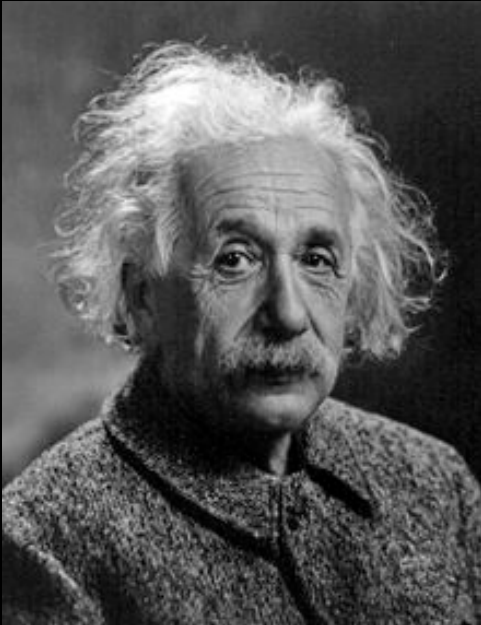


# The Software Industry Needs More Dyslexics



Dyslexia:

a **TALENT** for *non-linear* thinking, 3D processing, creativity, and intuition.

# Virtual Pets and Avatars

Simulation, Interaction,  
and Emergent Ecosystems

# Definitions

Virtual Pet:

an artificial companion kept for...  
enjoyment, and...

# Definitions

Avatar:

a representation of a user  
or a user's ego,  
or a user's alter-ego,  
or a user's character

The avatar is...

YOU

...

(simulated)

# But “You”

...are not a clearly-defined entity.

## So your simulation can come in many forms

### Text-based virtual world agent

You are crawling over cobbles in a low passage. There is a dim light at the east end of the passage.

? east

You are in a small chamber beneath a 3x3 steel grate to the surface. A low crawl over cobbles leads inward to the west.

The grate is open.

? west

You are crawling over cobbles in a low passage. There is a dim light at the east end of the passage.

? west

You are in a debris room filled with stones. A low wide passage with cobbles becomes a canyon here, but an awkward canyon leads upward. A black rod with a rusty stave says

"Magic word XYZZY".

A three foot black rod with a rusty stave says  
?



3D humanoid



cartoon

Non-human



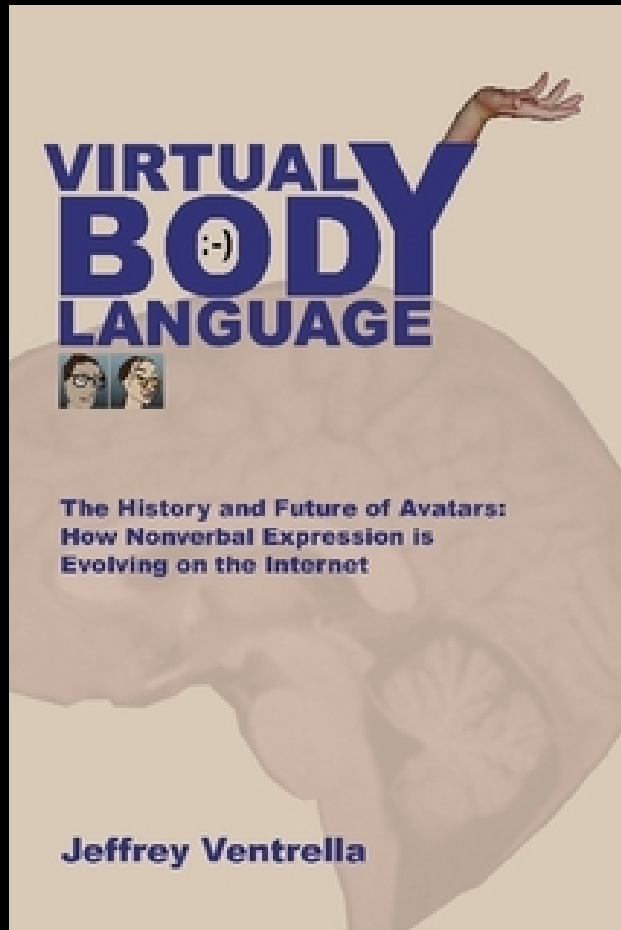
# More to the point:

“You” are not merely a physical object to be rendered using computer graphics.

You are a social agent. You are human being, defined by language, memory, and cultural history.



# Virtual Body Language



Starts with a nuts-and bolts account of avatar design...

Explores how nonverbal expression is evolving (or...NOT evolving) on the internet

[virtualbodylanguage.com](http://virtualbodylanguage.com)

# The Tail Wagging the Brain



How the plastic brain adapts to body language, including across species

# Computer Graphics

A major historical trend has  
been an increase in  
***VISUAL REALISM***

This implies...

***SIMULATION*** of light, and how it interacts  
with materials.

*A World of Objects*

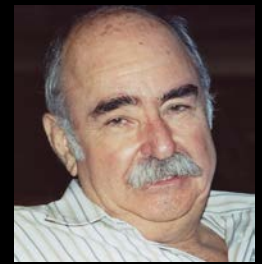


# Computer Graphics

also includes...

***SIMULATION*** of human visual perception  
and ***REPRESENTATION*** of knowledge.

*A world of ideas and tools*

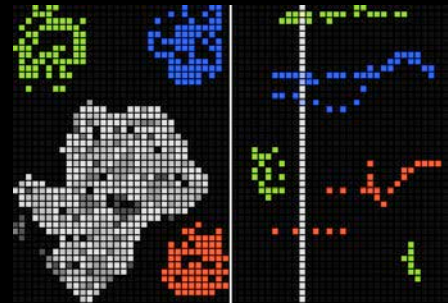


# Behavioral Realism

...achieved via simulation of:

Physics,  
Genetics,

And Intelligence (animal behavior)



And sometimes, as a by-product:

visual realism.

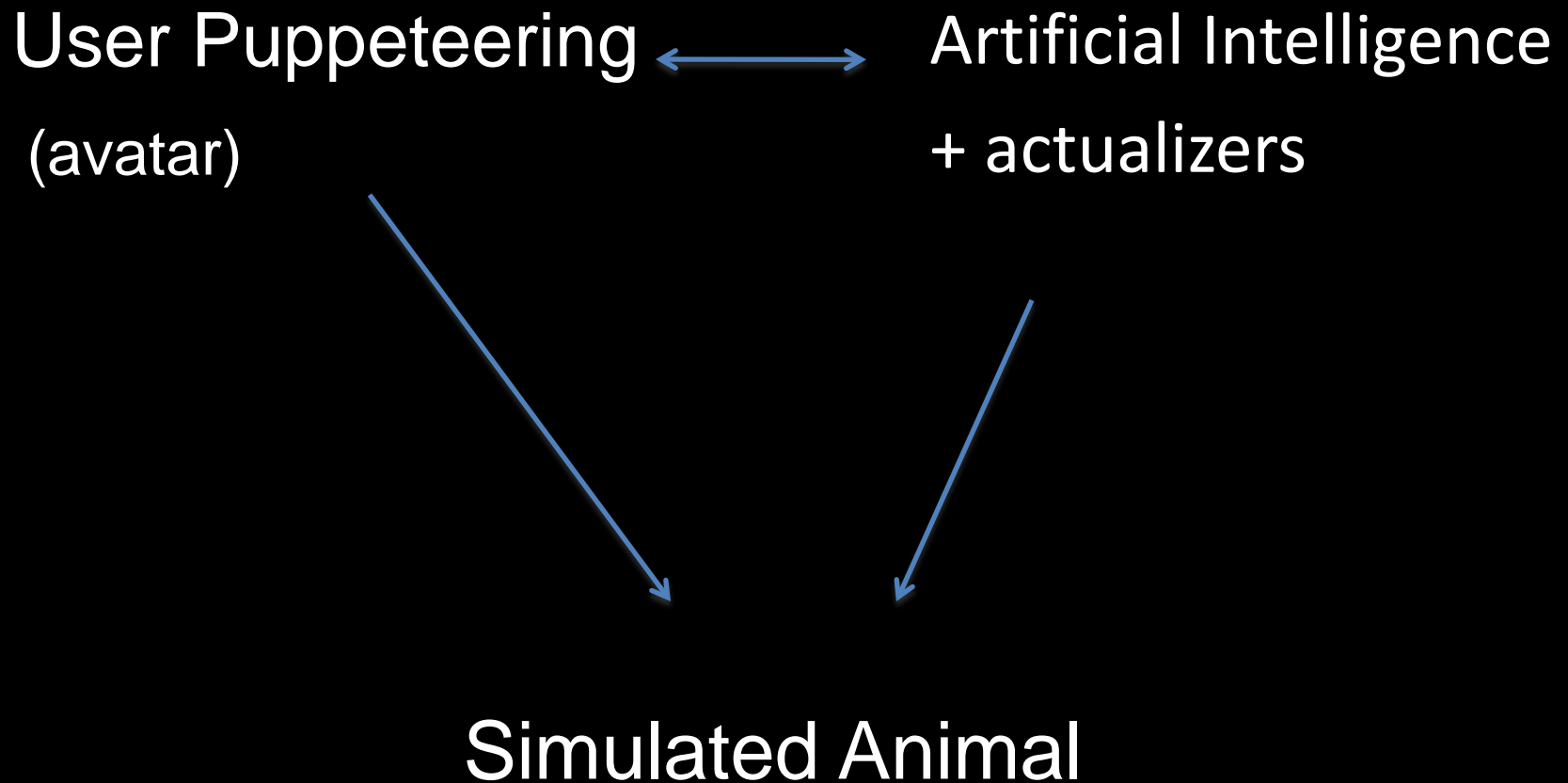


# Simulating Animals

- Avatars (controlled by YOU)
- Non-player game characters (AI)
- Virtual Pets

Mutual interactions create emergent behavior

# Control of Simulated Animal





# The Perceptive Puppet

Seamless Embodiment Exchange  
Between Real and Virtual Humans in  
Virtual Environments  
for Training

Andres Saros Luna, Valerie Gouranton, Thomas Lopez, Bruno Arnaldi

# Simulating Human Movement

# Human Motion

Explorations in  
the Uncanny Valley



## A Spoof on Second Life Avatars



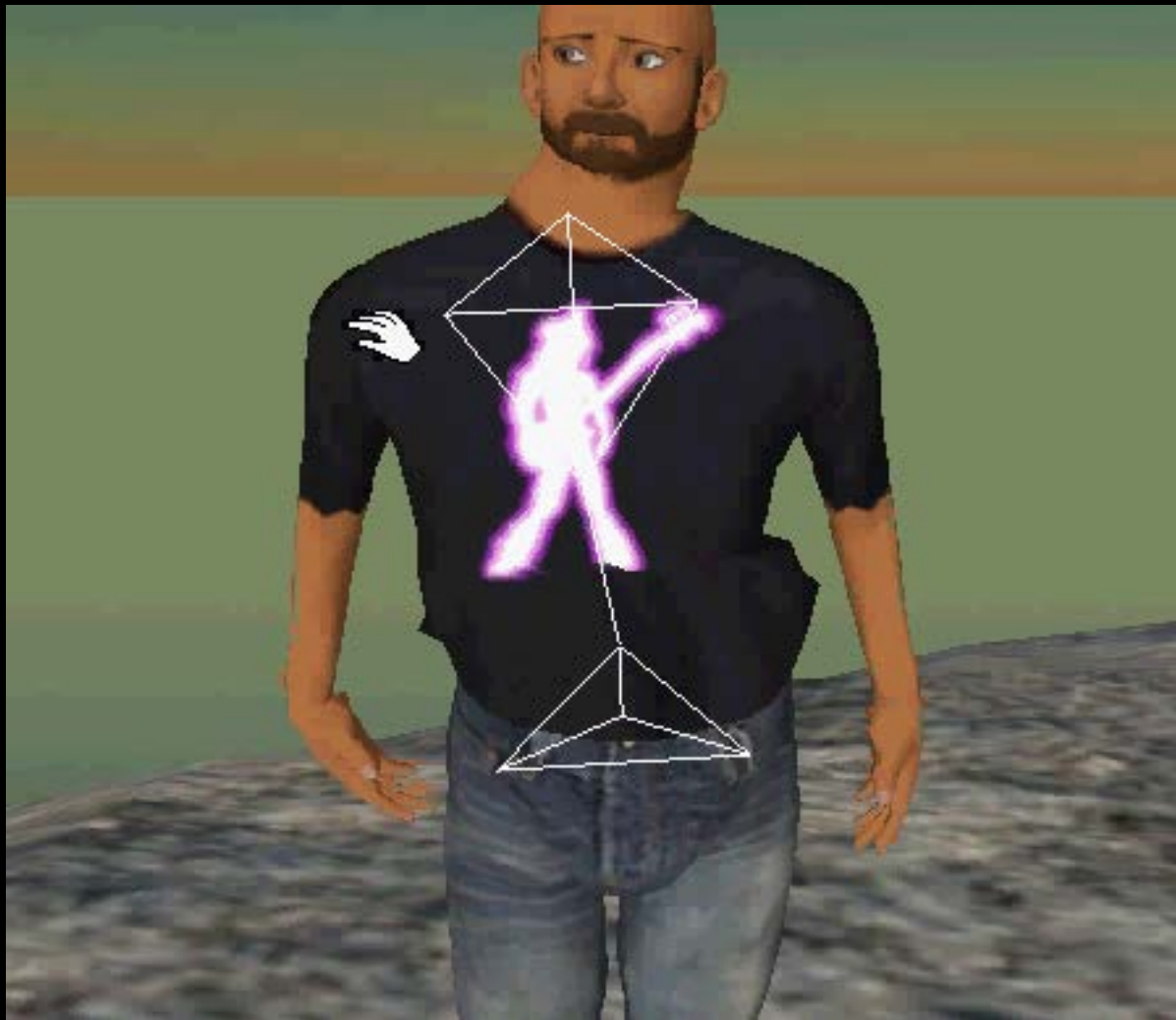
# Avatar Puppeteering













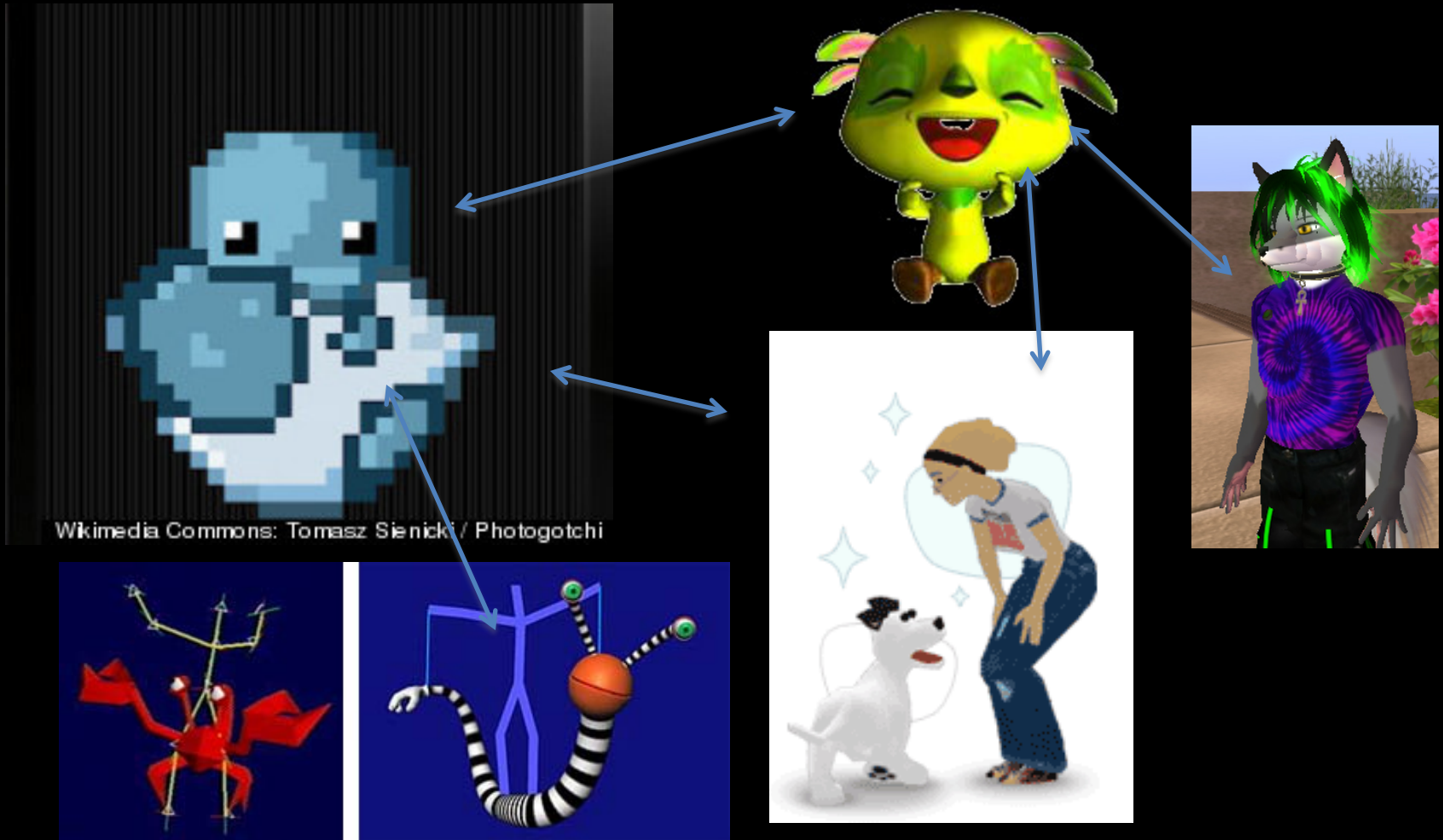




# Puppeteering non-human forms

# Emergent Virtual Ecosystems

A virtual world with autonomous and human-puppeteered characters can be seen as an emergent ecosystem of interacting agents



How do you design a virtual world to generate and sustain this much complexity?

It is not designed.

It emerges.

And it cannot be created by a corporation.

# Virtual Pets



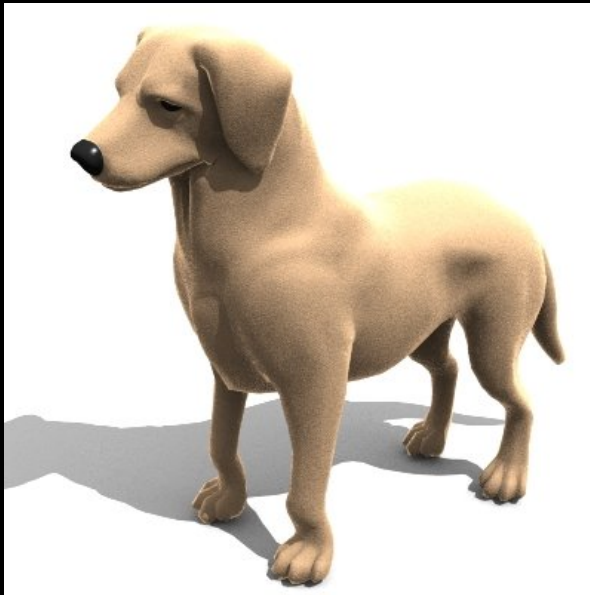


# Virtual Companions: should they be...

Realistic?

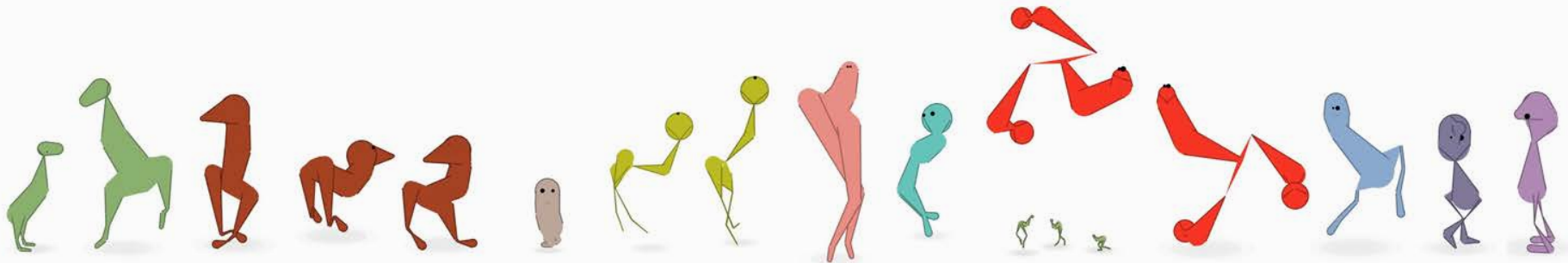
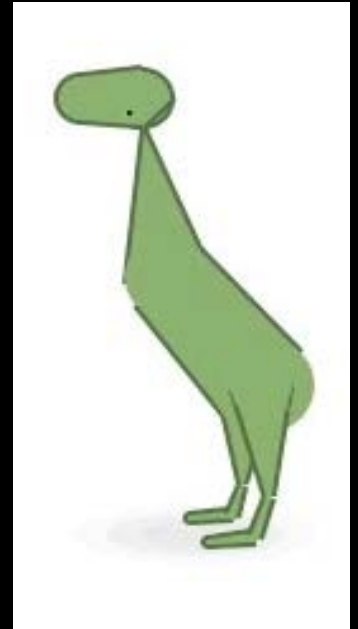
or

Imaginal?



My answer:

Wiglets



# Method

## Physics

- \* spring and balls networks
- \* ensemble of low-level motor controls (forces on the balls)

## Animation:

- \* Inverse-kinematics for walking (only when on ground)
- \* eyes blinking


## Genetics:

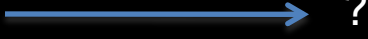

- \* parameters for variation in morphology and motion
- \* normalizing these parameters and calling them “genes”
- \* mating via crossover with mutation

## Intelligence

- \* a “brain” that (holds several persistent states)
- \* sensors array used as inputs to brain
- \* “desired output” (directives to actualizers)
- \* state machine for transitioning between states

# Kinds of Intelligence (Gardner)

- Interpersonal
  - Bodily-Kinesthetic
  - Spatial
- 
- A large right-facing curly bracket groups the three items in the list above. A blue arrow points from the center of the bracket to the text 'Virtual Pet AI'.
- Virtual Pet AI

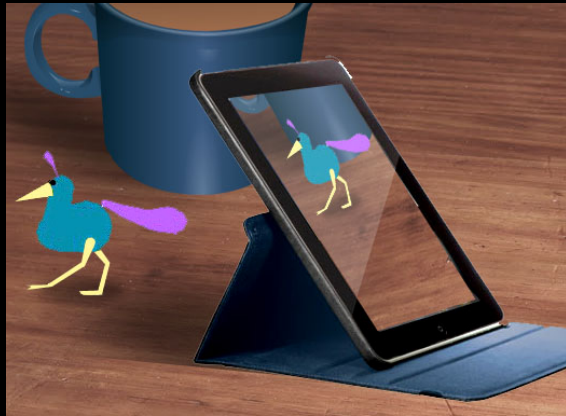
- Logical Mathematical
- Musical
- Linguistic 
- Intrapersonal
- Naturalistic 
- Existential



*These puppets have NO puppeteers*

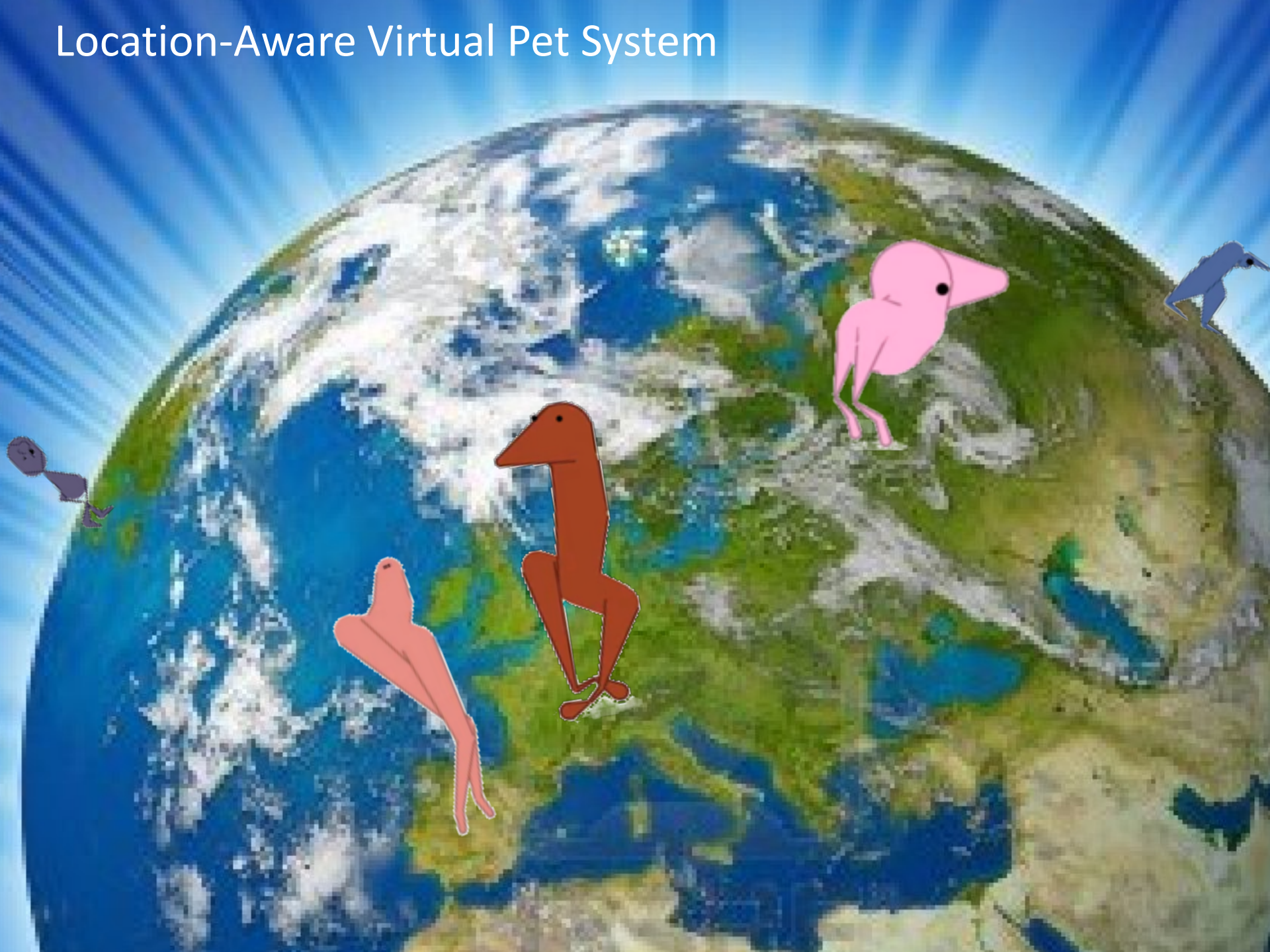


# Virtual Pets + Augmented Reality.





# Location-Aware Virtual Pet System





# Gracias!

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