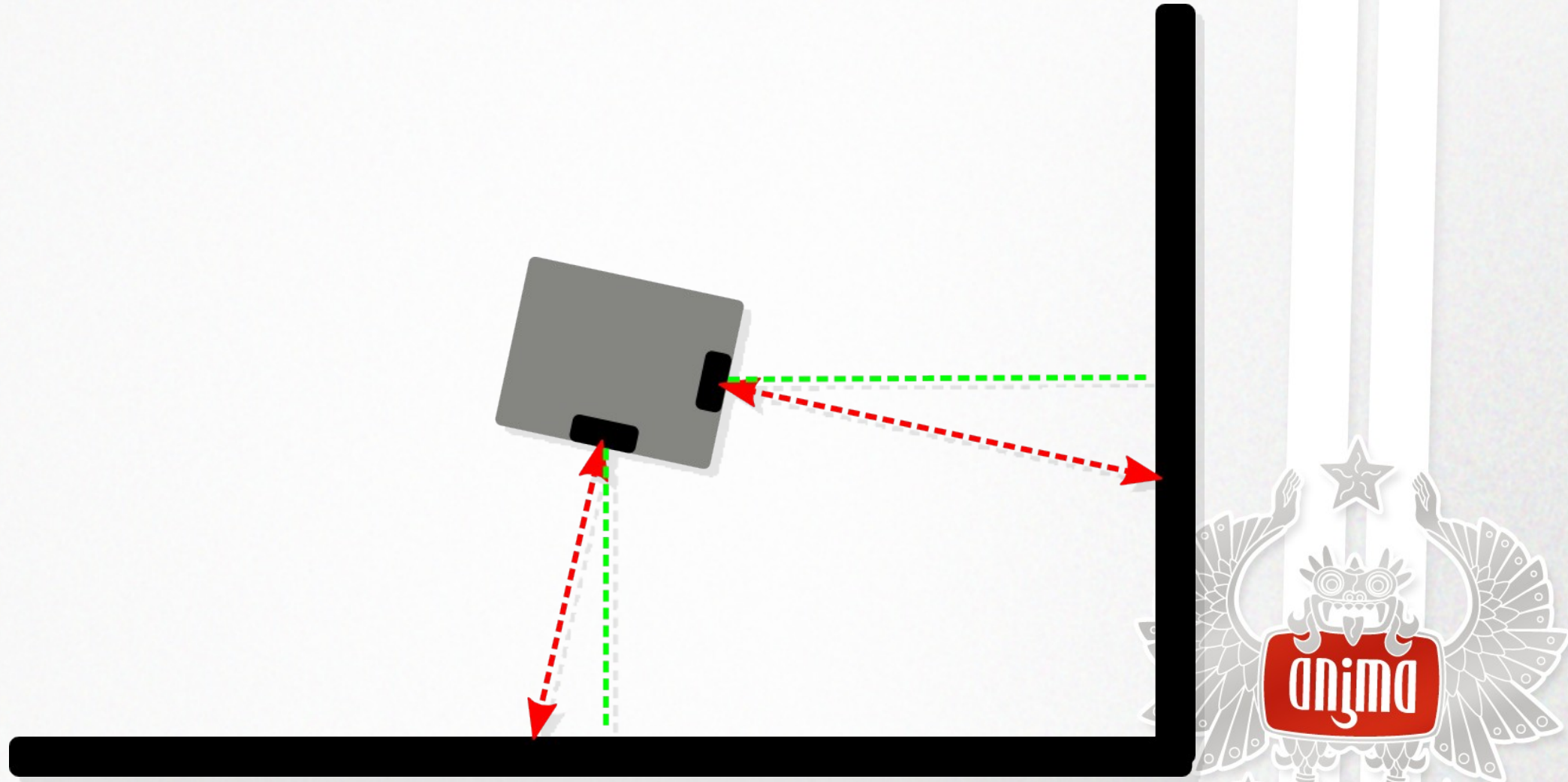
- > `./icubex | externserver -c hanska.cfg`
- Space/tab separated values
- Maya mocap api
- Minimal recording capabilities



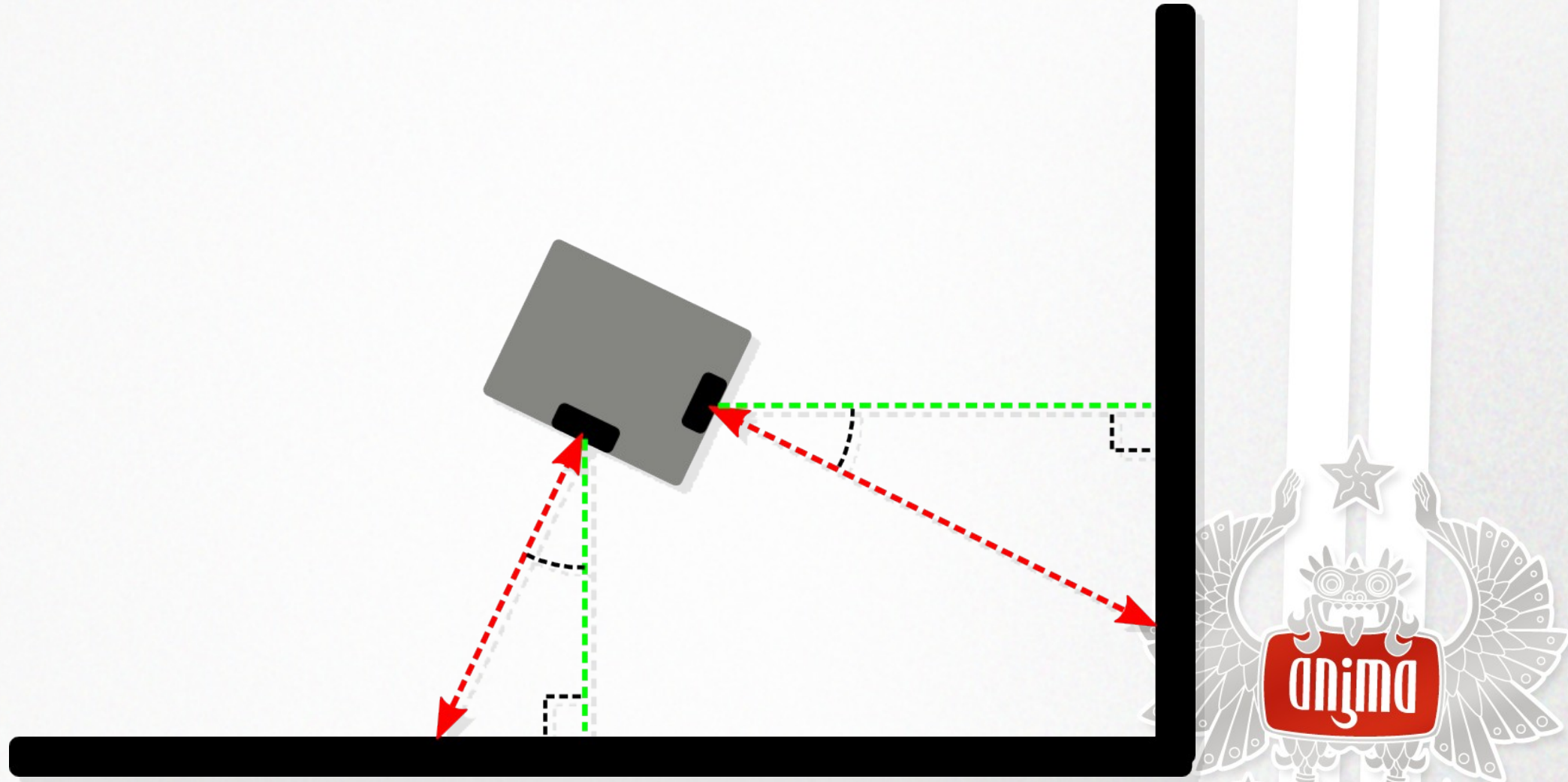
Issue #1 - "Rotated distance"



Issue #1 - "Rotated distance"



Issue #1 - "Rotated distance"



Issue #2 – Noisy Data

- Rotation sensor terribly noisy
- Need good realtime filtering
 - Post filtering not enough
 - Noisy feedback is bad when recording
- Implement **Kalman** filter
 - Works great realtime
 - Simple Kalman – simplified 1D version



Kalman Example



Human Testing

- Test on animators
 - Rhythmic test (drum beat)
 - Lipsync test (vo dialog)
 - Acting test (movie dialog)
- 15-30mins / person
- Feedback positive!
- **Not just for lipsync!**



”Tumppumies”

Control knobs:

- Eye target
- Mood



Human Testing – Medley Video



Human Testing – Acting Video

INTERNAL TEST ANIMATION MATERIAL

Contains dialog from Monty Python's Life of Brian.

Not cleared – so MUTE or EDIT OUT IF NOT OK!



Human Testing – Acting Video



Goal #2 – Puppeteering System

- **Aim higher!**
- Complete digital puppeteering solution
- 6 degrees of freedom
- Low latency
- Minimal noise



Hey! Didn't Jim Henson do all this already in the 80's or something?



The Jim Henson Hour "Waldo"



<http://www.youtube.com/watch?v=dP6TUB7KQc4>



PROTOTYPE #2

(aka "Production Hanska")



Search For the Right Tech

New goals geared us away from sensors and clumsy hardware (remember that jim henson stuff?)

- **Magnetic mocap?**
 - Sceptical about noise and distortions
- **Optical mocap?**
 - Expensive, clumsy setup and realtime not obvious



Polhemus Patriot

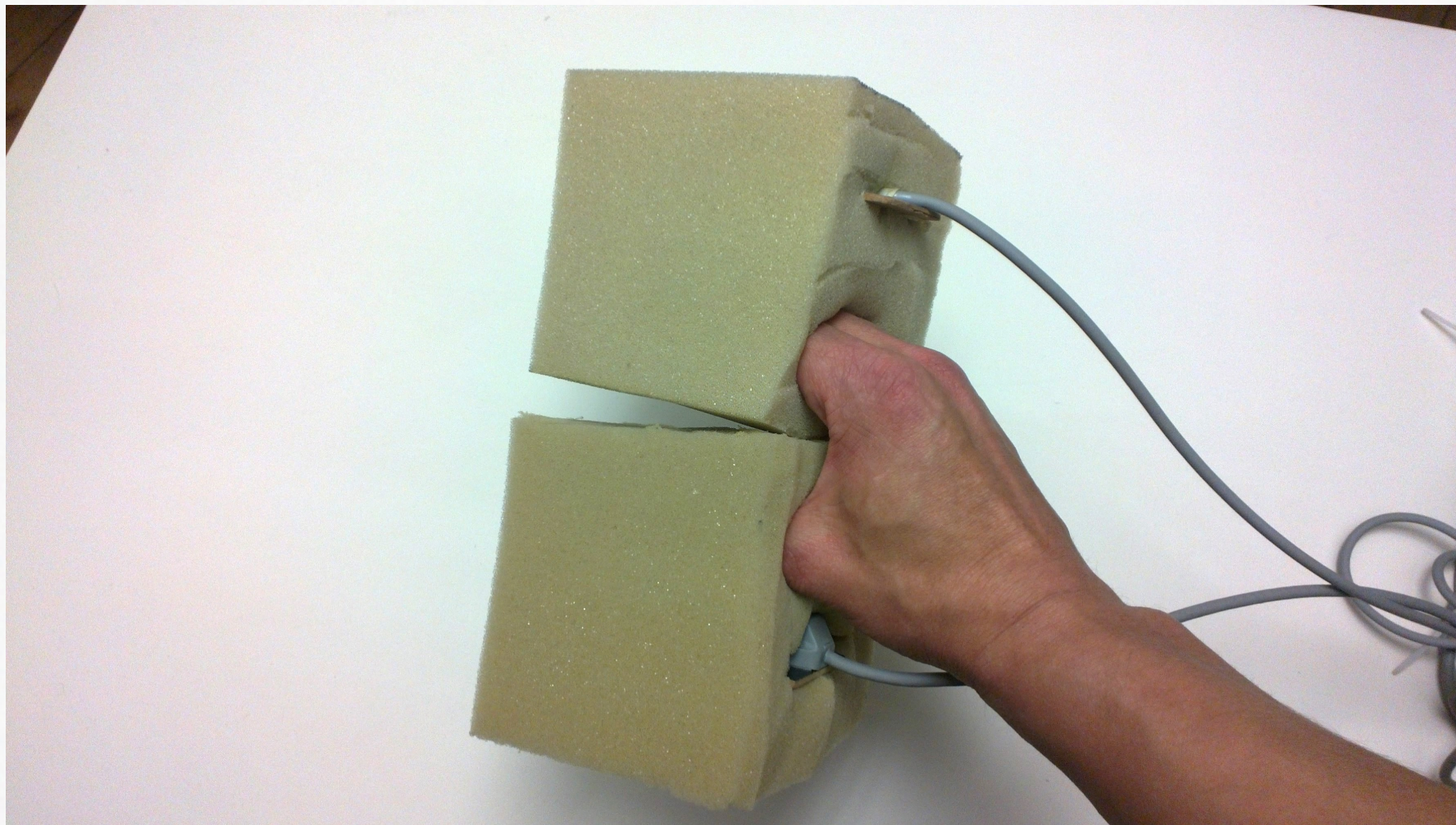


Polhemus Patriot

- Update Rate: **60 Hz.** per sensor, simultaneous samples
- Latency: Less than 18.5 milliseconds
- Static Accuracy: 0.1 in. RMS for X, Y or Z position; 0.75° RMS for sensor orientation
- Resolution: **0.0015 in. (0.0038 mm)** at 12 in. (30 cm) range; **0.1° orientation**
- Range: 36 in. (90 cm) at above specifications; useful operation up to 60 in. (152 cm)
- Not too expensive **~2500e** with 2 sensors



Polhemus Patriot



Video: Patriot Data Quality



DAILY APES GO SHANGHAI

ANIMA VITAE LTD - WWW.ANIMA.FI - WWW.FB.COM/ANIMAVITAE



Daily Apes Concept



World Expo in Shanghai

- **May-Oct 2010**
- Anima involved in pavillion project
 - Large scale projections in pavillion
- Producers managed to **sell DA concept to gov**
 - Apes are great for promoting Finland??
 - Ideal test project
 - Combine the tech and DA concept
 - **8x2min** webisodes
 - **www.dailyape.com**



Daily Apes Go Shanghai

GO FOR IT!

- Confident enough to try production with the prototype system
- Schedule allowed to fall back on traditional animation if all failed
- **Simplify character design to suite style**



Daily Ape - Episode



DA Shanghai Production Notes

- Most of the hands and faces were still hand animated
- Lipsync combination of puppeteering, automation and fixing by hand
- Used different kinds of Maya dynamics for secondaries (hair, particles, etc.)
- Nevertheless the puppeteered head/body **provided huge time savings**
 - Super fast to lay down basic timing and action of a scene



Lessons Learned - Feedback

- **WORKING THIS WAY IS REALLY FUN!!!**
 - Immediate feedback, WYSIWYG
 - Redoing stuff feels almost effortless
- AkiM: "It's like... **playing with a toy** vs. working with (finnish) patient record system"
- Jere: "**took one week to get into**"
- **Natural arcs** and **idling** come for free
- You can do **real production** with it!



Lessons Learned - Improvements

- Get rid of Maya mocap API
 - Good days / laggy days
 - Spent a lot of time trying to get to the root of the problem
- Minimize need to “take the glove off”
 - Interrupts the flow if need to access mouse or keyboard
- Easier / simpler / more stable dynamics
- Blend takes
- Facial animation?



APINATASAVALTA "Ape Republic"

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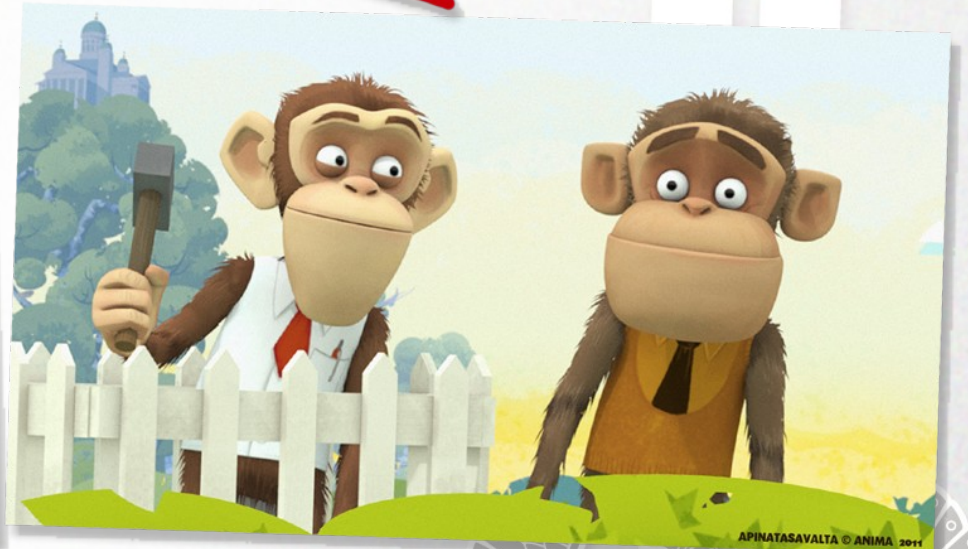


Evolve DA → AT

- **Apinatasavalta** - "Ape Republic"
- Adapted DA to fit YLE's "**political satire**" slot
 - **17x15min** series
- **Simplify characters even more**
 - Better suite the "hanska motion look"
 - More suitable for stylized movement
 - More efficient!



Character Evolution



APINATASAVALTA FINALISING TOOLKIT



Final Tools Example



Jog Wheel

- ShuttlePROv2 - a cheap generic USB edit jog wheel
- Control playback, record, time
- Minimize the need to “take the glove off”



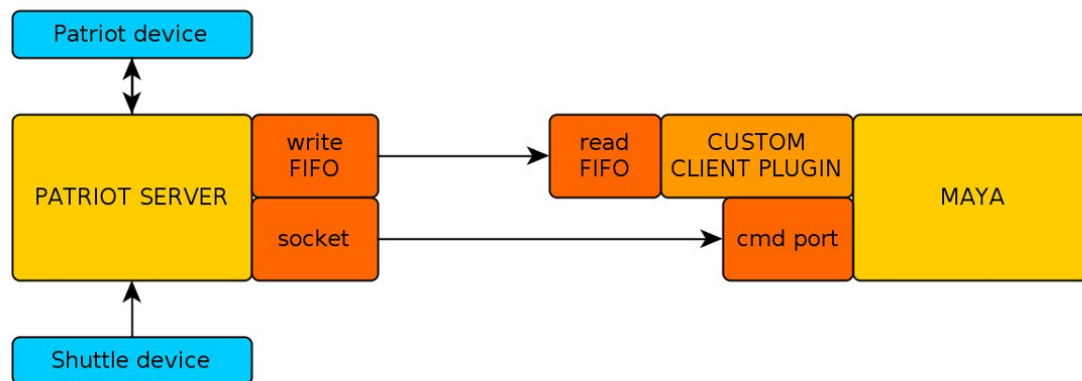
Jog Wheel



Jog Wheel



New Maya Connection



- Get rid of mocap API
- Custom DG-node plugin - animaHanskaClient
 - Patriot comm over unix named pipe
 - Shuttle comm over Maya command port



AnimaHanskaClient - Plugin

- DG-node (but not a typical one)
 - Support multiple in scene
 - Multiple can be active simultaneously
 - Scale and Offsets for sensor data



AnimaHanskaClient - Plugin

- Maya DG-nodes should be **black box**
 - Communicate only through inputs/outputs
 - First version implemented this way
 - Output attributes -> transform node
 - **What about recording and animCurves??**



AnimaHanskaClient - Plugin

- Don't want to disconnect/reconnect attributes
 - Must break the black box rule!
 - **Message connections** to xform nodes
 - Find destination attributes through API
 - **Override values at destination**



AnimaHanskaClient - Plugin

- Empty Compute()
 - Nothing to do here
- All functionality in Callbacks
 - **playingBackCB** (called when play state changes)
 - **timeChangedCB** (called when time changes :)



AnimaHanskaClient - Callbacks

playingBackCB():

for each ahcNode:

if **playStart** & **ahcNode.recordOn**:

clearCaches()

if **playStop** & **ahcNode.recordOn**:

createKeyFramesFromCache()



AnimaHanskaClient - Callbacks

timeChangedCB():

values = readValuesFromServer()

for each ahcNode:

if **ahcNode.active**:

ahcNode.getXFormNode().set(**values**)

if **ahcNode.recordOn**:

storeToCache(**values**)



”Hanska Rig”

- Layer between Hanska and character rig
- Easy to connect to many things
- Ribbon based “articulation”
- Add on top of regular animation rig
 - Does not prevent animating by hand



"Hanska Rig" - Ribbon



"Hanska Rig" - Head/Chest



"Hanska Rig" - Different Characters



Animation Layers

- Take blending
- Editing with Jog Wheel
- Basic layers
 - Eyes
 - Jaw
 - Ribbon (body)

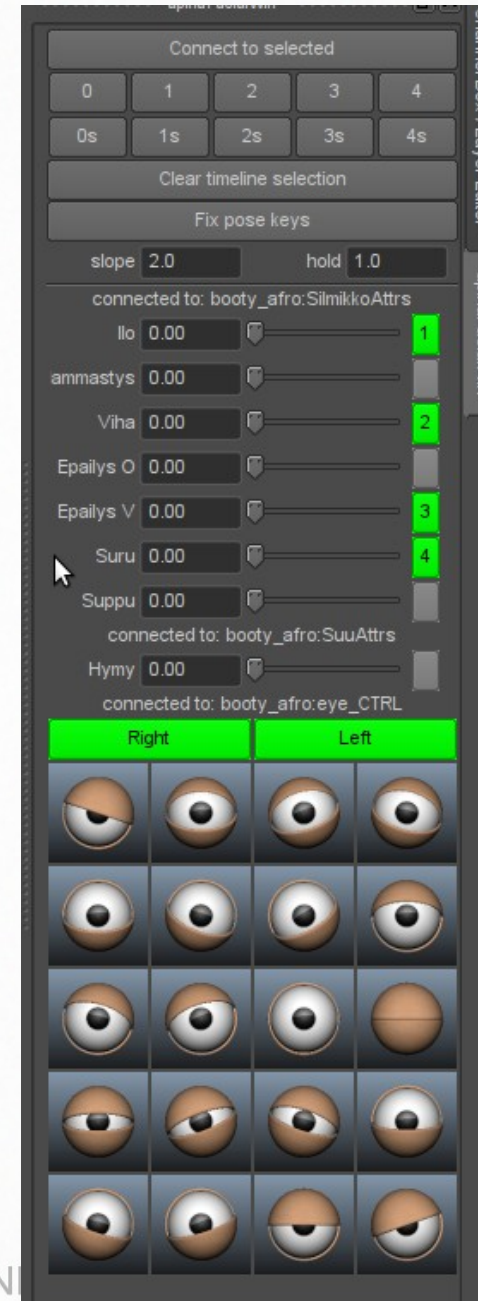


Animation Layers – Basic Layers



Facial Animation

- "Face machine" GUI
- Tailor made to fit AT
- Expressions go through eye blink
- Pose-to-pose
- Editing without "drifting values"
- First brows, then lids



Facial Animation - Demo



Jiggles and Other Dynamics

- Fast custom "mass spring" / "pendulum" dynamics
- Easy to add to many things
- Important for secondary movement
- Custom Maya node
- Simple unified baking
 - Bakes to keyframes
 - First bakes outputs
 - Then moves animCurve-connections to "bake inputs"



Dynamics – Basics



Dynamics – Hierarchy



Dynamics – Character Hands



Dynamics – Hangin'



APINATASAVALTA HOW DOES IT LOOK LIKE THEN?



AT – Random Clips



APINATASAVALTA CG PRODUCTION

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AT - CG-Production

- ~10wk?? pre-production time (small team)
- ~22wk production time (**Nov 2011 -> Apr 2012**)
- **17x15mins**
- first lower pace, quite soon 1wk/episode
 - Interleaved 2 week production cycle
 - 1wk animation, 1wk new chars/render/post/edit/sound



AT - CG Team

- Director/Editor
 - animatic
- Production Designer / AD
- 4 ape-a-nators
 - One puppeteer – never done animation before
- 1 production TD
 - props modelling, render, some comp
- 2 production artists
 - character textures / BG art



AT – Animating Speed Comparison

- Highend (i.e. Pixar) quality **~2-3 sec/wk**
- Euro-anim (i.e. Niko) quality **~10-12 sec/wk**
- Apinatasavalta **~60 sec/day!**
- Lead “ape-a-nator”: **“1,5-2 mins/day at best!!!”**



AT - Ape-a-nating a typical scene

- Lipsync (~30mins/scene)
- Setup cameras / cuts (based on the animatic)
- First pass (1 pass/char) to block out timing
- Iterate on all chars – reach target quality
- Faces
- Eyes



AT – Visual Storytelling

- **Limited camera angles**
 - Flat world - 2D backgrounds
 - No dynamic dollies / cranes
- **Use medium shots and close-up shots**
 - We don't want to show feet
 - Entering / exiting frame
- **Wide shots only if characters stay put**
 - (with a few exceptions ofcourse)



AT – Walks / Framing Video



AT – Character Variations

- Many **new characters** per episode
- Building blocks:
 - 5 x body types (ape, gorilla, chimp, child, baby)
 - 5 x upper face piece
 - 5 x mouth piece
 - few hair styles
- Costume **variations with texturing**
 - Simple "sleeveless shirt" geo
- All pieces **share same UV-layout**



APINATASAVALTA WRAP UP



AT – Lessons Learned

- **IT STILL IS REALLY FUN!!!**
- Works in a bigger fast paced production
- We can take in non-CG people
- Up to speed in a couple of weeks



Ideas for Further Development

- Control the "hanska rig mode"
 - i.e. go from a "walk mode" to "normal"
- Try other controllers
- "Sensor attached to stick"
 - For hands? Props?
- State Machine, Blend Trees
 - Facial animation, body actions, gestures
- "Face crunch"



Ideas for Further Development

- **Voice acting** puppeteer (like in Muppets)
 - Immediate expressive connection
 - Real dialog between 2 characters? Improv?
- Experiment with character designs
- Experiment with concepts
 - ...which suite the technique even better
 - i.e. "Dirty Socks"!

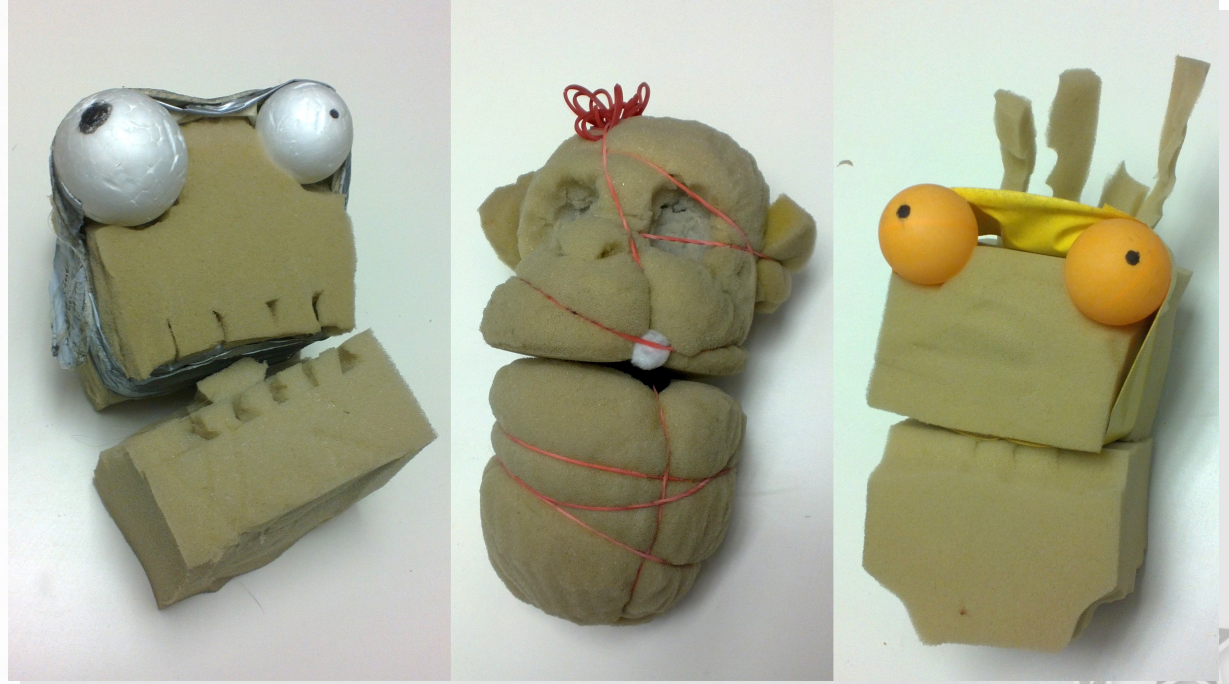


THANKS!

Lasse Lunden
Aki Martikainen
Mikko Pitkänen

Entire AT-team!
And all test subjects!





Thanks For Listening!

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