Overview

- Overview
- Movement Paradigms
- System Architecture
- Presentation and Networking
- Media Project Authoring
- Proof-of-Concept

Expanded Virtual Puppeteering

Bernard Lupiac / Luiz Velho
VISGRAF Lab - IMPA

Video
Movement Paradigms

- Animations
- Inverse Kinematics
- Physics-Based Simulation

Animations

- Animation Clips (pre-recorded)
- Blend Trees (transitions)
- Interactive Control (selection)

Inverse Kinematics

- Articulated Structures (human skeleton)
- Control of End Effectors (hands, feet)

Physically Based Simulation

- Interaction with Environment (collision detection)
- Forces and Torques (gravity, etc..)
Architecture

- Gesture Recognizer
- Movement Modes
- Presentation and Network

Gesture Recognizer

Mode Selection

- Input: Leap Motion
- Detection: SVM (ML Library)

Movement Modes

- Head
- Hands and Arms
- Jump
- Locomotion

Head

Simple Inverse Kinematics

- Palm of Hand Direction
**Hands and Arms**

Complex Inverse Kinematics

- Hand Position and Rotation
- Head follows Hands

**Jump**

Simple Animation

- Cycles btw Animations (blend tree)
  - Idle Standing
  - Jump / Fall : Hands Up Velocity
  - Idle Ground
  - Get Up : Palm Facing Upwards

**Locomotion**

Complex Animation

- Walking and Running
- Control Widget

**Locomotion - Control**

Joystick Paradigm

- Reference Sphere: Dead Spot
- Hand Position Vector: Velocity / Direction
- Locomotion Animation: Speed
Presentation & Network

Synchronization of Objects: Holojam SDK

- Class Structure

- Performers
  - Play Interaction
  - Audience

Performers

- Leap Motion
  - Attached to User's Forehead

- Feedback
  - Hands
  - Mode
  - Etc..

HUD

- Screen Feedback (Heads-Up Display)
Play Interaction

- Director
  - Live Cinema
- Other Characters
  - Avatars
- VR Mode

Audience

- Theatre Screen
- Virtual Reality
- Augmented Reality

Media Project Authoring

- Gesture Sets
- Puppets

Gesture Sets

- Built-In Gesture Recognizer
  - Default: 10 Gestures
- Changing / Adding Gestures
  - Training / Compiling
- Robustness and Reliability
  - Distinct Hand Poses
  - Redundancy (use two hands)
Puppets

- Humanoid (compatible rigged model)
  - Enforce T-Pose
  - Add Animator Component
  - Add Targets IK
  - Add Leap Control

- General (custom skeleton)
  - Adapt Everything!

Proof of Concept

- The Framework in Action
  - “O Boneco”

- Test and Refine Expressiveness
  - Short Piece

- Collaboration with Professional Puppeteers
  - Bando Criação Cegonha

O Boneco

- Creative Team
  - Screenplay and Direction: Vida de Oliveira
  - Puppeteering Animation: Miguel Araujo

- Agile Methodology
  - Iterative Workflow
  - Test / Improve

- Weekly Rehearsals
  - Feedback
  - Development

O Boneco

aparição final
Web Portal

Puppeteering

About
The objective of this project is to develop an application that lets puppeteers make performances with nothing but their hands. It aims to preserve the expressiveness and know-how of classic puppeteering, but at the same time, to look at it with a different perspective with the help of augmented reality.

- https://www.visgraf.impa.br/projects/puppet/

The Show

"See you soon!"

– o Boneco