Improving the accessibility of IoT platforms: Two study cases

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Motivations

Enabling individuals

- The 15% of the world's population has a **disability**
- Between 110 and 190 million people have a **severe disability**

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Assistive Technologies

- Reduce the ability divide
- SW & HW
- Design for Each & Design for All
- From end-users to **begin users**

Group Key Research Topics

Key Topics

- **Low-cost** and **Real-time** solutions
  - Remote communication system for deafblind people
  - Enhanced TV streams for deaf and elderly

Group Activities

	Deafblind	Deaf & Elderly
Inclusive Interfaces	■	■
Remote Communication	■	
TV Streams		■

Group Activities

	Deafblind	Deaf & Elderly
Inclusive Interfaces		
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TV Streams		

Parloma

A Communication System
for Deaf-Blind People

https://parloma.github.io

Deafblindness

Enabling individuals

- Low-incidence disability
- < 1% of the world's population
- **Usher Syndrome**
  - Congenital deafness + acquired blindness

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Communication

- Tactile Sign Languages
  - 1-to-1
  - Walkie-talkie
  - Physical contact

Deafblindness

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Communication

Parloma

Goals

- Transfer **remotely** and in **real-time** Tactile Sign Languages
- Enabling communication:
  - 1-to-N
  - NO Physical contact

Parloma

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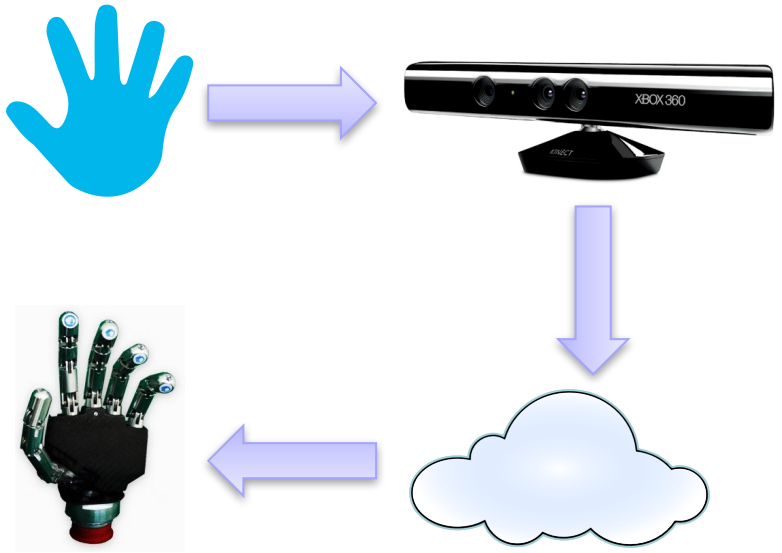
Pipeline



Side effects

Side effects

- Telerehabilitation
- Human-Robot Cooperation

Side effects

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- **Telerehabilitation**
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Side effects

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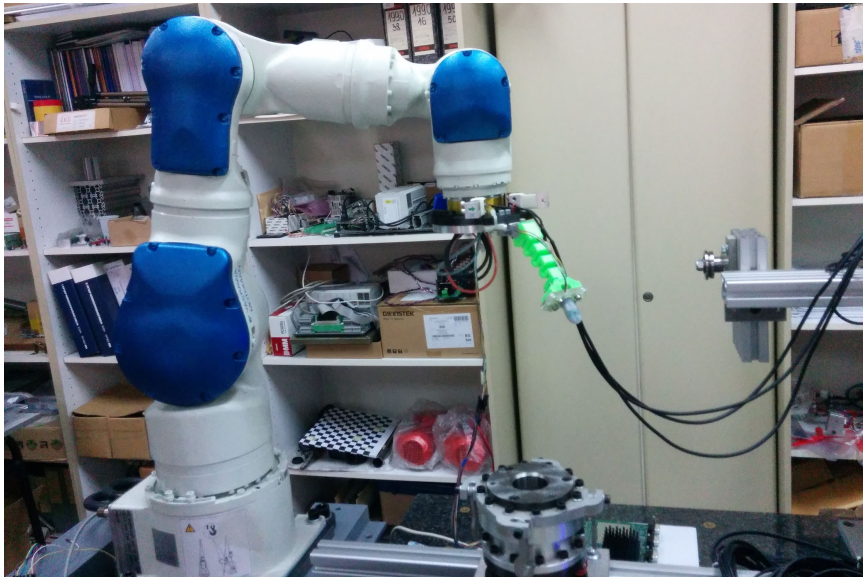
- Telerehabilitation
- **Human-Robot Cooperation**



Funding schema & Partners

Funding schema

- MIUR (2014-2017):
  - Smart Cities and Social Innovation – Under 30
- First three scholarships: June 2017

Partners

Group Activities

	Deafblind	Deaf & Elderly
Inclusive Interfaces		
Remote Communication		
TV Streams		

Stretch & Easy TV

Goals

Improving the accessibility of TV programs to people with different kinds of disabilities, including Hearing and Visual Impaired, Elderly People, …

Stretch & Easy TV

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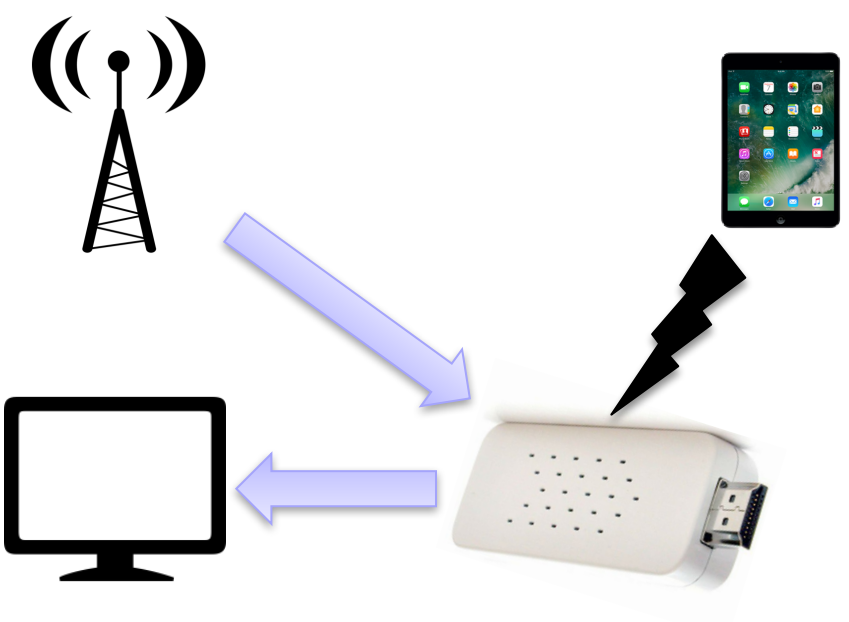
Architecture



Stretch & Easy TV

Goals

Improving the accessibility of TV programs to people with different kinds of disabilities, including Hearing and Visual Impaired, Elderly People, …

How

User customizable:

- Audio & Video Speed
- Audio Equalization
- Subtitles (Font types, colors, background, …)
- …

Accessing TV streams

Enabling individuals

- Information might be lost
- Very high volume: disturbing others
- No personalization: speed, subtitles, colors…

Present Developments

SW & HW

- A custom platform supporting:
  - Customized TV streams
  - Real-Time Program Slow down and Replay
  - Equalized audio
  - Set languages and subtitles

Future Developments

Next steps

- Tests with focus groups
- Miniaturization

Funding schema & Partners

Funding schema

- RAI: Centro Ricerche e Innovazione Tecnologica

Partners

Rai
Centro Ricerche
e Innovazione Tecnologica

Малые Автюхи, Калинковичский район
Республики Беларусь

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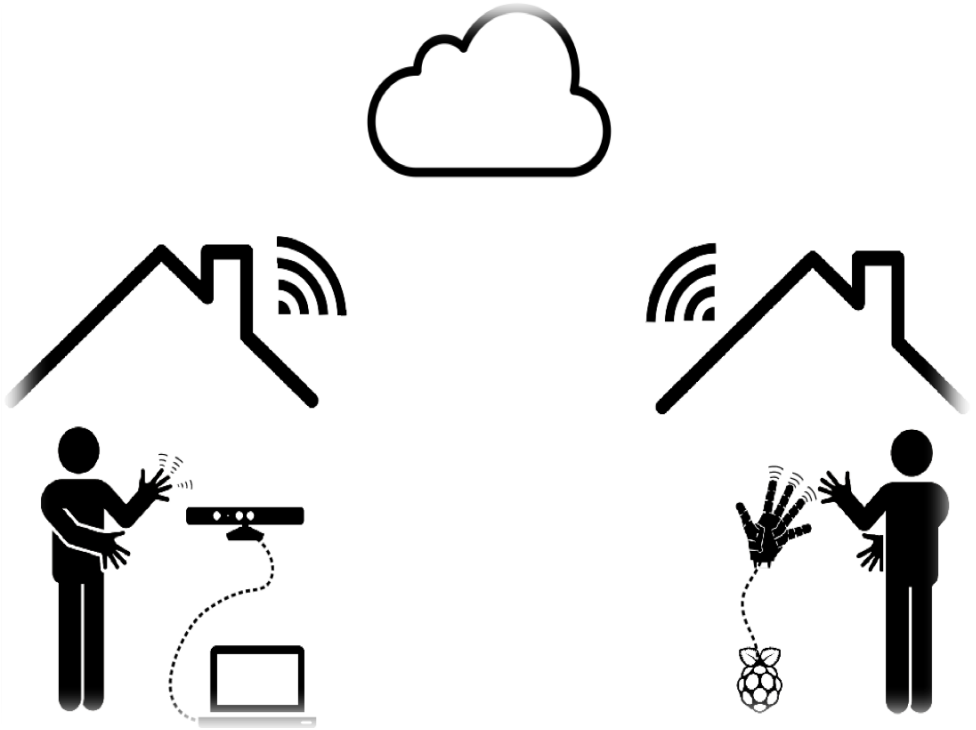
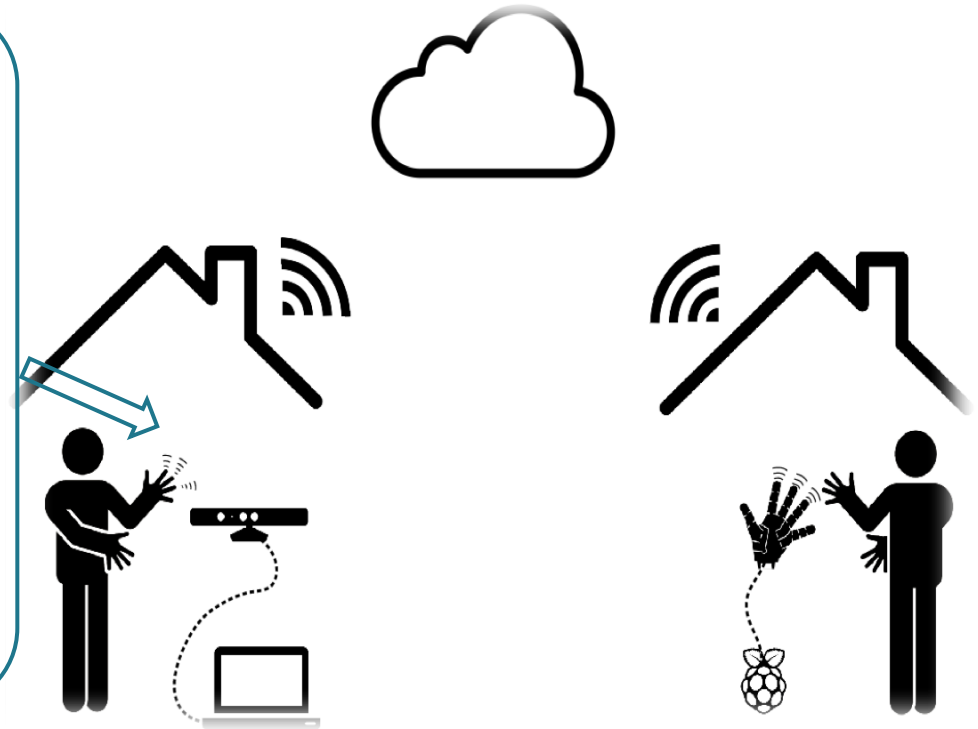
Communication Pipeline



Communication Pipeline

- Signs are acquired in real-time from a single low-cost depth camera
- No external instrumentation (markers, glove…)



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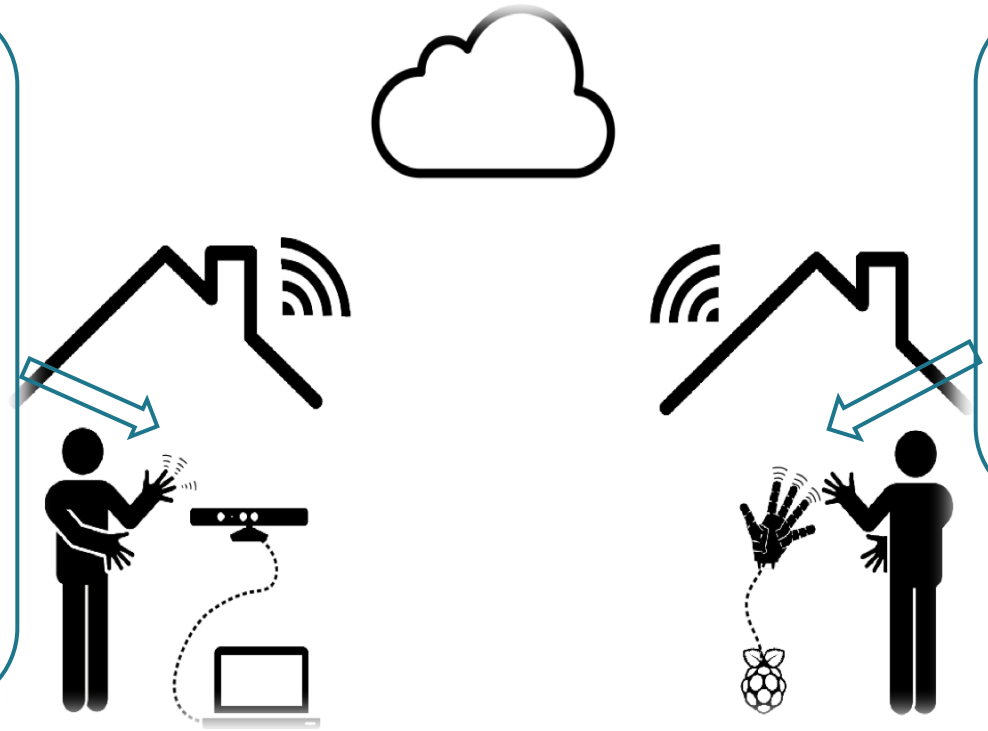
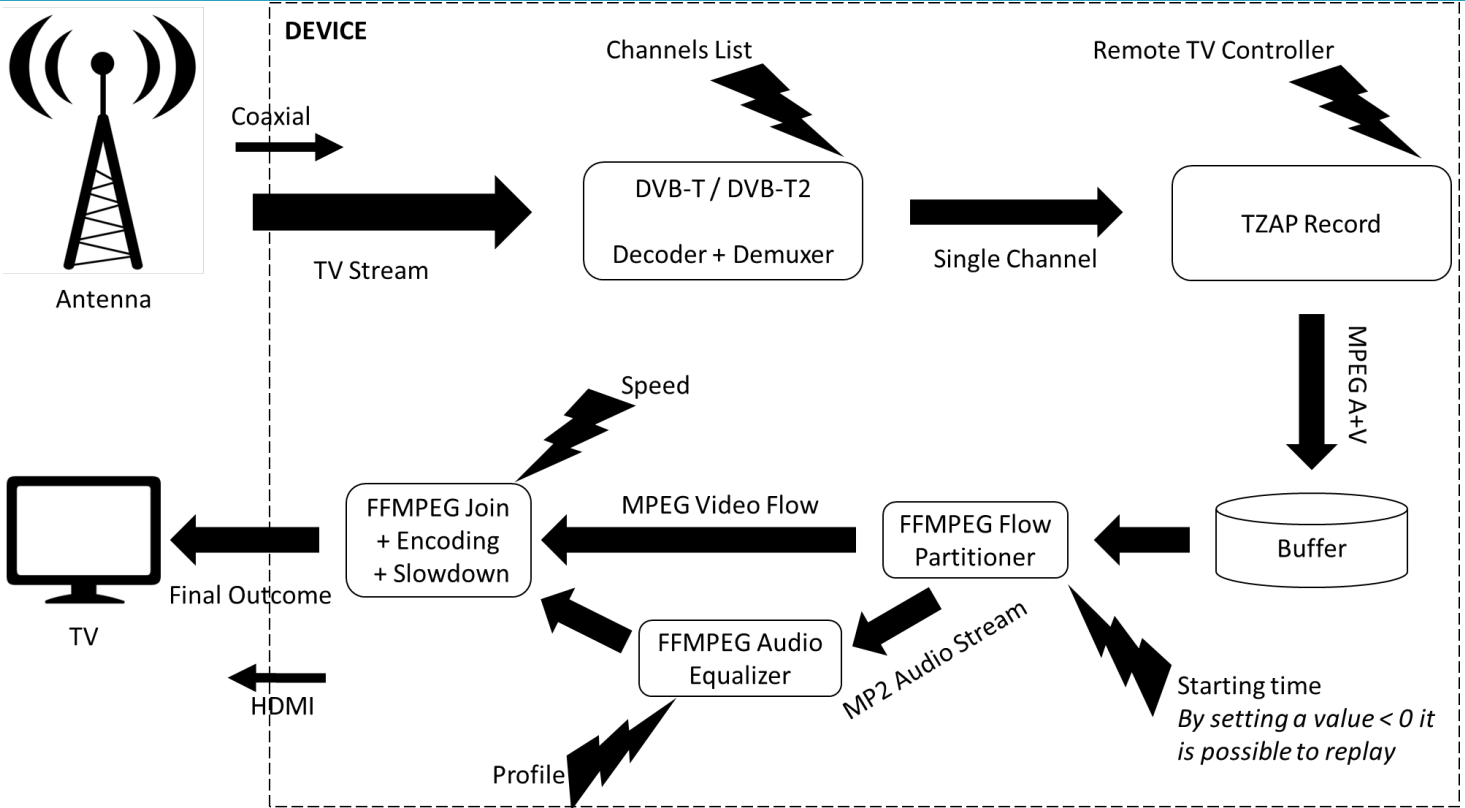
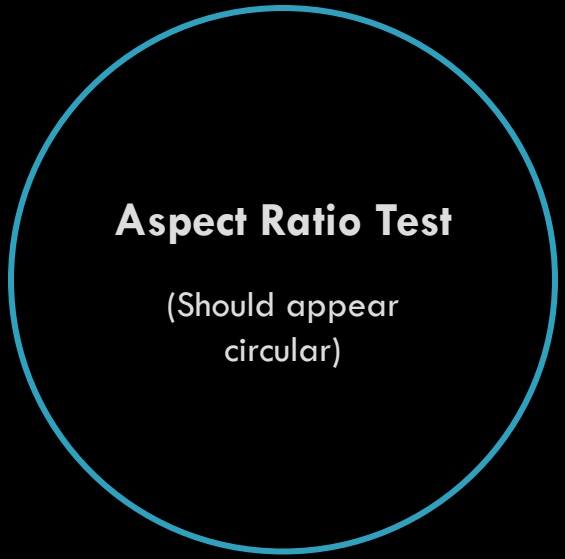


- 3D-printed robotic hand
- 1-to-many communication enabled

Stretch & Easy Pipeline



Widescreen Test Pattern (16:9)



4x3

16x9