



Innovation and Technology

A low-angle photograph of a modern building with a glass and white facade. The building is tilted diagonally. On the white part of the facade, there is a logo that reads "aimen" in blue and black, with "LASER Centre" written below it in black. The sky is blue with some light clouds.

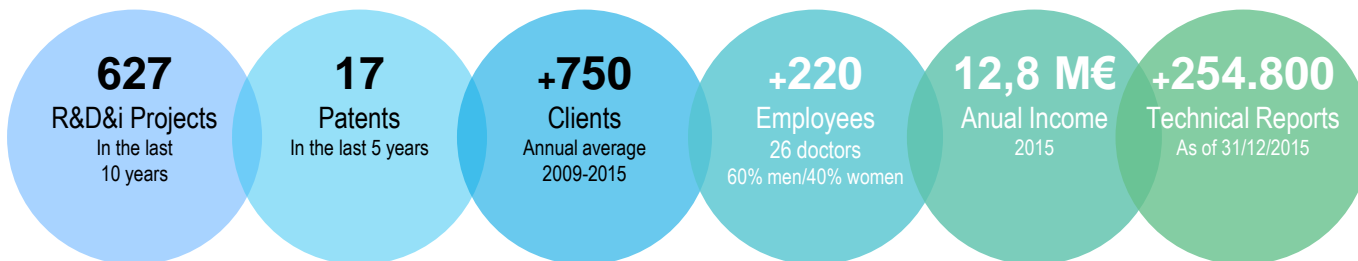
aimen
LASER Centre

Embedded Systems and CPS



We are an **Innovation and Technology Centre** specialized in **research** and in providing advanced **technological services**.

Our VISION is to become a strategic technology partner for each and every one of our associates and customers, contributing to improving their technological capabilities.



FIELDS OF SPECIALIZATION

R&D

Advanced Materials

Robotics and Control

Advanced Manufacturing Processes

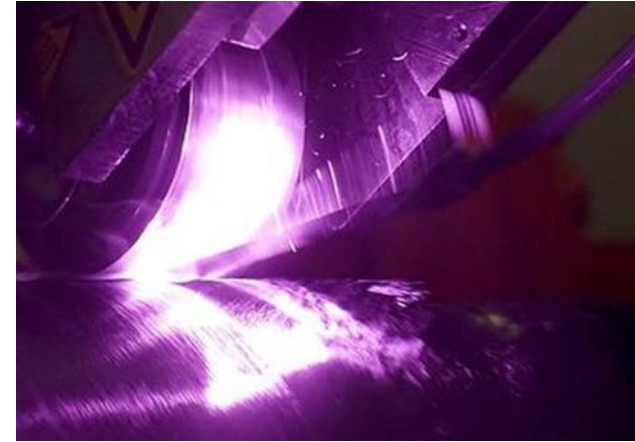
Environment

Robotics and control Unit: Research lines



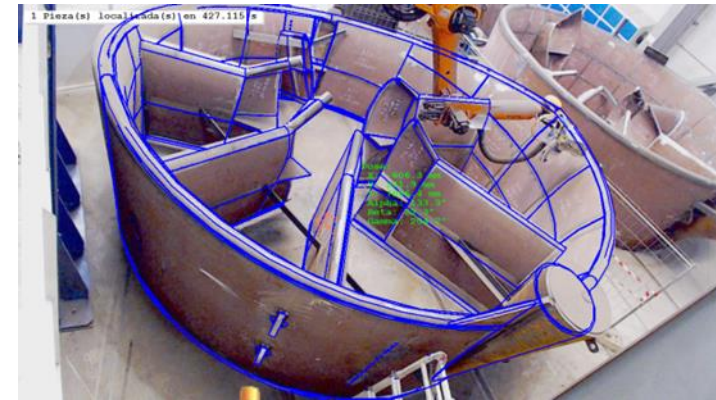
Advanced Assembly and Disassembly Technologies:

- Single and multi-stage manufacturing approaches
- Distributed monitoring and control
- Combination of advanced materials and additive/subtractive/forming processes
- Adaptive process automation
- From design to product



Robotics and flexible automation:

- Intuitive programming
- Accurate CAD-based localization
- Adaptive behavior to cope with deformations
- Reconfigurability. Plug&Produce
- Adapted for mass customisation and dynamic production



Embedded systems and CPS:

- Development of embedded systems (HW & SW)
- Multisensor embedded vision
- Real-time process control
- Machine learning (Deep Networks)
- Embedded sensing for machine condition



Mobile and collaborative manipulators:

- Robot co-workers
- Collaborate with humans in a shared workspace
- Safe Human-Robot Interaction
- Fenceless shared workspace. Open Environments
- Navigation on semi-structured environments

Robotics for transport and logistics:

- Multi-robot and multi-user control architecture
- Localization and navigation based on natural landmarks
- Holonomic and non-holonomic navigation
- Applied to warehousing and intralogistics
- Vertical integration. Integration with ERP

Mechatronics:

- Light and slim manipulators
- Integration and control of novel actuators
- Integration of robotics, adaptronics and flexible manipulation into machine tools

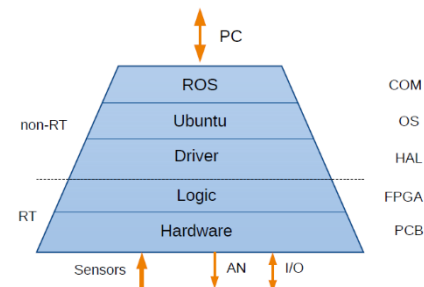
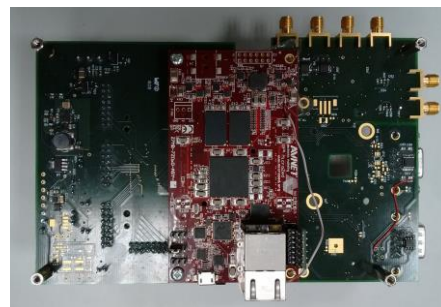


Embedded Systems and CPS



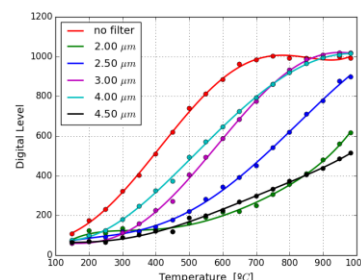
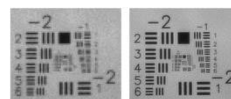
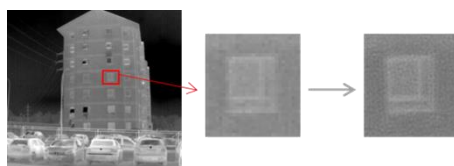
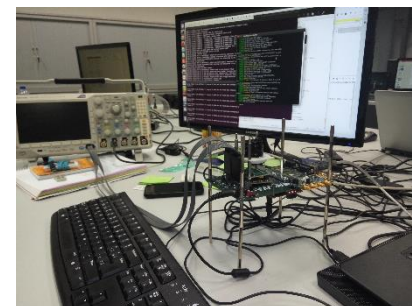
DEVELOPMENT OF EMBEDDED SYSTEMS

- *Electronics design (FPGA, GPU, ARM)*
- *Software development (VHDL, CUDA, C++)*

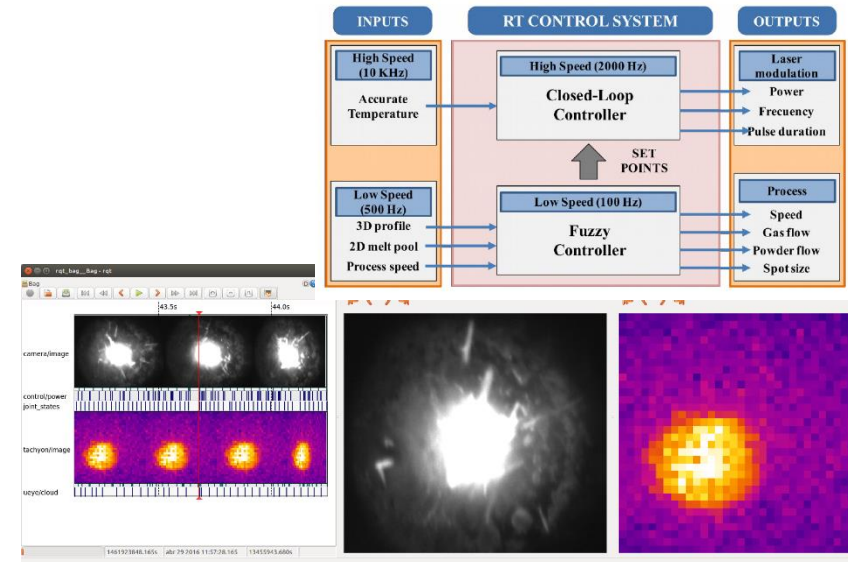
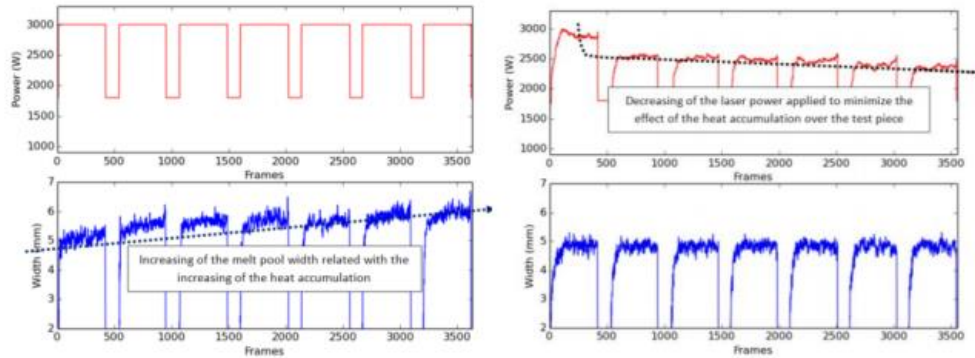


MULTISENSOR EMBEDDED VISION

- *Custom development of imaging modules*
 - Combining multiple FPAs in VIS and NIR bands
- *Embedded image reconstruction*
 - Multi spectral vision
 - Super resolution
- *Embedded vision and image analysis*
 - Detection, recognition measurement (e.g. objects, defects, anomalies)
 - Spatially resolved measurements (e.g. temperature, gases, geometry)
 - High speed and real time processing on GPU/FPGA



REAL TIME PROCESS CONTROL

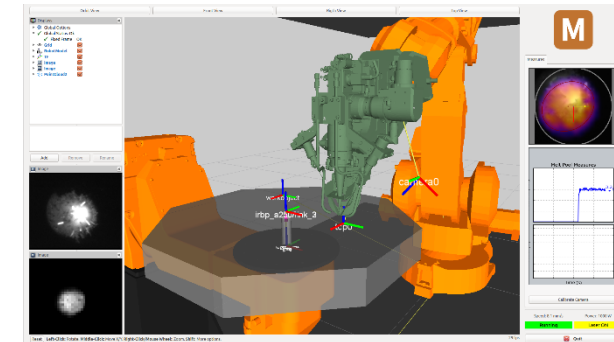
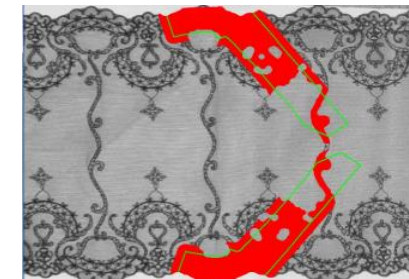
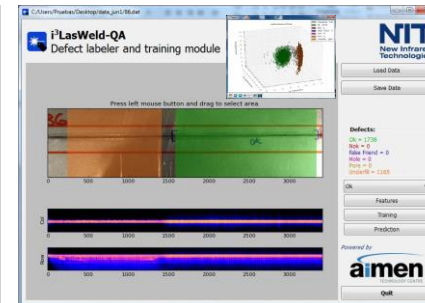
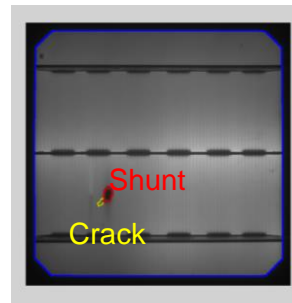


M2M and MACHINE TO CLOUD

- Integration of sensors, robots, machines, cloud
- E.g. OpenLMD (openlmd.github.io/)

MACHINE LEARNING (DEEP NETWORKS, CNN, SVM) FOR

- Detection, classification, reconfiguration
- Both embedded and cloud-based



Highlighted projects Embedded Systems and CPS



MANUFACTURING

- Real-time process monitoring
- Closed-loop process control
- Inline quality control, defect detection, and classification



FORTISSIMO



ENVIRONMENT, FOOD AND FARMING

- Quality control
- Crop monitoring



INFRASTRUCTURES

- Monitoring and surveillance for safety and security



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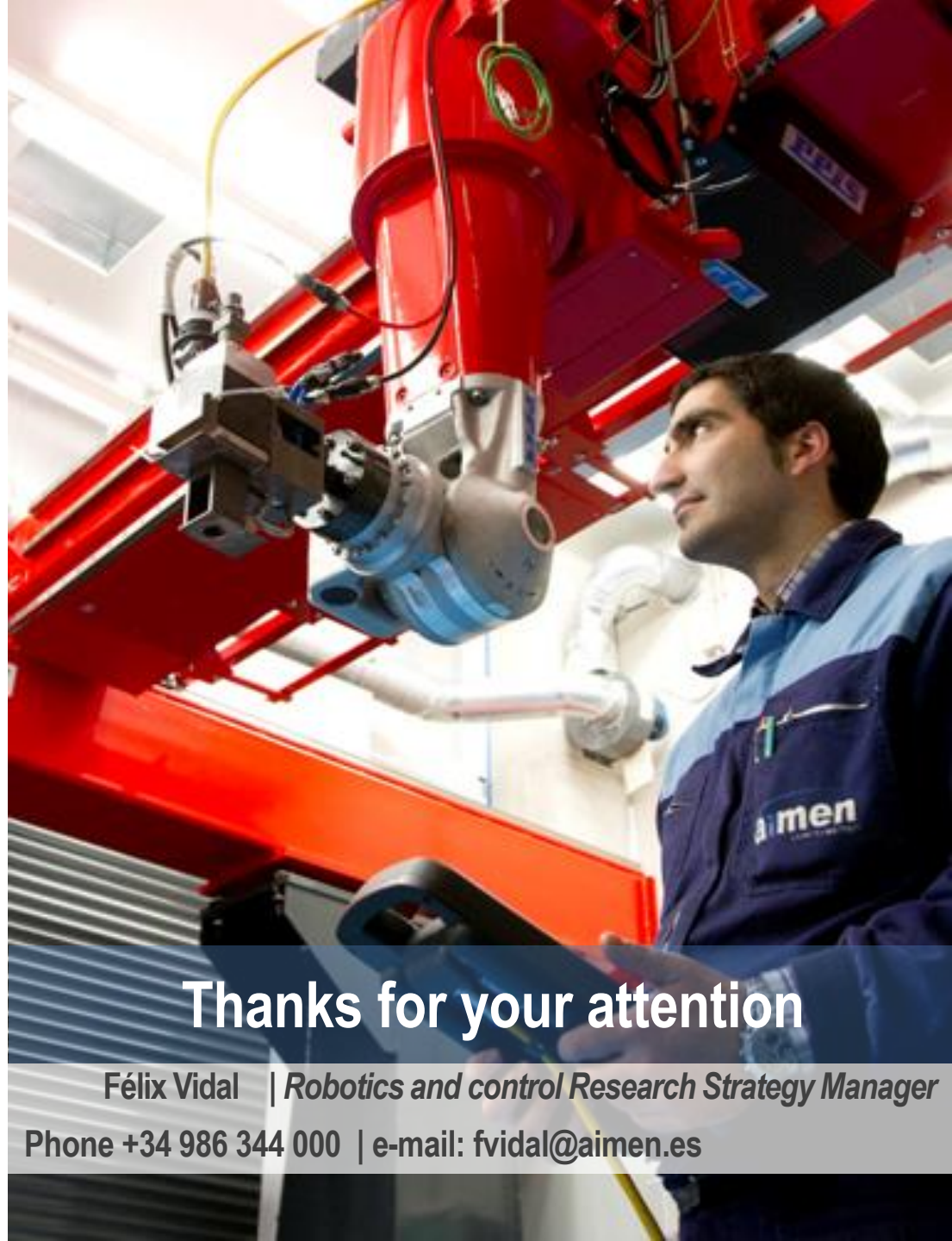
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Thanks for your attention

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