

# Introducing VISTA-SL: A Multilingual e-Learning Platform for Deaf and Hearing Learners of Sign Languages

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## Background

- VISTA-SL (Visual Interactive System for Teaching and Assessment of Sign Languages) is an Erasmus+ initiative, which aims to create an integrated e-learning platform for four European sign languages: German Sign Language, Greek Sign Language, Irish Sign Language, and Dutch Sign Language.
- We aim to connect Europe's sign language communities and L1 and L2 learners by providing an interactive tool with supporting learning materials.
- Curriculum covers vocabulary, grammar and Deaf culture materials. Provides video material presented by deaf L1 signers, and gamification features to motivate learning, together with several assistive technologies.

## Objectives

- Creation of interactive learning curricula and educational games in four EU sign languages, designed for deaf and hearing users.
- Design of a modular, accessible web platform with privacy-preserving architecture.
- Development of real-time augmented reality (AR) feedback tools using hand and facial landmark detection to provide immediate visual guidance on sign execution accuracy.
- Integration of 3D signing avatars for demonstrating correct sign production, with controllable playback for detailed examination.
- Implementation of an LLM-based virtual instructor that provides personalised coaching based on learner progress and performance patterns

## Curriculum

Content is developed by sign language educators and linguists at partner institutions. Requirements were gathered through focus groups with both deaf and hearing learners and deaf educators. Three-level hierarchical organisation of courses, modules, and lessons. Content includes:

- Vocabulary acquisition through flashcards and isolated sign demonstrations.
- Grammatical structures including non-manual markers and role-shifting.
- Sentence-level content for real-life sign language interactions.
- Signed dialogues between two people.
- Illustration of sign variation due to regional and individual differences.
- Additional bonus material on deaf communities and culture.

## Games and Gamification

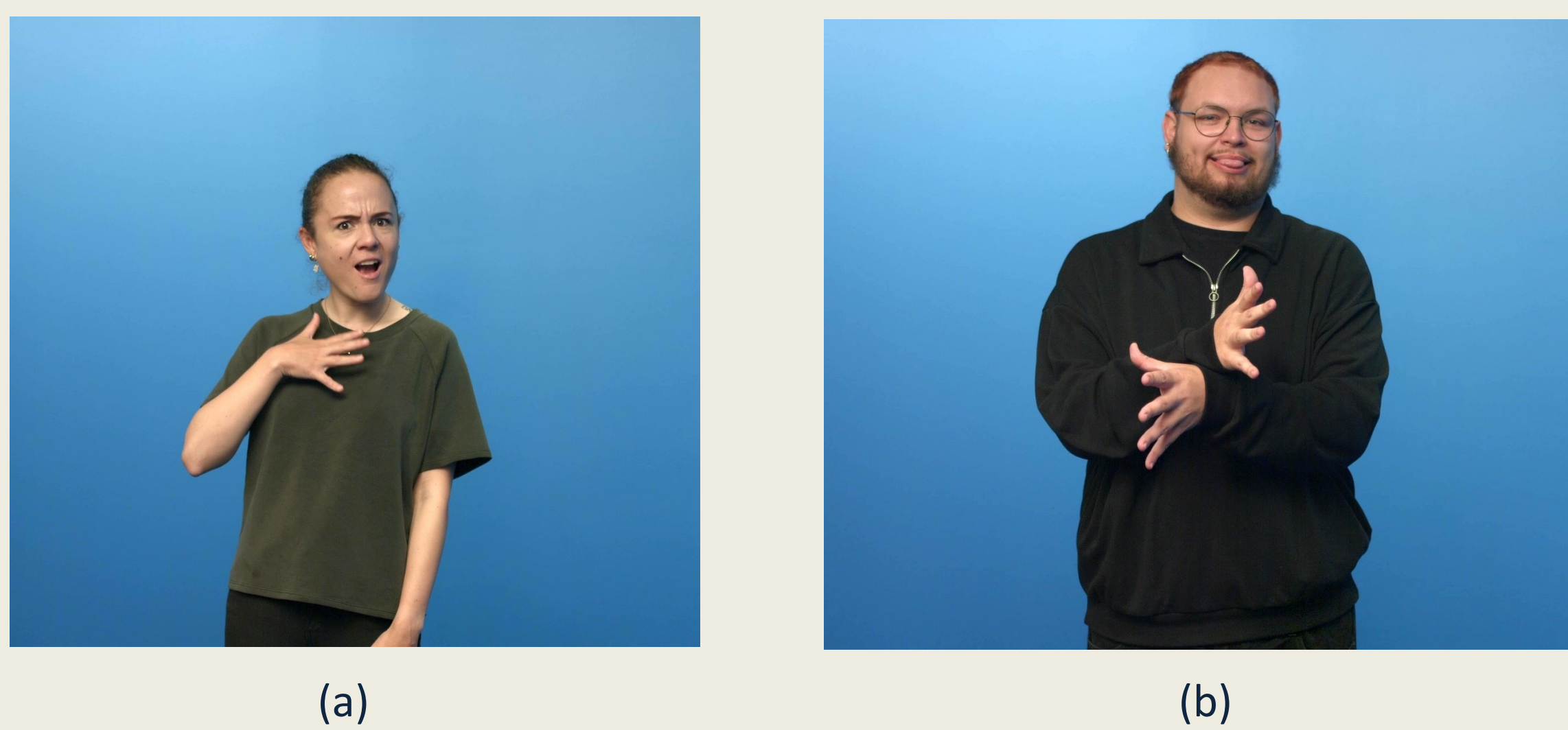


Figure 1: Examples of VISTA-SL exercise feedback, given in DGS, for (a) good performance and (b) mixing up signs

- Immediate exercise feedback.
- Progress tracking.
- Games to practice content.

To enhance language immersion, system feedback is provided in the target language, e.g. through signed expressions that indicate correct or incorrect answers in a playful manner (see Figure 1).

## 3D Avatar System

Users can view curriculum material performed by a virtual avatar, providing further viewing angles, zoom levels and trajectory tracks of hand and arm motions.

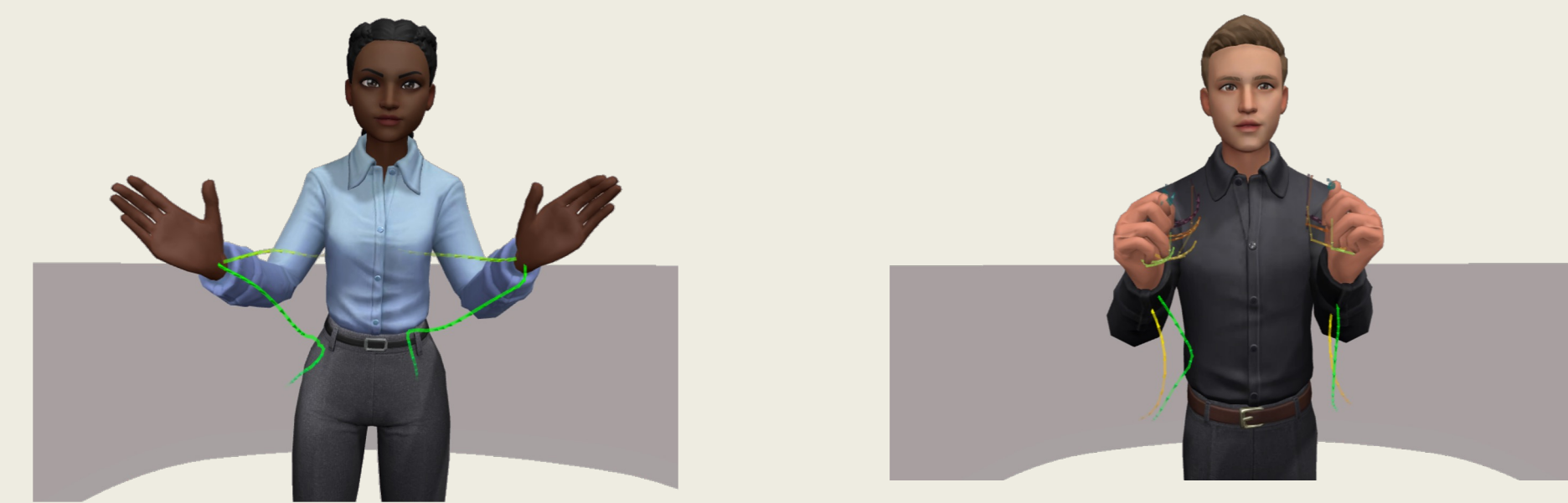


Figure 2: Hand and arm trajectory tracks

Users may choose from a variety of avatar appearances and background options, as can be seen in Figure 3.



Figure 3: VISTA-SL various avatar appearance options

## VISTA-SL Platform

- The VISTA-SL platform follows a modular client-server architecture, shown in Figure 4, designed to integrate independently developed components while maintaining a cohesive user experience.
- The AR feedback system will use Procrustes analysis for shape comparison, applying weighted distance metrics that emphasise fingertips and key joint positions. Figure 5 provides the AR hand sequence.
- The platform will use the Performs 3D avatar system developed by Universitat Pompeu Fabra.
- Avatar animations will be created and edited using the web-based Animics tool.

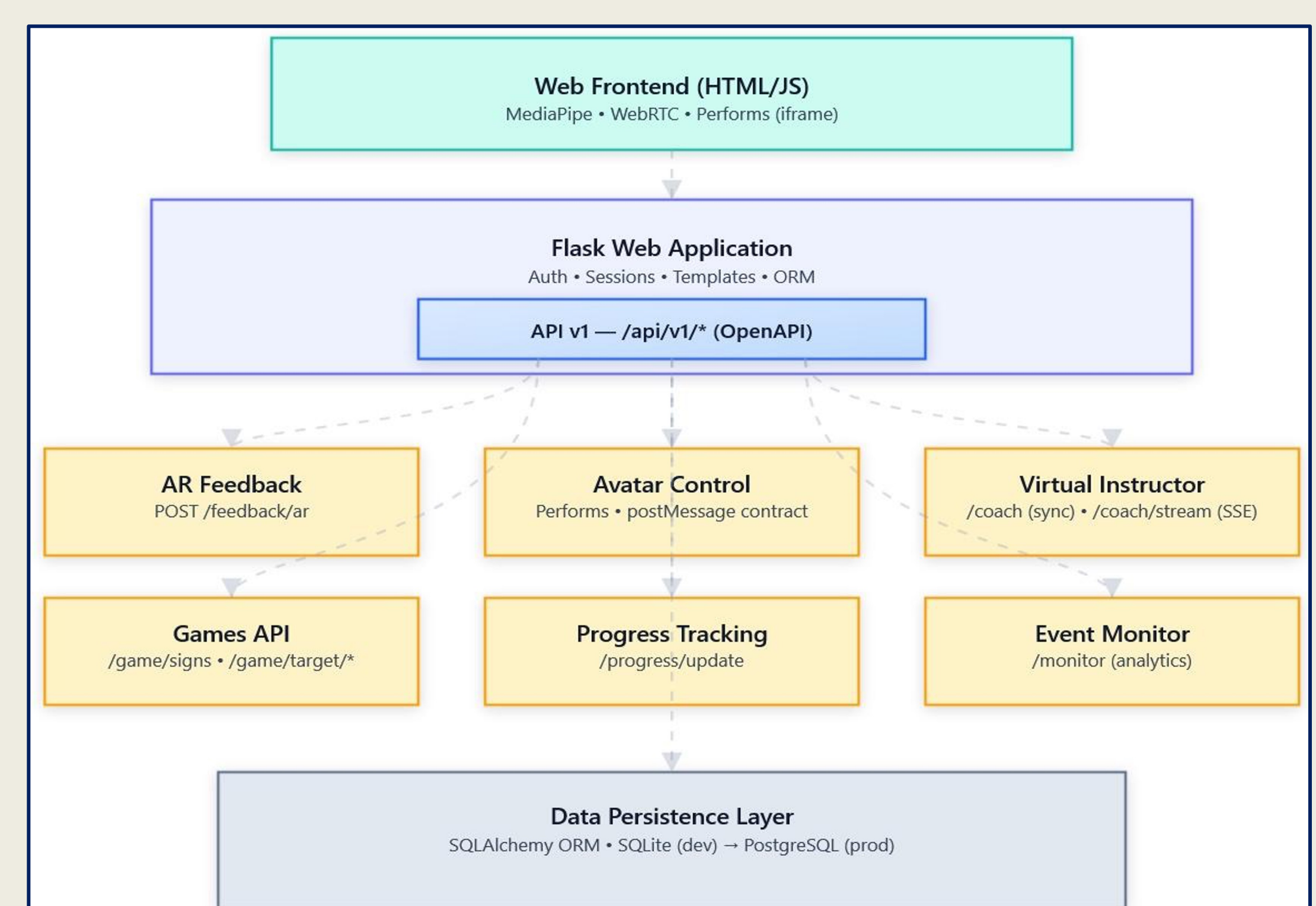


Figure 4: High-level architecture of the VISTA-SL platform

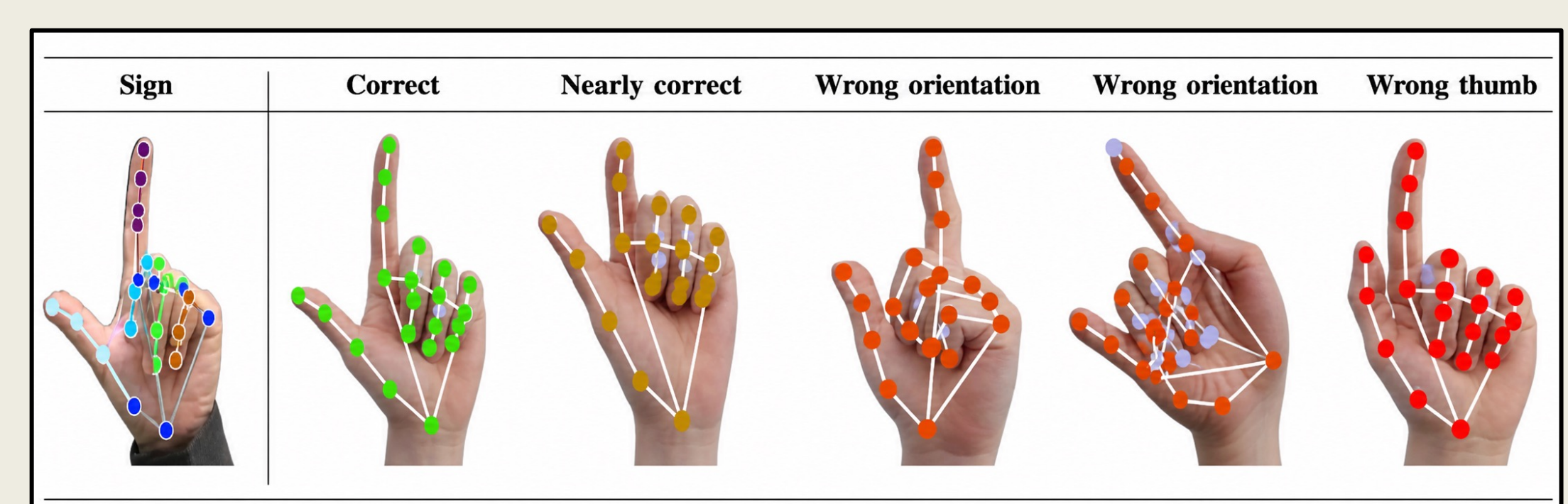


Figure 5: VISTA-SL AR hand sequence

## Acknowledgement

This project VISTA-SL has been funded with support from the European Union Erasmus+ Programme, grant number: 2024-1-EL01-KA220-HED-000257847. This publication reflects the views only of the authors', and the Commission cannot be held responsible for any use which may be made of the information contained therein.