



ISUP

instituto  
superior de  
engenharia do  
porto



Virtual Sign  
translator in  
Serious Games



# Virtual Sign



- Graphics, Interaction and Learning Technologies

# Main Goals

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## Human Computer Interaction

Implementation of a bidirectional translation system for **Portuguese Sign Language (LGP)**

- Focused primarily on educational and didactic aspects

# Sign Language

## Human Computer Interaction

Scope:

- configuration and movement of the hands;
- body position/inclination;
- facial expressions;

Detect all!

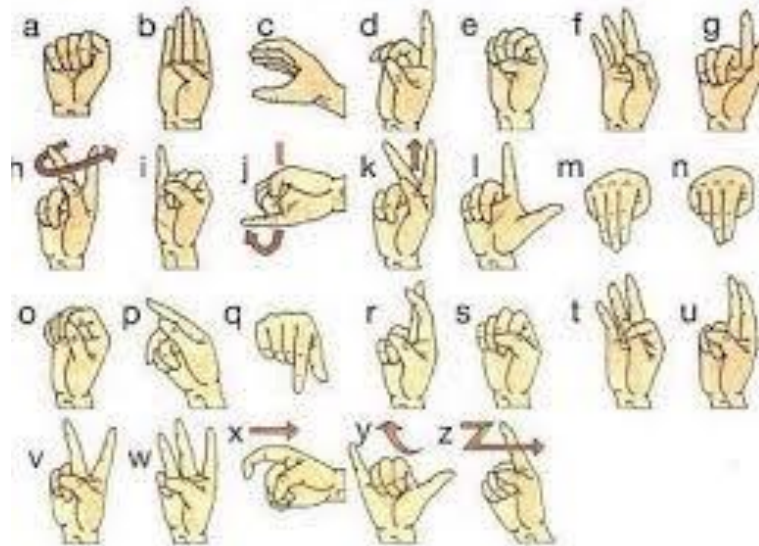
# Body Position



## Human Computer Interaction

# Configuration and Movement of the Hands

## Human Computer Interaction



# Facial Expression

## Human Computer Interaction





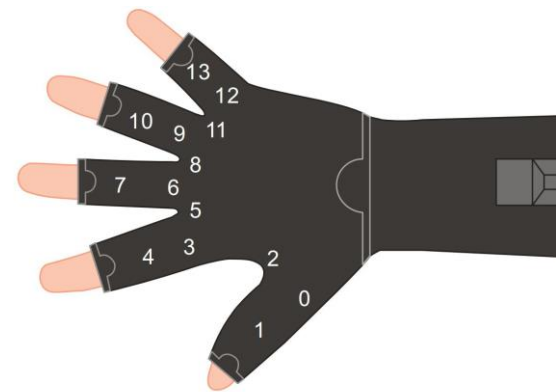
# System Components

## Human Computer Interaction

Depth Sensor (Kinect)



Data Gloves (5DT)



# Challenges

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## Human Computer Interaction

### **Words:**

- Sequential combination of movements and hands configurations;
- Significant variations in execution speed, hands and body position;
- Hard to understand where each word begins and ends;

# Divide and Conquer

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## Human Computer Interaction

There are 54 possible hands configurations (states); A word is defined by a transition from an initial to a final state; Each state transition has an associated movement;

# Divide and Conquer

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## Human Computer Interaction

Bom Dia!



# First Step

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## Human Computer Interaction

**Detect transitions** between hands configurations:

- Using data from the gloves to classify the configurations;

# Second Step

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## Human Computer Interaction

**Describe the movement** of the hands and arms:

- Using kinect to estimate the velocity, position and orientation;

# Third Step

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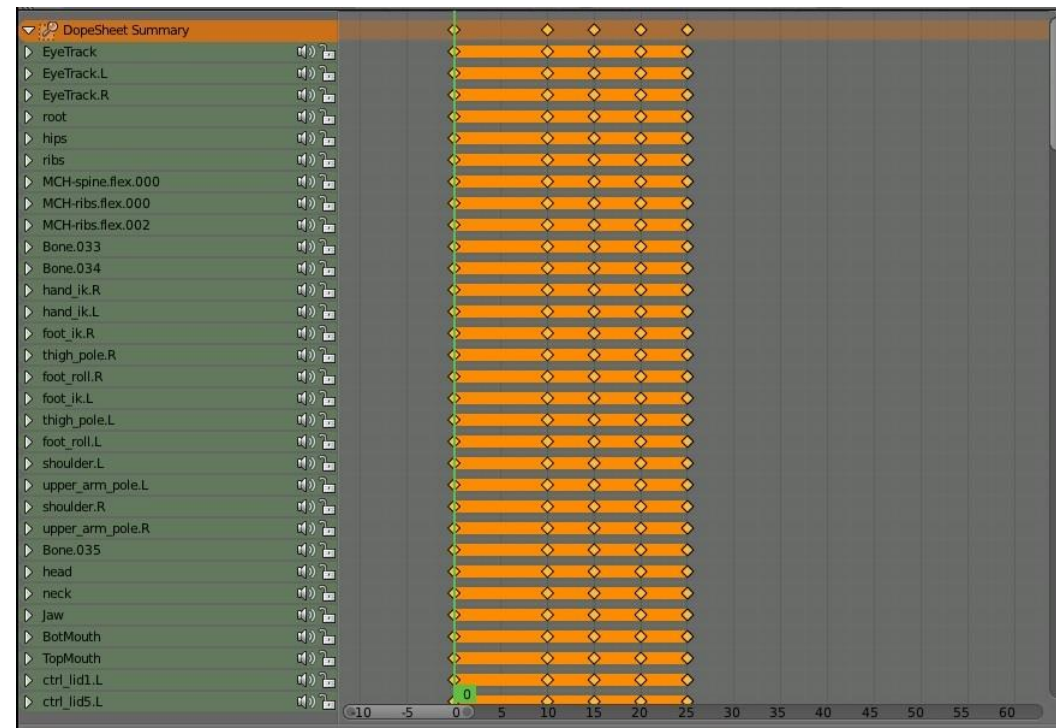
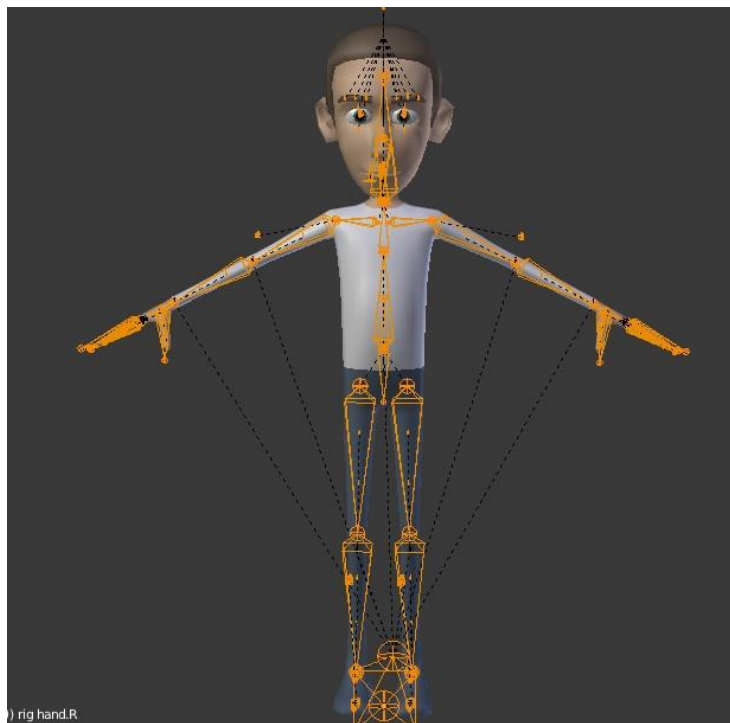
## Human Computer Interaction

### Words classification:

- Finite Automata
- Algorithms for Hierarchical Classification
- Sequence Alignment Algorithms

# Virtual Sign Application

## Translation Through an Avatar





# Virtual Sign Application

## Translation Through an Avatar



# Virtual Sign Application

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Translation Through  
an Avatar with Kinect



# Virtual Sign Application

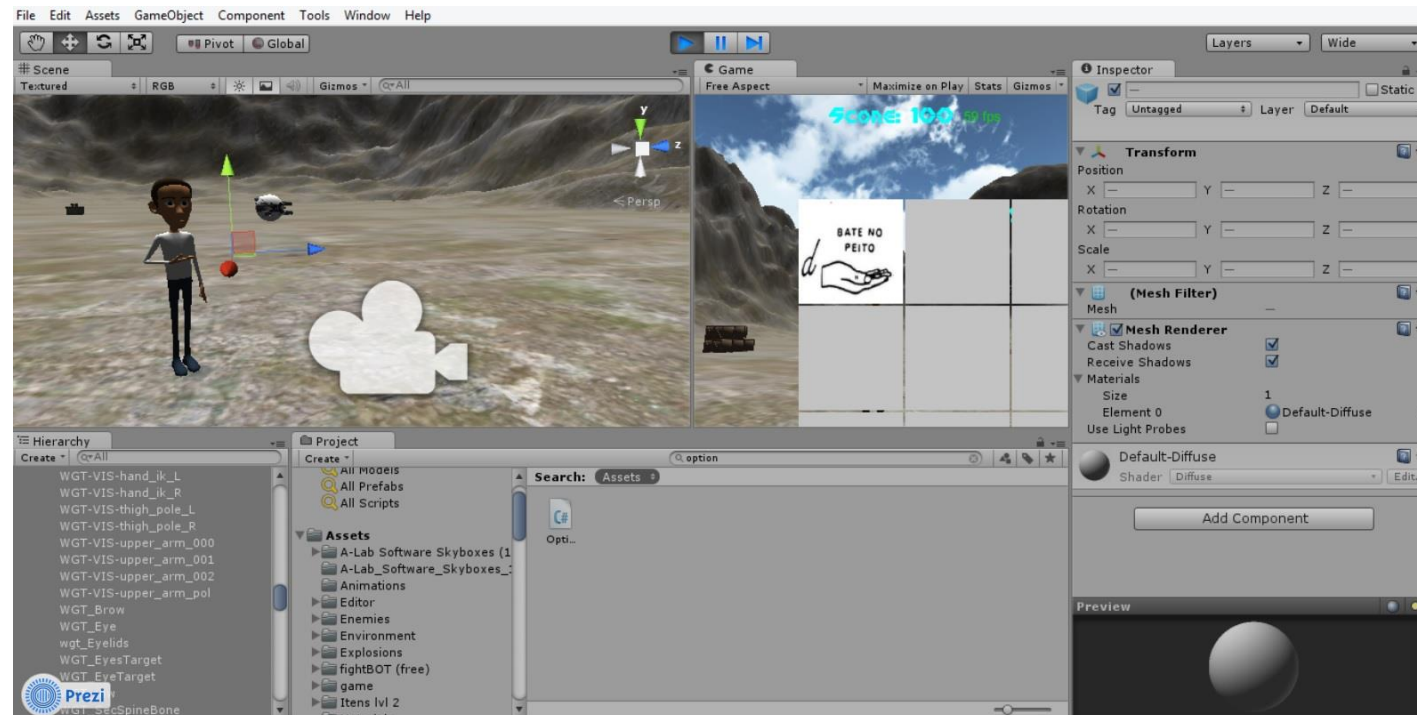
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Chat with Translation  
Through an Avatar



# Virtual Sign Application

## Sign Language Didactic Game



# Virtual Sign Application

## Sign Language Didactic Game



# Virtual Sign Application

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Human Computer  
Interaction

Thank you