



Computer Vision, Speech Communication & Signal Processing Group,  
Intelligent Robotics and Automation Laboratory  
Institute of Communication and Computer Systems (ICCS)  
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# Multisensory Video Processing and Learning For Human-Robot Interaction

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Tutorial at IEEE International Conference on Image Processing 2019,  
Taipei, Taiwan, September 22, 2019

# Tutorial Outline

- 1. Spatio-Temporal Visual Processing
- 2. Audio-Visual Processing, Fusion and Perception
- 3. Multisensory Systems for Perception & Recognition
- 4. A-V HRI in Assistive Robotics
- 5. A-V HRI in Social Robotics: Child-Robot Interaction



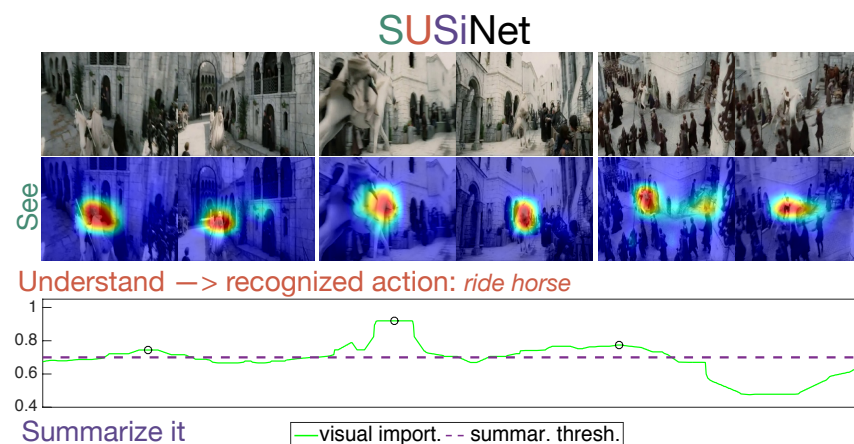
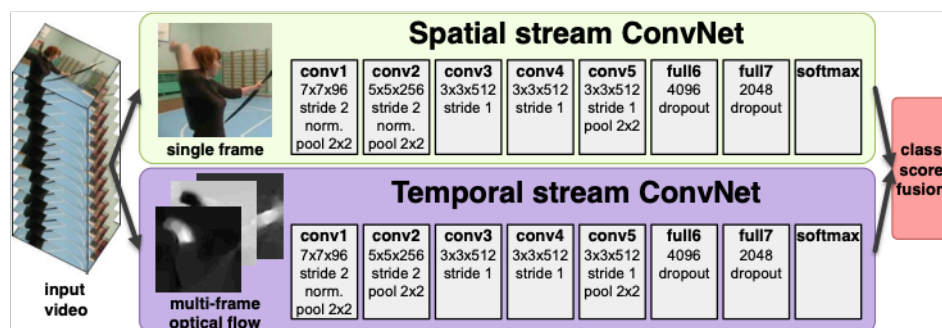
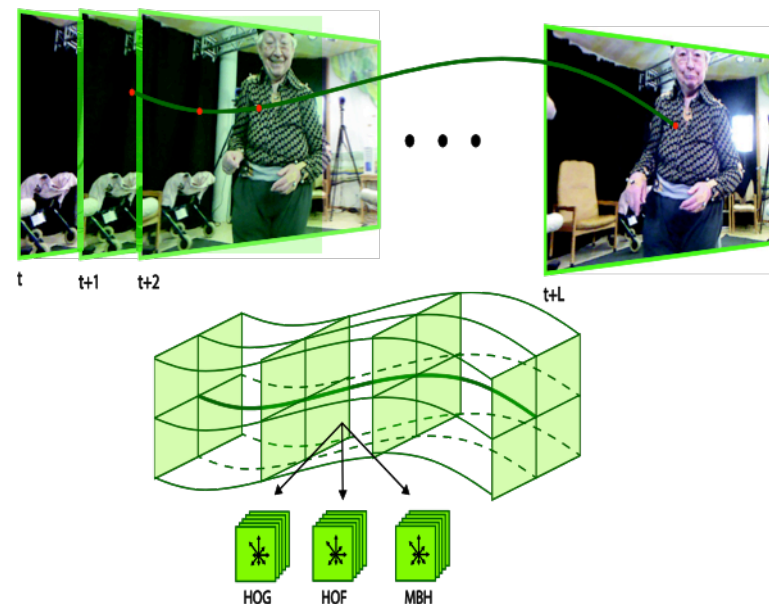
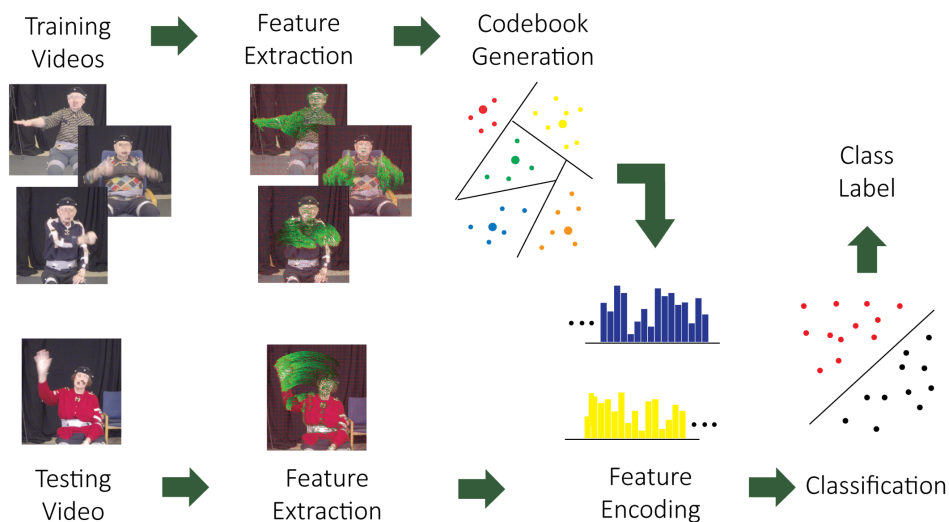
This research has been co-financed by the European Regional Development Fund of the European Union and Greek national funds through the Operational Program Competitiveness, Entrepreneurship and Innovation, under the call RESEARCH – CREATE – INNOVATE (project code:T1EDK- 01248)

<https://robotics.ntua.gr/i-walk/>

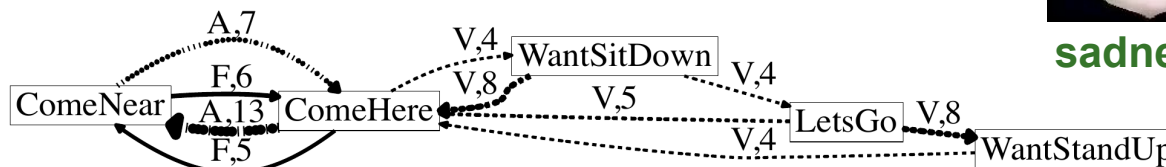
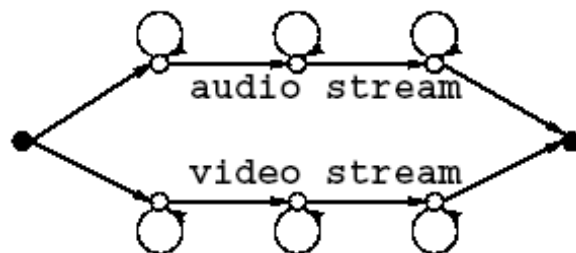
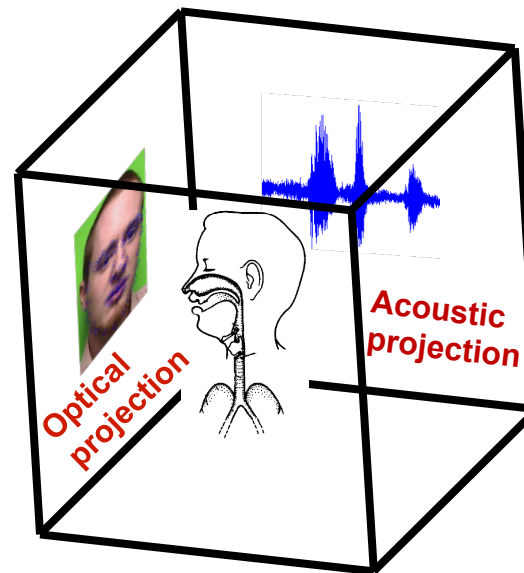
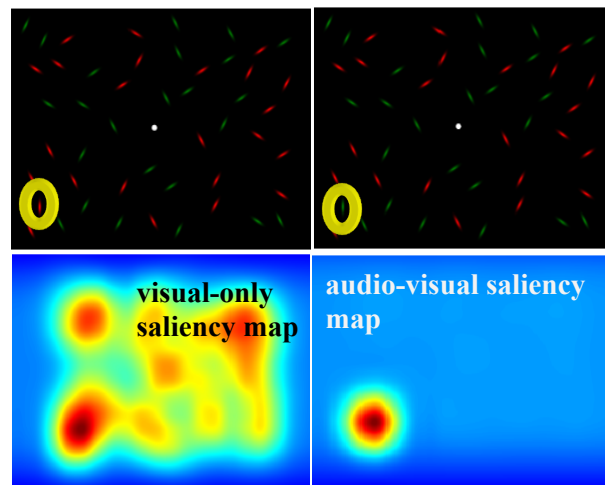


Co-financed by Greece and the European Union

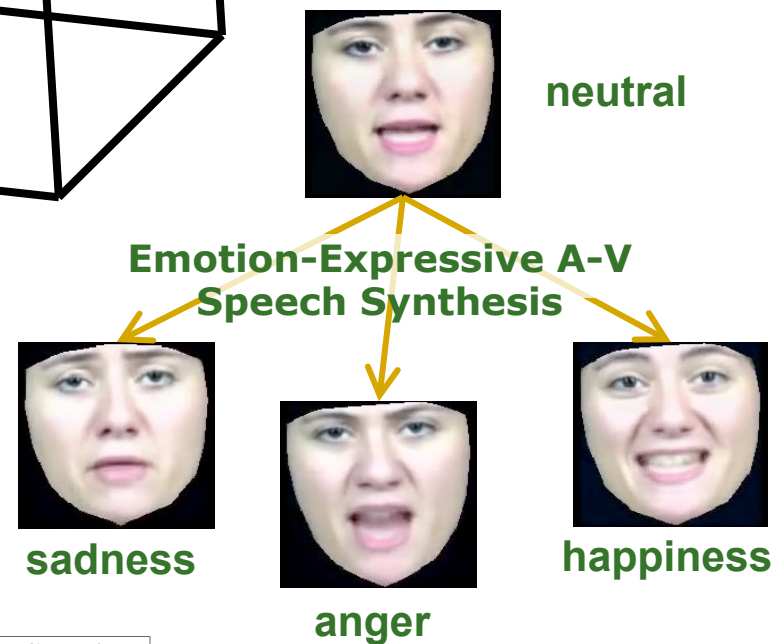
# Part 1: Spatio-Temporal Visual Processing



## Part 2: Multimodal Signal Processing, Audio-Visual Perception and Fusion



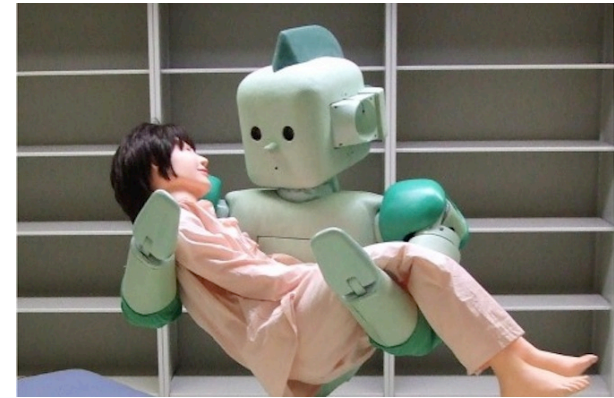
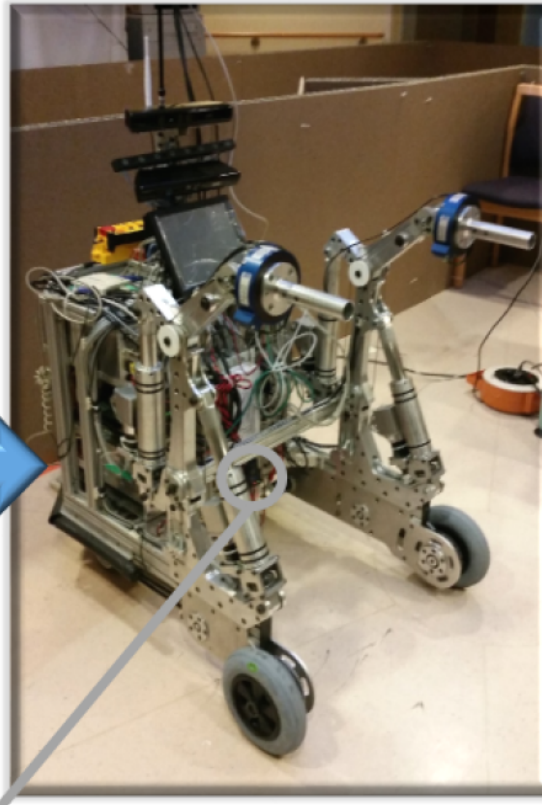
**Multimodal confusability graph**





# Part 3: Multimodal HRI: Applications and Challenges

## assistive robotics



## education, entertainment

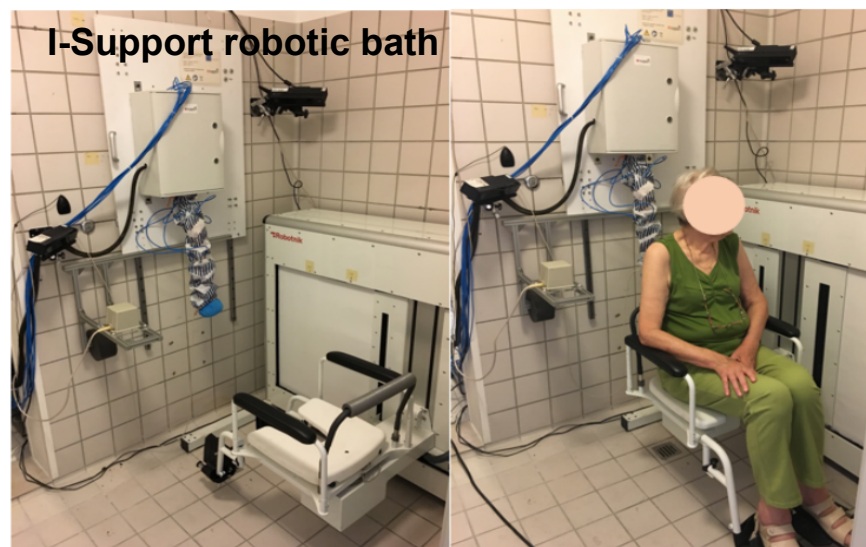
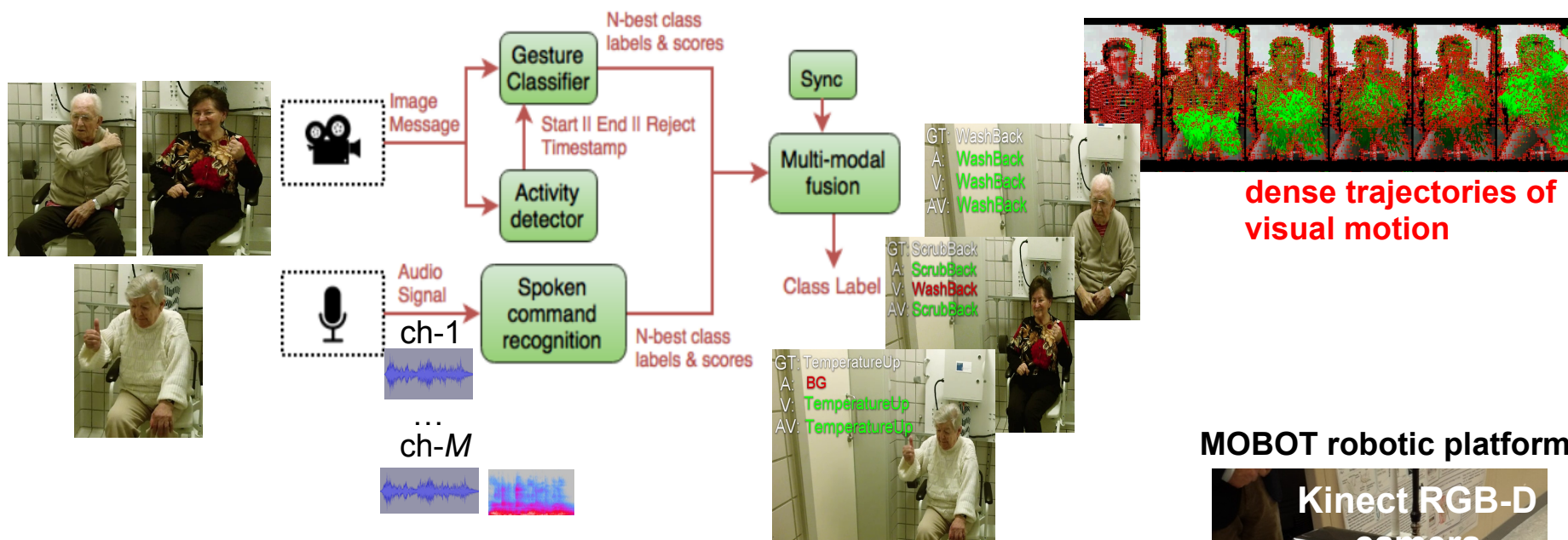


### ■ Challenges

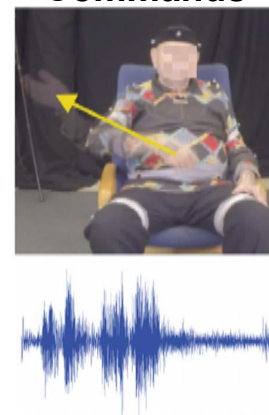
- Speech: distance from microphones, noisy acoustic scenes, variabilities
- Visual recognition: noisy backgrounds, motion, variabilities
- Multimodal fusion: incorporation of multiple sensors, integration issues

□ Elderly users, Children

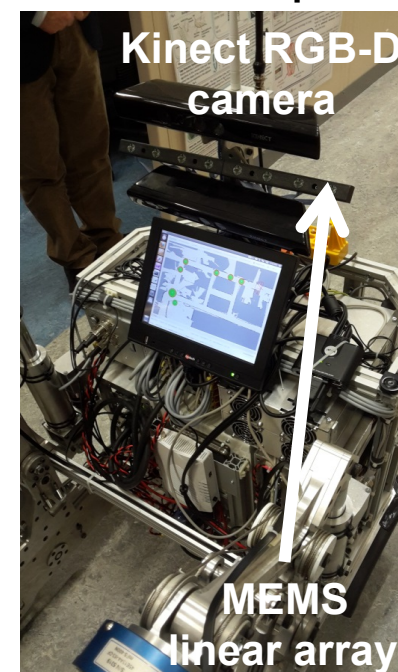
# Part 4: A-V HRI in Assistive Robotics



**Audio-Gestural Commands**

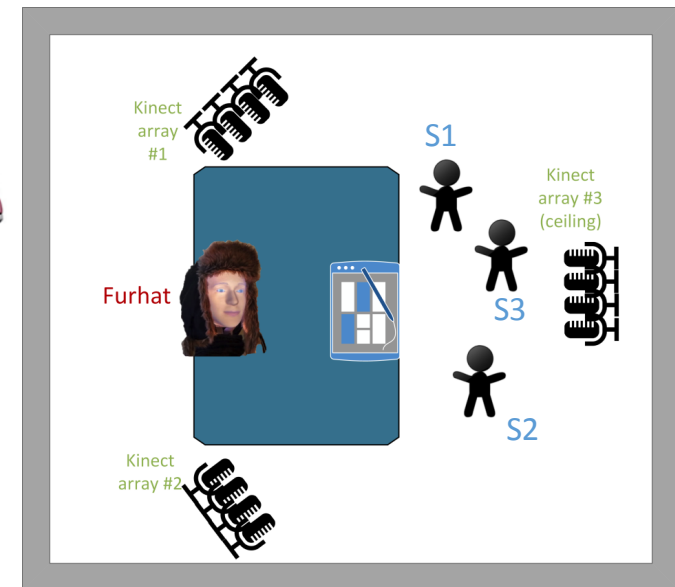
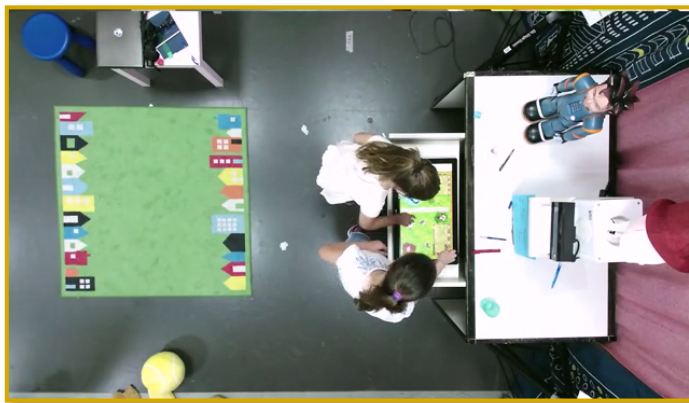
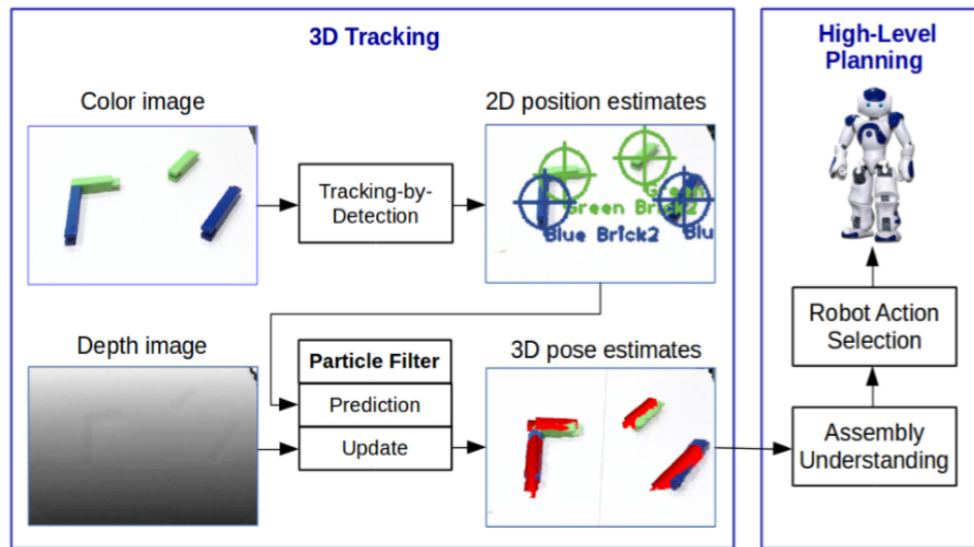


**MOBOT robotic platform**





# Part 5: A-V Child-Robot Interaction



## Collaborators

Chalvatzaki, Georgia  
Dometios, Thanos  
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Potamianos, Gerasimos  
Rodomagoulakis, Isidoros  
Tsiami, Antigoni  
Tzafestas, Costas  
Zlatintsi, Nancy

## Related Research Projects

**COGNIMUSE:** <http://cognimuse.cs.ntua.gr/>



**MOBOT:** <http://mobot-project.eu/>



**I-SUPPORT:** <http://www.i-support-project.eu/>



**BabyRobot:** <http://www.babyrobot.eu/>



**iMuSciCA:** <http://www.imuscica.eu/>

