ECOMODE

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Event-Driven Compressive Vision for Multimodal Interaction with Mobile Devices

What is ECOMODE?

ECOMODE is the acronym for "Event-Driven Compressive Vision for Multimodal Interaction with Mobile Devices" for a European project, which aims at developing and exploiting the quickly advancing biologically-inspired technology of audio-visual information. **This new technological approach is defined as "event-driven, compressive sensing (EDC)".** Through the application of this emerging new technology, the ECOMODE consortium will carry out a new generation of low-power, multi-modal, because involving more than one sense, human-computer interface for mobile devices.

Multimodal systems allow users to interact through input modalities, such as speech, hand gesture and gaze, and to receive information by the system through output modalities, such as speech synthesis and smart graphics which can be opportunely combined. Then a multimodal system has to recognize the inputs from the different modalities combining them according to temporal and contextual constraints.

The aim of this new generation of interfaces is to help the visually impaired and the elderly to overcome everyday issues and to facilitate their daily life.

This European project is coordinated by the University Pierre & Marie Curie (UPMC) through the person of Prof. Ryad Benosman of the Institut de la Vision in Paris.

The consortium consists of 8 beneficiaries from 3 different European countries: France, Italy and Spain, including 3 private companies (StreetLab; Innovati; Chronocam) and 1 organization exclusively dedicated to the management and administration (Foundation of Scientific Cooperation for Hearing and Seeing, FSCHS).

The ECOMODE project is supported by the European Commission for a period of 48 months from January 2015.

The beneficiaries are:

1	University Pierre & Marie Curie (UPMC)	Paris, France	*Ryad Benosman (coordinator) Xavier Clady*
2	Italian Institute of Technology (IIT)	Genoa, Italy	*Chiara Bartolozzi Leonardo Badino*
3	Consejo Superior de Investigation Scientifica (CSIC)	Sevilla, Spain	*Bernabé Linares-Barranco*
4	StreetLab (STL)	Paris, France	*Chris Reeves*
5	Innovati (INNO)	Madrid, Spain	*Gema Maestro Andrew Watkinson*
6	Foundation Bruno Kessler (FBK)	Trento, Italy	*Nadia Mana*
7	Chronocam (CHRONOC)	Paris, France	*Cristoph Posch Luca Verre*
8	Foundation of Scientific Cooperation for Hearing and Seeing (FSCHS)	Paris, France	*Claire Carapezzi*

The Facts

The visually impaired and the elderly, often suffering from mild speech disorders and motor disabilities, are experiencing a significant increasing barrier in accessing Information and communications technology (ICT) and services. Yet, in order to be able to participate in a modern, interconnected society that relies on ICT, for handling everyday issues, there is clear need also for these user groups to have access to ICT, in particular by means of cheap and small mobile platforms such as tablet computers or smartphones.

Work plan and objectives

The project is based on two main technology pillars: (A) an air gesture control set, and (B) a vision-assisted speech recognition set. (A) exploits the EDC vision sensors technology for low and high level hand and finger gesture recognition and subsequent command execution; (B) combines temporal dynamics from lip and chin motion information acquired using EDC vision sensors, with the EDC auditory sensor input to gain robustness and background noise immunity of spoken command recognition and speech-to-text input.

In contrast to state-of-the-art technologies, both proposed human-computer communication channels, vision and audition, will be designed to work reliably under uncontrolled conditions. **Particularly, mobile devices equipped with the proposed interface technology will facilitate unrestricted outdoor use under uncontrolled lighting and background noise conditions.**

Furthermore, due to the powerful encoding technology, needing very sparse input from the sensors to deliver a useful information, the EDC application excels conventional approaches in energy efficiency, yielding an ideal solution for mobile, battery-powered devices.
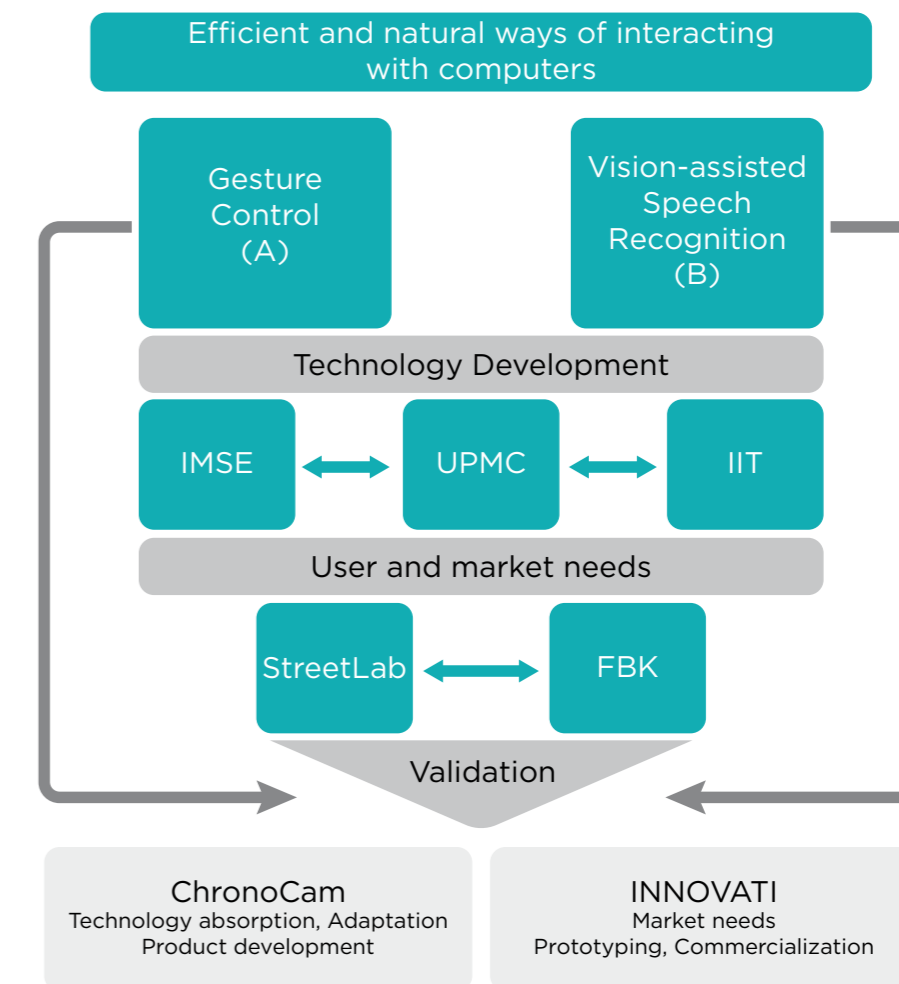
ECOMODE is committed to pave the way for industrialization of commercial products by demonstrating the viability of the developed hardware and software components and their incorporation into a mobile platform.

Efficient and natural ways of interacting with computers

Gesture Control (A)

Vision-assisted Speech Recognition (B)

Technology Development

IMSE — UPMC — IIT

User and market needs

StreetLab — FBK

Validation

ChronoCam
Technology absorption, Adaptation Product development

INNOVATI
Market needs Prototyping, Commercialization