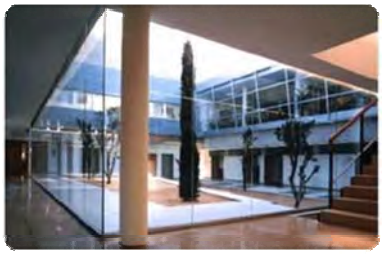


Computer Vision Projects

Petia Radeva

University of Barcelona &
Computer Vision Center

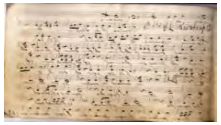
Presentation to: AComIn: Advanced Computing for Innovation

Sectorial focus of the R&D groups

ADAS: Advanced Driver Assistance Systems

ISE: Image Sequence Evaluation

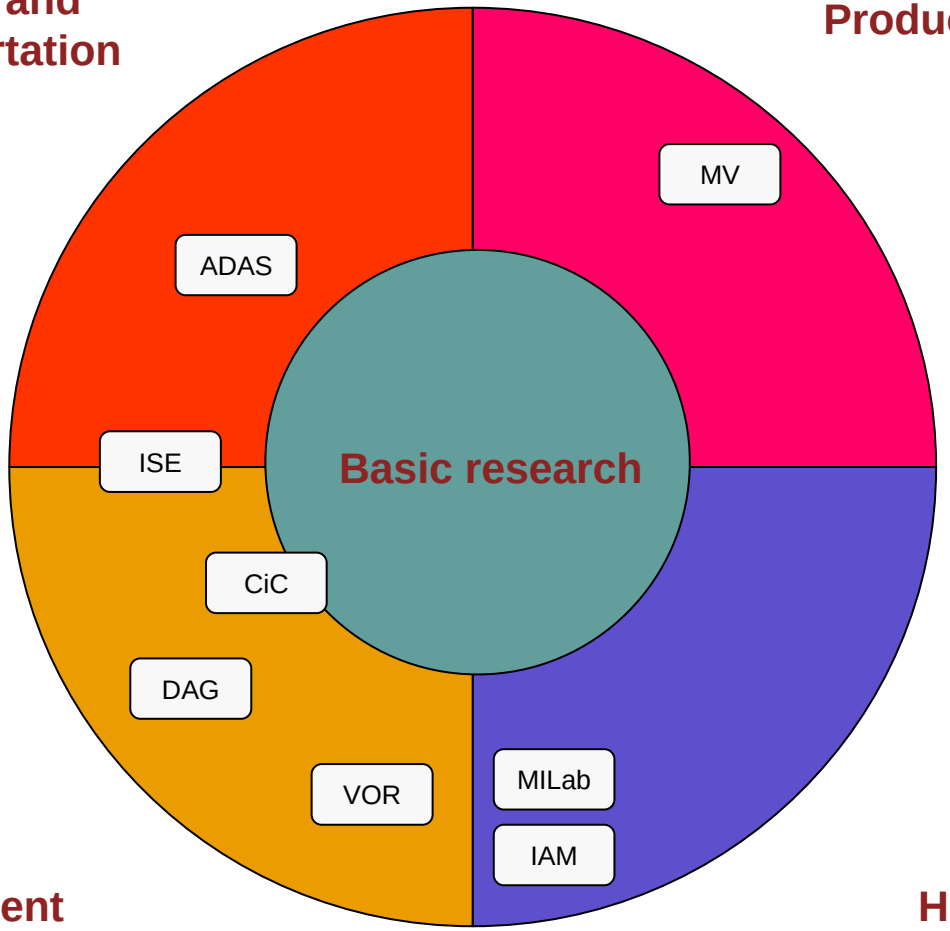
DAG: Document Analysis Group



VOR: Visual Object Recognition

Mobility and transportation

Production

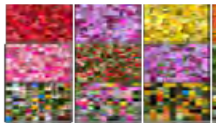


Intelligent contents and media

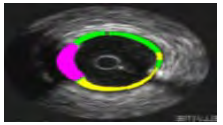
Health and wellfare

MV: Machine Vision

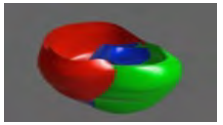
CIC: Colour In Context



MILab: Medical Imaging Laboratory



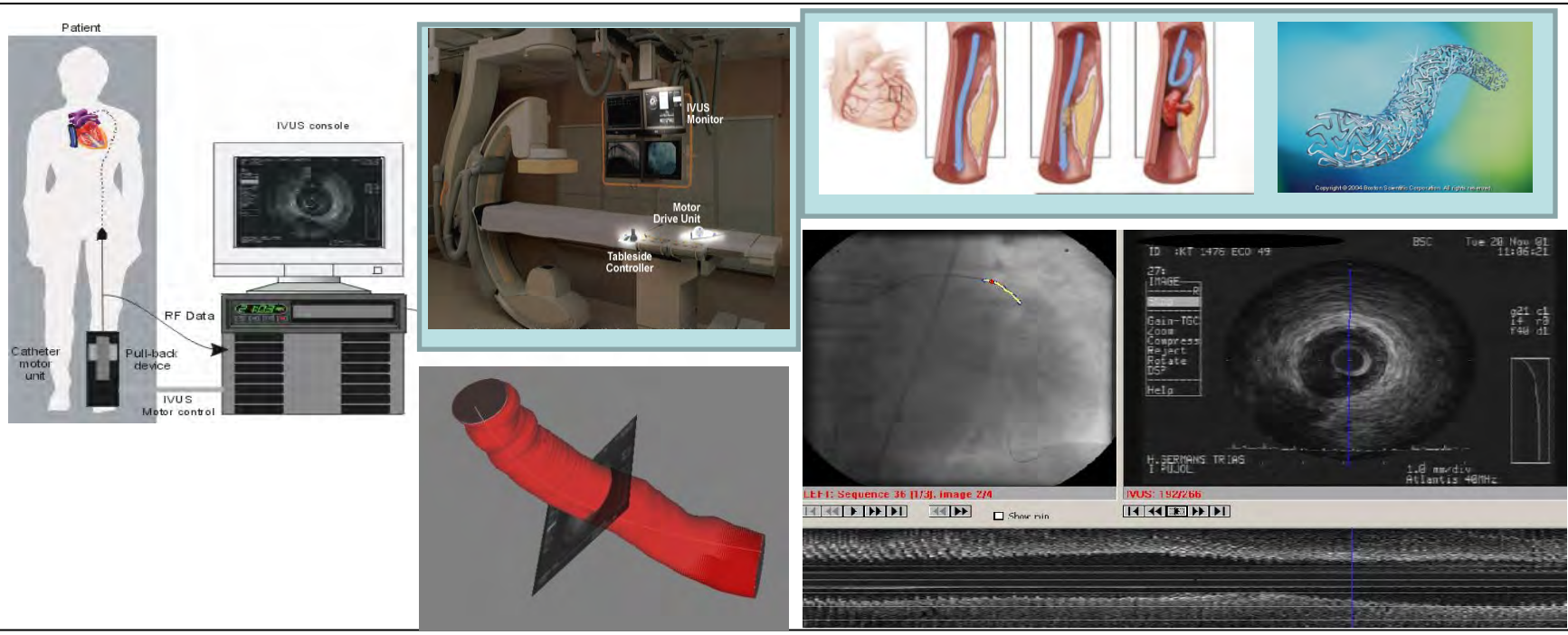
IAM: Interactive & augmented modeling



Interactive Fusion of IVUS and Angiographic Coronary Images (iFusion Workstation)

IVUS and Angiography images fusion to allow exact correspondences between both modalities, 3D measurements and reliable 3D models of vessel and lumen.

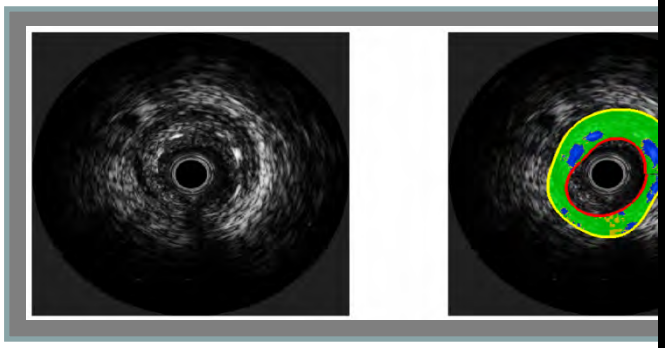
Group: MILab	Partners: Boston Scientific Corp, HUGTiP

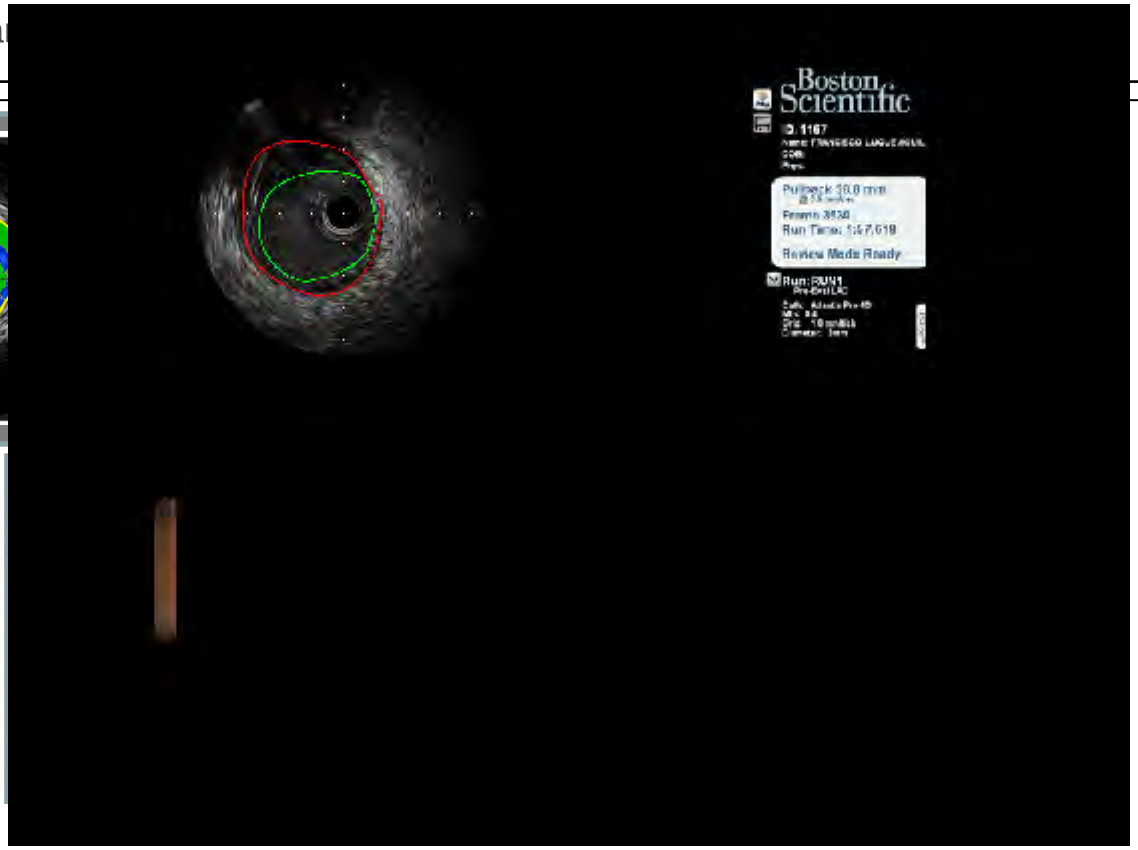


IVUS Tissue Characterization

Analysis of the RF data that forms IVUS images to precisely localize and characterize the plaque that narrows the lumen (blood area).

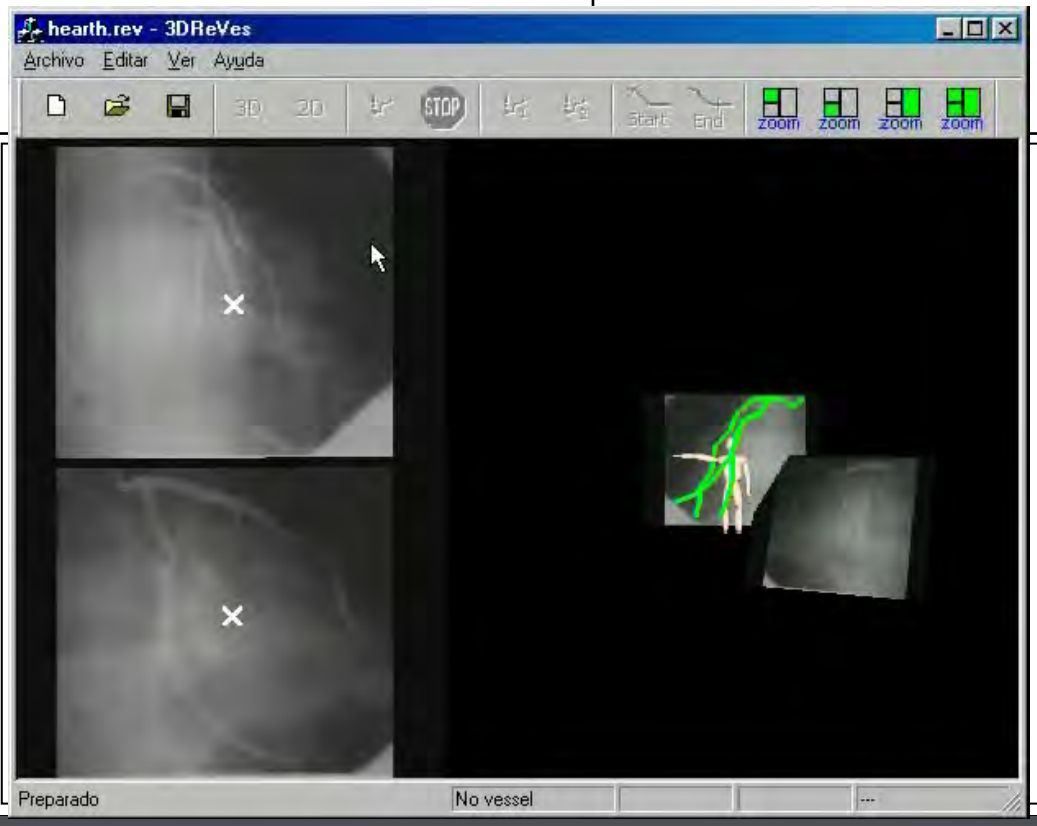
Group: MILab	Pa

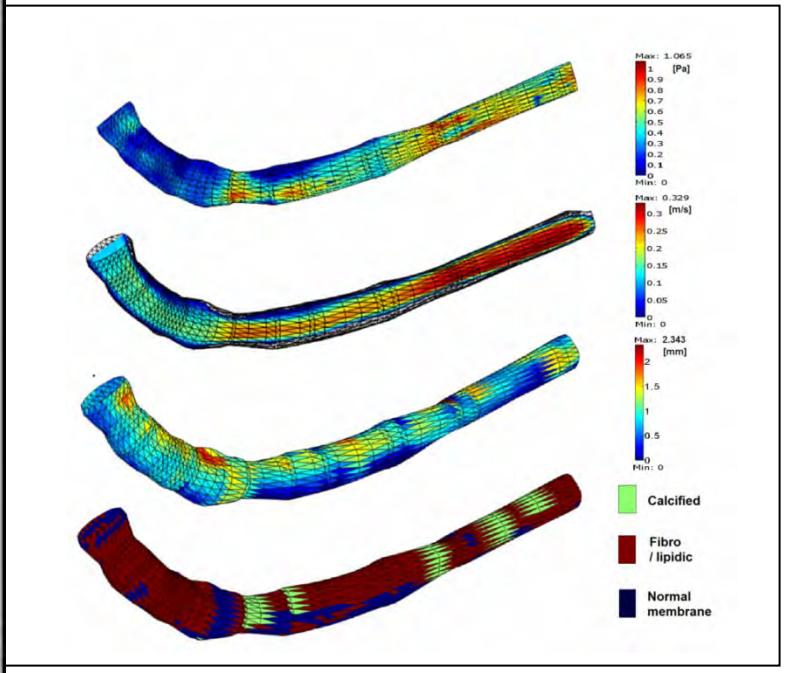




3D Positioning by Triangulation

Software for tracing the correspondence in space of 2D images by determining the coordinates and intersections between them and obtaining the conversion algorithms.

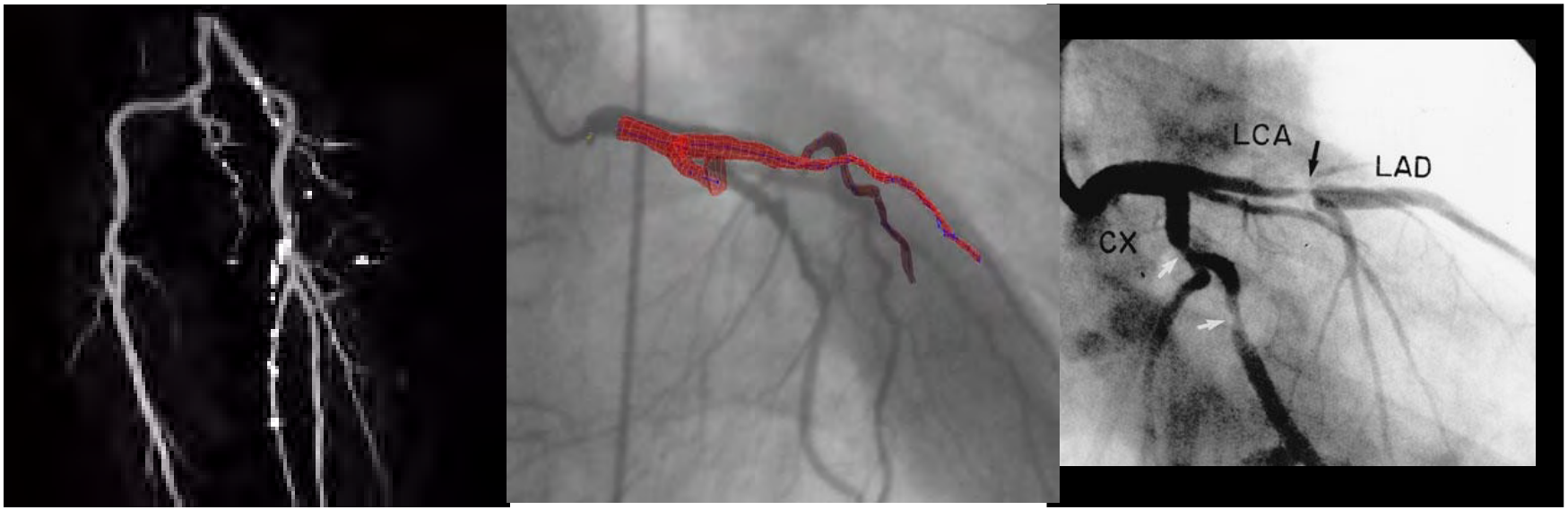




La Marató de TV3

Obstruction of coronary vessels is one of the main coronary lesions with severe health consequences. Opening chronically obstructed vessels is a recent interventional technique that has allowed to increase the success of coronary lesions treatment having implications to patient survival in a significant degree. In this project, we develop advanced computer vision technique to register a 3D coronary model extracted from preoperative CT images to 2D intraoperative images in an image-guided intervention framework.

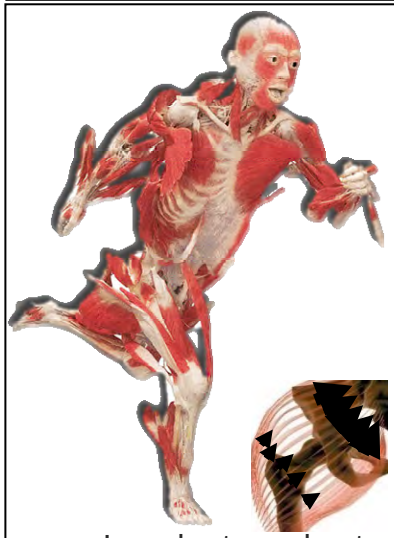
Group: MILab	Partners: Hospital “Santa Creu i Sant Pau”, Hospital Clínic de Barcelona, Fundació La Marató TV3



MIOCARDIA: Integration Model definition of the function and anatomy of the musculature of the left ventricle (TIN2009-13618)

An Integrative Model of the Functionality and Muscular Anatomy of the Left Ventricle

Group: VGM	Partners: Hospital Sant Pau, BSC



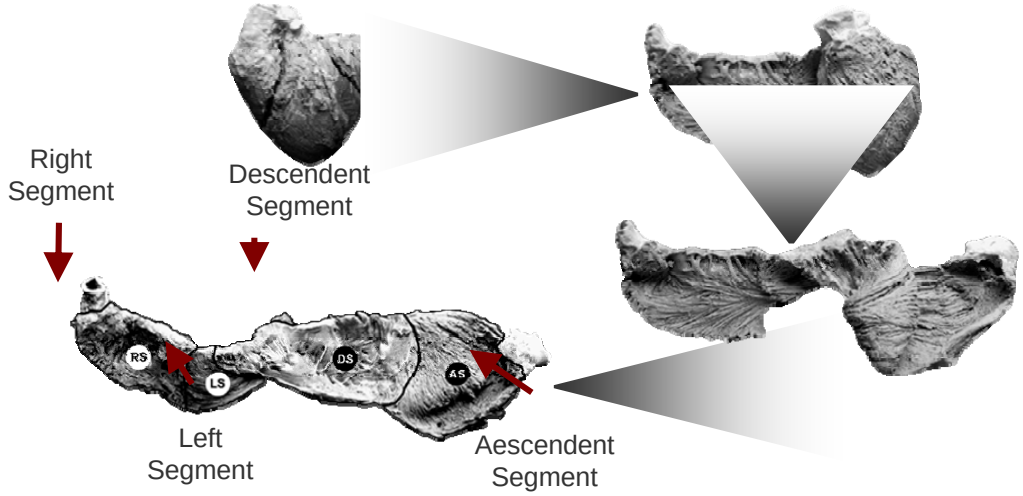
Muscle biomechanics strongly depends on the spatial disposition of its fibers.

In order to understand their behavior, both:

- Function
- Anatomy

should be taken into account.

Dr. Torrent-Guasp: Helical Ventricular Myocardial Band (HVMB) concept: Left and Right ventricles ⇔ Unique muscular band twisted in 2 helical loops from the root of the pulmonary artery to aorta.

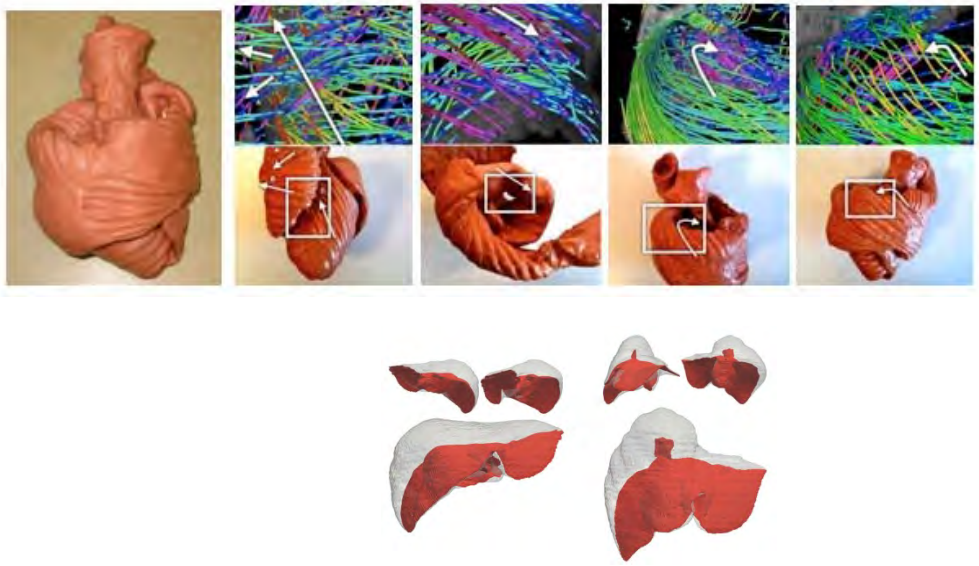


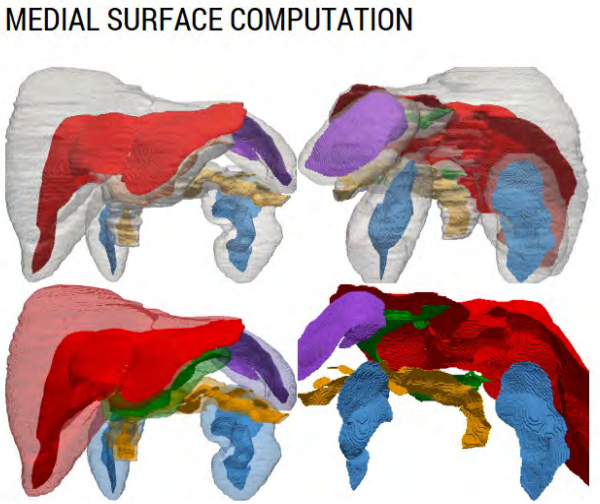
Bovine heart (photos from Kocica *et al.*, 2006)

Integration of anatomical and functional data using standardized coordinate maps based on physiological markers

The aim of the project is to mimic the natural clinical language used to describe anatomical structures and introduce physiological landmarks as references in coordinate systems that allow an accurate positioning in the anatomy of each subject regardless of the imaging modality.

Group: IAM	Partners: Ministerio de Economia y Competitividad



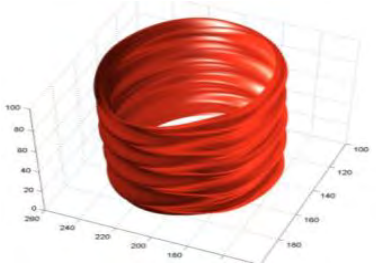


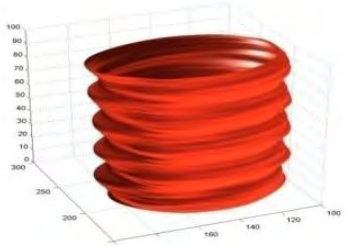
Miocardia

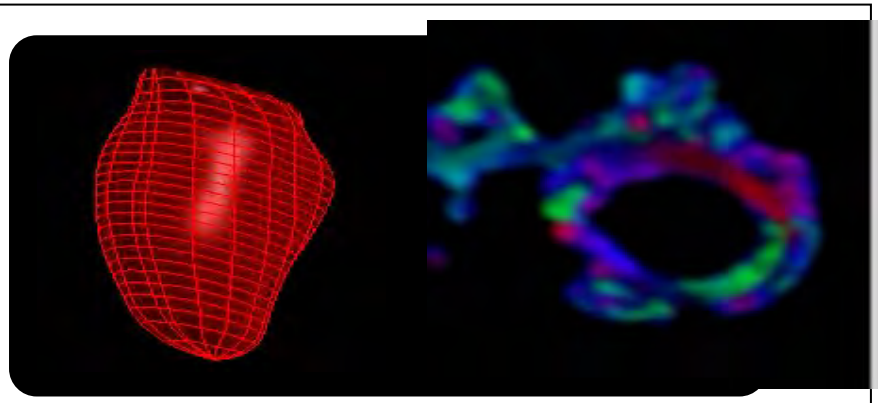
Computational model of the left ventricle's anatomy and functionality in order to establish a comparison framework for multiple cardiac imaging modalities.

Group: VM	Partners: Barcelona Super Computing, Hospital de Sant Pau i de la Santa Creu

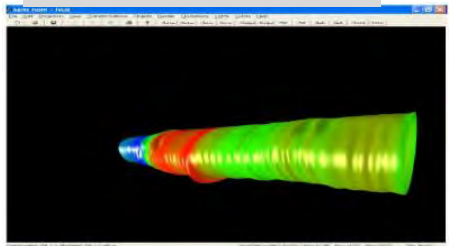
Data Visualization

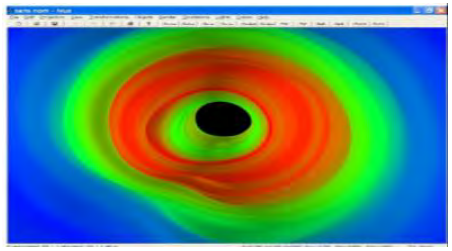


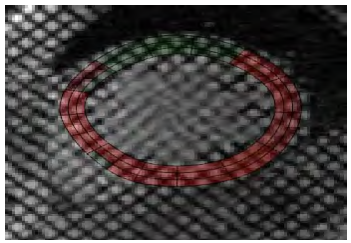




Healthiness Maps



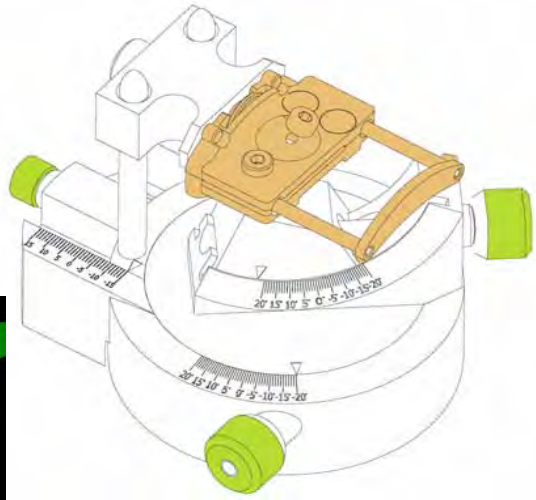




Vision Based System For Total Knee Replacement

System based on image analysis, which simplifies surgery procedures and minimizes material requirements: No markers, no cameras, no robots.

Group: MV	Partners: Hospital Verge de la Cinta de Tortosa,Traiber



TKR
Artroplàstia Total de Genoll Assistida per Ordinador

Una col·laboració del CVC amb TRAIBER S.A. i l'Hospital de Tortosa "Verge de la Cinta"

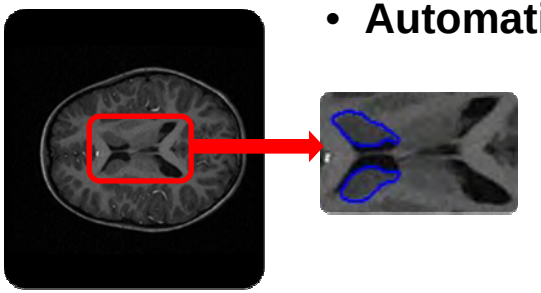
Automatic analysis of brain anatomical differences in ADHD children

•**Aim:** automatic techniques for detection of volumetric differences in certain brain structure, as the **caudate nucleus**.

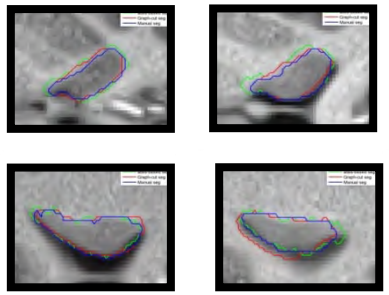
Group:MiLab

Customer: Cognitive Neuroscience Group, Hospital del Mar

•ADHD - the most common childhood psychiatric disorders (8-12% worldwide)
• ADHD is a neurodevelopmental disease characterized by:
Inattention, Hyperactivity, Impulsivity
• Structural neuroimaging studies identify the brain circuits altered in ADHD.



• **Automatic segmentation** of Caudate.

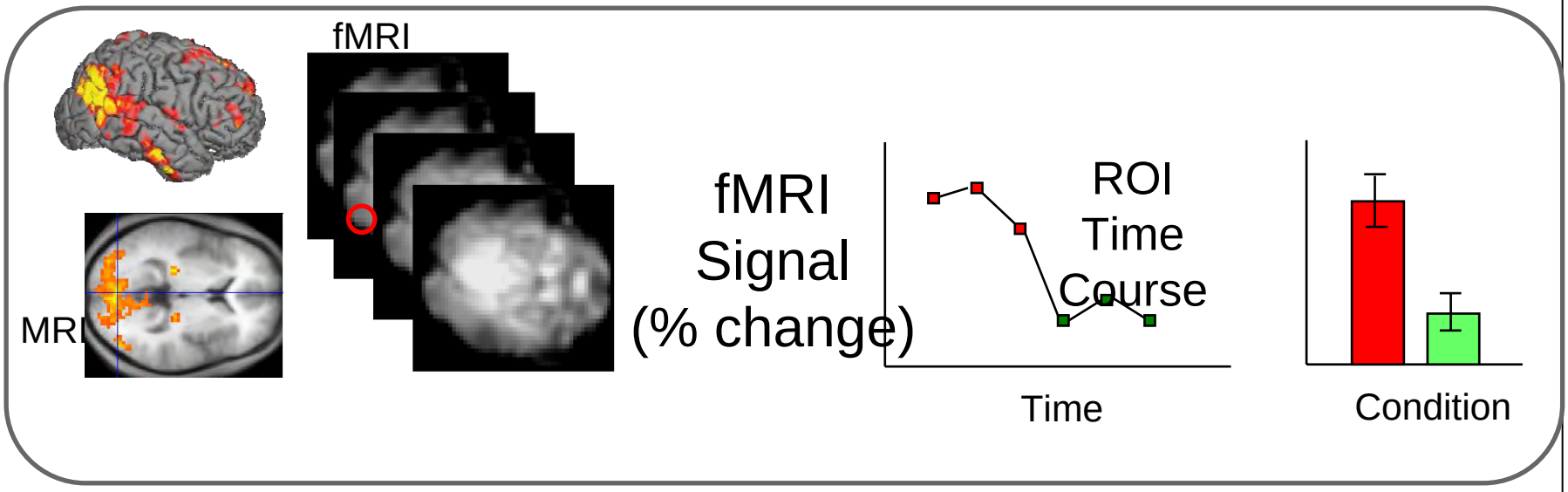


• **Diagnostic Test.**

Analysis of Brain fMRI

Automatic analysis of neural activity and connectivity in groups of people (ADHD, obese, etc. vs. control) based on a Region-of-interest (ROI) ICA analysis.

Group:MiLab	Customer: Hospital Clinic and CST

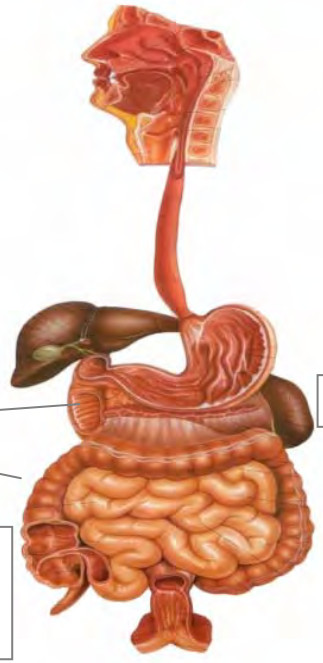


Intestinal Motility Analysis of Endoluminal Images Captured by a Wireless Capsule Camera

Analysis of the patterns of intestinal contractions obtained by labelling all the motility events present in a video from a capsule with a wireless micro-camera.

Group: MILab	Partners: Given Imaging LTD

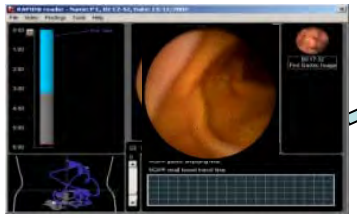
- M2A: 48 hours
- Battery: 6 hours



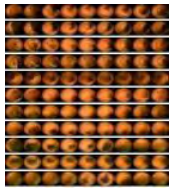
Clinical interest :

Duodenum-Cecum +/- 4 hours

Expert labeling



Contractions set



Categorization

a)

b)

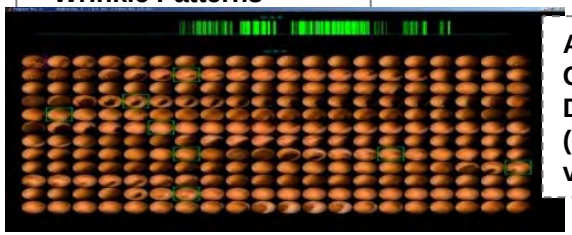
c

...

Image database

Feature Extraction/Descriptors

- Image Volume
- Statistical Moments
- Wrinkle Patterns



Temporal Analysis

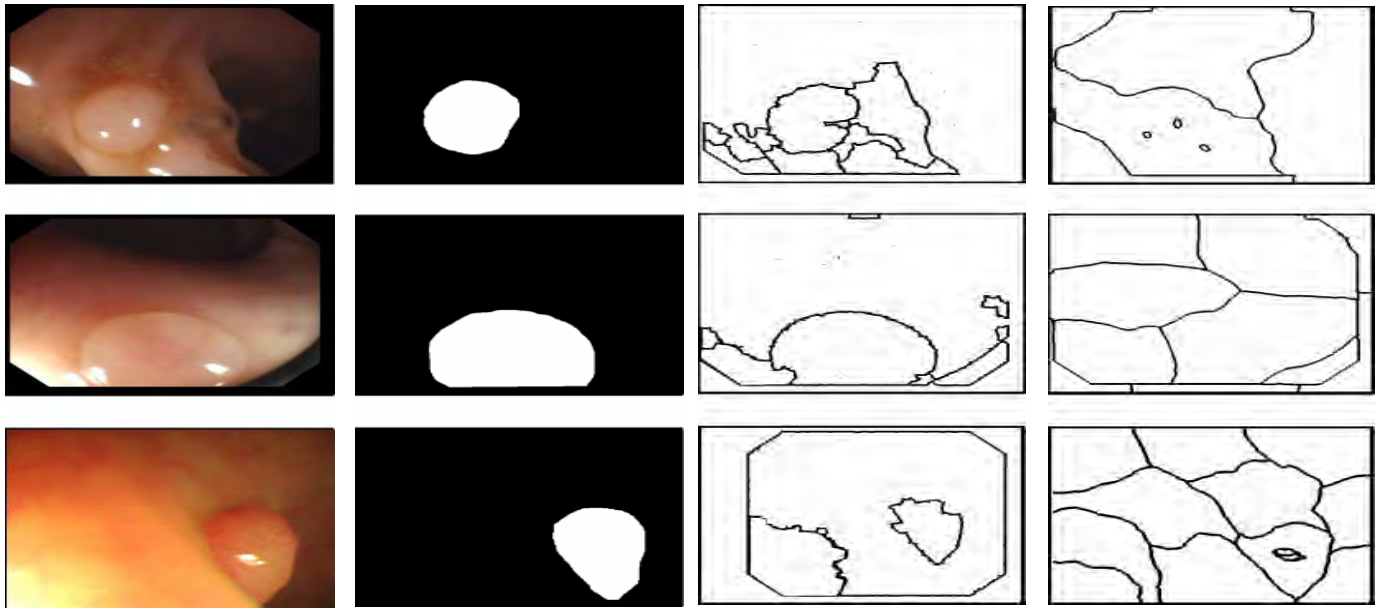
- Variable time sequences
- Cascade system
- Support Vector Machines

AUTOMATIC CONTRACTION DETECTION (ready for expert validation)

Colon-QA (quality assessment)

A software to obtain measures to assess the quality of the colonoscopic intervention. It also allows the RT colon cancer detection and to train physicians on this medical routine.

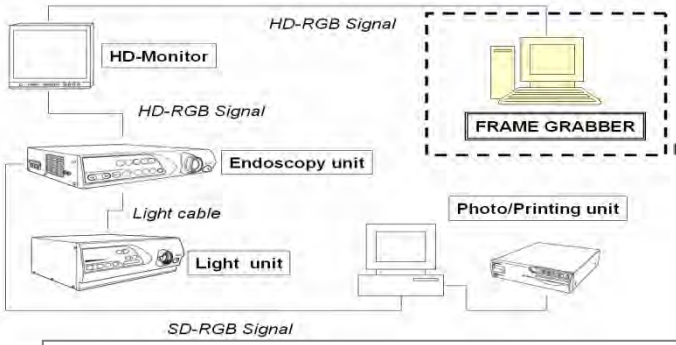
Group: MV	Customer: MICINN

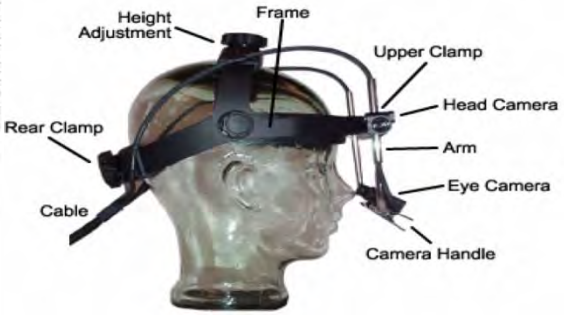


COLON-QA: Real time detection of colon cancer for quality assessment in colonoscopy (TIN2009-10435)

Real time detection of colon cancer for quality assessment in colonoscopy.

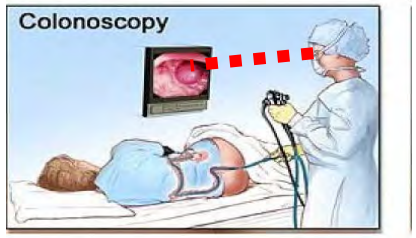
Group: MV	Partners: Trinity College, Beaumont and St. James's Hospitals, Dublin.





The experts visualize the video with an EYE-TRACKER. The gaze position is used to label the database.

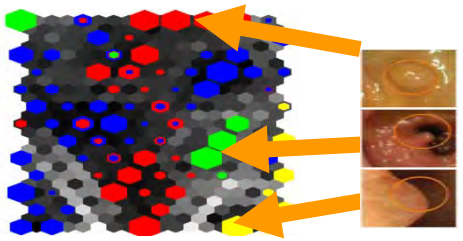
Colon cancer is localized **on each frame**



Feature Extraction Methods

Fast Machine Learning Algorithms

Towards ONLINE performance



Different *types of polyps* are automatically characterized by Machine Learning-based systems

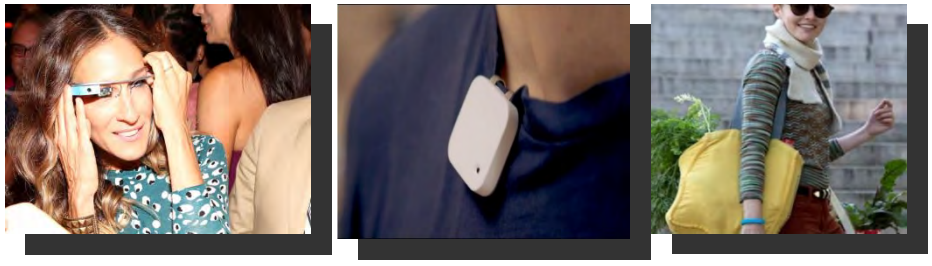
Life-logging for wellfare

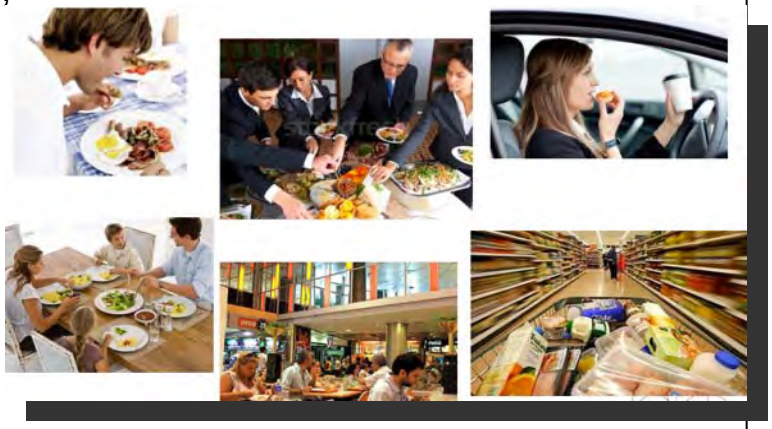
Applying Machine Learning and Computer Vision to characterize healthstyle

Group: MiLAB	Customer: Consorci Sanitari de Terrassa, Foundació “Jaume Cassademont”

To derive lifestyle patterns from visual lifelogs and to conduct a study on the feasibility of **automatically generation of lifestyle patterns and interpretations** to be used in the future to improve lifestyle of individuals.

- how to extract **semantic units** related to the lifestyle and their context relation,
- how to **segment lifelog data** into meaningful events,
- what are the semantic units that **characterize the lifestyle** of individuals,
- what is their **relation and how the context** affects them,
- how to extract and **characterize lifestyles** patterns,
- what is the **healtstyle**, etc.





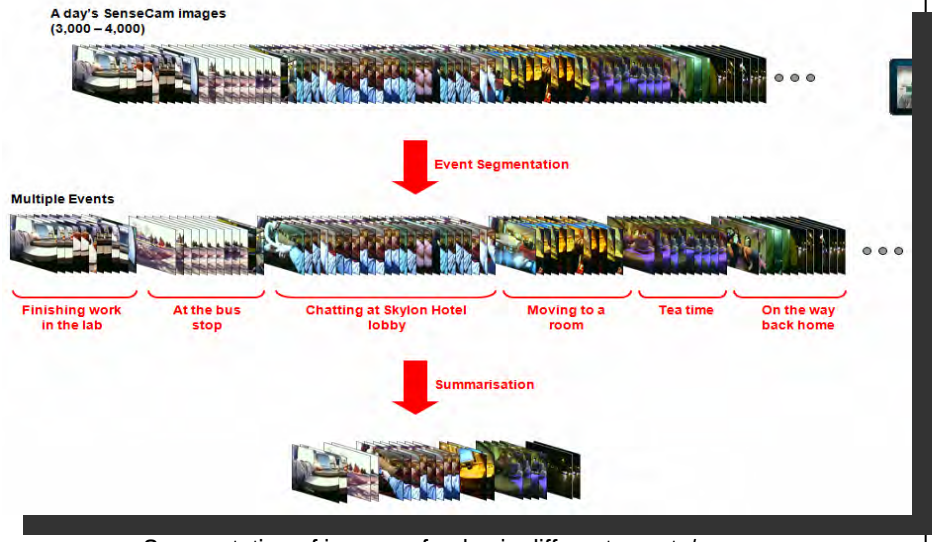
Life-logging for MCI treatment

Applying Machine Learning and Computer Vision to characterize and assist healthstyle of Alzheimer people

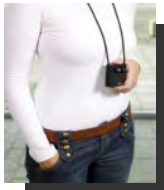
Group: MiLAB	Customer: Consorci Sanitari de Terrassa

To develop, for subjects with MCI, a program-based life-logging captured by a Wearable Camera (WeC) **recording specific autobiographical episodes for stimulating posterior-ly episodic memory function** known to be deficient in MCI.

•The challenge is to create an application to manage this large collection of images, which raises the issue of how **to organize the large image collection into manageable event segments**, which can be easily retrieved by users in a therapeutic context as a multimodal cognitive stimulation.



Segmentation of images of a day in different events/scenes



•To explore the association between changes in **biomarkers in cognitive, functional and emotional outcomes.** This approach will help us to learn more about the underlying biological mechanisms for **how effective behavioural interventions improve cognitive and functional outcomes.**

Life-logging for obese treatment

Applying Machine Learning and Computer Vision to characterize and assist healthstyle of obese people

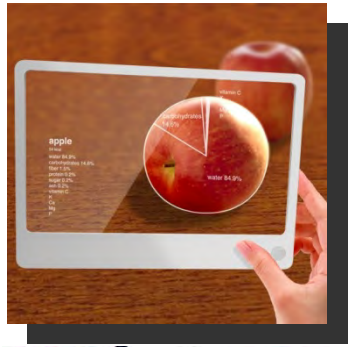
Group: MiLAB	Customer: Consorci Sanitari de Terrassa, Foundació “Jaume Cassademont”

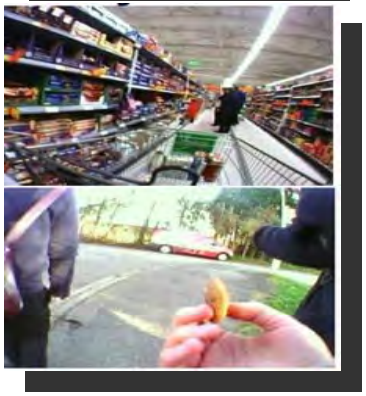
The DALIDA model of eating behaviour will be able to construct the eating pattern of an individual answering to questions like: when the person used to eat, how much, how long, in which context and how it influences to the individual, etc:

Eating pattern in each meal: portion size, time (hour) & velocity (fast, slowly), meals frequency (missing meals, nibbling).

Quality of diet: semi-automatic identification of the daily choice of food and drinks, computation of calories and composition of the diet: e.g. vegetable.

Environmental factors: exposition to eating stimulus during the day (time in contact with food and drink stimulus out of time of meal intake), place (home, bar), situation (e.g. eat while watching TV or while working, etc.).





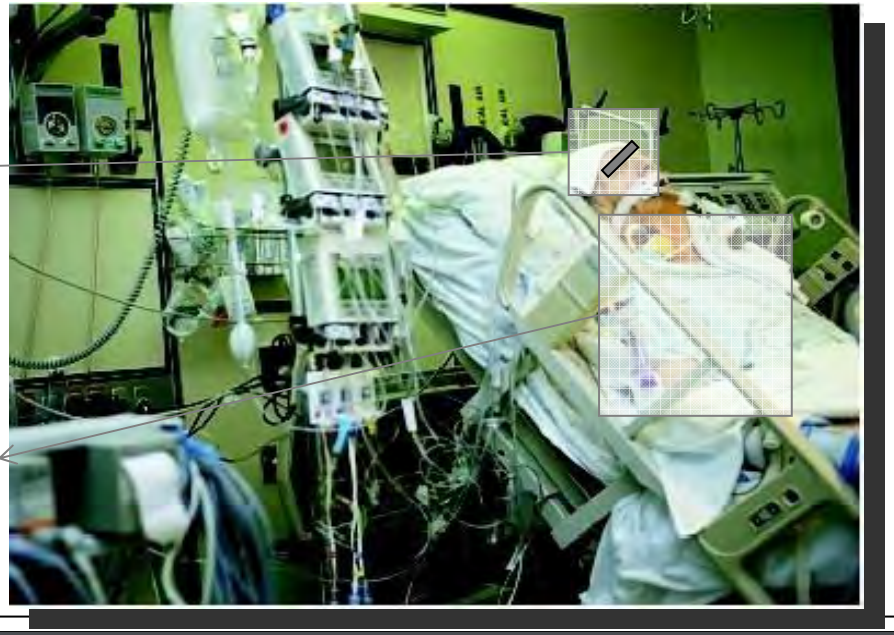
Monsurí (facial expression detection)

A camera, connected to a computer, registers all the movements and facial expressions of the hospitalized patients and then analyzes them. When the system detects that the nearness of an agitation episode an alarm is activated so that hospital staff can act before the agitation occurs.

Group: OR	Partners: Hospital “Parc Taulí”

Automatic detection of facial expressions related too anxiety episodes.

Body movement measurement.

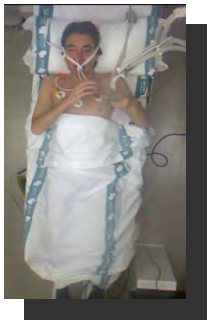


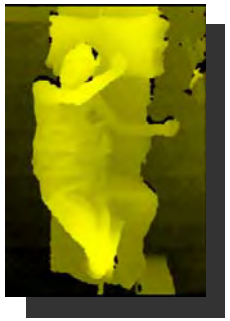
Looking at humans at the ICU

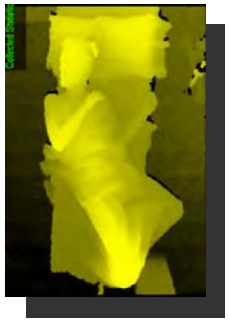
Detection of agitation episodes

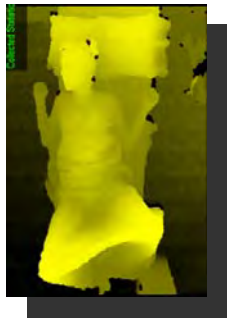
Group: OR	Customer: Hospital “Parc Tauli”

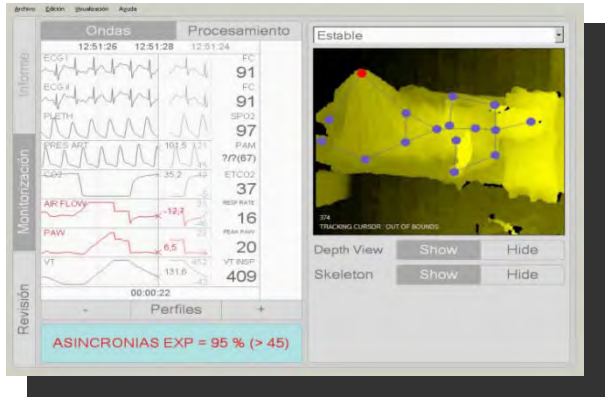
Agitation is a psychomotor disturbance characterized by a marked increase in motor and psychological activity in a patient. It occurs very frequently in the intensive care unit (ICU), affecting 71% of sedated adult patients during 58% of ICU patient-days. However, current methods of assessing agitation are subjective and prone to error. Using RGBD data and advanced CV techniques, agitation is detected in its initial phase.







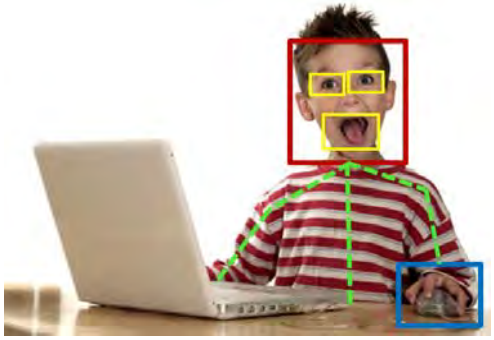




The incidence of the “MOTIVATION” at the construction of the (ADHD) Attention Deficit Hyperactive Disorder

The definition of ADHD is based on two well-known standard criteria technologies, which mechanism validates three blocks: the attention deficit, hyperactivity and impulsiveness. However, the motivational variable does not appear in any of them. Clinical experience shows that the variable motivation has an important role. Our aim is to determine the weight of the motivation in the clinical construct of ADDH.

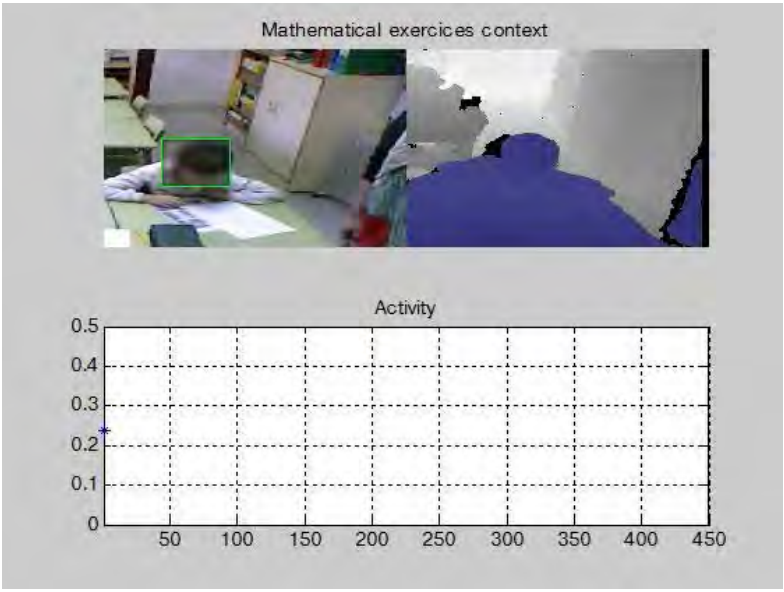
Group: MILab	Partners: Parc Taulí i Centre de Salut Mental Infantil i Juvenil de Martorell



Supported diagnosis

A system which allows to extract diagnostics patterns for hyperactive children.

Group: HuPBA	Customer: Hospital “Parc Tauli”

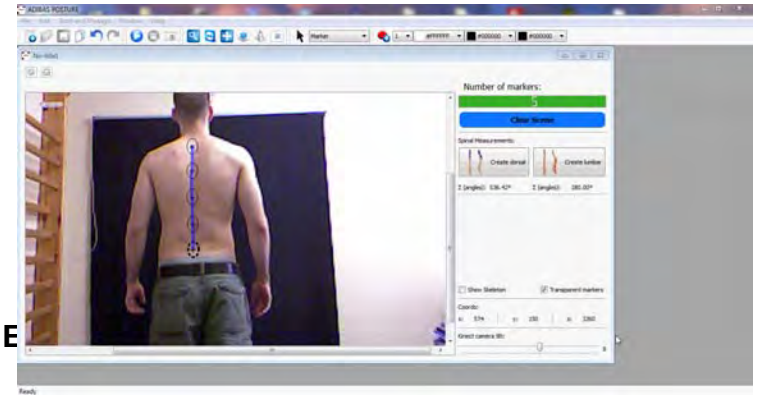


HuPBA – Intelligent Technology in Physiotherapy and Rehabilitation

Description: **Multi-modal data analysis from RGB-Depth data for human body segmentation, biometry analysis, accurate distance and angle measurements, supported diagnosis, feedback and recommendation in physiotherapy, rehabilitation, fitness conditioning, and improved autonomy.**

Group: Human Pose Recovery and Behavior Analysis	Partners: IFGM Physiotherapy, Imserso, SAR

Biometry, spine and range of movement analysis



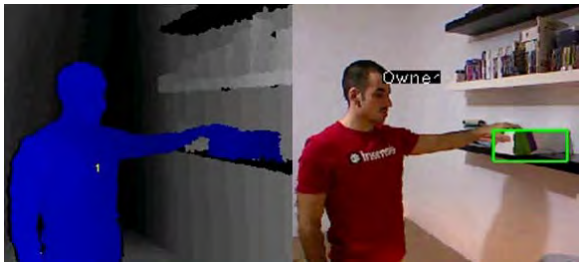
HuPBA – Depth data analysis

Description: **Next generation of Computer Vision, Multi-modal data analysis, and learning techniques from Depth data. Applications in Human Computer Interaction, Intelligent Surveillance, Smart Cities, and Health (e.g. physiotherapy, rehabilitation, assistance for the elder, and supported diagnosis of physical/mental diseases).**

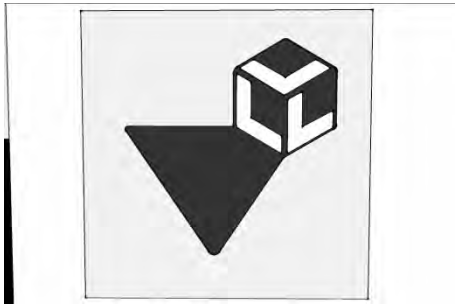
Group: Human Pose Recovery and Behavior Analysis

Partners: ISE, Imersivo, Hospital Taulí, IFGM Physiotherapy, Imserso, Dept. Justicia Generalitat

Human Computer Interaction



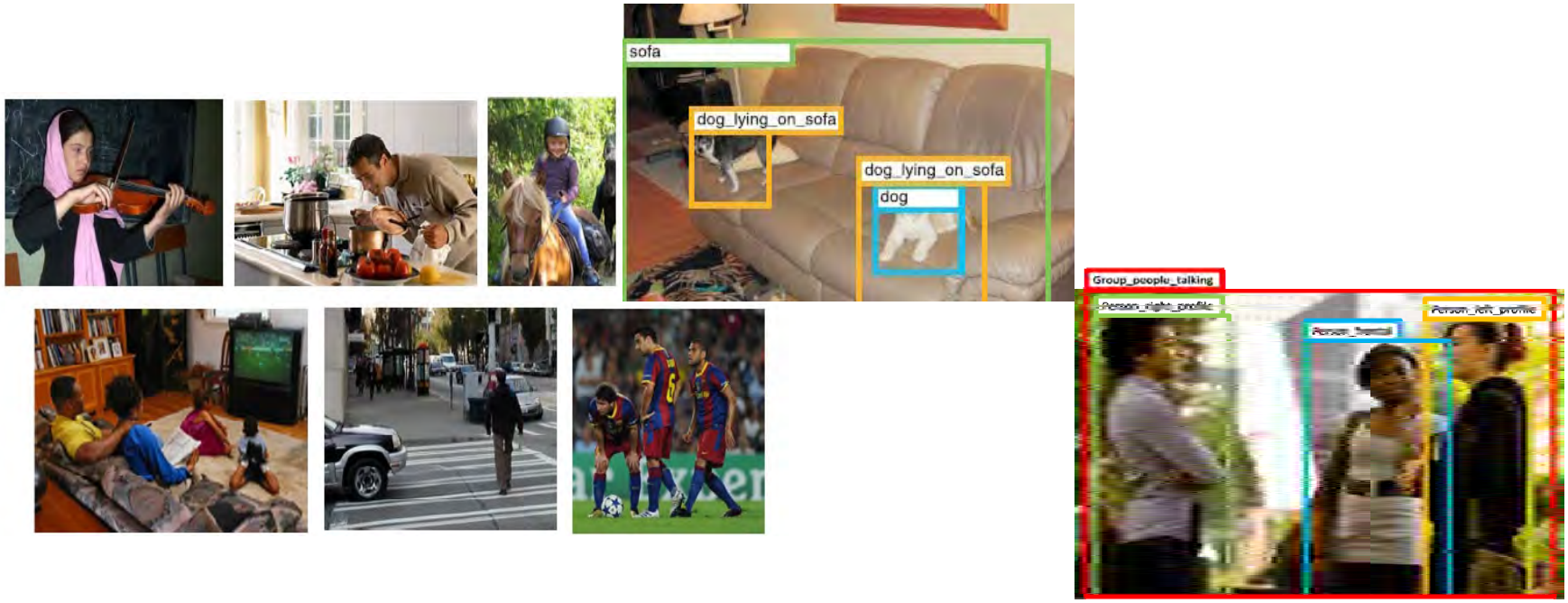
Smart Cities and Smart Environments
Assistance for the elder and people with mental/physical disabilities



PRAGMATA – Developing Visual Hermeneutics for Image Understanding

The aim of the project is given an image sequence of a human action, to automatically generate semantic labels descriptions of the objects and subjects appearing in the image and their relationship to the humans.

Group: ISE	Partners: Ministerio de Economia y Competitividad



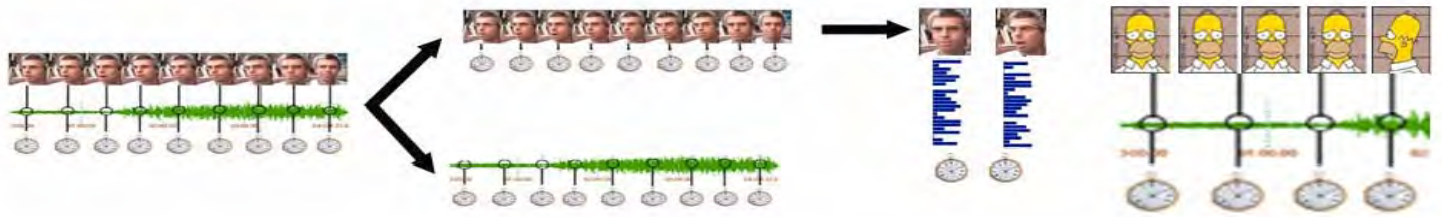
ERINYES:Epistemological Reasoning for the Interpretation of coNtext and securitY Events in Surveillance (TIN2009-14501-C02)

Epistemological Reasoning for the Interpretation of coNtext and securitY Events in Surveillance	
Group: ISE Lab	Partners: UAB, CVC

Video Call Avatar Animation

Face detection for video call avatar animation.

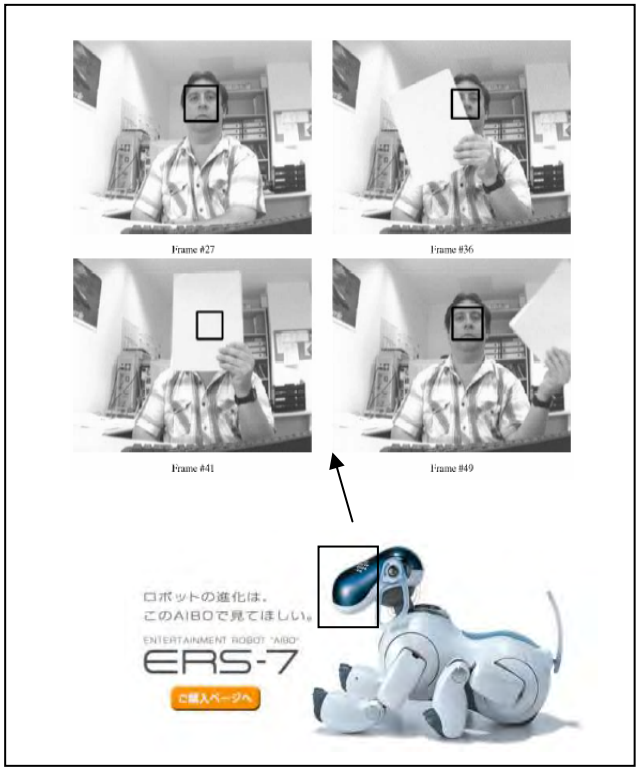
Group: OR	Partners: Alcatel Barcelona



Face Detection and Recognition

Real-time visual object detection and recognition of people by their facial features.

Group: OR	Partners: MICINN

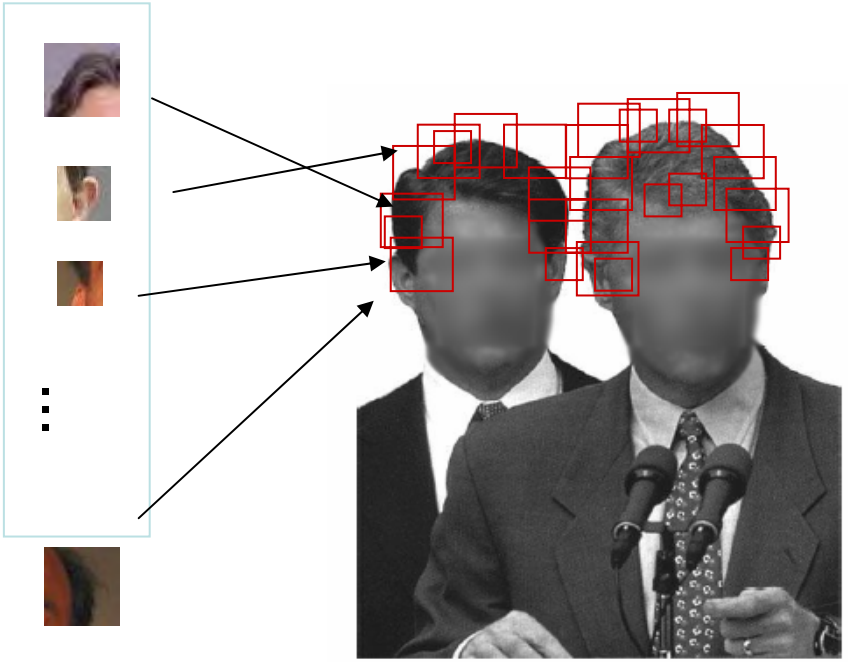


Face Detection and Recognition Using Facial External Features

Algorithms that use external face features (hair, chin, ears) to develop more robust face recognition systems.

Group: OR	Partners: Plan Nacional

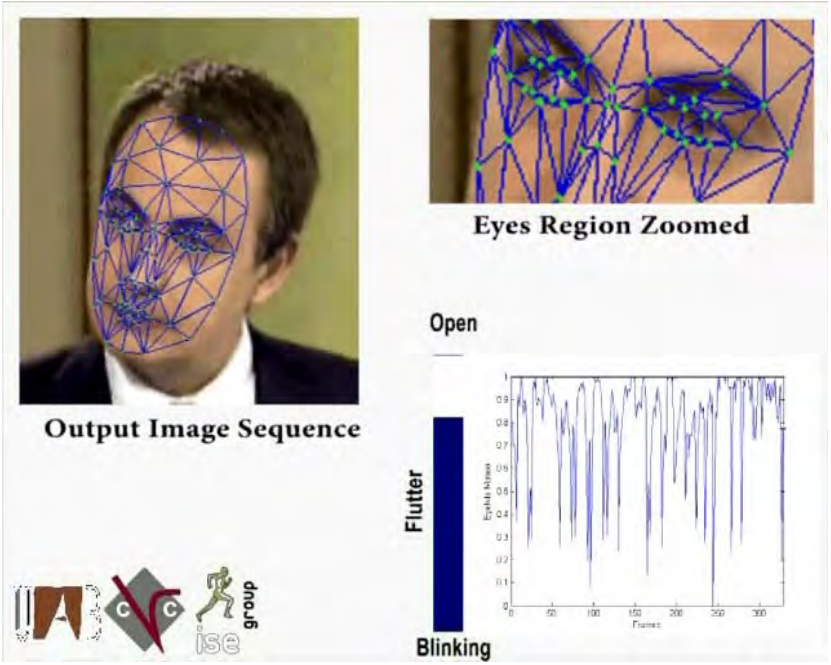
Il·lusió presidencial

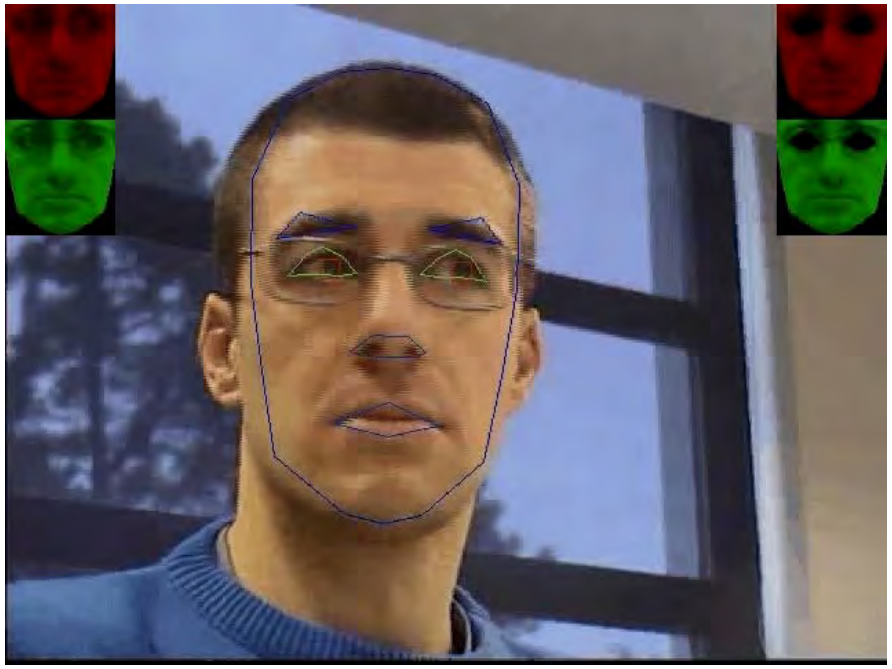


Tracking of Face Motion

Hierarchical face and gaze tracking by wise-combination of Appearance-based Trackers, estimating predefined facial features in monocular video sequences.

Group: ISE	Funding: Ministerio de Ciencia e Innovación





Human-Expressive Representations of Motion and its Evaluation in Sequences

Extract descriptions of human behavior from videos in a restricted discourse domain.	Possible Applications: •Smart video surveillance: intruder detection, suspicious action detection. •Automatic Animation: language-based control of virtual actors and virtual worlds. •Behavioral Animation: games, intelligent agents, interactive play-spaces, publicity. •Advanced User Interfaces: friendly interfaces, gesture –driven control, teleconferencing.

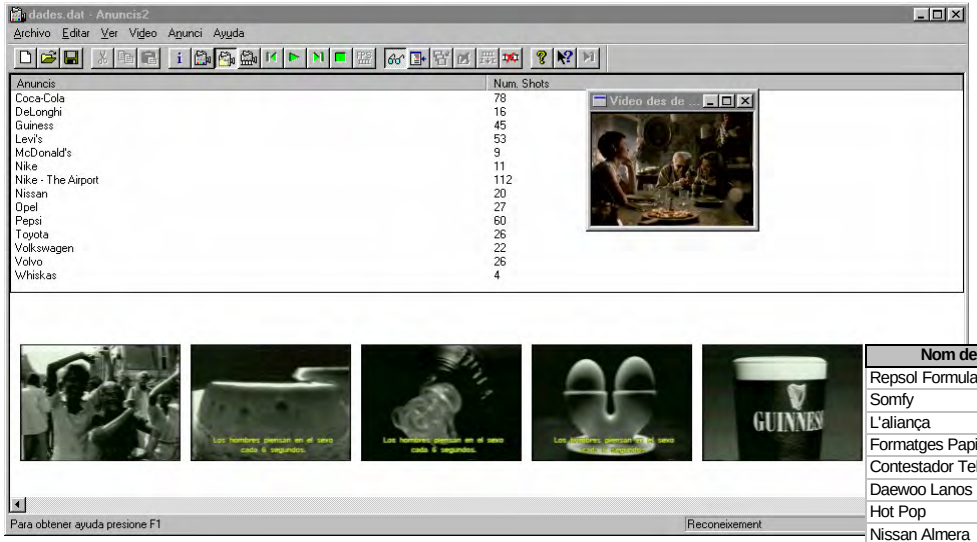
Human-Sequence Evaluation

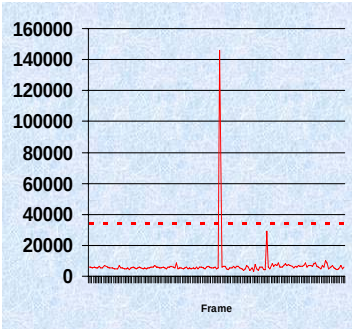
> “Alert!!!
> A Person is forcing a Ticket

AUDICOM: Video Sequence Recognition

System for real-time TV advertisement analysis. The system presents a synthesis of different parameters like exact broadcasted period, advert control and timing.

Group: OR	Partners: European Commission





Nom de l'anunci	Data	Hora d'inici	Hora de final	Nombre de shots	Anunci posterior
Repsol Formula 1	31/07/98	18:42:57	18:43:43	15	Somfy
Somfy	31/07/98	18:43:43	18:43:55	7	L'aliança
L'aliança	31/07/98	18:43:55	18:44:25	7	Formatges Papillon
Formatges Papillon	31/07/98	18:44:25	18:44:47	10	Contestador Telefònica
Contestador Telefònica	31/07/98	18:44:47	18:44:58	6	Daewoo Lanos
Daewoo Lanos	31/07/98	18:44:58	18:45:18	11	Hot Pop
Hot Pop	31/07/98	18:45:18	18:45:40	7	Nissan Almera
Nissan Almera	31/07/98	18:45:40	18:46:11	17	Blockbuster
Blockbuster	31/07/98	18:46:11	18:46:23	5	Telefònica
Telefònica	31/07/98	18:46:23	18:46:40	1	Cap
Telefònica	31/07/98	18:46:40	19:46:49	2	Nescafé
Nescafé	31/07/98	18:46:49	18:47:14	10	Cap

Tracking

Study and development of algorithms for movement detection and tracking, as well as scene reconstruction.

Group: ISE	Customer: Barça

Tracking V: 30s

Vista V: 20s

Semantic Video Search with a Thesaurus of Machine-Learned Audio-Visual Concepts

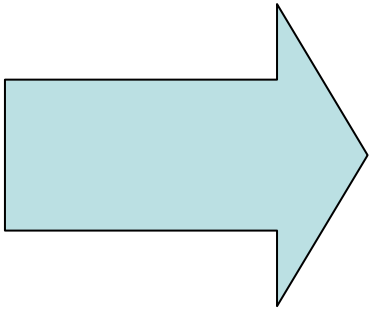
Creating a substantially enhanced semantic access to video, implemented in a search engine.

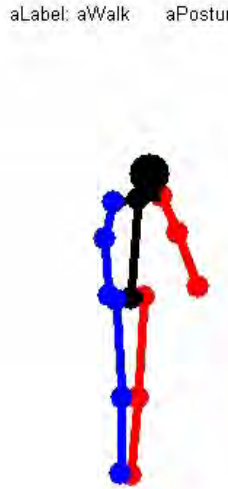
Group: ISE	Partners: European Commission

Optical Capture of Movement Applied to Biomechanics

Optical System able to capture human skeleton movement for biomechanical studies. It uses articulated 3D tracking models, it is designed as a SDK so it can be used and accessed by other applications.

Group: MV	Customer: Centre d'Ergonomía i Prevencio (UPC) and Anàlisis de Biomecànica Clínica.

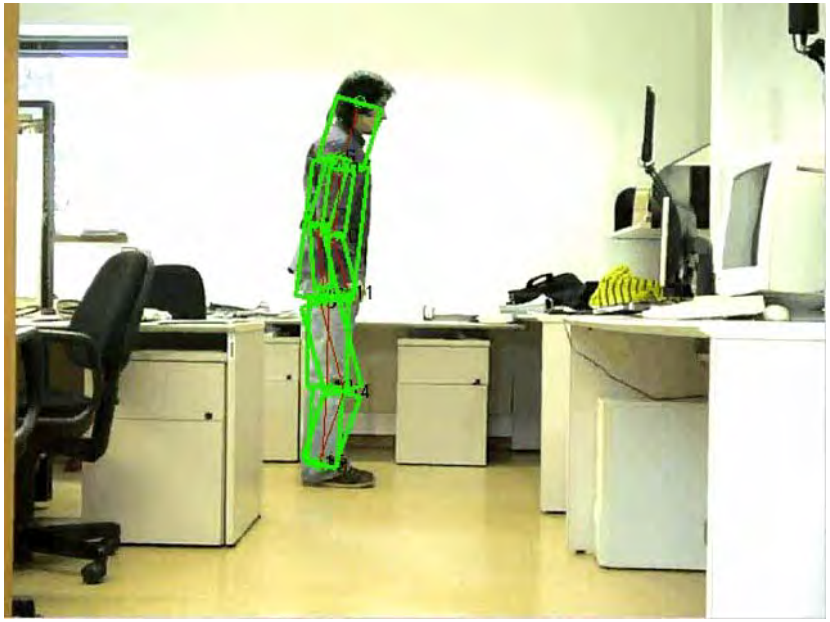


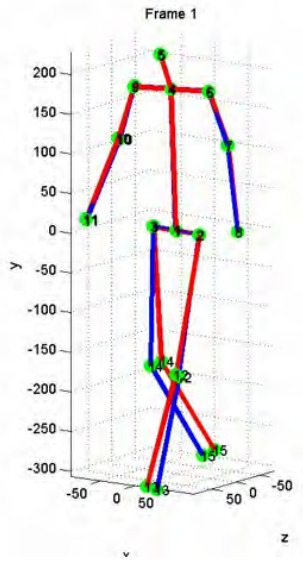


Tracking of Human Body Motion

Full body 3D tracking from a monocular image sequence, based on action-specific dynamic model of human motion.

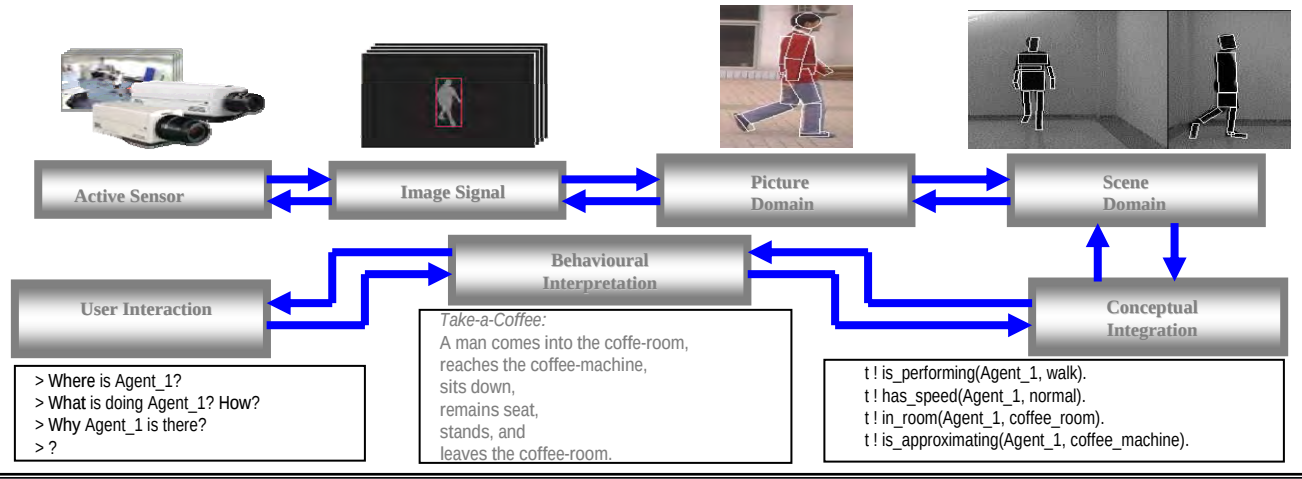
Group: ISE	Funding: Consolider





Human-Expressive Representations of Motion and its Evaluation in Sequences

Partners:	European Commission, Cenit
Objectives:	**Extract descriptions of human behavior from videos sequences in a restricted discourse domain.**
Methodology / Technique:	The analysis is based on the three stages of human behavior: motion of people, their posture and gestures, and their facial characterization. Natural language texts and synthetic animation are used to communicate with end-users



Pedestrian Protection System

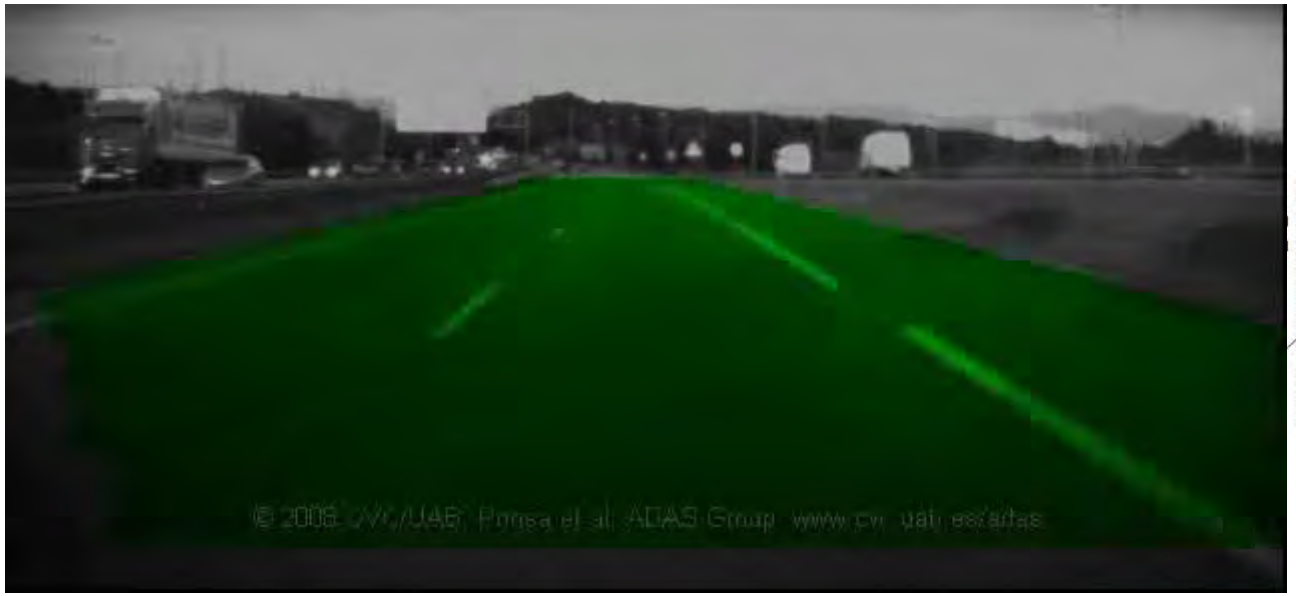
Vision system for day and nighttime pedestrian detection from a mobile platform in an outdoor scenario. The system is able to deal with aspect–changing class targets like pedestrians.

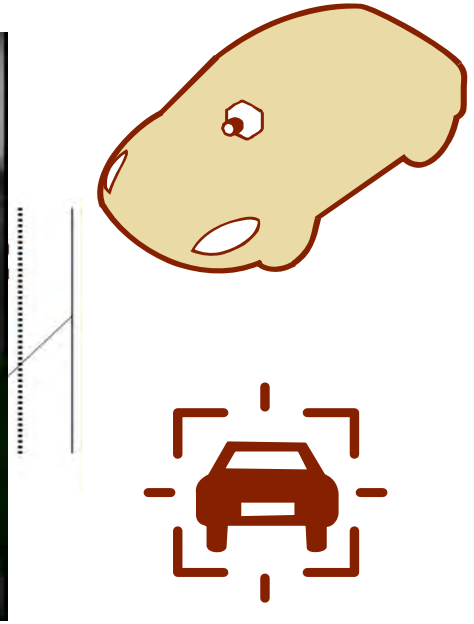
Group: ADAS	Partners: SEAT

Vehicle Detection in 3D from a Monocular System

Computer vision system to determine the position and velocity of vehicles with respect to an ego-vehicle, in order to predict their position in future instants of time.

Group: ADAS	Partners: SEAT / VW

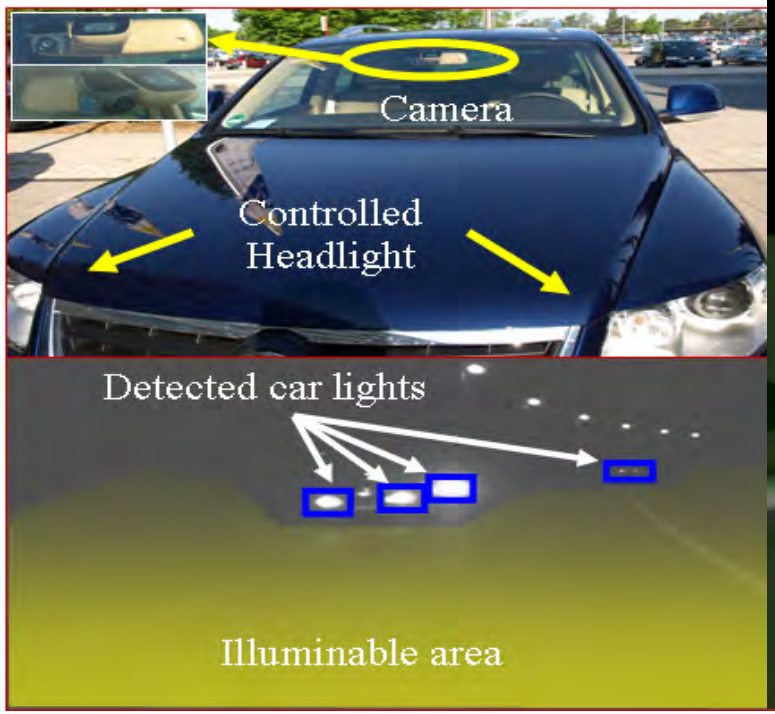




Vision-Based Headlights Control

Automatic vehicle headlights control system that releases drivers from the manual high-to-low beam switching task. The system determines the best headlight pattern to be use according to the traffic situation: illuminate as much as possible without glaring other drivers.

Group: ADAS	Partners: SEAT / VW



TRAMO3D: TRAffic MOnitoring in 3D

The project aims to develop a traffic survey system based on stereovision, to detect and track vehicles in crossroad and roundabouts with better performance than technologies currently applied.

Group: ADAS	Partners: TEDESYS, APIA XXI

Lane Markings Detection

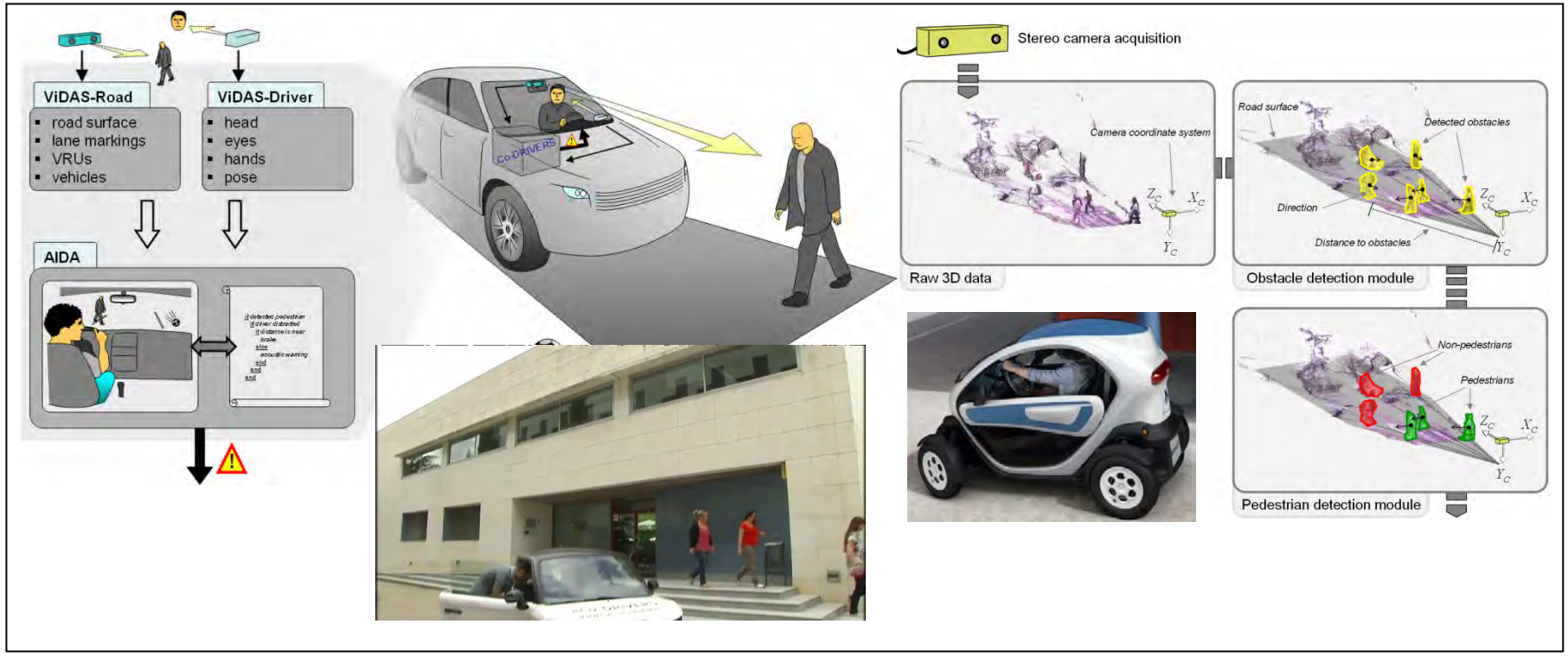
Detection of lane markings based on a camera sensor. Low cost solution to lane departure warning and lateral control.

Group: ADAS	Partners: SEAT / VW

eCo-DRIVERS

Ecologic Co-operative Driver and Road Intelligent Visual Exploration for Route Safety

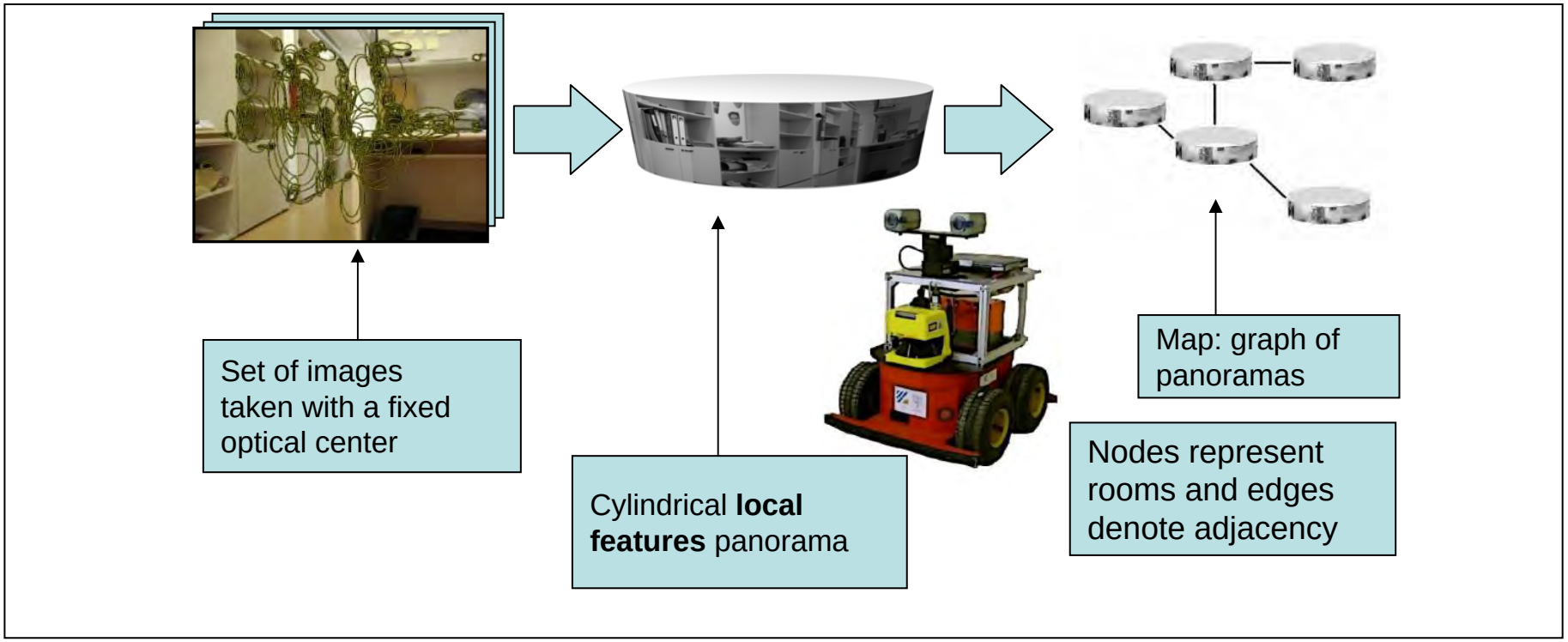
Group: ADAS	Partners: ADAS, LSI-UC3M, CAOS-UC3M. Coordinator: ADAS. EPOS: SEAT, TRAINTIC, TEDESYS, DAVANTIS



Qualitative Navigation Using Panoramas

Simultaneous Localization And Mapping (SLAM) techniques to iteratively build a map (panorama) and to correct robot localization errors.

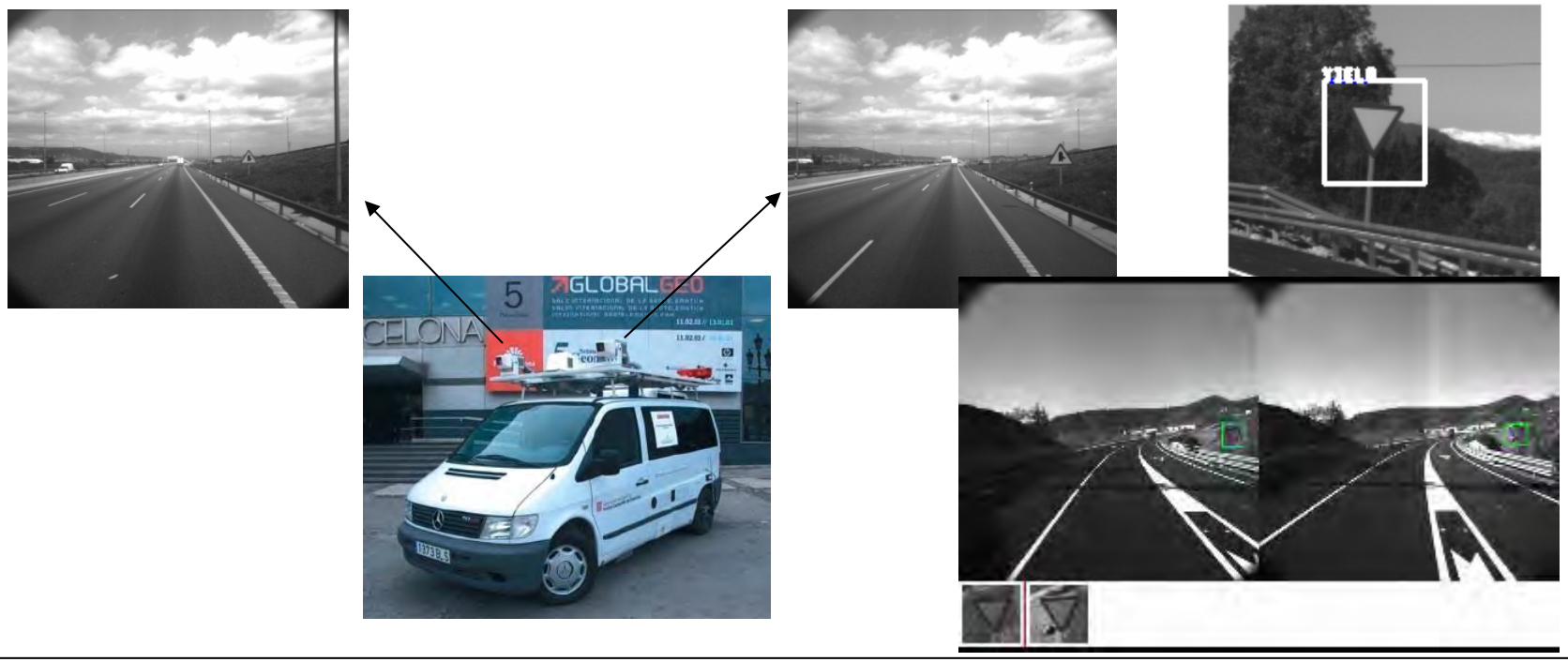
Group: RV	Partners: Consolider



Traffic Sign Mobile Mapping

Real time detection of traffic signs. Images are acquired by calibrated cameras mounted in a georeferenced van.

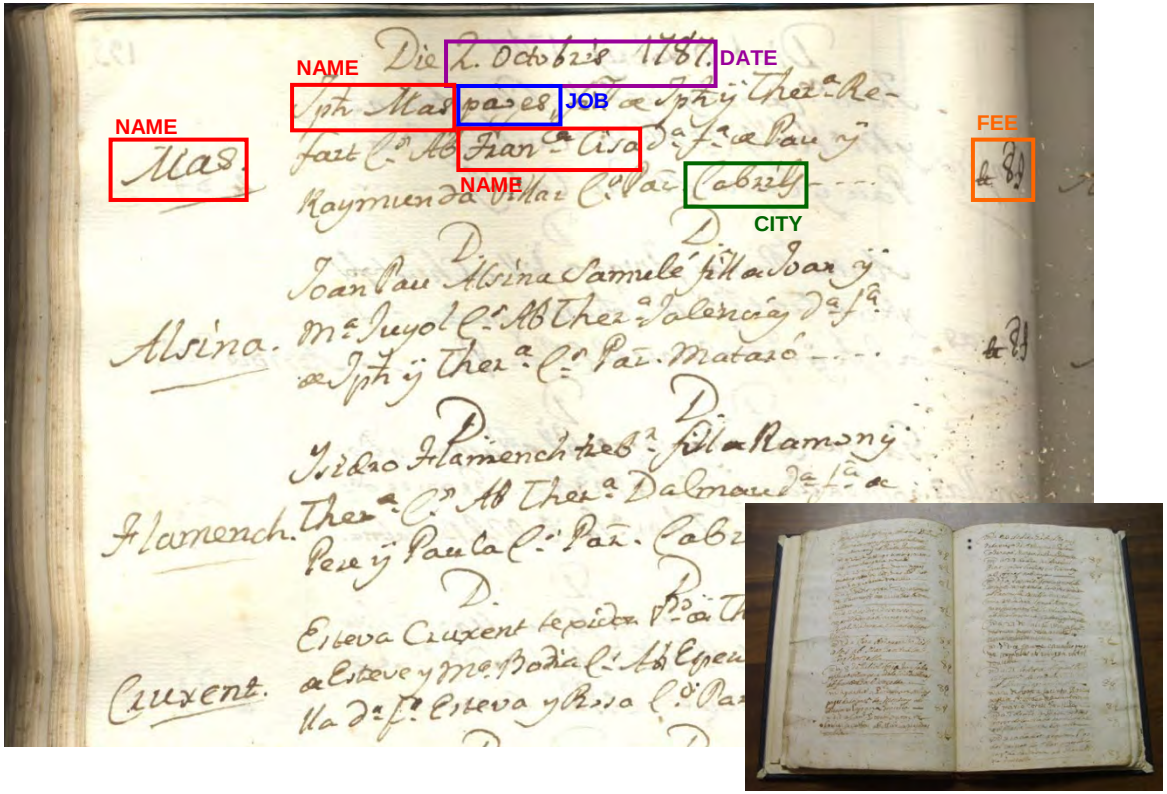
Group: OR	Partners: Institut Cartogràfic de Catalunya (ICC)



5CofM- Five Centuries of Marriage

Transcription of the wedding archive of the Cathedral of Barcelona (15th-19th centuries). Automatic Extraction of demographic data.

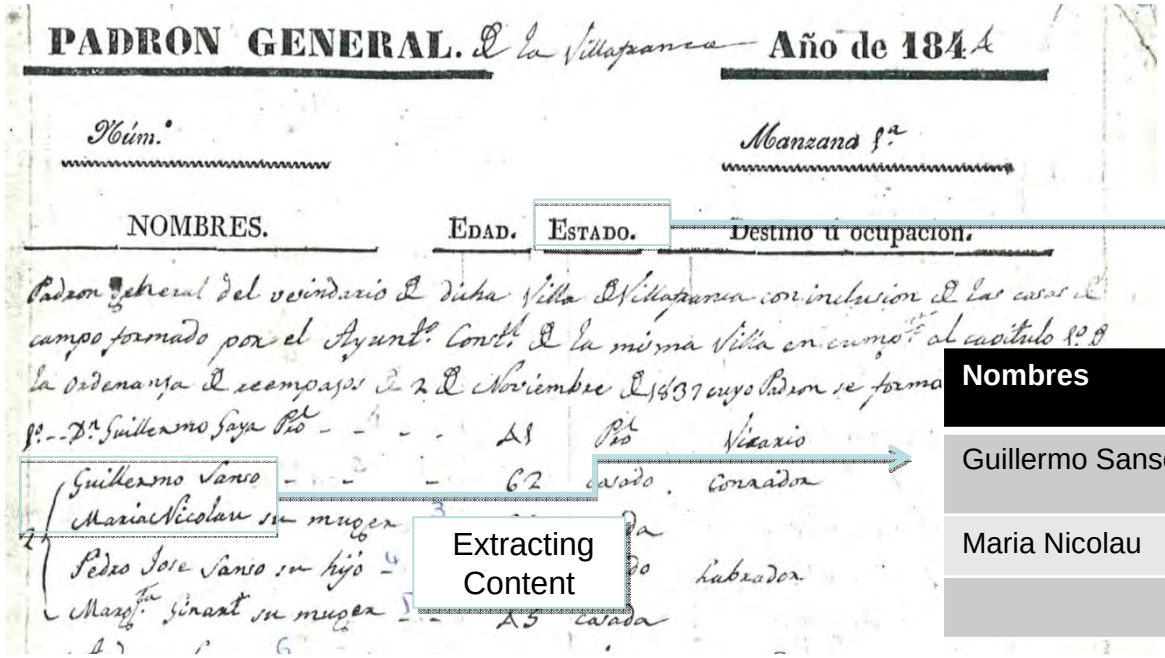
Group: DAG	Partners: Centre d'Estudis Demogràfics



Search in Ancient Documents (SearchInDocs)

Developing document analysis technologies aiming at making easier the access to Digital Libraries taking into account document heterogeneity, the large-scale amount of data, cross referencing and users ubiquity.

Group: DAG	Partners: Ministerio de Economia y Competitividad



Nombres	Edad	Estado	Ocupación
Guillermo Sanso	62	Casado	Vicario
Maria Nicolau	66	Casada	

Novel Paper User Interfaces for Businesses

Businesses and organizations need to extract, analyze and value incoming information, using it efficiently to facilitate decision making. This project addresses the challenge of easy accessing of digital information, through novel intuitive interfaces, using the paper as the key medium for interaction with the digital counterpart.

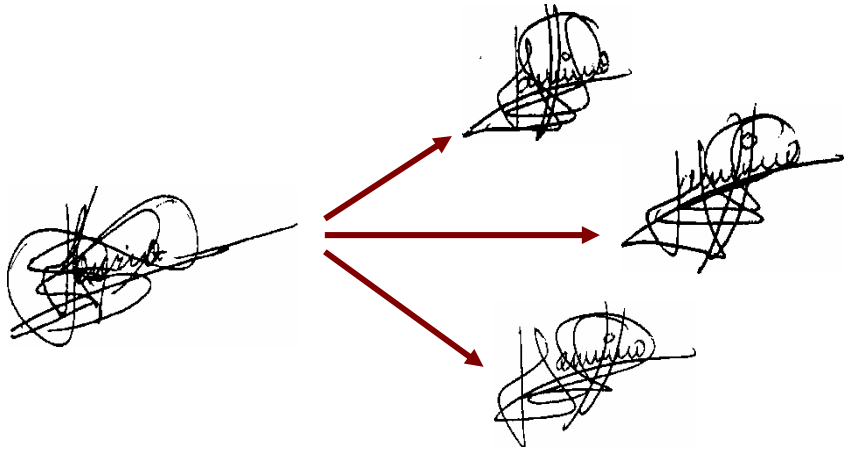
Group: DAG	Partners: iTESOFT

Identica: Offline and Online Signature Verification

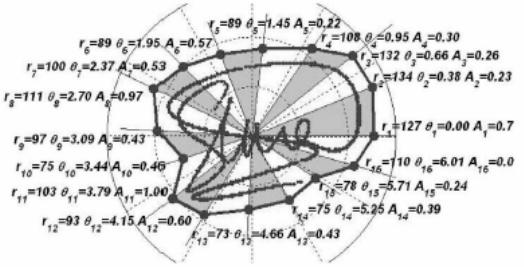
Confidence measure for signature verification, offline (scanned image) and online (dynamic information such as time, pressure and position).

Group: DAG	Partners: ICAR

Is this signature original or is it a forgery?



Off-line



On-line

Information Extraction from Gas Meter Images

Utility companies are actively looking for more efficient ways to acquire and process meter readings from their customers. The CVC is working with Gas Natural Fenosa for developing a novel application, based on smartphones that will enable the acquisition of meter images from the consumers and their subsequent automatic analysis.

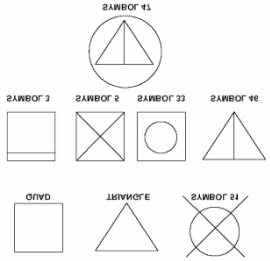
Group: DAG	Partners: gasNatural fenosa

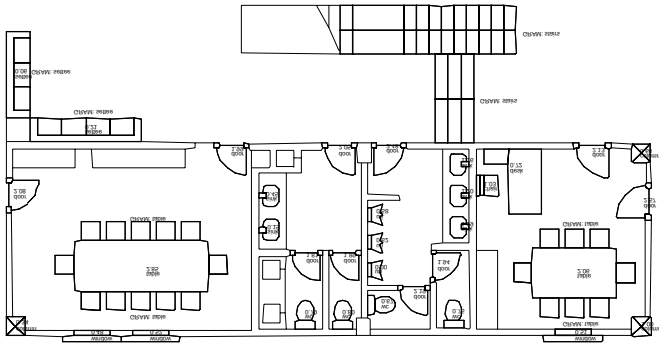
Virtual Prototyping of Architectural Projects

Partners:	Certap

Objectives:	**Vectorization and recognition of floor plan sketches to build and modify entities and to render a 3D view of the building enabling the user to navigate through.**

Methodology / Technique:	The use of symbol and shape recognition algorithms and 3D virtual environments.

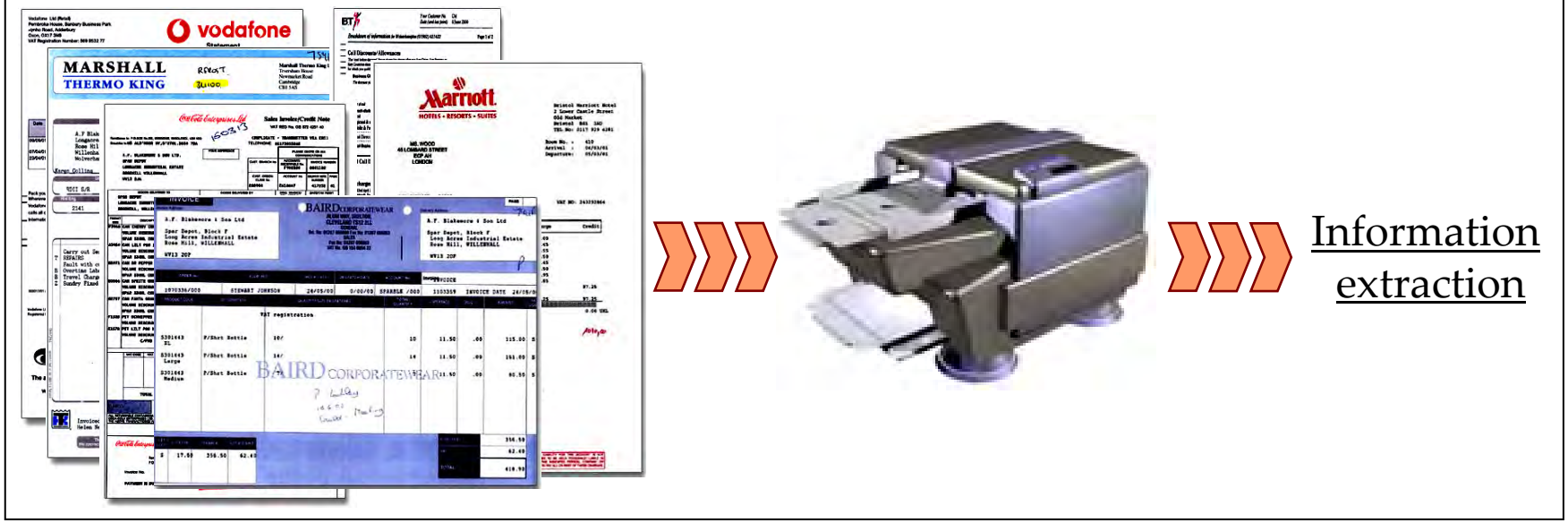




Digital Mail Room

Efficient processing of digital(scanned) documents in phase of storage / before storing / in storage phase. To develop algorithms that allow the categorization of documents from the identification of visual elements (presence of logos, key words, structure, etc.).

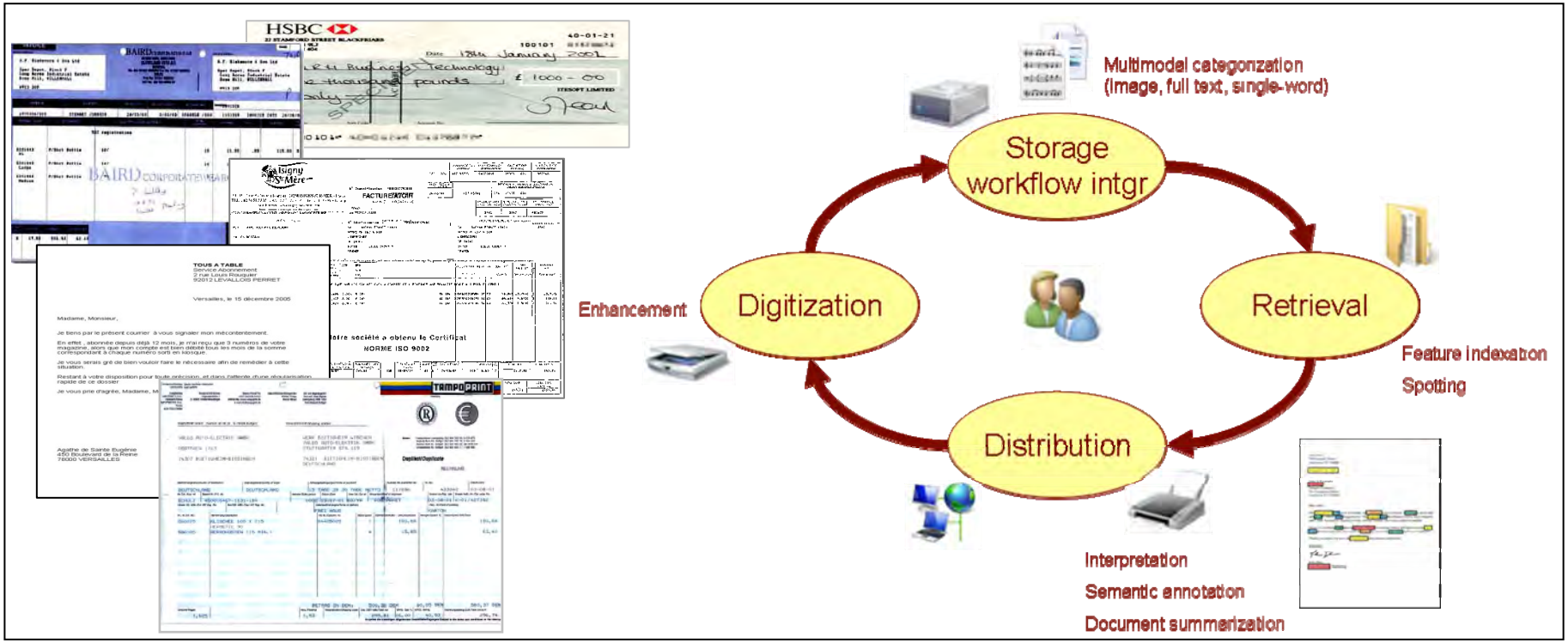
Group: DAG	Partners: La Caixa, ITESOFT, France



Digital Mail Room

Information extraction from business documents for classification, indexation, workflow optimization, etc.

Group: DAG	Partners: Xerox, Itesoft, La Caixa



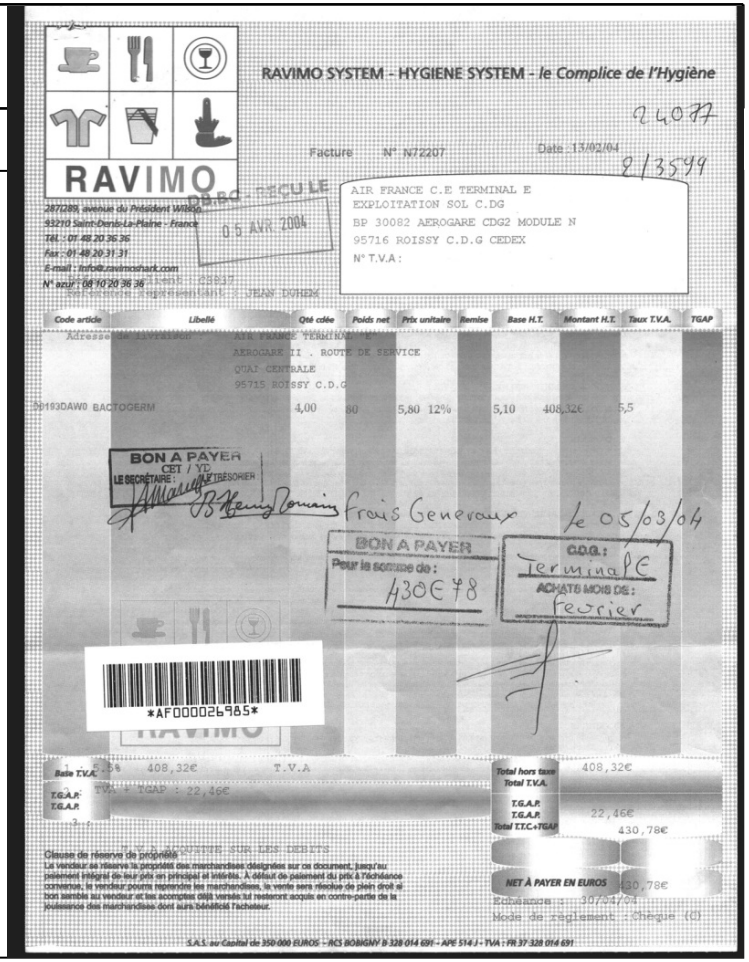
Documents on Demand (DoD)

Sponsored research project for the development of algorithms for extracting (handwritten and printed) text and numbers from scanned documents.

Group: DAG	Partners: Itesoft

- Documents on Demand will be a service for small and medium sized enterprises to process business documents automatically.

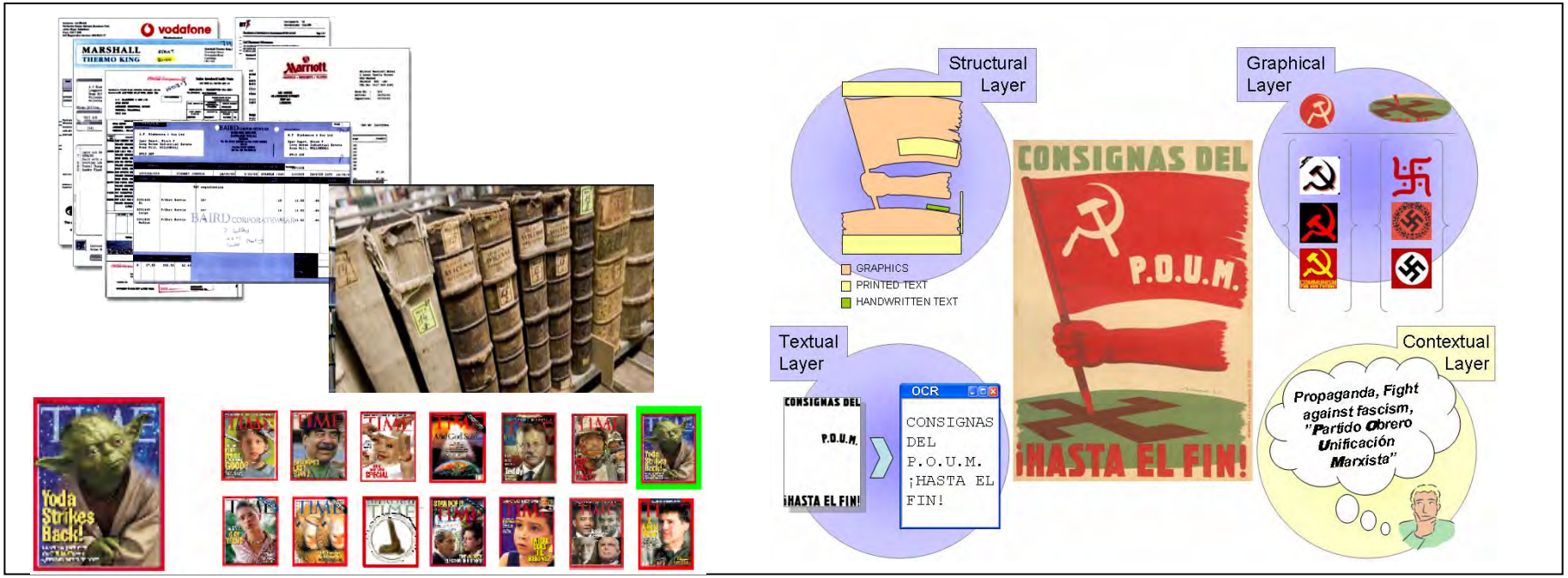
- Documents are scanned and uploaded to a server where every text (and number) of the document is identified and recognized, machine printed as well as handwritten annotations.



KEDIHC: Knowledge Extraction from Document Images of Heterogeneous Content (TIN2009-14633-C03-03)

Knowledge discovery from large collection of scanned documents containing heterogeneous data (text, graphics, manuscript, structure) for classification and retrieval by content.

Group: DAG	Partners: Universitat Politècnica de València (UPV)



iLeafBook

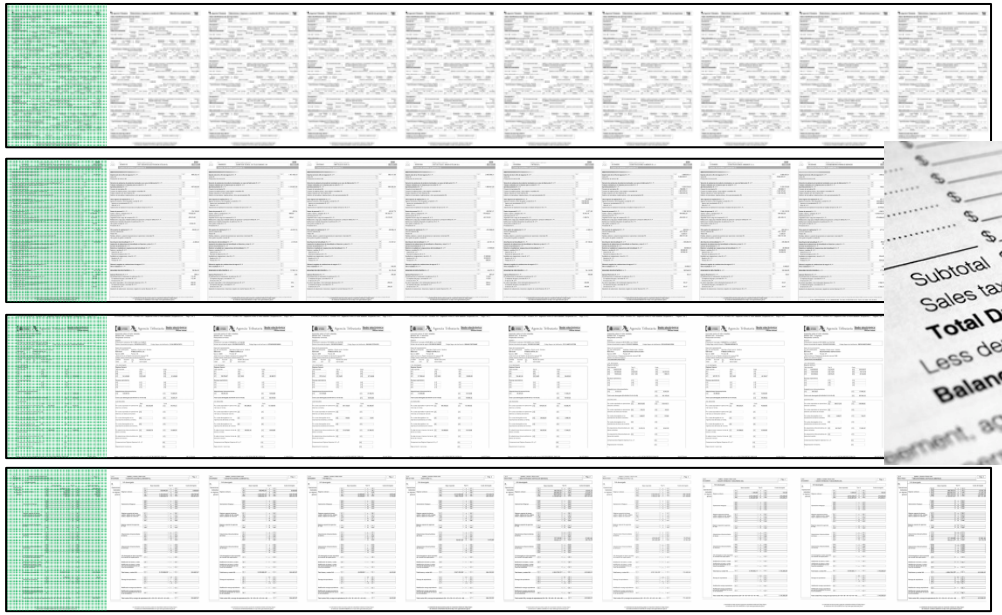
iLeafBook is an application for mobile devices designed for educational purposes. It is able to recognize the different kinds of leaves by understanding their shape and assigning them to their corresponding tree species thanks to an automatic classifying system.

Group: MV	Partners:

Digital Mail Room Viability Study

This project looks into methods for document classification and information extraction in the context of a large document throughput application (La Caixa's Document Management Pipeline) where a-priori knowledge about document classes is not available and existing knowledge is at a semantic level.

Group: DAG	Partners: Caixa d'estalvis i pensions de Barcelona

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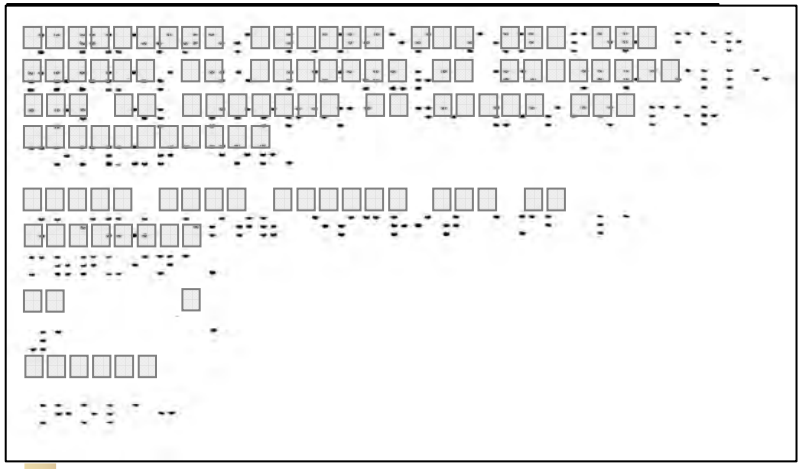
Optical Braille Recognition

Automatic segmentation and recognition of texts written in Braille using a Perkings typewriter.

Group: DAG	Partners: ONCE

Encoding of a Braille character

There are Braille alphabets for text, numbers, music, etc.

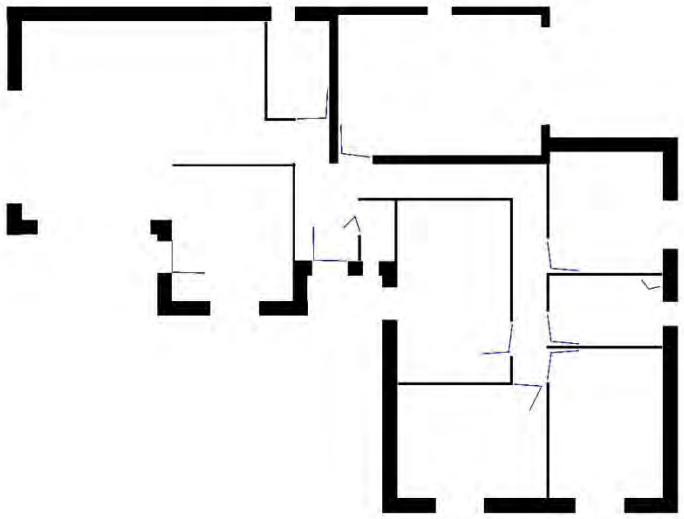


This is an example of Perkin's typewriter Braille characters that are analyzed by the system.

DocuRead: Componentes avanzadas de reconocimiento de contenidos documentales hetereogéneos. Aplicación a mercados de diseño asistido por ordenador y banca.

The goal of the project is to add a new function of recognition and import of scanned floorplans in a 3D architecture software

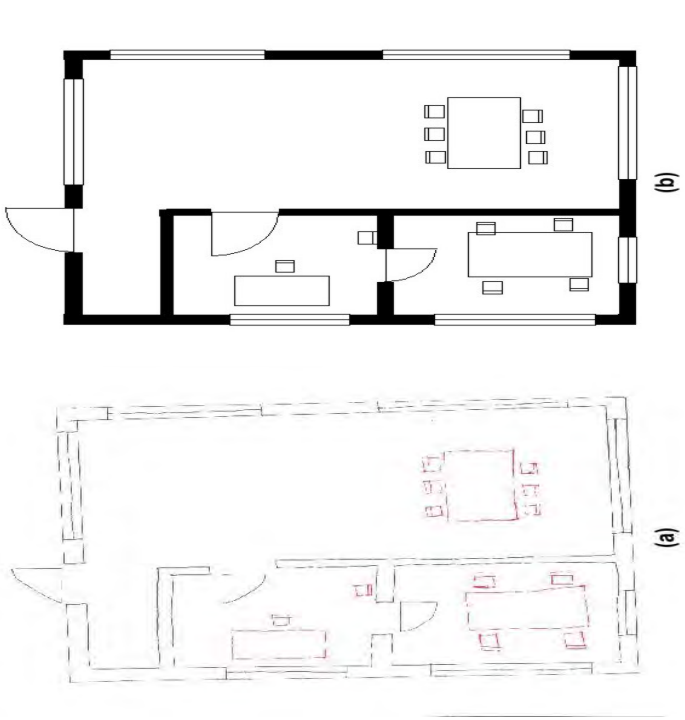
Group: DAG	Partners: ICAR Vision systems, MITYC, Loria, Anuman

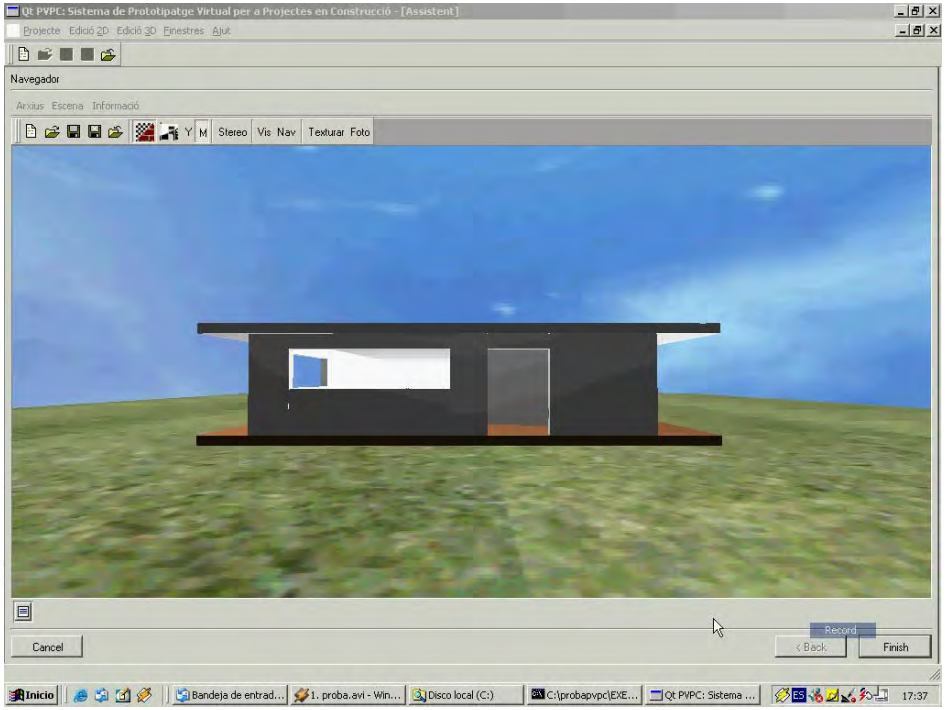


Virtual Prototyping of Architectural Projects

Vectorization and recognition of floor plan sketches to build and modify entities and to render a 3D view of the building enabling the user to navigate through.

Group: DAG	Partners: Certap

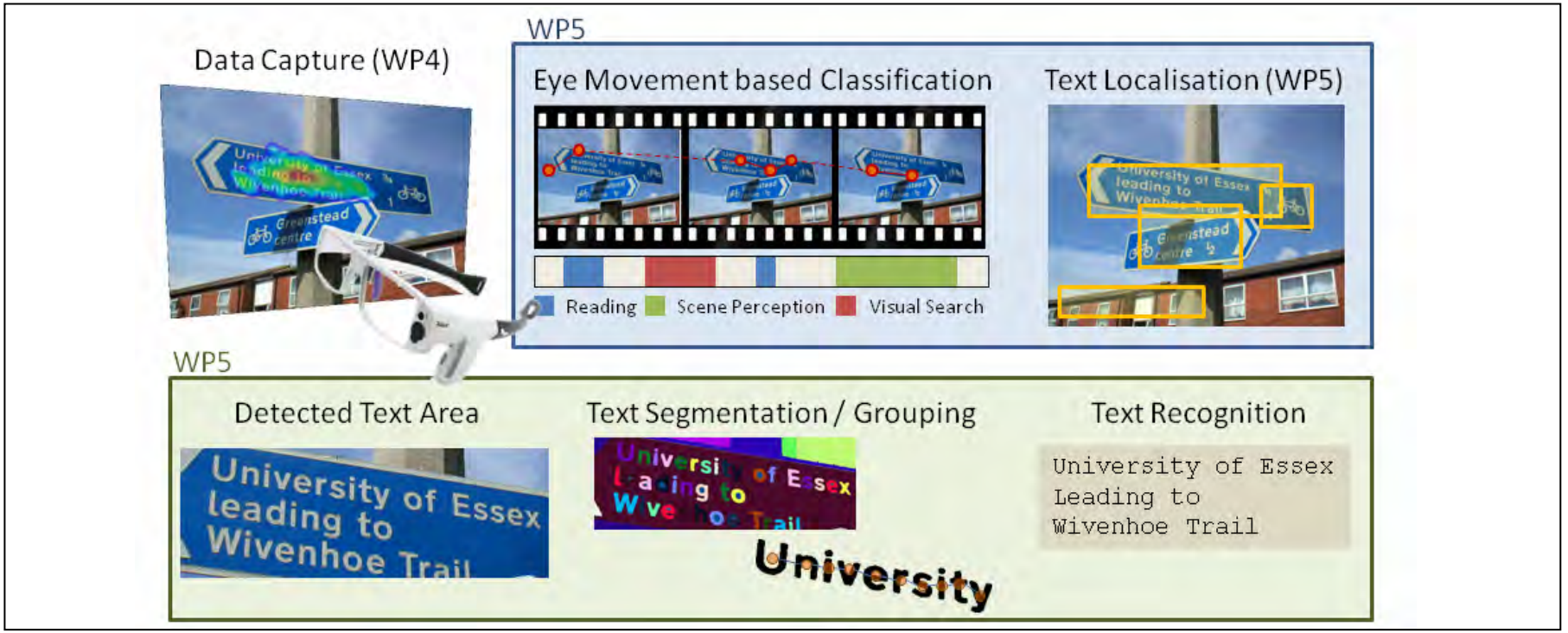




Text and the City

In active vision particular locations in the scene are selected based on their relevance to the task at hand (top-down) or on local image cues (bottom-up). This project utilizes computer vision both ways, to understand the intentions of the user (eye-tracking) and to analyze the scene image.

Group: DAG	Partners: Deutsches Forschungszentrum für Künstliche Intelligenz GmbH; Osaka Prefecture University



Automatic Image Annotation

Simulate the task of assigning a color name or category to an specific image segment.

Group: CIC	Partners: Age fotostock.

Holistic color-image understanding: combining bottom-up and top-down cues (TIN2009-14173)

Proposal of a holistic framework for color-image understanding which closes the loop between low-level and high-level color-image understanding.

Group: CiC	Partners:

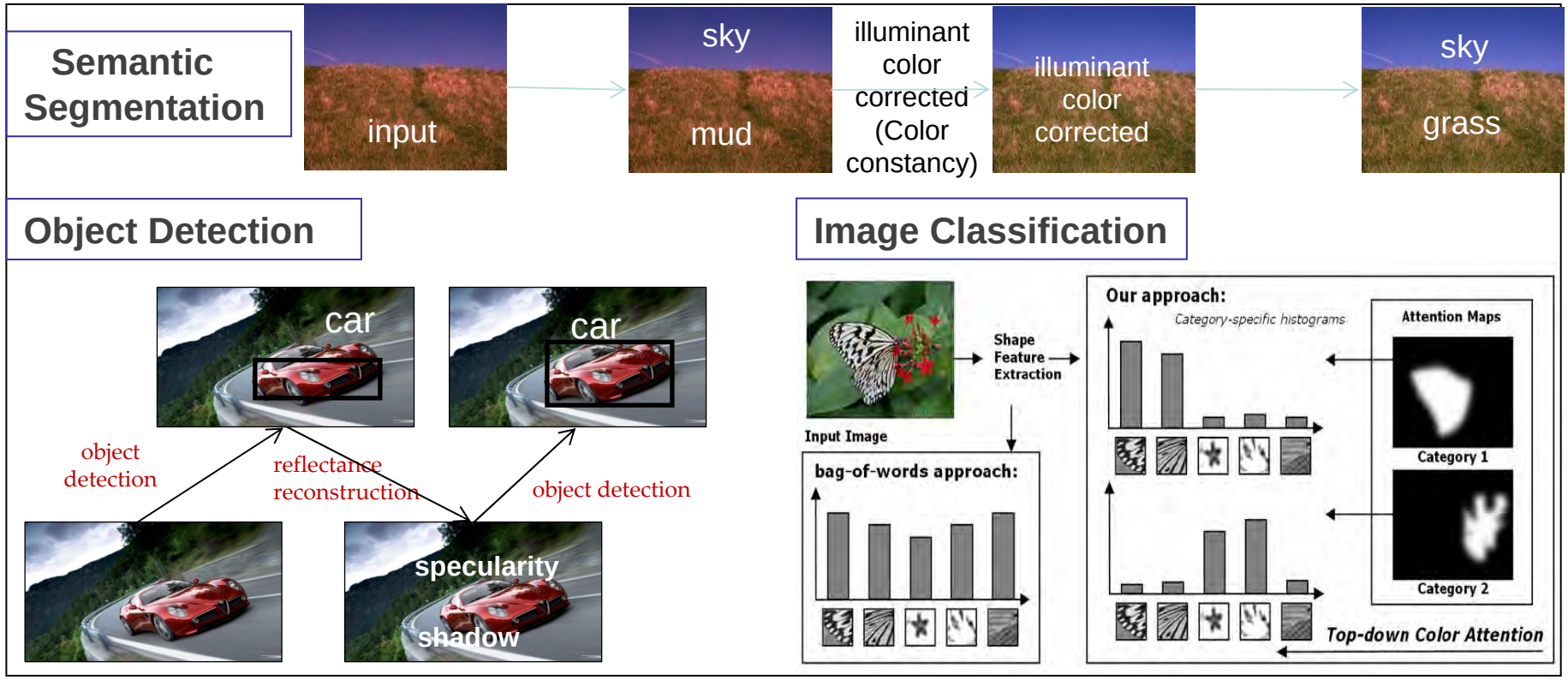


Image Understanding based on biologically-inspired computer vision models (TIN2010-21771-C02-1)

Last decade, results obtained by CV methods in visual recognition tasks have experienced a spectacular increase in performance, essentially due to machine learning techniques in the field. Currently, improvements are still expected through the development of computational models with biological inspiration. The approach of this project is to take into consideration attention mechanisms for combining all the color visual information available to the system, namely, bottom-up and top-down evidences together with contextual knowledge about the scene.

Group: CIC (Color in Context)	Partners: Universitat Pompeu Fabra

(a) Detection of salient objects

(b) Adaptation to illuminated changes

(c) Shadow-free representations

d) Adaptation to different local contrast in the field of view

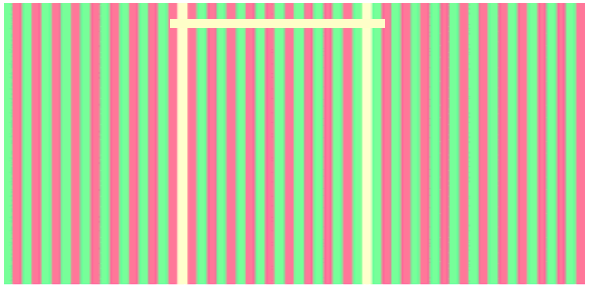
Colour-Texture Classification

Partners:	Masadecor, Cidemco, Alcalagres.

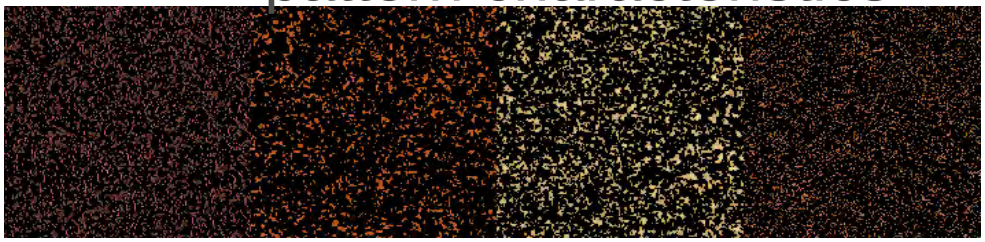
Objectives:	**Classify manufactured goods/products according to their visual homogeneity using computational models that simulate the chromatic induction of the human visual system in order to categorize them in conformity with their similarities.**

Methodology / Technique:	The problem was approached by doing colour and texture segmentation of the basic and predominant colours, simulating the human visual system's behavior. Also, the pattern characteristics were analyzed to obtain more accurate results.

color segmentation



pattern characteristics



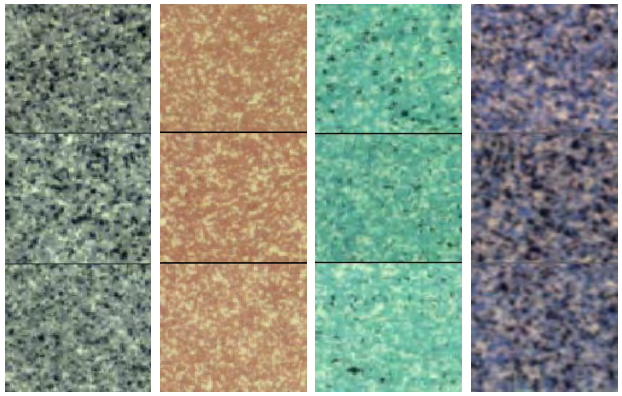
Colour-Texture Classification

Classify products according to their visual homogeneity using computational models that simulate the chromatic induction of the human visual system in order to categorize them in conformity with their similarities.

Group: CIC	Partners: Masadecor, Cidemco, Alcalagres.

Printed paper for melamines

Porcelanic tiles



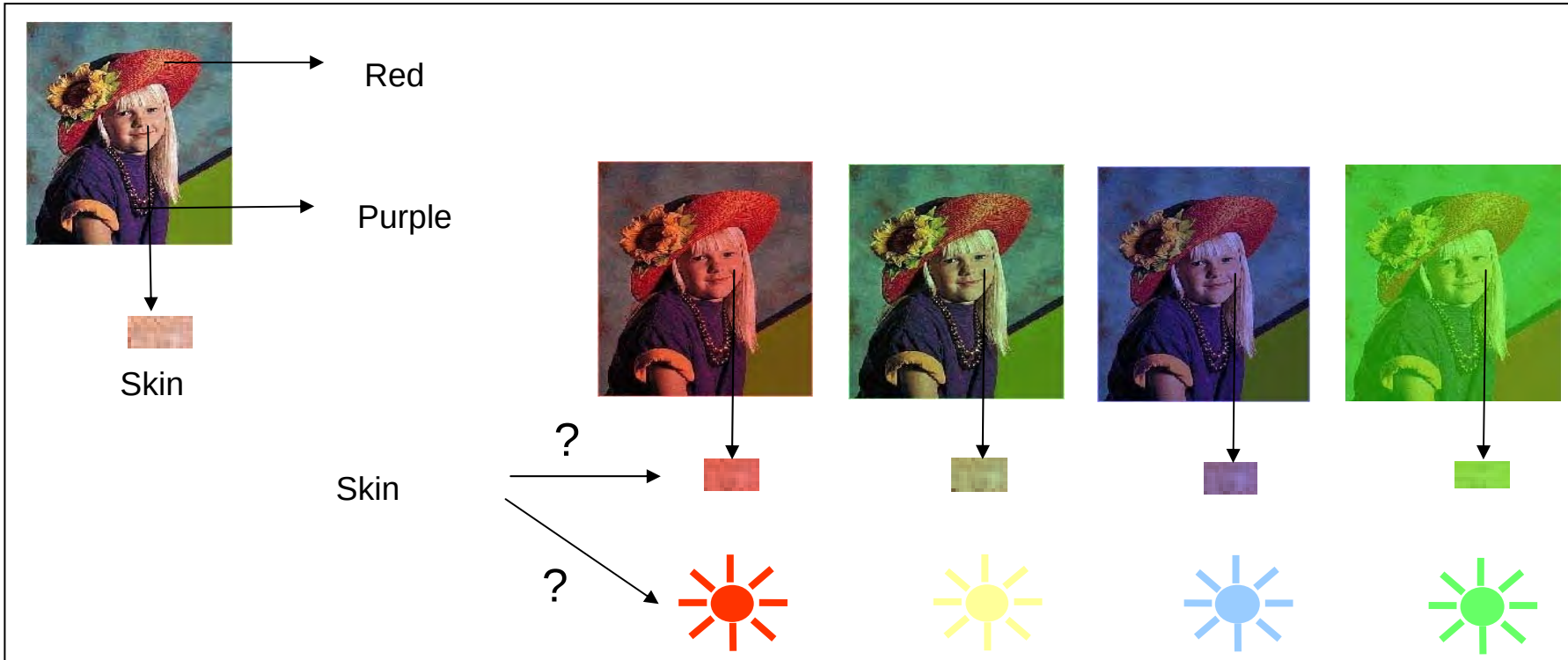
But, be aware …

They look different, but are the same

Illuminant Estimation

Building algorithms to estimate scene illuminant from the image content.

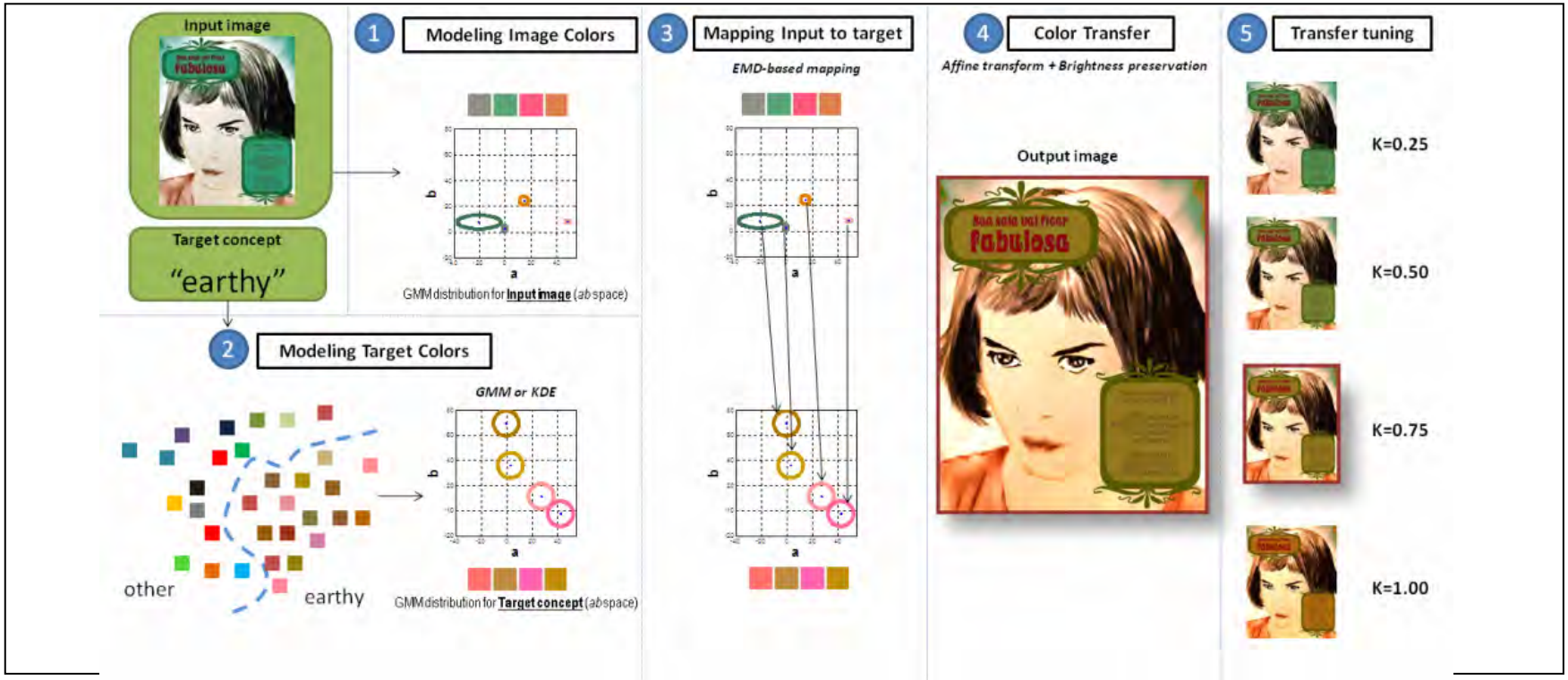
Group: CIC	Partners: Grup Peralada.



Applied Visual Aesthetics Sponsored Research

The subject of this research project is the study of aesthetic preferences for photographic or graphic design media with a learning based approach.

Group: CIC	Customer: Xerox Research Centre Europe



Multimedia Applications

Multimedia applications based on automatic image annotation.

Group: CIC	Partners: Agefotostock S.A, Inverama S.A.

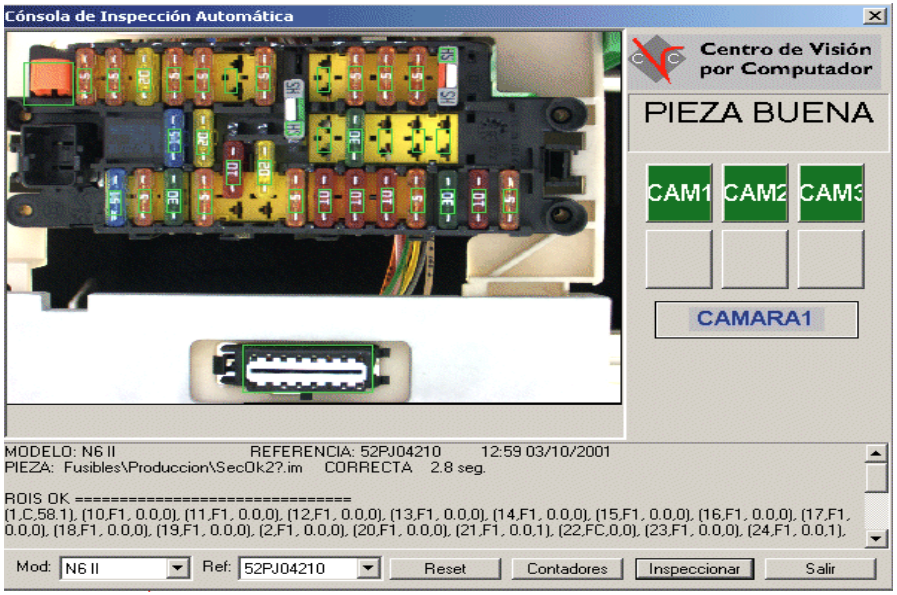
Bank image (Agefotostock S.A.)

Security (Inverama S.A.)

Industrial Applications

Vision based system for automotive fuse box inspection. The system checks that components are well assembled in the fuse boxes.

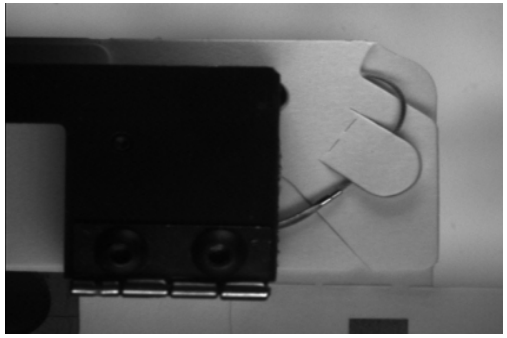
Group: MV	Customer: Lear Corporation Holding Spain, S.L.U.



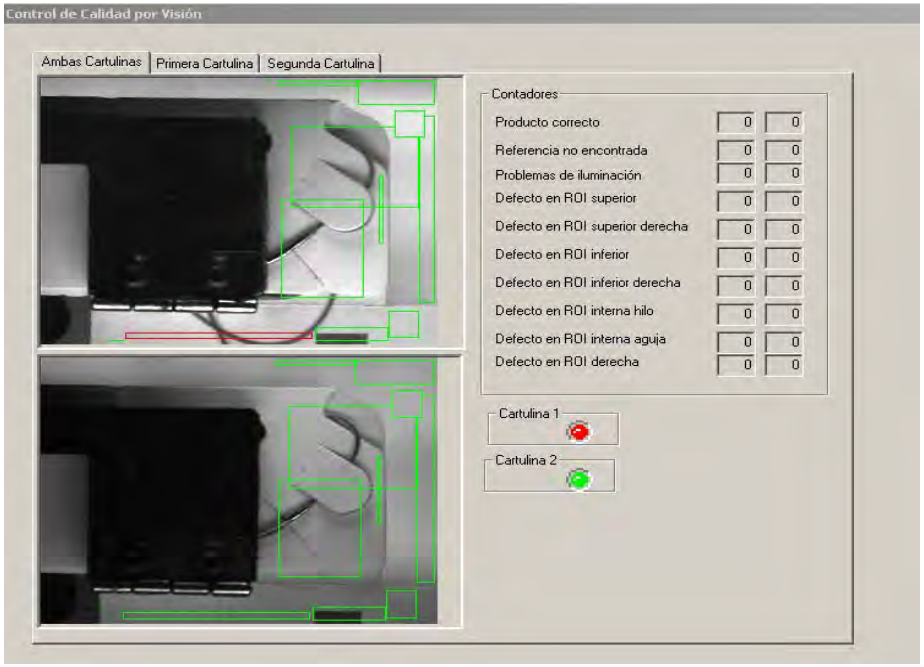
Quality Control in Surgical Sutures Manufacturing

Vision system that detects the presence or absence of the sterile surgical sutures components and verify their correct placement in the sachets during the manufacture process.

Group: MV	Partners: B/Braun



B|BRAUN
SHARING EXPERTISE



Blister Quality Control

Computer vision system for tablet blister packaging inspection and quality control for the pharmaceutical industry. It detects absence of tablets in the blister package.

Group:OR	Customer: Lilly

Car Front-panel Quality Inspection

Illumination analysis of car front-panels to make partial measurements of inner elements and global comparisons between different panels.

Group: MV	Partners: Continental

Beverage Bottling Quality Control System

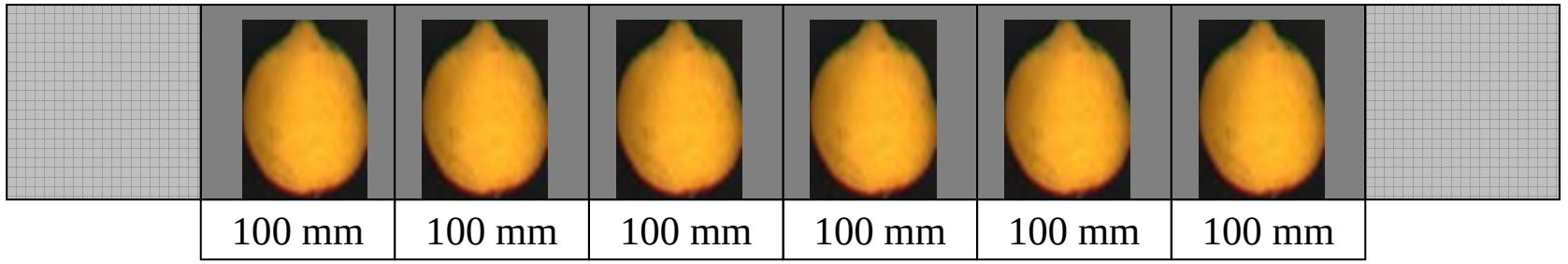
Computer vision system for quality control in the beverage bottling process and production line. The system automatically detects the presence of alien organic or inorganic material such as cork, crystal, insects, glass, etc.

Group: MV	Customer: Empresa de cava

Study: Fruit Quality Control System

Optic system for quality control and classification of all kinds of fruit.

Group: MV	Customer: Caustier-Fruita

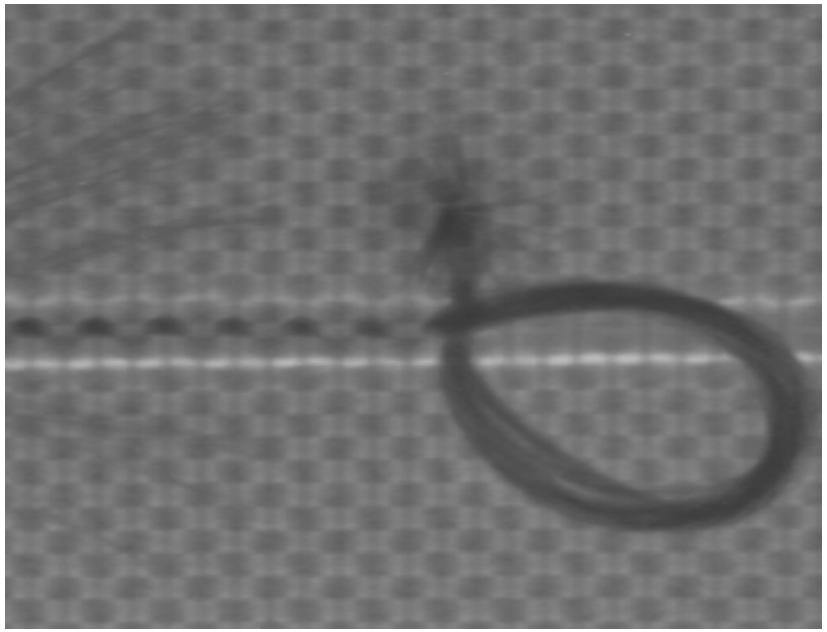


Transport band speed: 1,5 m/s
Vision area: 600 x 400 mm

Study: Textile Fabrics Quality Control System

Optic system for the detection of texture, defects and quality control of textile fabrics.

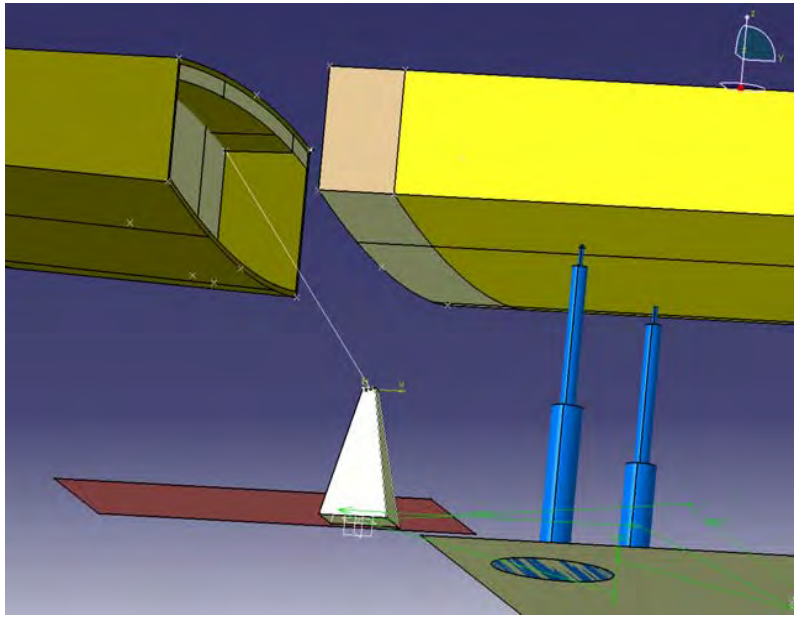
Group: MV	Customer: Ródenas Rivera



Algorithms for Installation of 3D Model Objects

Analysis and development of 3D modeling algorithms useful for the fitting and installation of objects and applied in high precision installation of aircraft components.

Group: MV	Customer: TMS-Aritex Cading



VPWSys Vehicle Windshield Collocation

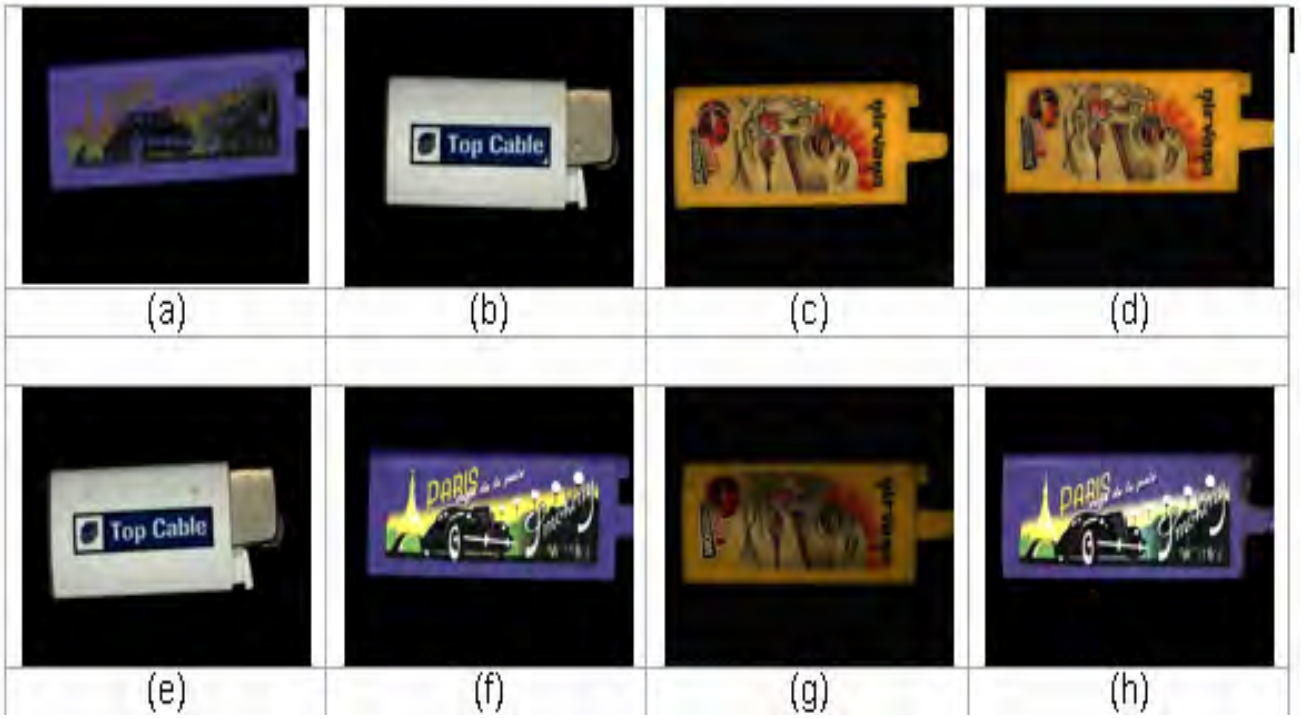
High precision vision system for the collocation of windshields in vehicles with the use of robots. Flexible system that recognizes different models and colors of vehicles.

Group: MV	Customer: ASM - Dimatec

Lighter Print Inspection

Find printing imperfections on lighters, e.g. total or partial lack of a color, ink displacement, incorrect color, scratches, etc.

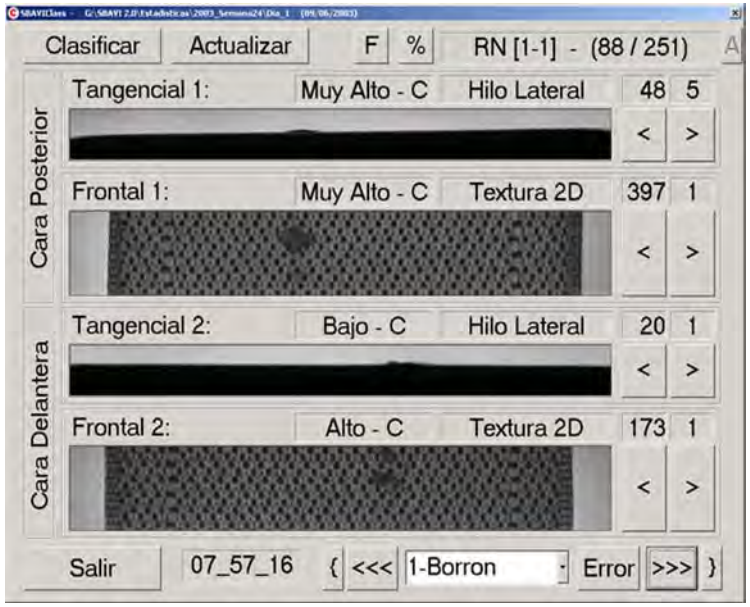
Group: MV	Partners: Flamagas / CDTI



Elastic Berger

Visual system consisting of 4 cameras that allow for inspection in both sides of the seatbelt. Each one of the bands is inspected by 2 cameras. With this system one can quantify the defects and classify them by their importance.

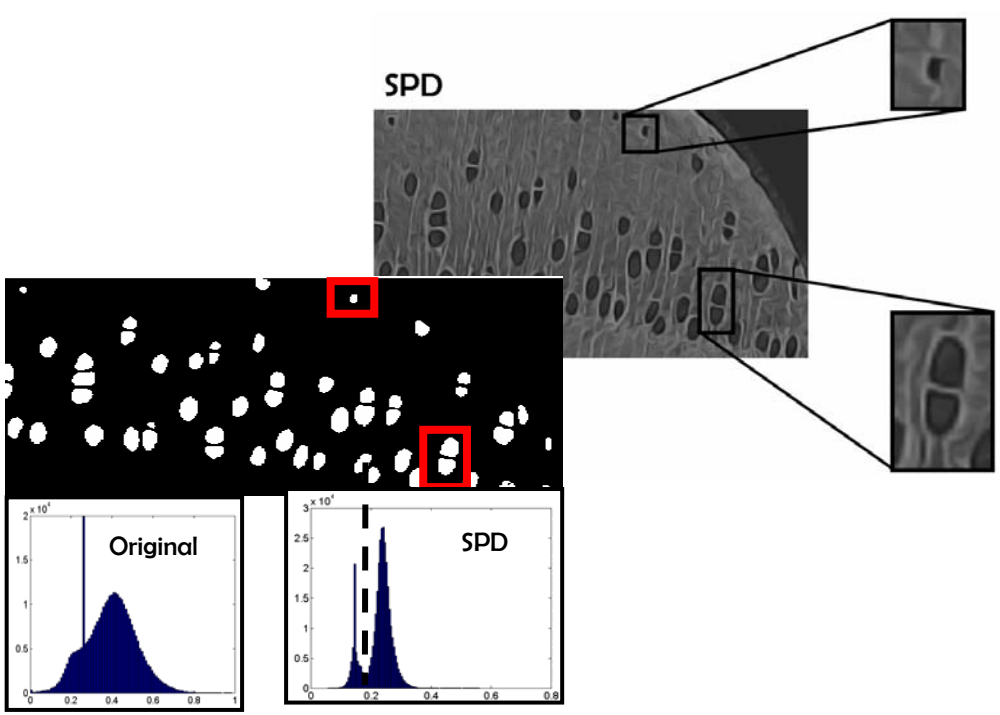
Group: ISE	Customer: Elastic Berger

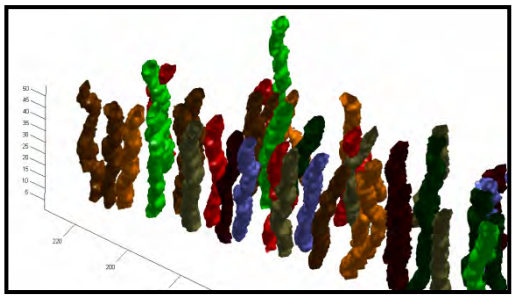


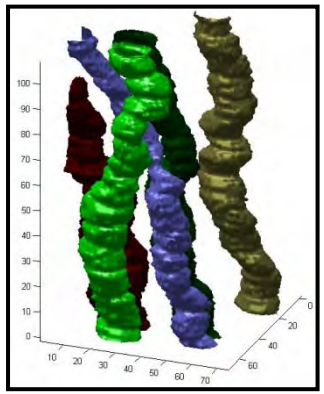
Phydrance: Plant Hidraulic Resistance Analysis

A computer vision system for 3D modeling and reconstruction of plant Xylem network(conduits and membranes defining their connectivity) in order to determine plants resistance to extreme climatic conditions.

Group: IAM	Customer: CREAF & Institute of Systematic Botany and Ecology





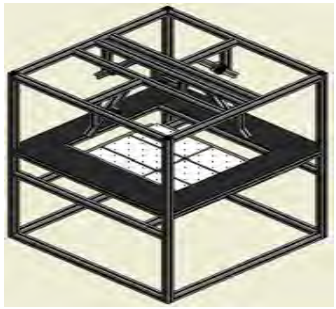


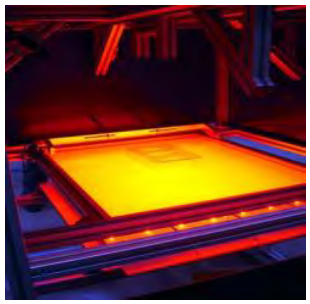
Thermoforms Inspection

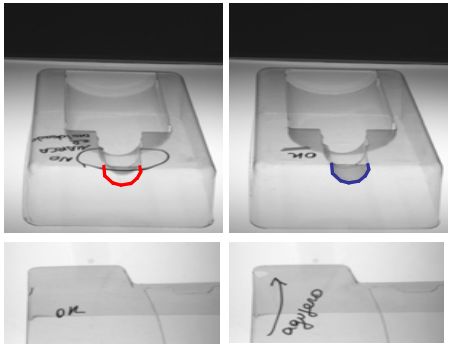
Vision system for 3D shape verification and detection of holes and scratches in the surface of thermoforms.

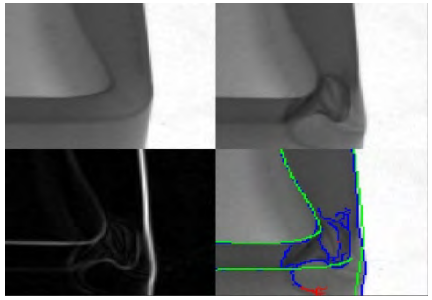
Group: MV	Partners: Micro Natural / CDTI

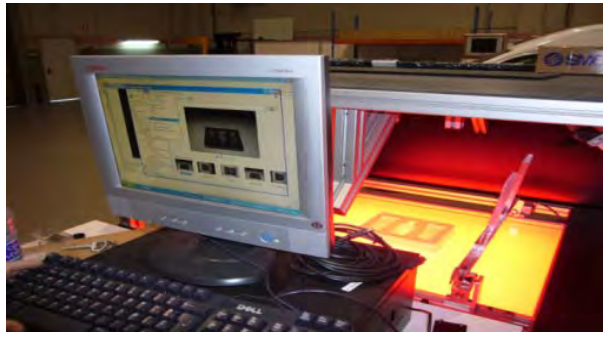
- First phase: Transparent pieces
- Second phase: Translucent pieces











Airbag Copkit Cover Quality Control

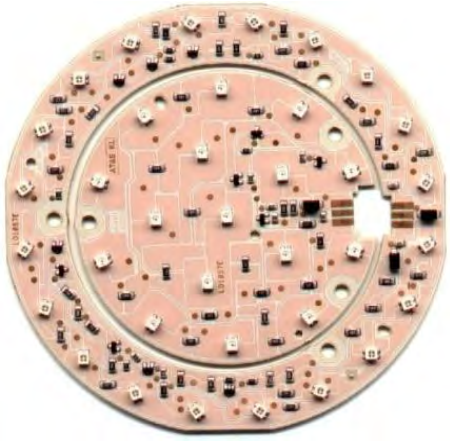
Vision based system for airbag protection profile thickness measurement with an image resolution of 0.006 mm/pix and a R&R reliability test lower than 10%.

Group: MV	Customer: Faurecia

LED’s Color And Light Intensity Inspection

Computer vision based system for quality inspection of taillights’ LEDs color and light intensity.

Group: MV	Customer: Comelta

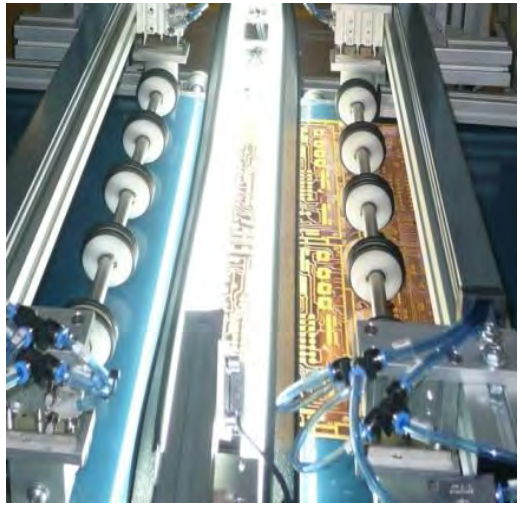


Color: LED’s Central wavelength verification (±2nm)
Intensity: LED’s intensity verification(±12%)

Printed Circuit Boards Inspection

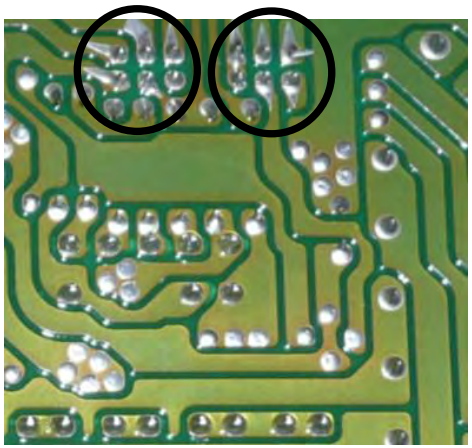
Vision system for PCB tracks analysis, identification of presence or absence of components and verification of the soldering joints.

Group: MV	Partners: Lear Corporation



PCB tracks analysis

Soldering joints inspection



Components presence or absence verification

Plate Number Detection

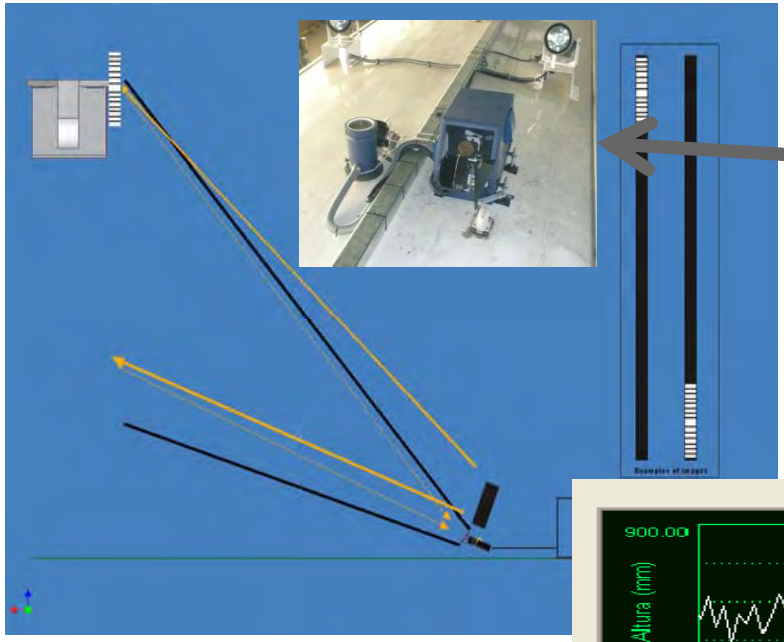
Security system base on computer vision for vehicle plate number detection, identification and classification.

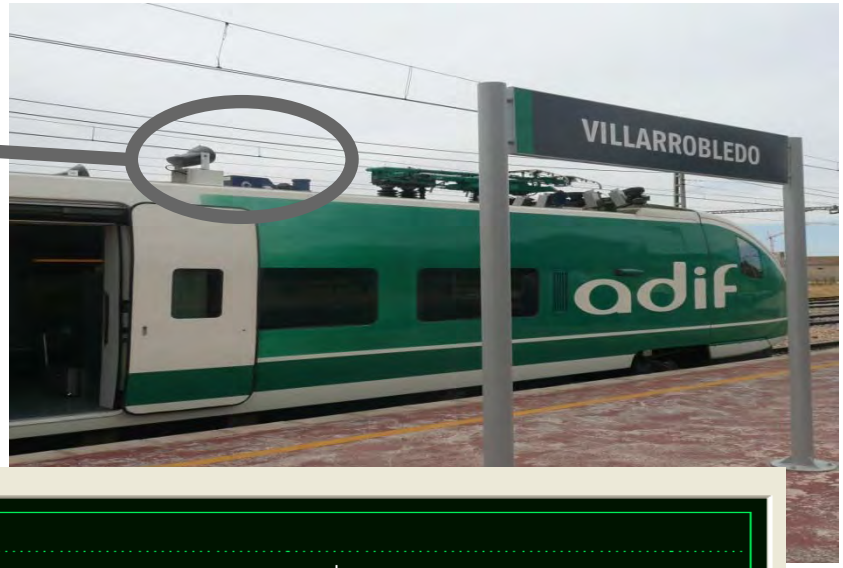
Group: MV	Customer: Aeropuerto de Barcelona

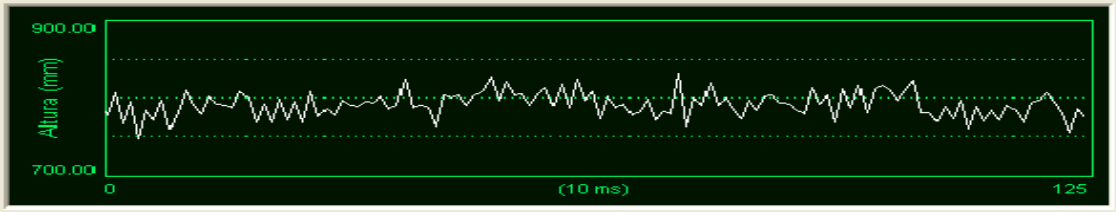
OHMS: OverHead Monitoring System

Vision system placed on the roof of a high speed train to track and measure the strength and acceleration of the movement of the pantograph and the stagger.

Group: MV	Partners: Alstom, TMB, RENFE





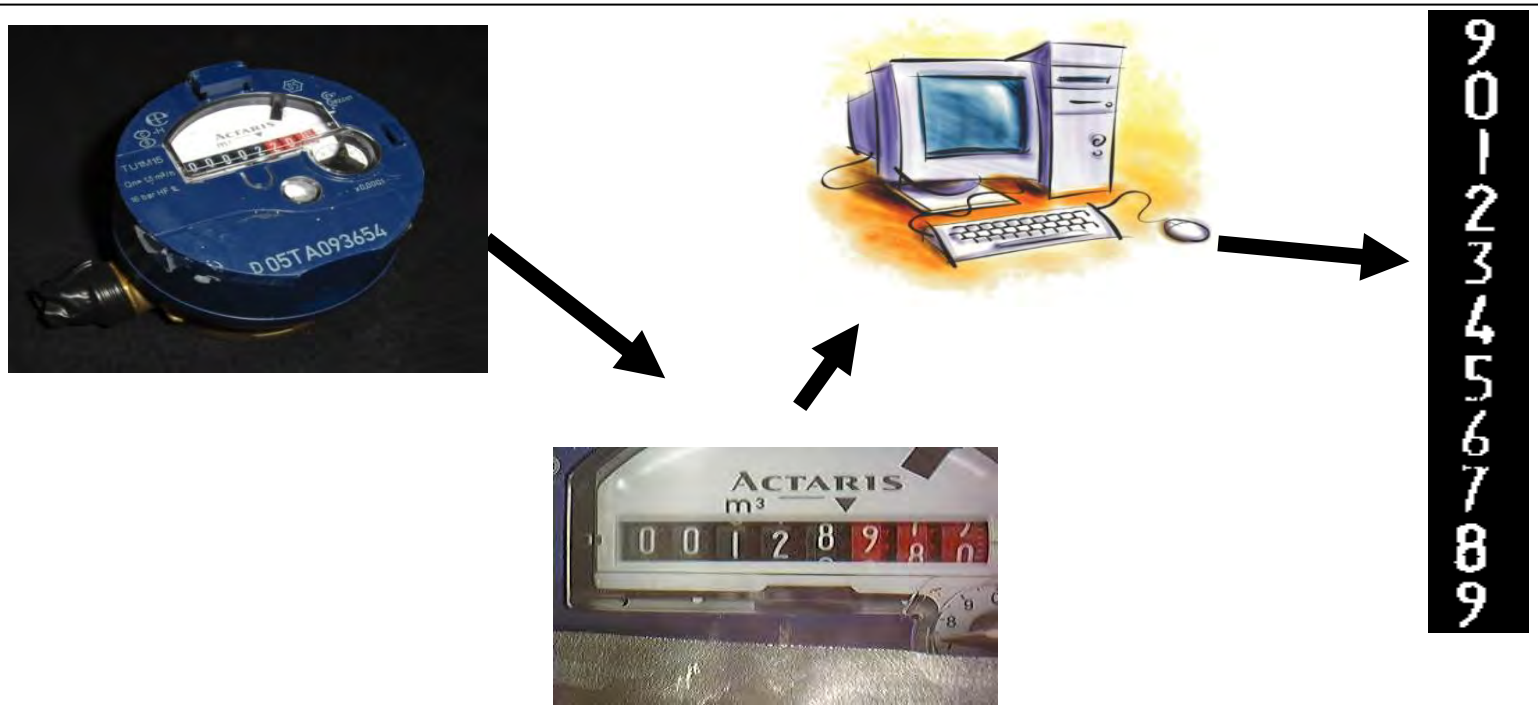


TRANSPORT | ALSTOM

Automatic Water Meter Reading Using OCR

Water meter reading system formed by a low cost camera from a mobile phone and a GPRS connection from which an image of the water meter lecture is automatically sent to the water provider.

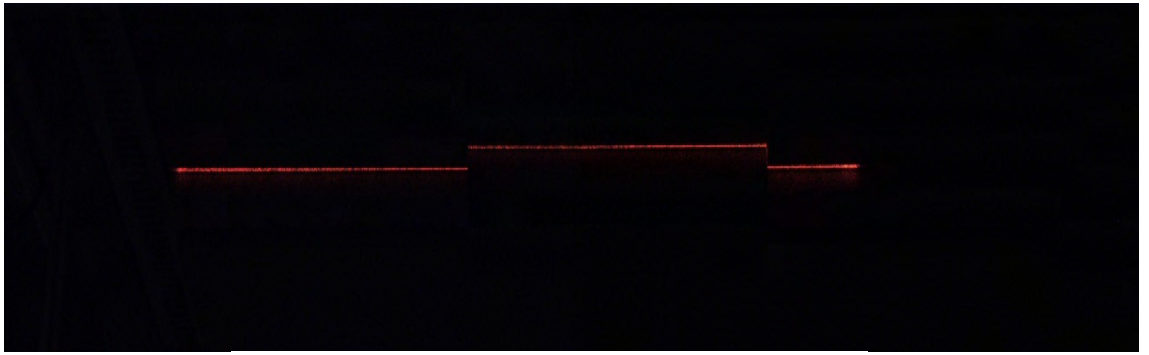
Group: MV	Partners: Iviron



VISIOPAL – Pallets automatic measurement and detection of nails and cramps incorrectly fixed

Precise automatic measurement of industrial pallets using laser triangulation and detection of nails and cramps incorrectly fixed using thermal cameras.

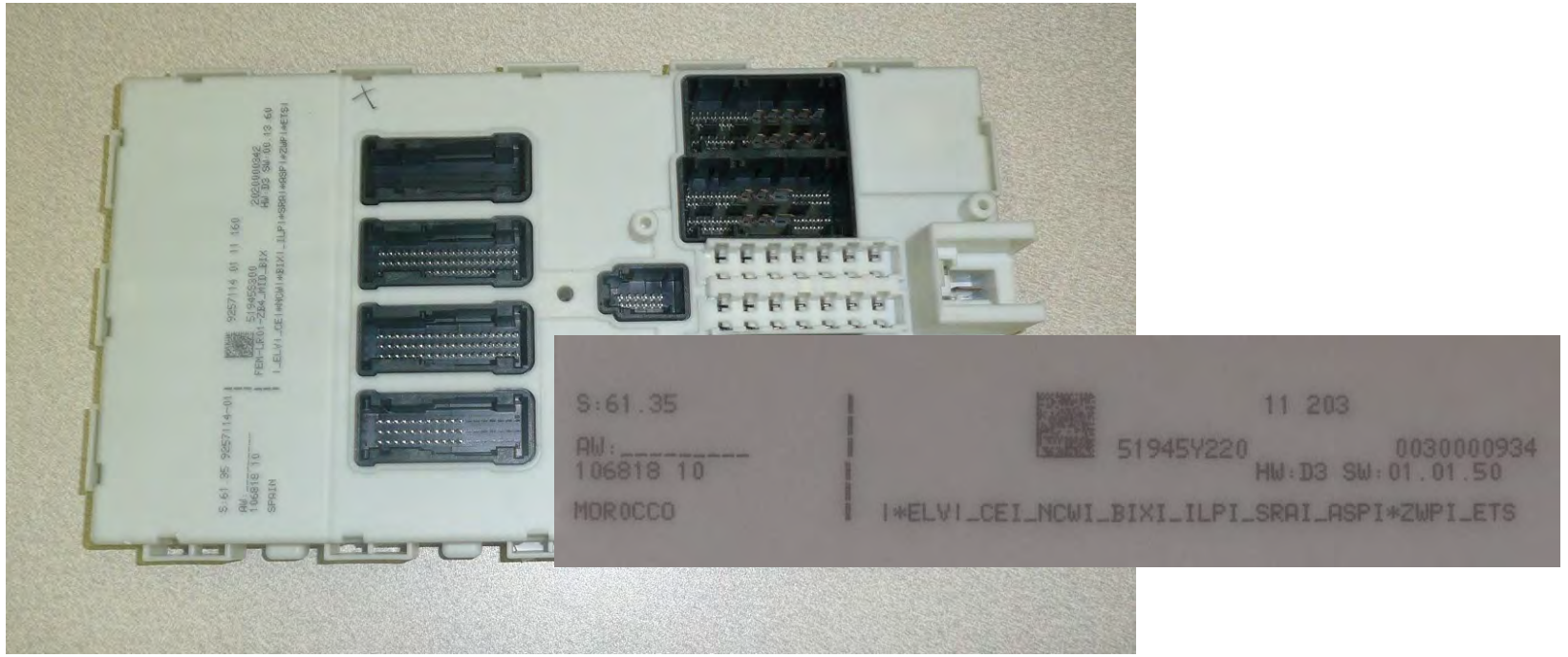
Group: Machine Vision	Customer: CAPE, CDTI



Software module for inspecting laser printed information

Description: Datamatrix Recognition and OCR on PL7 boards for BMW

Group: Machine Vision	Customer: Lear Corporation Holding Spain SLU



Guidance system of a robot arm for automatic deboning hams

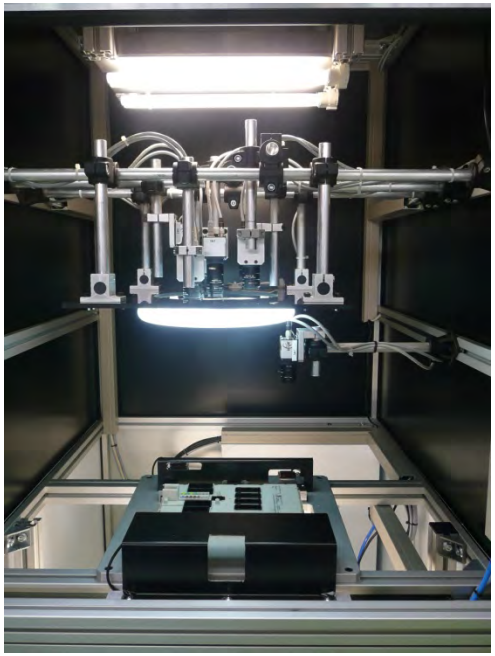
To carry out a proposed new robotic cells for ham making process based on a set of hardware and software for current and future requirements demanded by the market for the meat industry.

Group: IAM + MV	Partners: Automatismos Proyectos y Montajes, SA

Rabat X10 IIPTE Connector and labelling inspection

Vision equipment for inspection of the four connectors and label of the piece X10

Group: MV	Partners: Lazpiur Construcciones Mecánicas



CASO FAISAN

An Antropometric expert study in order to determine the correspondence between images, comprising matching facial features, body shape and bone structure.

Group: ISE	Partners: Audiencia Nacional

Title: Hardware Independent Colour Calibration

Implementation of four visual tests, based on certain human perception principles for use in TruColour's Colour Calibration framework.

Group: DAG	Partners: TruColour Ltd, UK

Multispectral Stereo Vision System

Imaging system for computing sparse/dense depth maps from multispectral images. The stereo head consists of two cameras rigidly attached: a color camera (VS) and an infrared camera (IR).

Group: ADAS	Partners: none

VS camera

Color image

IR camera

IR image

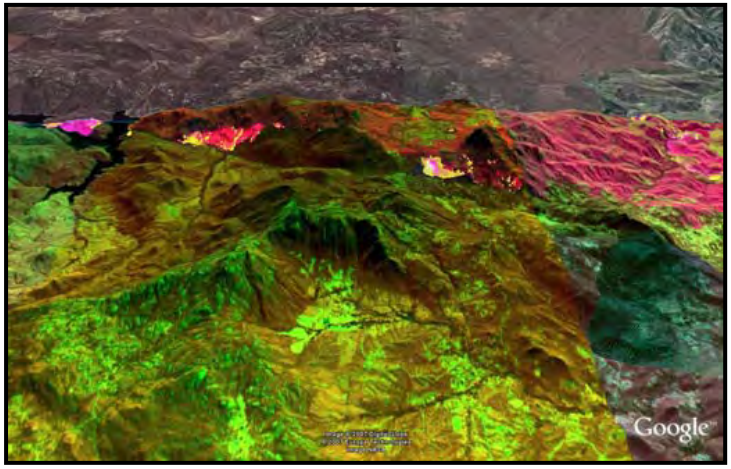
3D Multispectral Representation

FireWATCHER

Fire Warning by Aerial Terrain Control of Hot Embers Regions

Group: ADAS-CVC	Partners: Logisim-UAB, FIB-UPC

Ikhana System (NASA)



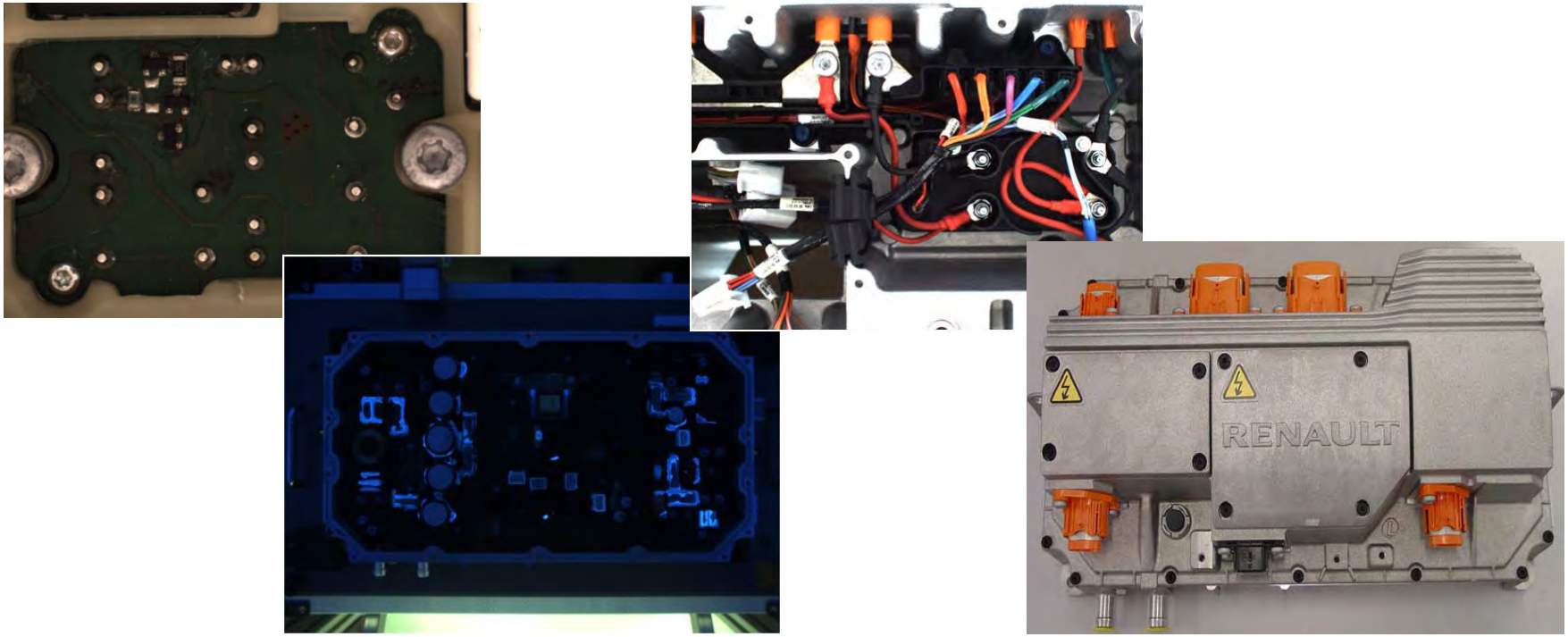
FireWATCHER is a subproject of the FireGUARD project (acronym for “Fire Guided Unmanned Aircrafts and Resources Distribution”) whose goal is developing a system to assist firefighters in extinction missions, increasing the effectiveness of their fire mitigation activities.

It focuses on the use of Computer Vision algorithms to process data provided by a fleet of unmanned aerial vehicles, to detect and characterise hot spots and fire fronts in remotely acquired aerial images.

Battery charger test labels extension

The aim of the project is to verify the assembly of three connectors in Battery Charger test labels equipment: the soldering, the wiring, the glue to immobilize the components and the final labeling

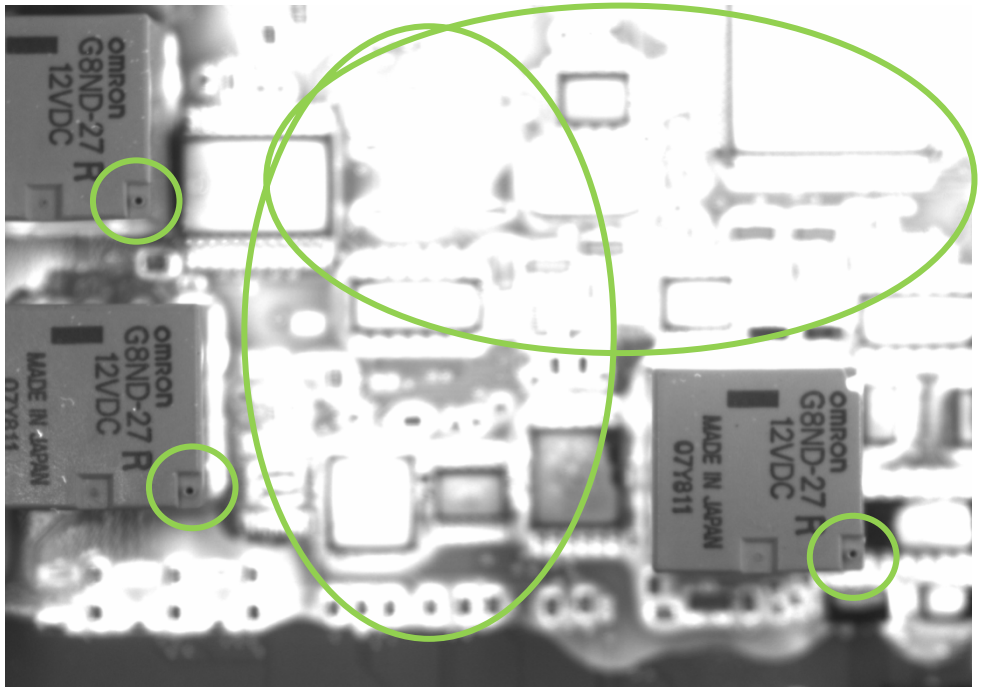
Group: MV	Partners: Lear Corporation



Extension of PL2 Vent Hole (machine 2) for T4/EMM

The project is to verify that the printed circuits are correctly varnished and that the vent holes relays have not been plugged.

Group: MV	Partners: Lear Corporation



Miniwatt

Software for TV screen quality inspection. Analysis of contrast, texture and trace distortion and sub-pixel quality.

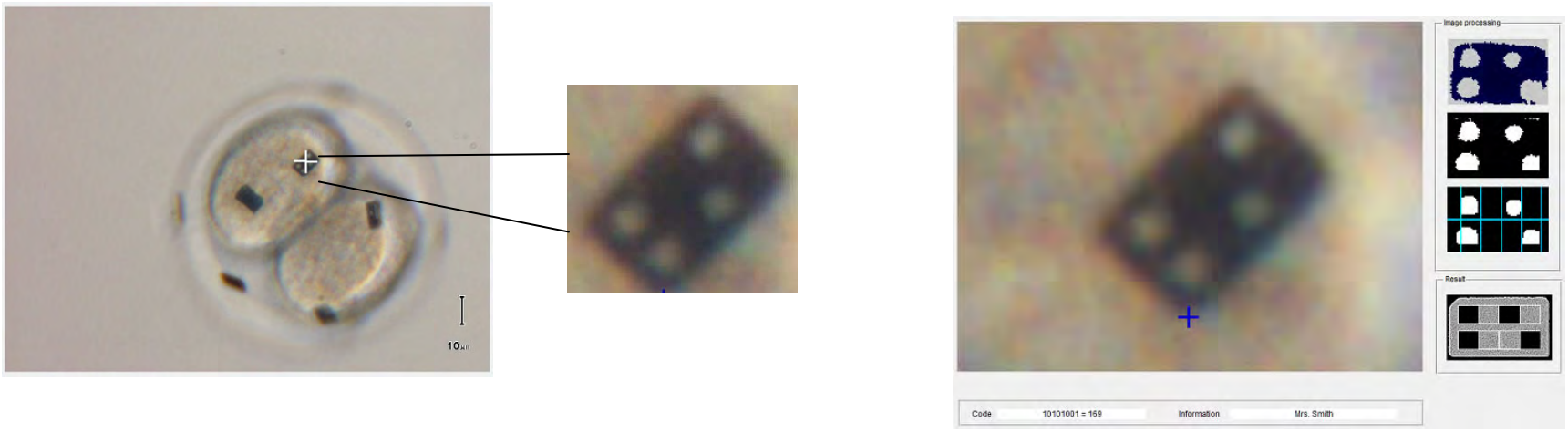
Group: MV	Customer: Miniwatt

Miniwatt V:130seg

Feasibility study for the automatic reading of barcodes on microscopic images of pre-embryos

Feasibility study for the development of a prototype computer interface for the automatic detection and reading of micro-barcodes for microscopic images of oocytes / embryos of mice and humans.

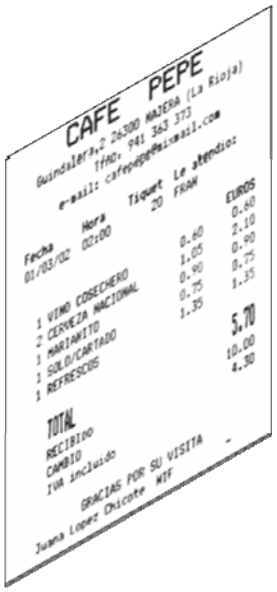
Group: IAM	Partners: Universitat Autònoma de Barcelona (UAB)



Mobile ScanTicket

Application to extract relevant information from sales tickets (provider name, date and amount of the ticket) from images acquired with an smartphone.

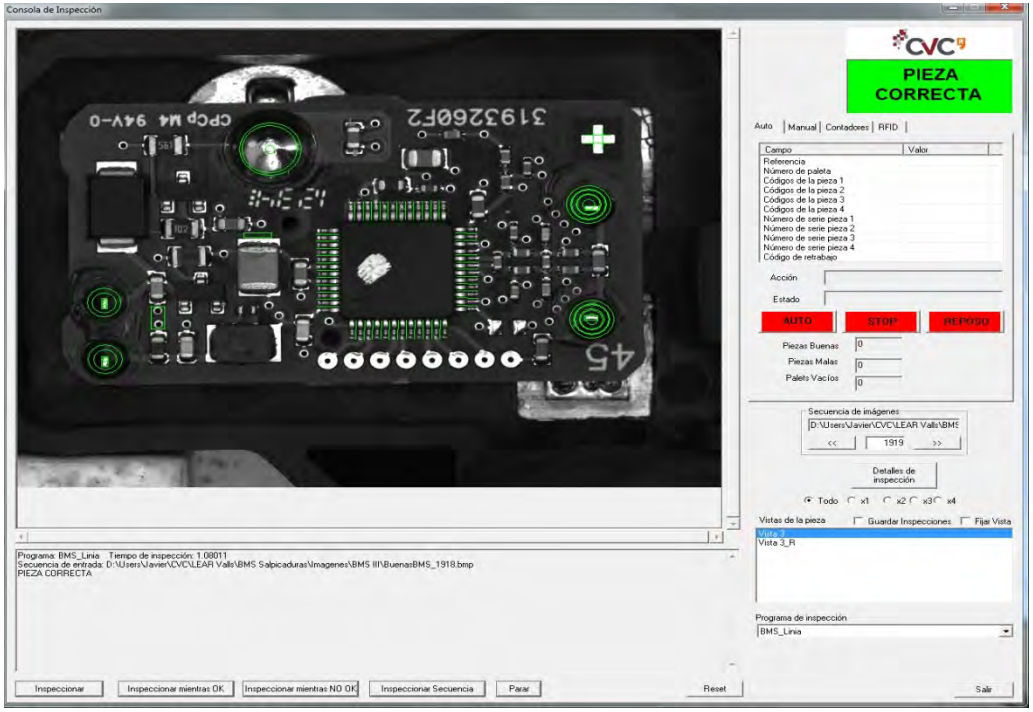
Group: DAG	Partners: ONGEST



Detection of short circuits between integrated circuits pins of BMS plates

Development of a new VisionOk II control that can be used in BMS, BMS II and BMS III lines to detect splashes of tin on the whiskers of the integrated circuits.

Group: MV	Partners: Lear Corporation



Audiences Measurement with Computer Vision

Analysis of human behavior based on computer vision for measuring audience digital signage systems, and other exhibitors

Group: VOR	Partners: Inspecta S.L.

Uimersivo: Development of an Interface Demo for Imersivo

The goal of this project is to deliver an advanced User Interface (UI) for enhancing urban retail.

Group: HuPBA, ISE Lab	Partners: imersivo

Tailor4Less

The project pretends to develop a software solution that allows estimating different body sizes by automatically making various garments.

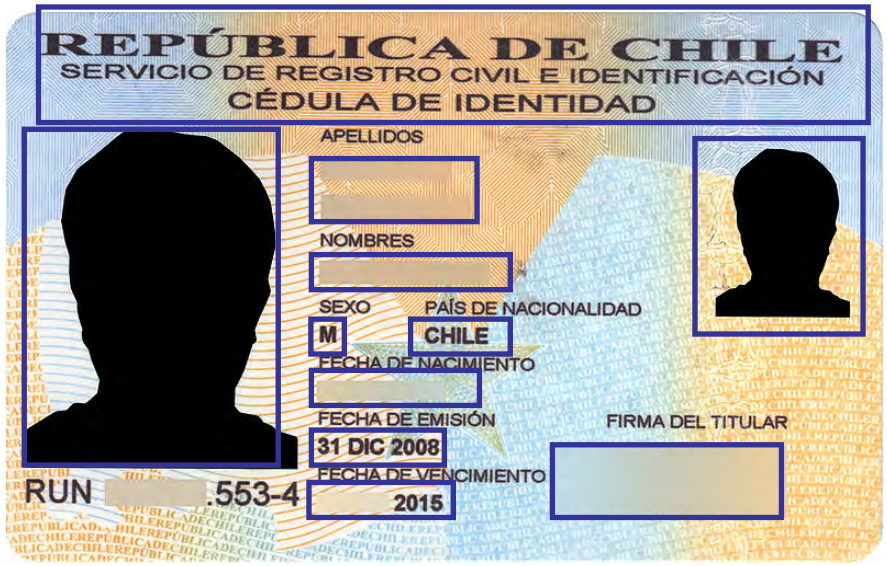
Group: ISE	Partners: Pink Fish International

$M(a_1, a_2, a_3, a_4)$

Modeling Identity Documents

This project aims to improve the ICAR's process of modeling different identity documents to be able to automatically extract and validate its information.

Group: DAG	Partners: ICAR Vision Systems



Automatic cork stopper inspection

Automatic design and development of advanced Computer Vision technology for analysis of cork stopper quality and defaults.

Group: MiLab and OR	Partners: RXiberta

THANK YOU