



CONTENT4ALL

PERSONALIZED CONTENT CREATION FOR THE DEAF COMMUNITY IN A CONNECTED DIGITAL SINGLE MARKET

The CONTENT4ALL project

Giacomo Inches

FINCONS GROUP AG



LEAD-ME Winter School

Online, November 23rd 2020

CONTENT4ALL



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Project start: **1 September 2017**
Duration: **36+3 Months (November 2020)**
Funding: **European Commission**
Horizon 2020 grant agreement no. 762021
Topic: **Media Convergence and Social Media (Unit I.4)**

Phase 1

- Remote live virtual human to provide live signing (market ready)
- Build a collection of live signed content for further research projects or academic studies

Phase 2

- Develop the necessary technologies and algorithms to explore automatic sign-translation capabilities (laboratory test/PoC)

A solution to many needs

- Legislative compliance
- Cost reduction
- Audience engagement





Advisory Board Member



CONSORTIUM



Compliant to the most recent legislations

ART.30, 21 UN CONVENTION ON THE RIGHTS OF PERSONS WITH DISABILITIES

Television content should be accessible e.g. to the Deaf, Blind, ...



Excerpt of the UN Convention

Article 30 - Participation in cultural life, recreation, leisure and sport (1)

States Parties recognize the right of persons with disabilities to take part on an equal basis with others in cultural life, and shall take all appropriate measures to ensure that persons with disabilities:

Enjoy access to **cultural materials** in accessible formats:

Enjoy access to **television programs, films, theatre and other cultural activities, in accessible formats:**

Enjoy access to **places for cultural performances** or services, such as theatres, museums, cinemas, libraries and tourism services, and, as far as possible, enjoy access to monuments and sites of national cultural importance.

Article 21

Urging private entities that provide **services to the general public**, including through the Internet, to provide information and services in accessible and usable formats for persons with disabilities: Encouraging the mass media, including providers of information **through the Internet**, to make their services accessible to persons with disabilities:

THE EUROPEAN ACCESSIBILITY ACT

- EU Member States have an **obligation to apply what the Act mentions** (Directive legally binding)
- **EU Law that would make many products and services in the European Union (EU) more accessible** for persons with disabilities.

Certain products and services need to be accessible:

- Smartphones, tablets and computer
- Ticketing machines and check-in machines
- **Televisions and TV programmes**
- Banking and ATMs
- E-books
- Online shopping websites and mobile applications
- **Public sector and Private companies**

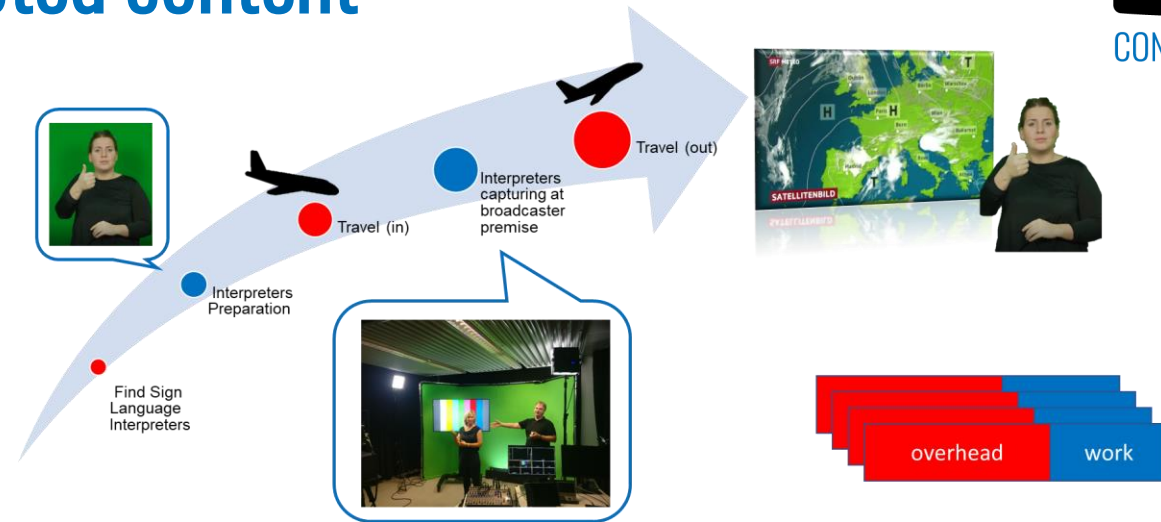
Cost reduction and more interpreted content



Current broadcasters workflow

For each new content:

- overhead** signer travelling to studio and
- work** on-site interpretation



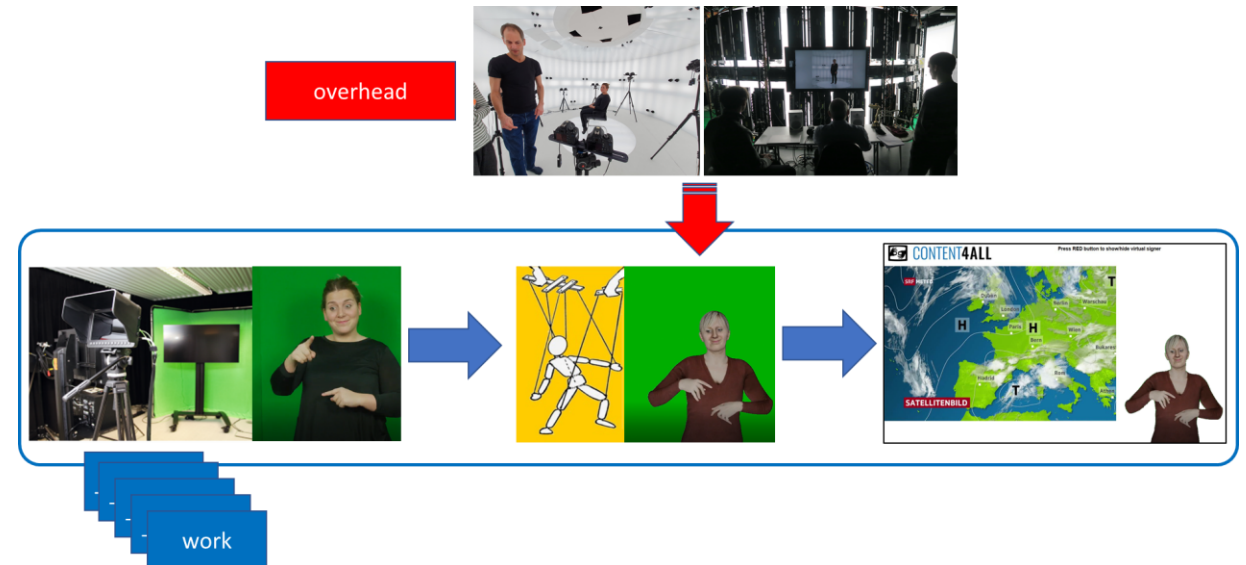
With CONTENT4ALL workflow

1st time only:

- overhead** signer travelling to studio for model creation (realatar)

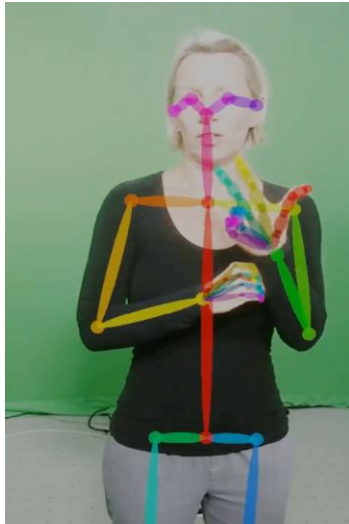
For each new content:

- work** signer remote interpretation and automatic model animation



Content targeting for user engagement

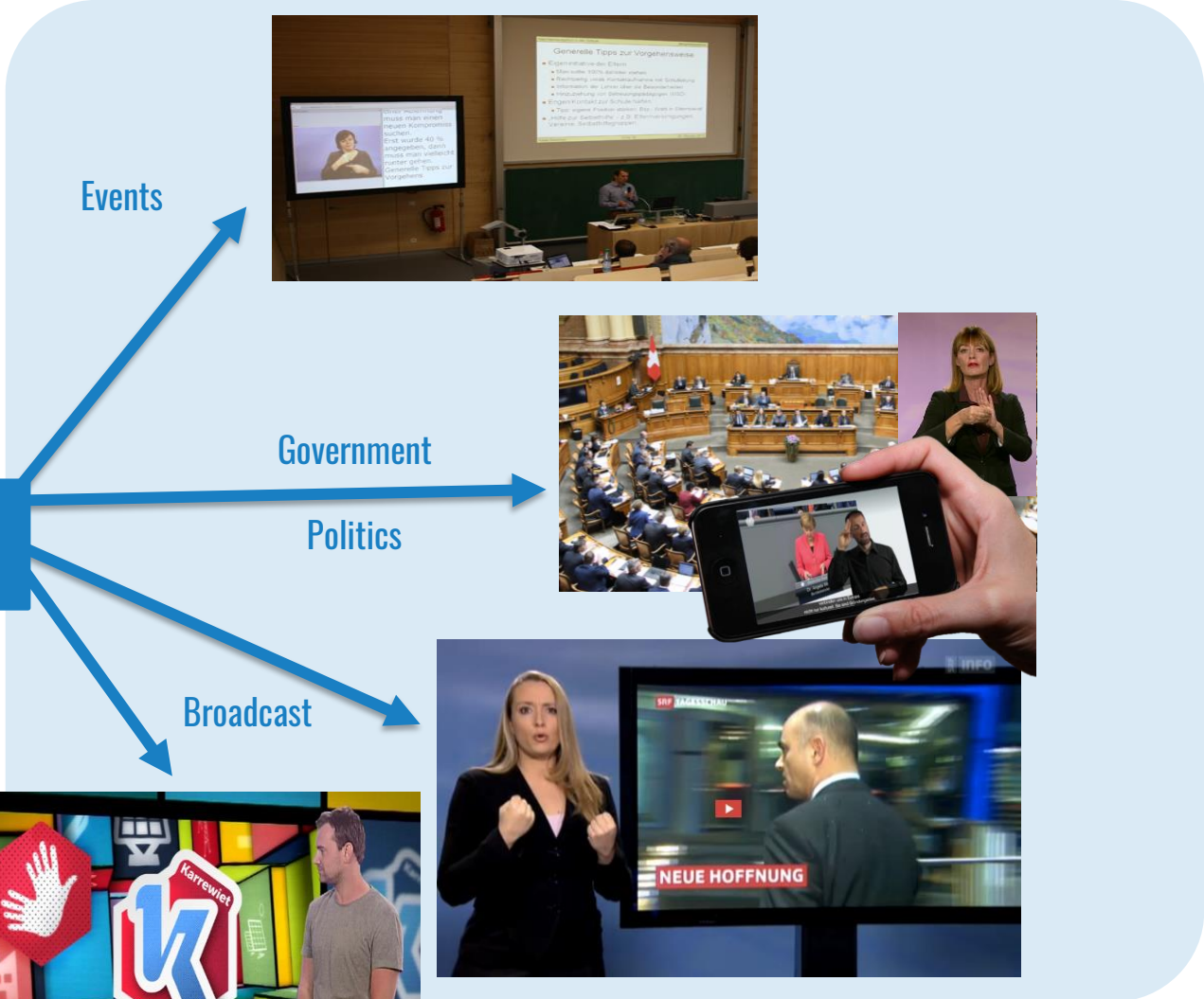
Remote (e.g. Home)



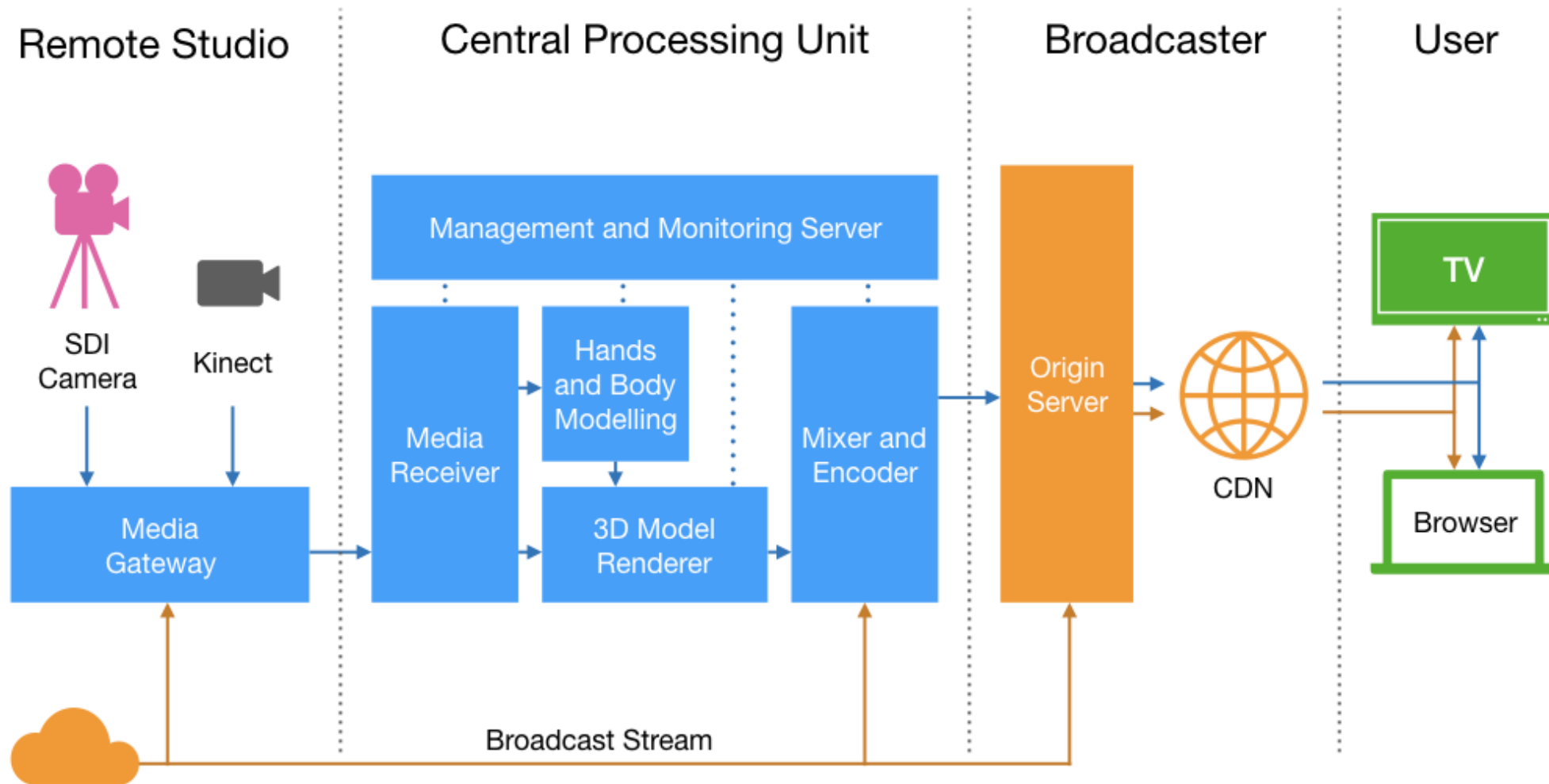
Realatar
Personalisation:
gender, physical
appearance, clothes,
branding, ...

Parameters
extraction

Realatar
animation

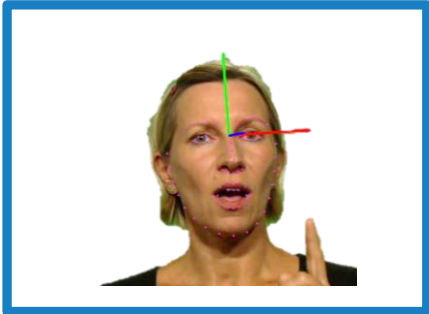


Workflow architecture

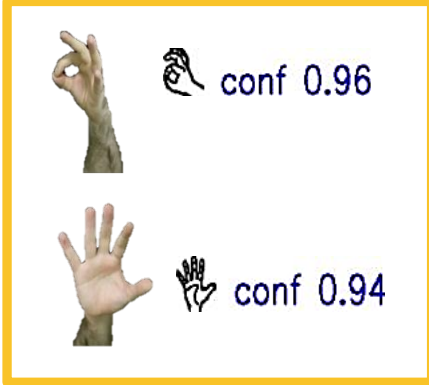


Realatar components

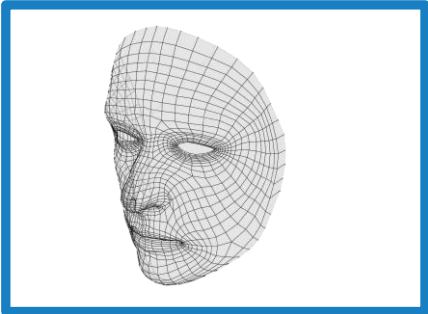
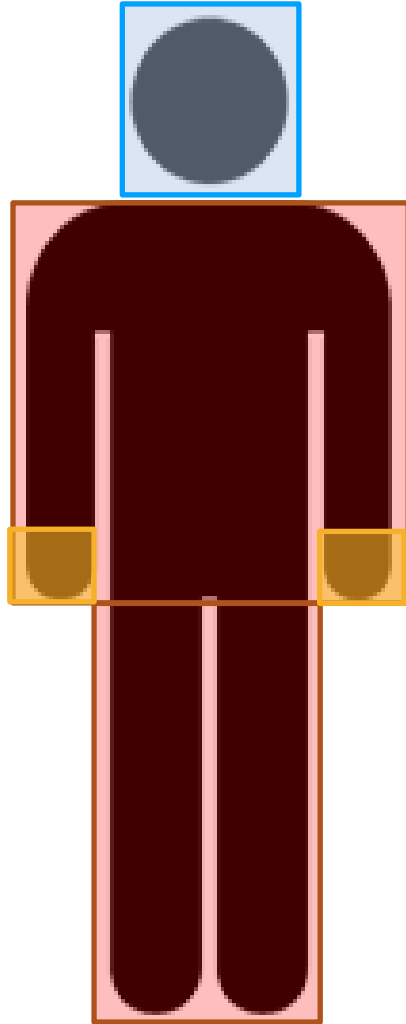
Face: live RGB video on 3D model



Hands: Deep Learning HandShape classifier reproducing hand poses



Body: Kinect Skeleton



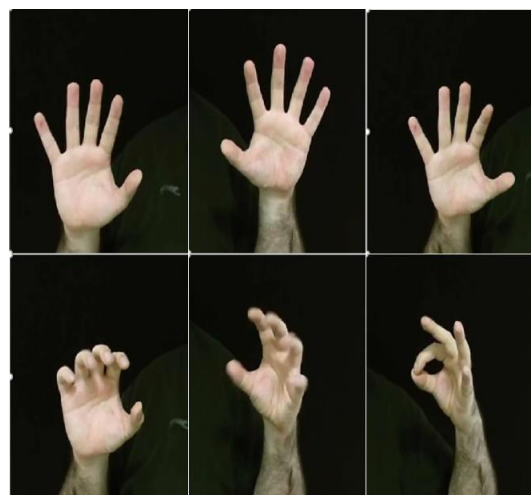
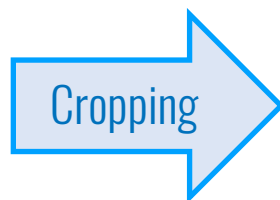
Face: parametric 3D model















Body and Hands: 3D Regression on 2D parameters identified from the video stream only (no kinect or depth sensor needed)

Phase 1: Hands and body modelling (+ RGB face)

OPTION A: HAND SHAPE ANALYSER + KINECT BODY



Nr	Shape	Name	Nr	Shape	Name
6		5	36		index
45		s	13		b_thumb b
11		b	1		1
20		f	55		ae
49		v	2		2
40		ital	46		write



Phase 1: Hands and body modelling (+ RGB face)

OPTION B: OPENPOSE + 2D TO 3D REGRESSION

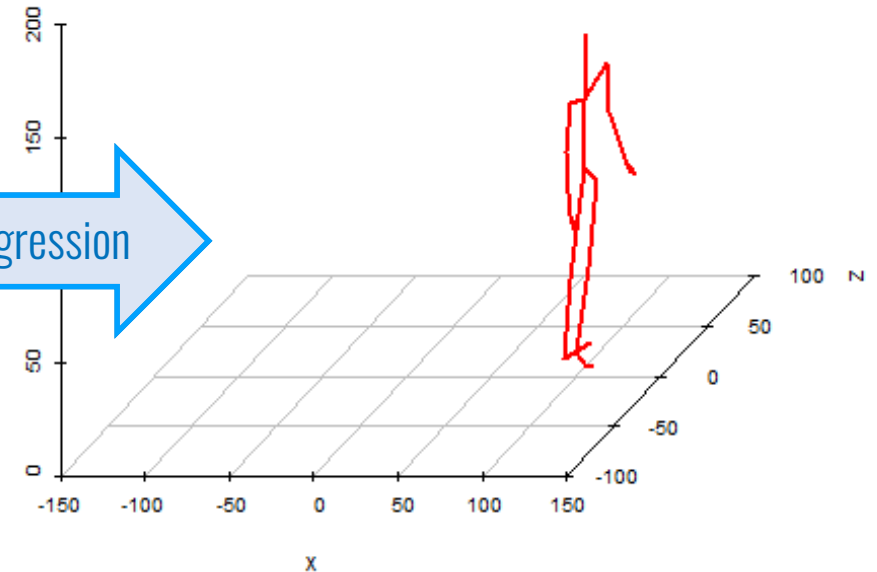
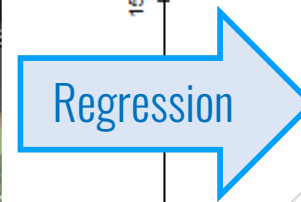
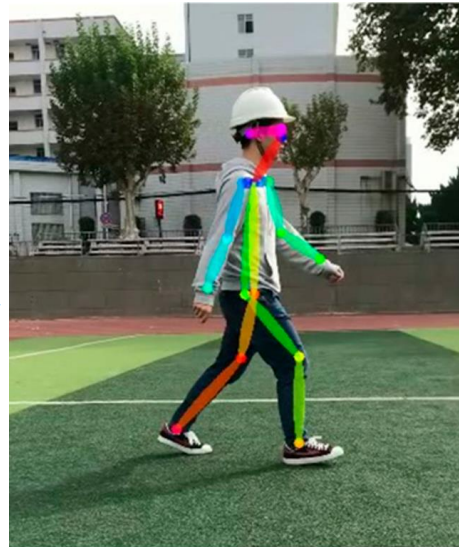
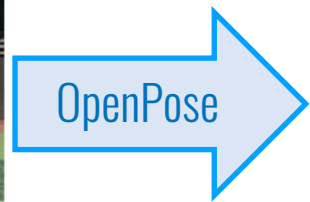


Image source: MDPI – Fall Detection Based on Key Points of Human-Skeleton Using OpenPose (Chen *et al.* 2020)



TIEFSTTEMPE

SOURCE

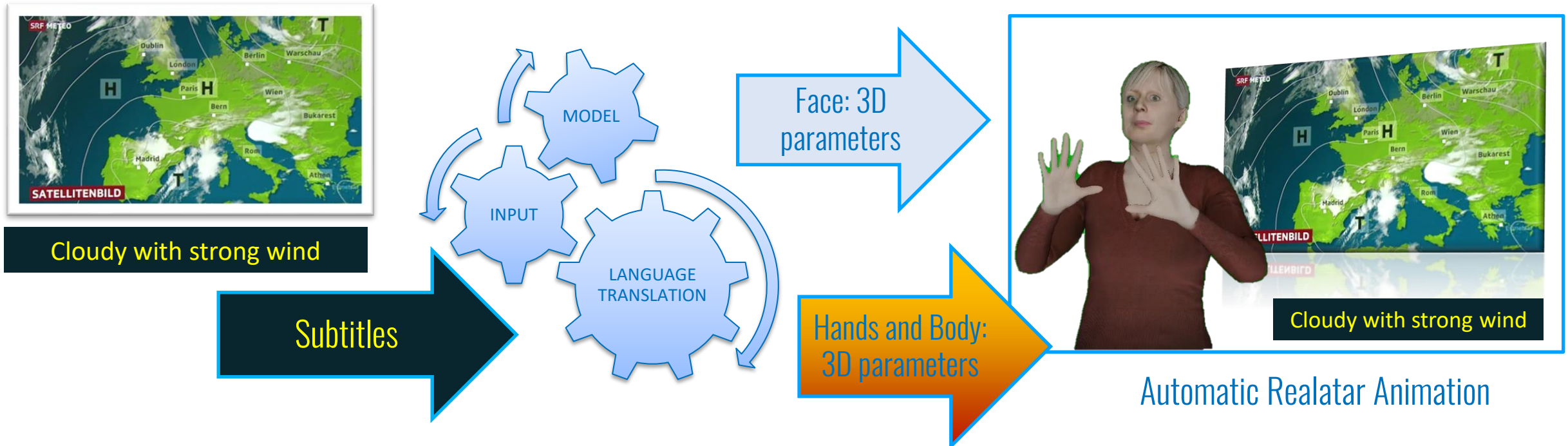
KINECT

REGRESSION


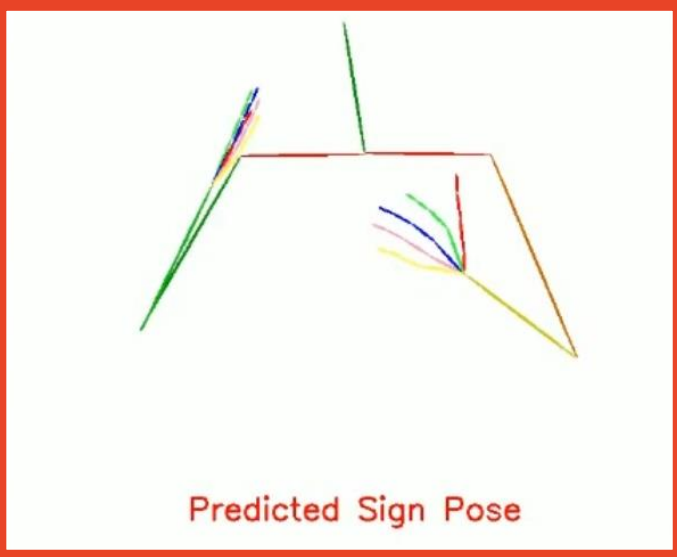
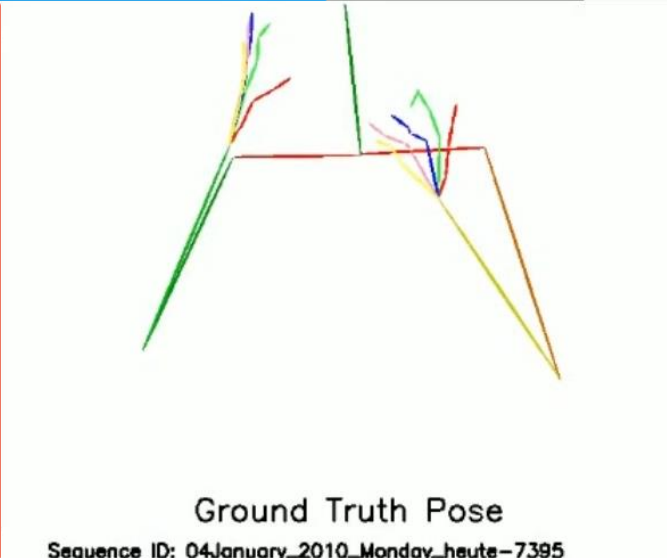
Phase 2: Automatic sign language production (proof of concept)

CONTENT4ALL leverages state of the art AI technologies:

- Language Translation (via Deep Learning) from **German Spoken** Language (subtitles) to **German Sign Language** (DGS)
- Face and Mouth movements via 3D parameters
- Hands and Body movements generations (via Deep Learning algorithms)

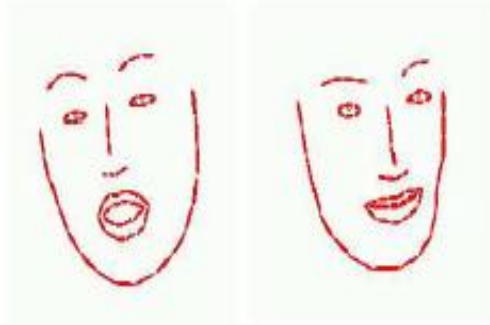


Phase 2: Automatic sign language production (proof of concept)

Subtitles		
	GT German: Guten abend liebe zuschauer (English Translation: Good evening dear viewers)	
	 <p>Predicted Sign Pose</p>	 <p>Ground Truth Pose</p> <p>Sequence ID: 04January_2010_Monday_heute-7395</p>
Real Signer	Automatic Parameters Generation From Subtitles	Real Signer Parameters

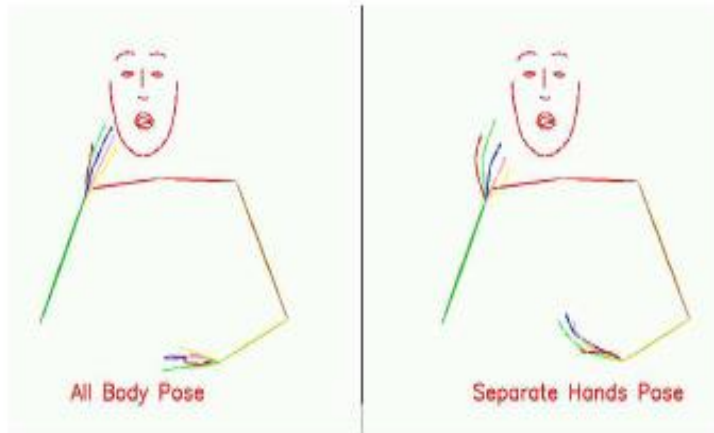
Phase 2: Automatic sign language production (proof of concept)

- Adding **Face and Mouth** together with Body and Hands movements (visemes)



Face and Mouth:
3D parameters

- Producing the **hands movements separately to the body** encourages expressivity



Hands and Body:
3D parameters





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THANK YOU

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