SUITCEYES

Sensor Technology, Gamification, Haptic Interfaces In An Assistive Wearable

Jarosław Urbański, HARPO

This project has received funding from the European Union's Horizon 2020 Research and Innovation Programme under grant agreement No 780814.

University of Borås, Sweden
Centre for Research & Technology Hellas, Greece
Offenburg University of Applied Sciences, Germany
University of Leeds, United Kingdom
Vrije Universiteit Amsterdam, Netherlands
Les Doigts Qui Rêvent, Talant, France
Harpo Sp. z o.o., Poznań, Poland

SUITCEYES Project

2018 - 2020

€ 2 359 962

Smart, User-friendly, Interactive, Tactual, Cognition-Enhancer, that Yields Extended Sensosphere

Appropriating sensor technologies, machine learning, gamification and smart haptic interfaces

Partners

University of Borås

HÖGSKOLAN I BORÅS

Centre for Research & Technology Hellas

CERTH CENTRE FOR RESEARCH & TECHNOLOGY HELLAS

University of Offenburg

Hochschule Offenburg offenburg.university

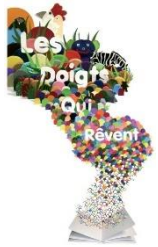
University of Leeds

UNIVERSITY OF LEEDS

Eindhoven University of Technology

TU/e Technische Universiteit Eindhoven University of Technology

Les Doigts Qui Rêvent



Harpo Sp. z o.o.

HARPO

Handouts: https://suitceyes.eu/2019/03/07/csun-at-conference-session-of-suitceyes/

Deafblindness

Nordic Definition of Deafblindness

Nordens välfärdscenter

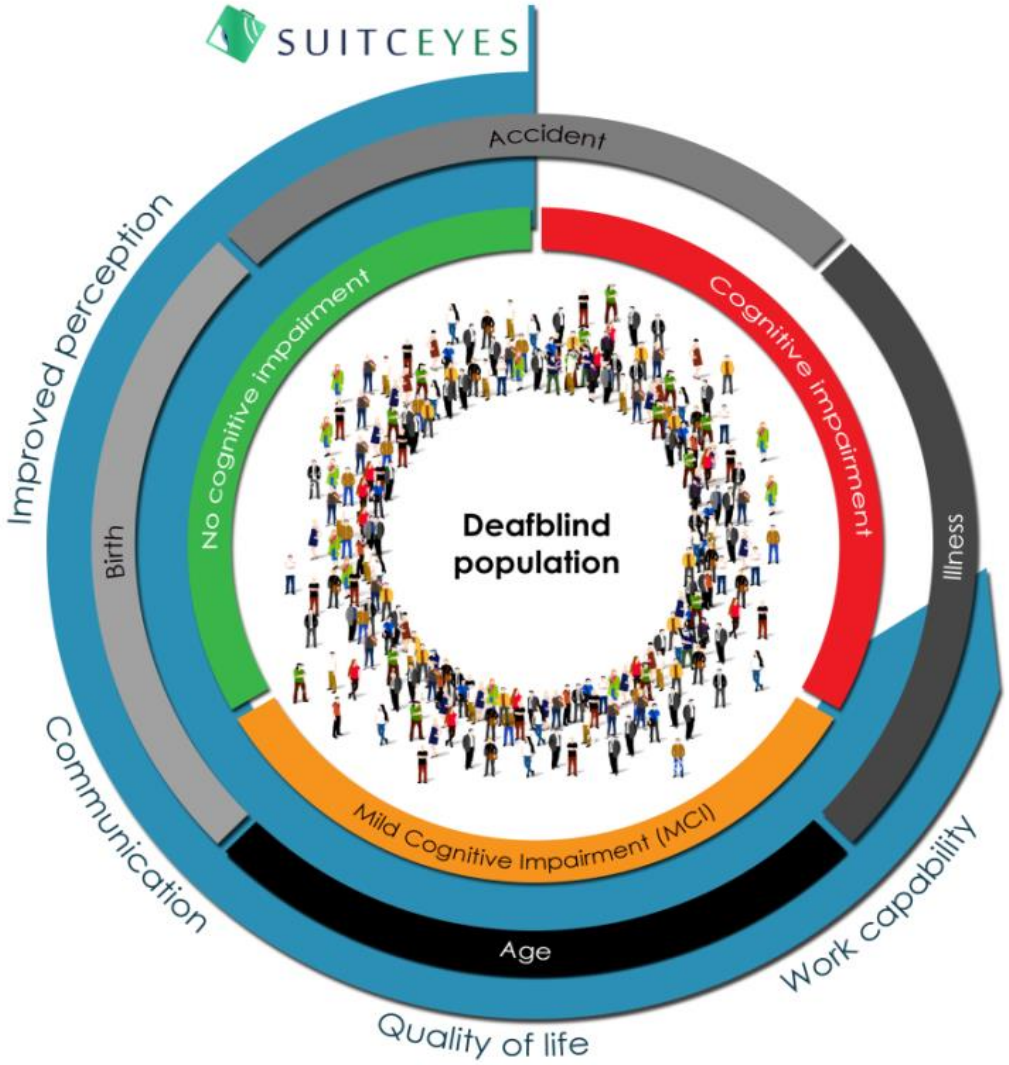
Deafblindness is a combined vision and hearing impairment of such severity that it is **hard for the impaired senses to compensate for each other**. Thus, deafblindness is a distinct disability.

Deafblindness

- Congenital
- Acquired
  - ❖ Illness
  - ❖ Accident
  - ❖ Age

SUITCEYES

The Idea Behind the Project



The overall objective of SUITCEYES is to:

- improve the level of independence and participation of persons with deafblindness and to
- enhance their communication, perception of the environment, knowledge acquisition, and conduct of daily routines.

SUITCEYES

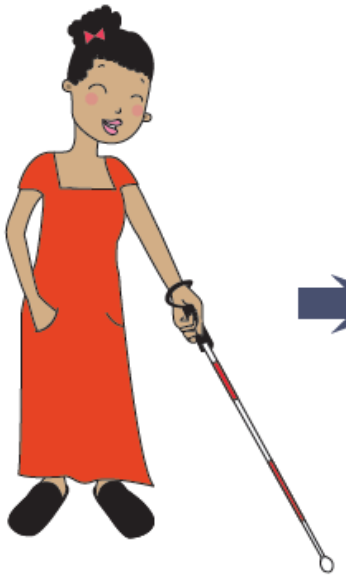
The HIPI

OUR APPROACH : user-centered design

Perception of the environment

Haptic communication

Gamified learning and mediated social interaction



Haptic
Intelligent
Personalised
Interface

Extensive interviews with people with deafblindness, policy analysis and prototype testing will help us to better understand the **needs** and **challenges** of designing **technological solutions**.

Integration of:

- Smart textiles
- Haptics
- Sensors
- Semantic technologies
- Image processing
- Face and object recognition
- Machine learning
- Affective computing
- Gamification

SUITCEYES

Red Dress

SUITCEYES

Red Dress

Simple proximity trigger - recognition of objects and people when they come into close vicinity to the user

Automatic proximity trigger - e.g. when the user approaches home, the prototype can act as a key communicating with door-lock and open the door

Direct user feedback - components can supply feedback in order to reassure the user that a certain trigger has been activated

Automatic sensor triggering - smart components surrounding the user can communicate with each other, elicit and aggregate information concerning physical structures, surrounding signs, sounds etc.

Personalised user feedback - the feedback can be personalised in order to retrieve specific kinds of information that matches the needs of the individual user

SUITCEYES

Research

- Extensive **user studies** to know the needs of people with deafblindness
- A range of potential feedback modalities explored including **vibration, pressure and temperature**
- A variety of **sensors** explored **to provide information about the environment**: distance sensors to detect proximity of obstacles, a camera feed to allow recognition of objects or people, indoor positioning systems to help locate objects, or radio frequency identification to identify when the objects come near
- A **processing unit** used to interpret sensor input against a knowledge base and determine appropriate feedback
- **Smart textiles** used to accommodate sensors, feedback units and the processing unit on different parts of the body, either mounted on the textiles, or built into them
- **Gamification** to integrate video game elements into non-game services and applications, to improve the user experience, engagement and performance

SUITCEYES

User Studies

- **Interviews** with potential users and their representatives (DE, EL, NL, SE, UK)

➢ importance of solutions that help the users to get out and about, taking an active part in life and work and contributing to the society

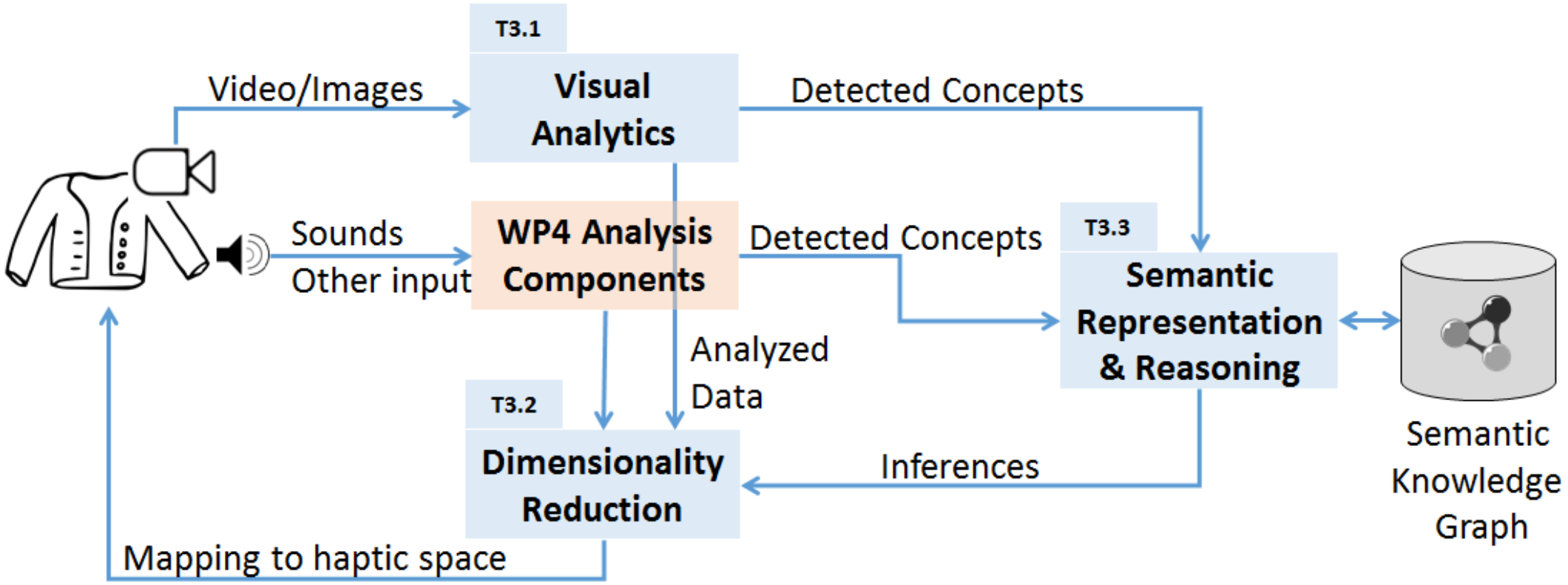
➢ need for potential solutions that will facilitate engaging in reciprocal and equal social relationships with friends, family and acquaintances

➢ need for affordable devices that are robust and cannot easily be broken, stolen or misplaced

➢ need for a neutral appearance that is not strange looking and which would attract unwelcomed attention

SUITCEYES

Capturing, Translating and Semantically Representing Environmental Cues



SUITCEYES


book: 69%
5
chair: 99%
7
chair: 98%
tv: 97%
3
laptop: 91%
4
0
1
bottle: 69%
6
2

Plans

- Conclusions from user-study data analysis and legal, and policy implementation
- Evolve face detection into face recognition and deploy gesture (and activity) recognition for communication with other people
- Semantic reasoning scenarios to investigate what kinds of higher-level inferences we can derive
- Development of distant sensors array and algorithms, psychophysics experiments, and creation of a garment that allows flexible attachment of various components
- Prototypes for psychophysical studies and for user studies
- Concepts and scenarios for gamified experiences

References

- Korn, O., Holt, R., Kontopoulos, E., Kappers, A.M.L., Persson, N.-K., Olson, N., Empowering Persons with Deafblindness: Designing and Intelligent Assistive Wearable in the SUITCEYES Project, PETRA '18 Proceedings of the 11th Pervasive Technologies Related to Assistive Environments Conference, p. 545-551, Corfu, Greece – June 26-29, 2018, DOI: 10.1145/3197768.3201541

- Giannakeris, P., Avgerinakis, K., Vrochidis, S., Kompatsiaris, I., Activity Recognition from Wearable Cameras, 16th International Conference on Content-Based Multimedia Indexing (CBMI) Proceedings, IEEE Xplore Digital Library, La Rochelle, France – September 4-6, 2018, DOI: 10.1109/CBMI.2018.8516553

SUITCEYES

SUITCEYES

This paper is based on the SUITCEYES project which has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 780814.

We would like to thank all project members and specifically Efstratios Kontopoulos, and Sarah Woodin for their contributions to this paper.

Handouts: https://suitceyes.eu/2019/03/07/csun-at-conference-session-of-suitceyes/

www.suitceyes.eu

SUITCEYES

THANK YOU FOR YOUR ATTENTION

Nasrine Olson
University of Borås
nasrine.olson@hb.se

Nils-Krister Persson
University of Borås
nils-krister.persson@hb.se

Mauricio Fuentes
Les Doigts Qui Revent
ldqr.mf@gmail.com

Jarosław Urbański
Harpo Sp. z o.o.
jurbanski@harpo.com.pl

Joanna Starosta-Sztuczka
Harpo Sp. z o.o.
jstarosta@harpo.com.pl

www.suitceyes.eu