



**EDUSAFE PROJECT**

**IDEASQUARE**

O. Beltramello

# Who are we ?

A Collaboration of 12 Partners  
EDUSAFE FP7 Marie Curie ITN Project

3.2 MEuros, 4 years program (started in Sept. 2012)

CERN / ATLAS is coordinator

10 PhD Fellows

2 Post Doc. Fellows

Athens University of Economics and Business, Greece

Canberra, France

CERN / ATLAS

EPFL, Switzerland

Novocaptis, Greece

IASA / National Technical University Athens, Greece

Prisma Electronics, Greece

Technical University of Munich, Germany

Universita Degli Studi Di Roma Tor Vergata, Italy

Aristotle University of Thessaloniki, Greece

CAEN University, France

Democritus University of Thrace, Greece



# What are our goals ?

Assist people working in extreme environment

Our test case: CERN maintenance activities in radioactive environment

We supervise workers, their environment and their activities

- \* audio / video connection
- \* environment parameters
- \* health data

We provide information to worker

- \* various display: tablets, HMD
- \* from various nature: working procedures, dose maps
- \* using Augmented Reality technologies



→ increase safety levels

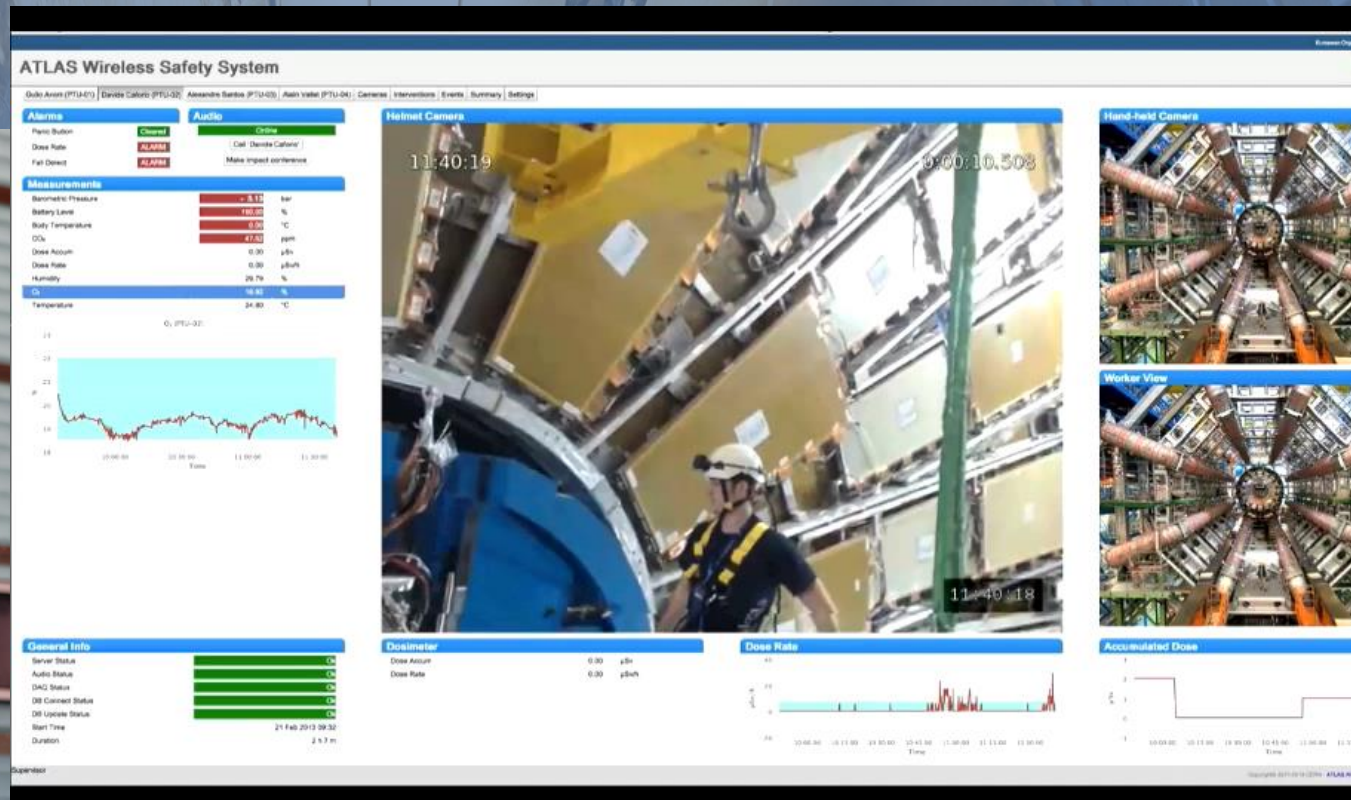
→ reduce human errors

→ decrease intervention time

→ reduce intervention stress

# What is the status of our developments?

## The Worker Supervision System is ready



# EduPix gamma imaging camera prototype is ready and tested

360° scan, remotely controlled, motorized, light 3 Kg

We are able to detect the gamma hot spots in the environment !



Tour - Superimposed Panofamic Result - ATLAS Beam Pipe

Navigation controls for the panoramic view, including a grid icon, left and right arrows, up and down arrows, zoom in (+) and zoom out (-) buttons, a 'Clear' button, a play button, a 'Save' button, a 'Single shot' button, a '360°' button, and a full-screen/exit button.



# Augmented Reality developments are on going and under integration process

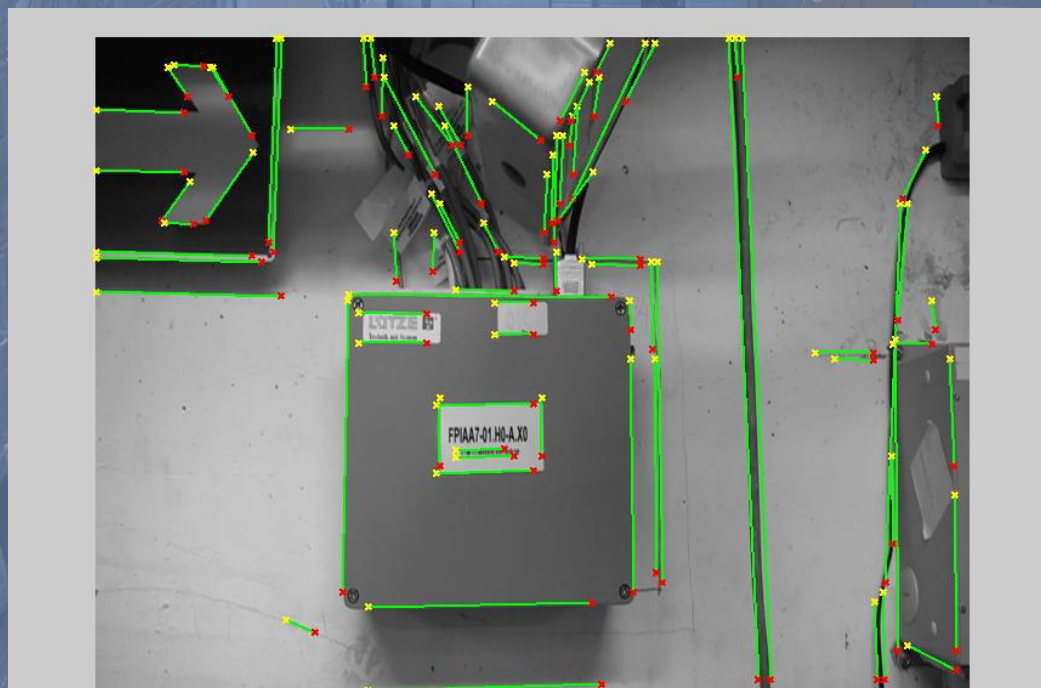
- ✓ Computer vision state of the art algorithms for a (very) fast worker position determination - EPFL



✓ The WRM, the analogic Weighting Resistor Matrix – Roma II Development are on going, and the results are very promising

WRM is directly derived from the CERN high energy physics technology, used in LHC to make pattern recognition at nanosecond level ...

Now to be used to boost Computer Vision algorithms  
.. Increase robustness ... Decrease time of computation

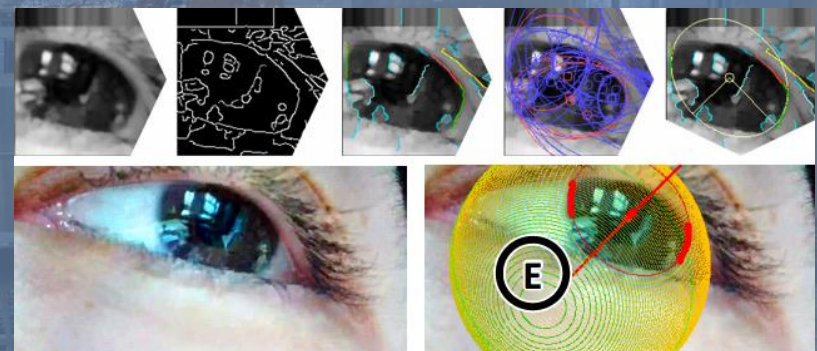
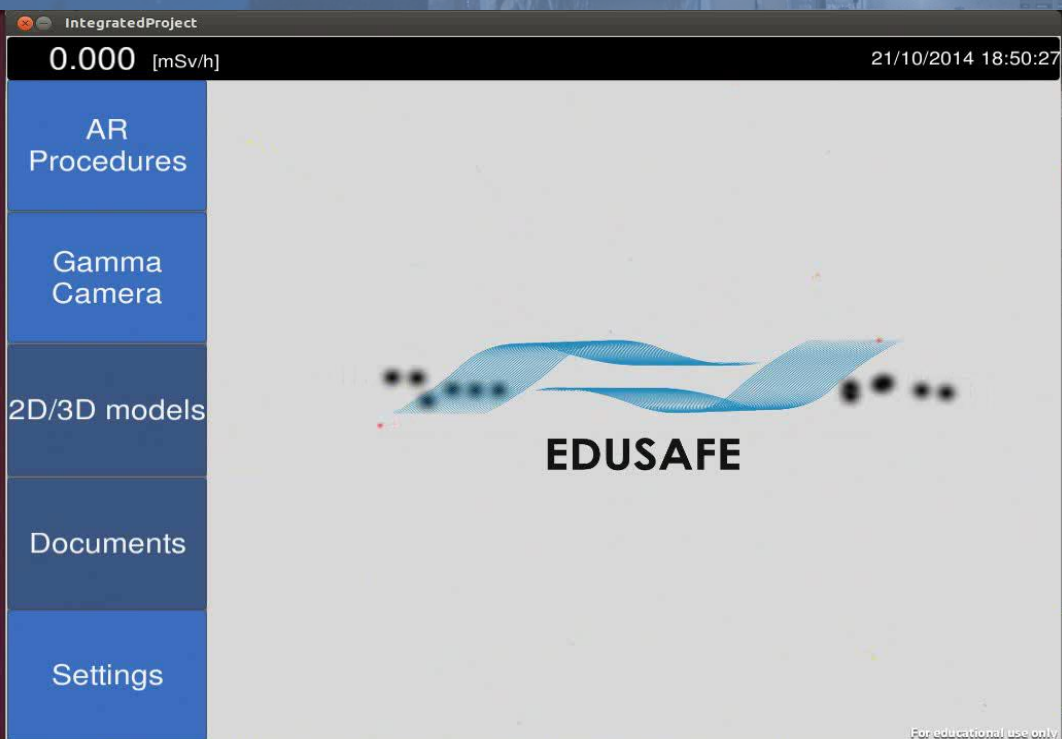


# Augmented Reality developments are on going ...

## ✓ Sensor Fusion and rendering – CERN and TUM

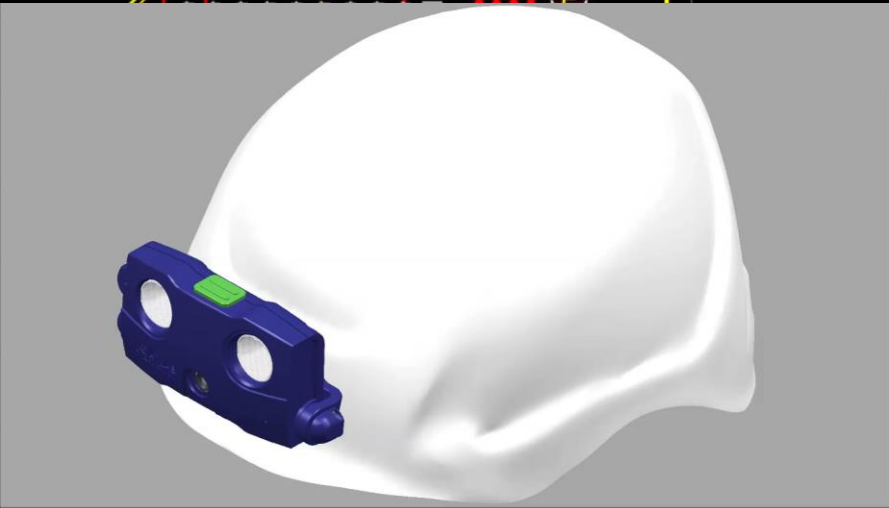
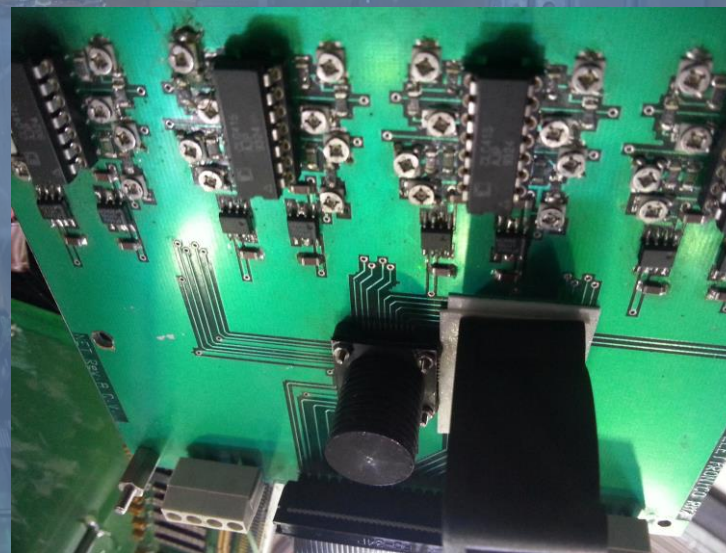
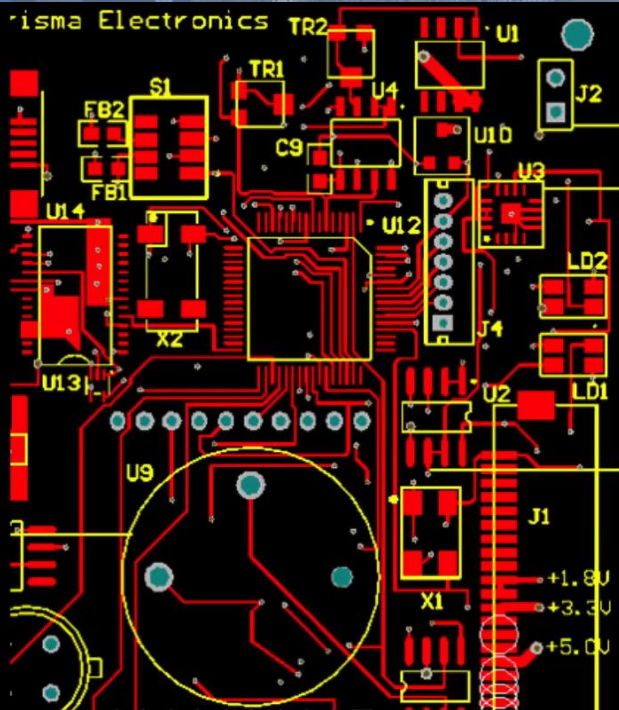
We fuse the data coming from image analysis with IMU sensors and provide rendering (procedure information) to the worker  
... every 30 ms...

We track the eye and project information at right position





# The System Hardware is under construction ...



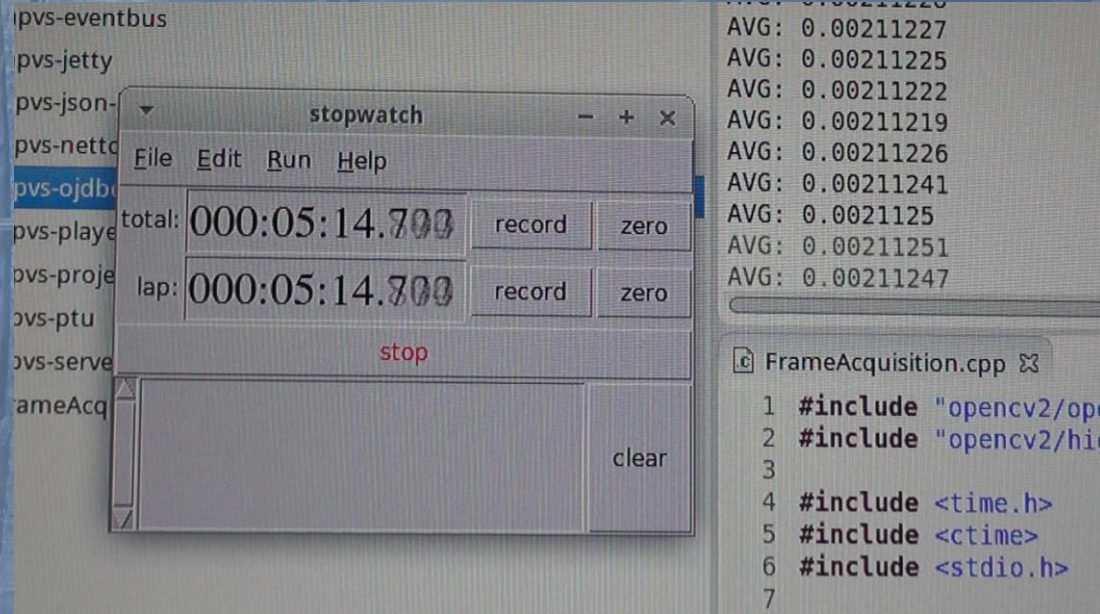
EA.F64

# System integration and testing campaign has started ...

## We start measuring performance ...

- ✓ data transfer
- ✓ system accuracy and fastness
- ✓ ease of use
- ✓ ergonomomy, etc ...

The results are up to now better than expected for the first prototype !



The screenshot shows a terminal window with a list of system services on the left and performance metrics on the right. A stopwatch application is overlaid in the center, displaying a total time of 000:05:14.700 and a lap time of 000:05:14.700. Below the stopwatch is a code editor showing the beginning of a C++ file named FrameAcquisition.cpp.

```
pvs-eventbus
pvs-jetty
pvs-json-
pvs-netto
pvs-ojdb
pvs-playe
pvs-proje
pvs-ptu
pvs-serve
ameAcq
```

```
AVG: 0.00211228
AVG: 0.00211225
AVG: 0.00211222
AVG: 0.00211219
AVG: 0.00211226
AVG: 0.00211241
AVG: 0.0021125
AVG: 0.00211251
AVG: 0.00211247
```

stopwatch

File Edit Run Help

total: 000:05:14.700 record zero

lap: 000:05:14.700 record zero

stop

clear

```
1 #include "opencv2/ope
2 #include "opencv2/hig
3
4 #include <time.h>
5 #include <ctime>
6 #include <stdio.h>
7
```

**We already look for dissemination and future !**



**One first outreach case :**

**Technology transfer to assist **Autistic Spectrum Disorder** children learning !**