

# Professional Profile

Josep Sanz Campderrós.

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## 1 Personal Data

- Josep Sanz Campderrós.
- Born in Barcelona on December 7, 1976.
- EMail: [josep.sanz@saltos.org](mailto:josep.sanz@saltos.org)
- Web: [www.josepsanz.net](http://www.josepsanz.net) & [www.saltos.org](http://www.saltos.org)
- Github: <https://github.com/josepsanzcamp>
- Sourceforge: <https://sourceforge.net/u/josepsanzcamp/profile>
- Linkedin: <https://www.linkedin.com/in/josepsanz/>
- Mastodon: <https://mastodont.cat/@josepsanzcamp>
- Facebook: <https://www.facebook.com/josep.sanz.56>
- Twitter: <https://twitter.com/josepsanzcamp>



## 2 Academic achievements

- Computer Engineer (UPC).
- Degree of Computer Applications Development.
- Technician in Telecommunications Electronics.

## 3 Other trainings

- AutoCAD basic course
- Driving license B1
- Seminar on computer network security
- Distributed Java Programming with CORBA
- ALTERA's FPGA Seminar
- Seminar Echelon - LonWorks
- Law enforcement Seminar on Data Protection.

## 4 Brief resume

- I performed R+D throughout my career.
- In my business project, Wide Spectrum Software Solutions, I directed the SaltOS and RhinOS projects and their release under the GPL-3.0 license.
- I've been a member of the CatPL, Association of Free Software Business of Catalonia.
- I have worked in research environments such as the Institute of Space Studies of Catalonia and the Technical University of Catalonia at Dept. of Applied Physics.

## 5 Professional experience

### 5.1 AB Custom Group - Road or rail transportation (since 2019)

Developments for GNU/Linux environments and integration of SaltOS in all business areas:

- Documentation recognition systems using OCR, bar codes and QR codes.
- Integration of SaltOS in all the business areas of the company.
- Automation of processes using embedded systems based on Raspberry PI
- Route optimization using AI and online appointment automation

### 5.2 Institute of Space Studies of Catalonia (2011-2019)

Developments for GNU/Linux environments to control robotic telescopes:

- Development of OpenROCS 2.0 (GPL-3.0 license), control software used by the TJO and SQT telescopes.
- Development of the [www.oadm.cat](http://www.oadm.cat) for the divulgation of the TJO telescope, the [www.ice.csic.es](http://www.ice.csic.es) for the ICE and the [www.ieec.cat](http://www.ieec.cat) for the IEEC.
- Development of the MUR application: an online software for sending astronomical proposals.
- Fork of the IndiCCD project to allow the control of multiple Andor cameras.
- User interface and control system for the SQT telescope, the Allsky camera and the IEEC-CSIC telescope.

### 5.3 Wide Spectrum Software Solutions (2007-2011 in R+D Dept.)

Developments for GNU/Linux, MONO, Firmware, PDAs and web environments:

- Development of the SaltOS and RhinOS projects released under the GPL-3.0 license.
- Project for the NTE/ESA to do some parts of the unit-test of the LISA Pathfinder project.
- Project for the IEEC to make improvements in the GOLD-RTR project (v2 and v3).
- Multiple web projects (portals and online shops) to different customers.

### 5.4 Enfasytem (2006-2007 in R+D Dept.)

Developments for WEB using LAMP environments (Linux+Apache+MySQL+PHP):

- Improvement of the "admin" control panel (RhinOS in the future)
- Development of the "mecano" project (RhinOS in the future)
- Development of the DBMailer project (RhinOS in the future)
- Several collaborations with IEEC for the PARIS and GOLD-RTR projects

## **5.5 Information Engineering, IN2 (2005-2006 as team's chief)**

Software development for GNU/Linux and Windows CE.

- Use of security tools like Snort.
- Programming of mobile devices using EVC++ 3.0 for PDA devices
- Programming in C, PHP, .NET
- Use of DBMS such as MySQL, ORACLE

## **5.6 Institute of Space Studies of Catalonia (2001-2005)**

Development of software for UNIX environments.

- Design and implementation of hardware and drivers.
- Planning and implementation of software for various projects.
- Programming in C with GTK, Tcl/Tk on Unix tcsh.

## **5.7 Universitat Politècnica de Catalunya, Dept. of Applied Physics (1999-2001)**

Administration of Unix Systems and Microsoft Windows

- Implementation of network security systems (SSL)
- Security audits for the computer systems of the department
- Software development and maintenance of the department's intranet
- Software development for the Generalitat de Catalunya (SIGMA and NivAval)
- Collaborations with the WFAAE association.
- Support to users, and so on.

## **5.8 INCOSE, ingeniería de contrataciones y servicios (1997-1999)**

Installation and maintenance of industrial equipment.

- Programming of PLC's for industrial applications.
- Installation of electrical boards and waste treatment systems.

## **5.9 GESTHOS, gestión técnica hospitalaria (1996-1997)**

Assembly and maintenance of electromedical equipment.

- Repair of medical equipment.
- Specification and implementation of equipment for technical tests.

## 6 Languages

- Spanish native (read, written and spoken).
- Catalan native (read, written and spoken).
- Technical English (intermediate level for read, write and speak).



## 7 Annex (detailed professional experience)

### 7.1 AB Custom Group - Road or rail transportation (since 2019)

Developments for GNU/Linux environments and integration of SaltOS in all business areas:

- Documentation recognition systems using OCR, bar codes and QR codes.
- Integration of SaltOS in all the business areas of the company.
- Automation of processes using embedded systems based on Raspberry PI
- Route optimization using AI and online appointment automation

### 7.2 Institute of Space Studies of Catalonia (2011-2019)

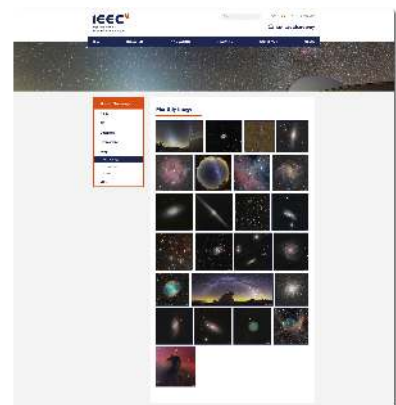
Developments for GNU/Linux environments to control robotic telescopes:

- Development of OpenROCS 2.0 (GPL-3.0 license), the control software used by the TJO and SQT telescopes.
- Development of the [www.oadm.cat](http://www.oadm.cat) for the divulgation of the TJO telescope, the [www.ice.csic.es](http://www.ice.csic.es) for the ICE and the [www.ieec.cat](http://www.ieec.cat) for the IEEC.
- Development of the MUR application: an online software for sending astronomical proposals.
- Fork of the IndiCCD project to allow the control of multiple Andor cameras.
- User interface and control system for the SQT telescope, the Allsky camera and the IEEC-CSIC telescope.

#### 7.2.1 IEEC website project

Development of the IEEC website:

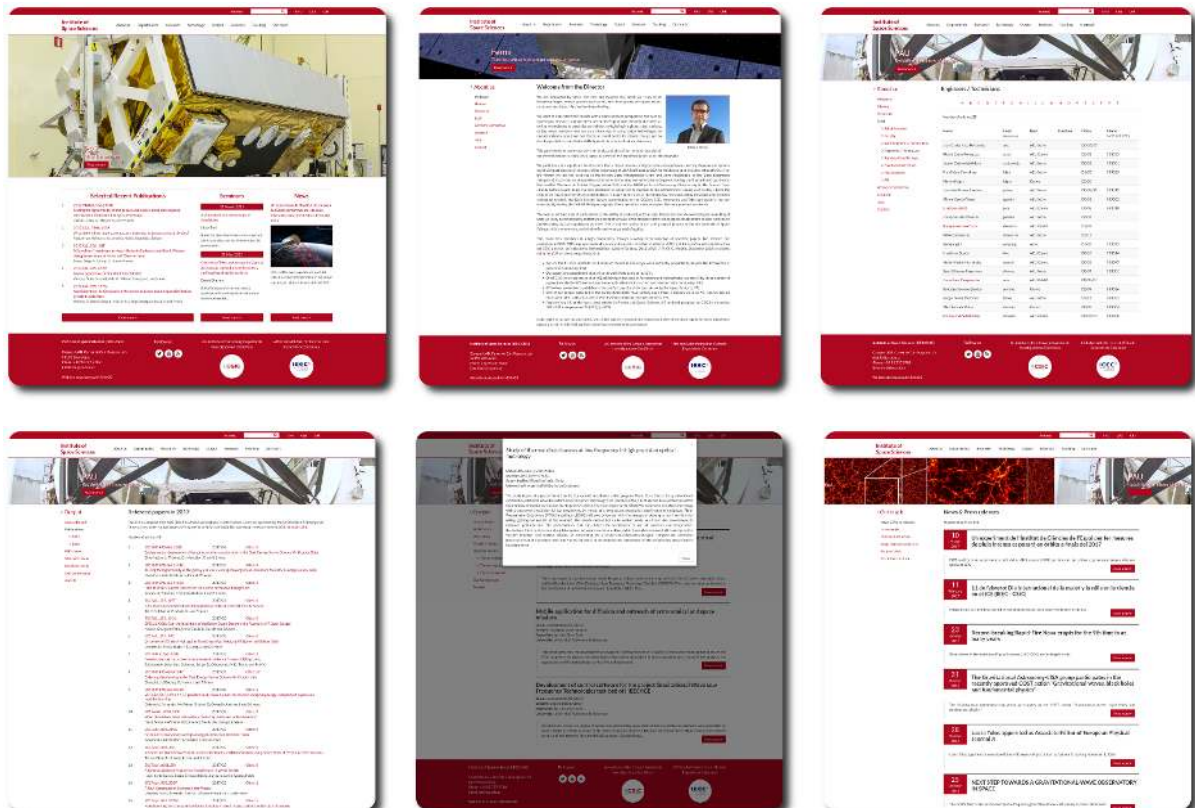
- Based on the RhinOS framework.
- Data synchronization using the databases of the units related to the institute.
- Responsive design that adapts to computers and mobile devices.
- WordPress content migration to the new website.
- <http://www.ieec.cat/>



## 7.2.2 ICE website project

Development of the ICE website:

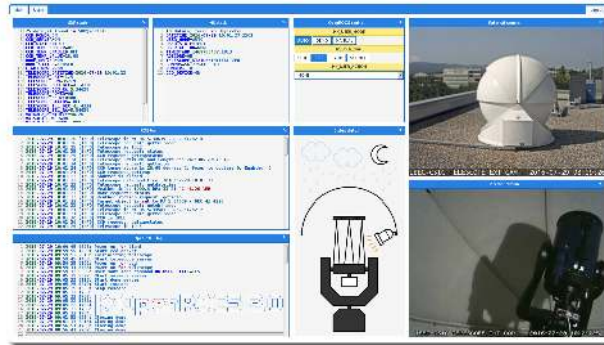
- Based on the RhinOS framework.
- Data synchronization using the databases of the units related to the institute.
- Responsive design that adapts to computers and mobile devices.
- WordPress content migration to the new website.
- <http://www.ice.csic.es/>



## 7.2.3 IEEC-CSIC telescope project

Project to automate the IEEC-CSIC astronomical telescope:

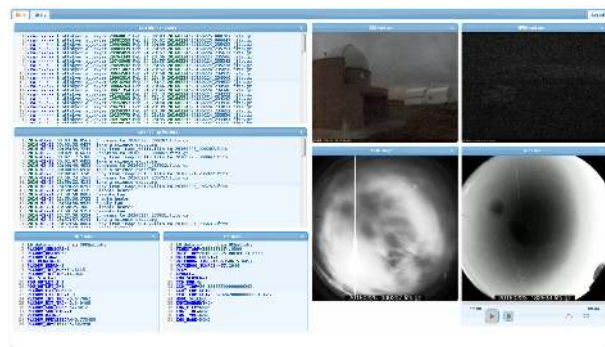
- Control system based in the OpenROCS 2.0 control software.
- Controlled devices using the industrial ROS standard.
- Development of the graphical user interface for control the entire system.
- Controlled devices: A Meade telescope, a Baader dome, an APC pdu, a Vaisala weather station, a cloud sensor and a SBIG camera.
- All system is controlled using only one Raspberry PI 2.



#### 7.2.4 Allsky camera project

Project to automate the IEEC Allsky camera:

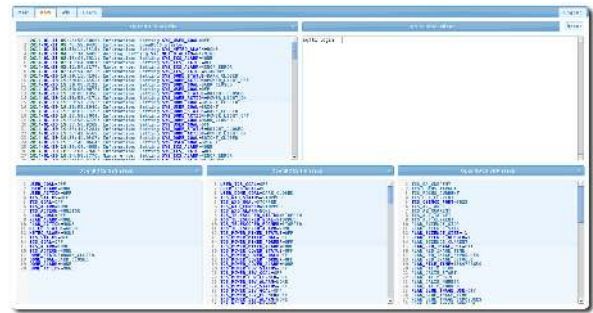
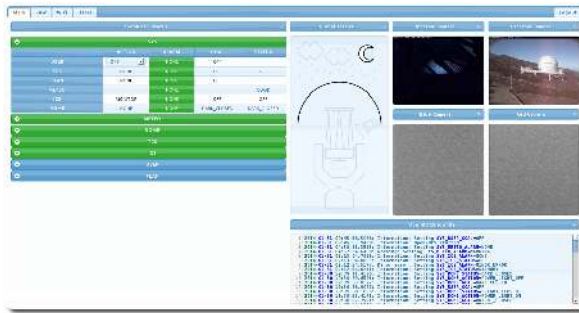
- Control system based in the OpenROCS 2.0 control software.
- Controlled devices using SNMP and INDI protocols.
- Programming of a driver that communicate with an industrial Siemens PLC.
- Development of the graphical user interface to monitor the entire system.
- Controlled devices: a heater, a fan, an APC pdu and an APOGEE camera.



#### 7.2.5 SQT telescope project

Project to automate the SQT astronomical telescope:

- Installation of the operating systems in the two control computers (nominal and redundant).
- Development of some control packages as the dome control and the second motor focus.
- Installation of some specific software packages as talon, OpenROCS and IndiCCD to operate the telescope and instruments.
- Develop of the GUI to allow the remote supervision (useful in the commissioning process).



## 7.2.6 IndiCCD driver project

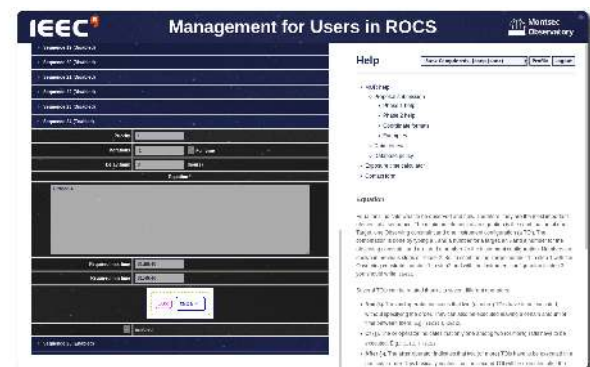
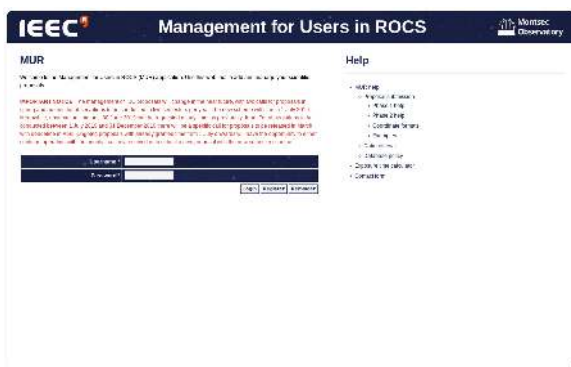
Fork of the XmCCD v.4.2.1 project:

- Added improvements to the cameras control (indiccd).
- Added support to the Andor and Finger Lakes Instruments cameras.
- Added support to use simultaneous cameras.

## 7.2.7 MUR project

Project that must allow the end users to send astronomical observing proposals:

- Design and implementation of the corporate website with private areas and user roles.
- Create a new broadcasting model for the OAdM webcams (using VLC) to prevent DoS.
- Data model specification to store the different phase data of the proposals.
- Language definition to allow end users to specify the observing sequences (using the toi concept).
- Implementation of tools to validate and plot the sequence equations.
- Front-end for each end user role that are involved in the different acceptance phases of the proposals (admin/CAT)



## 7.2.8 Proyecto OAdM/TJO

Improvements in the infrastructure, and in the different software parts that are involved in the normal operation:

- Audit and automate execution of the PbCdIComm software for the data collection of the SMC weather station.
- Programming of drivers to communicate with the follow hardware equipments:
  - DAVIS Weather station.
  - Previstorm.
  - Boltwood Cloud Sensor II (using the BWCloudSensorII code).
  - Rain detector.
  - Vaisala (using the Indi protocol).
- Configuration of the SNMP server to publish all data collected by the previous drivers.
- Improvements in the configuration and distribution of the network devices.
- <http://www.oadm.cat/>



## 7.2.9 OpenROCS v2.0 project

Software for unattended control of TJO (OAdM) and SQT astronomical telescopes.

- Design, implement and test control software using the following architecture.
- A server service that serves the requests from port 2323 to provide remote storage and accessible using predefined commands.
- A broadcast service that allows you to synchronize others remotely OpenROCS using broadcast techniques.
- A monitor service that the main task of this service is update the SDP and HK to be used by the scheduler.
- A scheduler service that lets you execute the actions that controls the telescope when you change the SDP or HK.
- This project is released under GPL-3.0
- <https://sourceforge.net/projects/openrocs/>
- <https://upcommons.upc.edu/handle/2099.1/26215>





### 7.3.3 IEEC - GOLD\_RTR live CD project

LiveCD with installer for easy tasks in campaigns:

- Allows working on LiveCD or installed with wizard on HDD.
- Useful for quick restore of the entire system.

### 7.3.4 IEEC - GOLD\_RTR v3.0 project

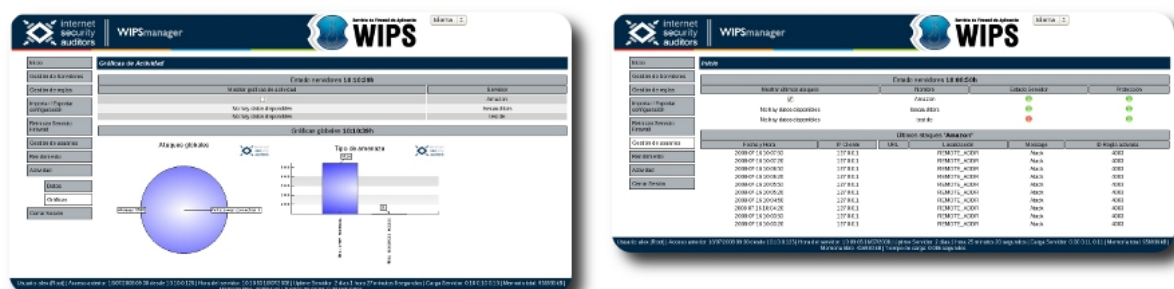
To carry out campaigns of experiments in Antarctica, it is necessary that the system is autonomous and can work remotely with and without communication in unattended mode:

- Improved control software GOLD-RTR
- Add a new algorithm for the integration of waveforms
- Validation of the new algorithm using unit-testing and validation-test.
- Generation of the documentation
- Deployment of a scheduler control system
- Management of the scheduler using pseudo-language files
- Integration with SVN commands to synchronize the results
- Notification system for monitoring the status of experiments
- Installation of the control system based on scheduler
- Generation of the documentation

### 7.3.5 ISEC Auditors - MANAGER WIPS project

### Developing a security manager application for online servers:

- Import and management of the Apache logs server
- Generation of reports and security alarms
- Application that be used with multiple users, multiple servers and multiple roles.



### 7.3.6 AXA Winterthur - Tracking project

Several online applications:

- Follower for online campaigns (LAMP environment)
- Online shop for AXA Club

### 7.3.7 VUELING - PUNTO 2 project

Functional improvements project.

### 7.3.8 AIDA CENTRE - PDA HORMIPRESA project

Application for mobile devices that be used in process management:

- Integration of RFID reader to read passive tags.
- Operating Modes using GPRS and WIFI networks or desktop connectivity.
- Desktop application for data synchronization



### 7.3.9 WS3 - SaltOS Project ([www.saltos.org](http://www.saltos.org))

Development of a framework for developing Rich Internet Applications:

- Based on XML + XSL technology on LAMP environments.
- Integration of management system for SMEs.
- Management of permissions on each system layer.
- Applications as: mail client, documentary manager, RSS and ATOM client, and more...
- User interface based in jQuery UI
- This project is released under GPL-3.0
- I continue developing this project on my own.
- <https://sourceforge.net/projects/saltos/>
- <https://github.com/josepsanzcamp/SaltOS>



### 7.3.10 WS3 - RhinOS Project ([www.saltos.org/rhinos](http://www.saltos.org/rhinos))

Development of a framework for developing web sites:

- Designed for LAMP environments.
- Includes 2 layers (CMS and CPS).
- Pseudo-code for the interpretation of the RhinOS templates.
- Separation of logical layers (presentation and business)
- This project is released under GPL-3.0
- I continue developing this project on my own.
- <https://sourceforge.net/projects/rhinos/>
- <https://github.com/josepsanzcamp/RhinOS>



### 7.3.11 CVA - SISAC project

Project for the Catalonia Agency of Water

- Its objective is service to the citizen.
- Based on eZpublish.
- Pilot project for 2000 users.

### 7.3.12 IEEC - GOLD-PRO project

Software develop for embedded system

- Use of XILINX hardware
- Programming MicroBlaze processors
- Programming LEON3 processor (space-certification)
- Routing Ethernet communications at low level (raw data)

### 7.3.13 RETEVISION - TRACEBOX Audit

Audit the software developed by HYR, TraceBox, that has been customized to service a client of Abertis Telecom:

- Identify the origin of the problems in streaming video.
- Propose a viable solution according to the current development.
- Generate a detailed technical report of the problem and proposals.
- Audit the correct deployment of the proposed solution and accepted

### 7.3.14 Alliaria (IN2 GROUP) - FIR@KEY project

Access control project for the fairs at the Fira de Barcelona:

- Development in VB6.0 using SOAP (by client requirements)
- Integration of RFID reader for user identification
- Installation wizard without dependencies for Microsoft operating systems.

### 7.3.15 WEB Projects

#### **Shop online CADAICO**

Improvements to the initial online shop

#### **Web site for the EUSS school**

Web site and intranet for this university:

- Technology has been used RhinOS.
- There have been several evolutions with successful results.
- Customizing Moodle e-learning application

#### **Web site for the COACB company**

Functional enhancements of its corporate portals

#### **Web site for the MEDIATORS OF INSURANCE ASSOCIATION**

Custom deployment of an e-learning online tool.

#### **Web site for the VERTEX company**

Development of the corporate portal and intranet

#### **Web site for the APQ company**

Development of the corporate portal and intranet

#### **Web site and online shop for the SEVIBE company**

Several online applications:

- Development of corporate website
- Some promotional portals
- Development of online recruitment system and backoffice
- Integration of Wordpress News management.



## Web site for the TRITON restaurant

Development of the corporate portal and intranet

- Online Reservation System

## Web site for the Castelldefels's hostelry school

Development of the corporate portal and intranet

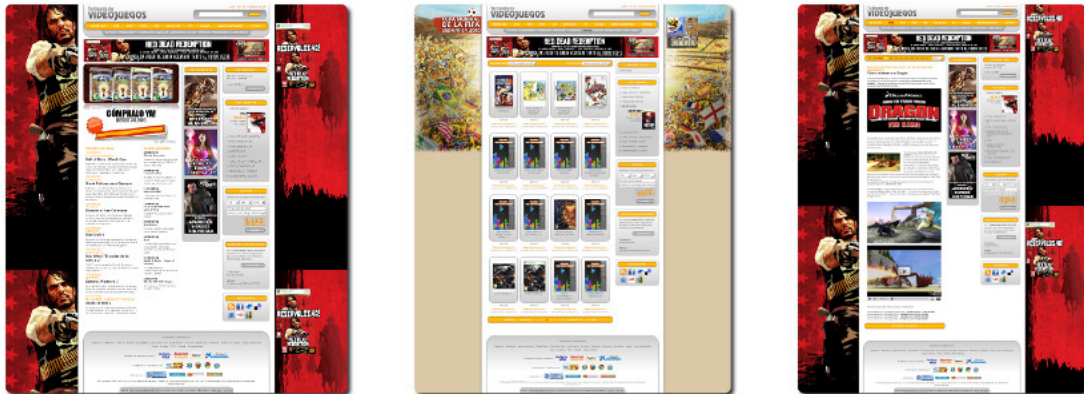




## Online shop for the TUTIENDADEVIDEJUEGOS.COM company

Several online applications:

- Development of the corporate website, online shop and intranet
- System for mass data import
- System for mass mailings sending
- Management of personalized dispatching



## 7.4 Enfasystem (2006-2007 in R+D Dept.)

Developments for WEB using LAMP environments (Linux+Apache+MySQL+PHP):

- Improvement of the "admin" control panel (RhinOS in the future)
- Development of the "mecano" project (RhinOS in the future)
- Development of the DBMailer project (RhinOS in the future)
- Several collaborations with IEEC for the PARIS and GOLD-RTR projects

### 7.4.1 ADMIN project ([www.saltos.org/rhinos](http://www.saltos.org/rhinos))

Dynamic content manager for online applications

- Use of GPL software as TinyMCE and other

### 7.4.2 Mecano WEB project ([www.saltos.org/rhinos](http://www.saltos.org/rhinos))

System for generating dynamic web sites with the following characteristics:

- Programming using multi-tier architecture (templates and code)
- Design and implementation of high-level language
- Generation of thumbs in realtime (images)
- Generation of multimedia content in realtime (audio)

- Documentation generation in real time (PDF)

#### 7.4.3 DBMailer project ([www.saltos.org/rhinos](http://www.saltos.org/rhinos))

System to sending mass mailings

- Controlled by database
- Control panel for maintenance
- Trigger and checks via crontab for detection of errors and system crashes

#### 7.4.4 EXIT Foundation - Social participation project

Portal of the social participation:

- Analysis and design of the database for the project
- Implementation of the control panel to administer and coordinate the foundation.
- Compliance with the Data Protection Act (Spanish Organic Law on Data Protection)
- Quality control for the processes of information

#### 7.4.5 IEEC - GOLD\_RTR project

Software for IEEC in the GOLD\_RTR project:

- Segmentation of the configuration files
- Reorganization of the configuration lines according to the GPS data
- Improvements in the graphical interface

#### 7.4.6 IEEC - PARIS signal processor subsystem project

Programming a NIOS2 microprocessor

- Design and implementation of a program to be used inside a ALTERA NIOS2 microprocessor
- Transmission of more that 4Mbytes/seg using an ethernet connection (UDP)
- Parser for evaluate commands and validation of these
- Optimization of the ALTERA libraries to improve timings
- Control via digital oscilloscope to monitor timings and guaranty the correct work.

Programming a software (for GNU/Linux platforms) for reception of UDP frames

- Design and implementation of a program for reception of UDP frames
- Validation of the frames and checking their integrity
- Saving data to local disk at high speed (using DMA technology)

Configuration of the computer systems for data reception

- Installation of GNU/Linux Slackware 11.0

- System Setup (remove unneeded processes)
- Software Installation for UDP frame reception
- Empirical calibration and performance certification document

## 7.5 Information Engineering, IN2 (2005-2006 as team's chief)

Software development for GNU/Linux and Windows CE.

- Use of security tools like Snort.
- Programming of mobile devices using EVC++ 3.0 for PDA devices
- Programming in C, PHP, .NET
- Use of DBMS such as MySQL, ORACLE

### 7.5.1 SNIFFER project

Capture and system control for network communications TETRA

- Using Snort software to capture IP frames
- Shell scripts using Python
- Download real-time data using FTP and HTTP protocols
- Generation of reports by using web technology.

### 7.5.2 IVP project

Urban maintenance software for PDA devices

- Using EVC++ 3.0 using GIS software Adobe OnSiteView
- Communication link using Bluetooth to GPS receivers and NMEA 0183 protocols for parse outputs.
- Using HP libraries to integrate camera inside the software
- Use of XML for IO transfers

### 7.5.3 WEB CONTROL project

Software for monitoring network status

- Using SNMP v1.0 and v2.0
- Programming in C for the daemon service
- PHP programming language for the user interface
- Using MySQL 4.0.23 for massive data storage (daemon and web)

### 7.5.4 SICAT project

Software demonstration of TETRA network operation



- Wizard for DB module design
- DB module WebService
- Using MySQL for DB module
- Terminal Module (TETRA terminal emulation)
- Module DB (dynamic application defined by Wizard)
- GIS Module (programming using SDK's for TomTom GPS network)

#### 7.5.5 Upgrades for some applications at BAMESA

Development of applications software to migrate from Portal to PHP

- Table maintenance programming
- Generation of reports of various types: lists, graphs, calendars
- Conversion from DB triggers to PHP code
- Using AJAX to create dynamic filters
- Import and export of all filters
- Using the ORACLE DBMS

### 7.6 Institute of Space Studies of Catalonia (2001-2005)

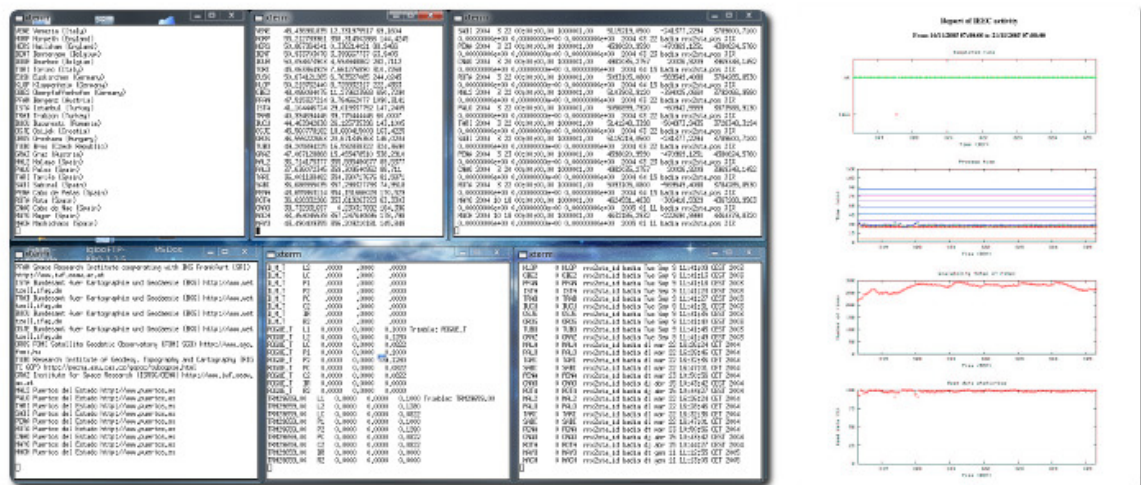
Development of software for UNIX environments.

- Design and implementation of hardware and drivers.
- Planning and implementation of software for various projects.
- Programming in C with GTK, Tcl/Tk on Unix tcsh.

#### 7.6.1 REALTIME (COST716) project

Automation of the calculation of Total Zenith Delay

- Shell scripts using tcsh, tcl/tk, etc ...
- Download realtime data using FTP, HTTP, SSH
- Generation of 'reports' by using web technology and LaTeX.
- Management processes on the Linux kernel.
- Detection of bugs in the file system Solaris 2.6



GUI for RealTime by SANZ - Rinex		List stations for RINEX 205	
File	Show	File	Show
FTP	low icc ic2 igs gsc ip1 iec	Antares (Spain) (ANAR)	X
FTP_DIR(icc)	ftp://oc.ussc.edu/pub/rinex/205/icc/	Bellmound (Spain) (BELL)	X
FTP_RAW(icc)	ftp://oc.ussc.edu/pub/rinex/205/raw/	Bonanza (Spain) (BON)	X
FTP_FILE(icc)	ftp://oc.ussc.edu/pub/rinex/205/file/	Bonanza (Spain) (BON)	X
FTP_DIR(icc2)	ftp://oc.ussc.edu/pub/rinex/205/icc2/	Bonanza (Spain) (BON)	X
FTP_RAW(icc2)	ftp://oc.ussc.edu/pub/rinex/205/raw/icc2/	Bonanza (Spain) (BON)	X
FTP_FILE(icc2)	ftp://oc.ussc.edu/pub/rinex/205/file/icc2/	Bonanza (Spain) (BON)	X
FTP_DIR(igs)	ftp://oc.ussc.edu/pub/rinex/205/igs/	Bonanza (Spain) (BON)	X
FTP_RAW(igs)	ftp://oc.ussc.edu/pub/rinex/205/raw/igs/	Bonanza (Spain) (BON)	X
FTP_FILE(igs)	ftp://oc.ussc.edu/pub/rinex/205/file/igs/	Bonanza (Spain) (BON)	X
FTP_DIR(ip1)	ftp://oc.ussc.edu/pub/rinex/205/ip1/	Bonanza (Spain) (BON)	X
FTP_RAW(ip1)	ftp://oc.ussc.edu/pub/rinex/205/raw/ip1/	Bonanza (Spain) (BON)	X
FTP_FILE(ip1)	ftp://oc.ussc.edu/pub/rinex/205/file/ip1/	Bonanza (Spain) (BON)	X
FTP_DIR(igc)	ftp://oc.ussc.edu/pub/rinex/205/igc/	Bonanza (Spain) (BON)	X
FTP_RAW(igc)	ftp://oc.ussc.edu/pub/rinex/205/raw/igc/	Bonanza (Spain) (BON)	X
FTP_FILE(igc)	ftp://oc.ussc.edu/pub/rinex/205/file/igc/	Bonanza (Spain) (BON)	X
FTP_DIR(iecc)	ftp://oc.ussc.edu/pub/rinex/205/iecc/	Bonanza (Spain) (BON)	X
FTP_RAW(iecc)	ftp://oc.ussc.edu/pub/rinex/205/raw/iecc/	Bonanza (Spain) (BON)	X
FTP_FILE(iecc)	ftp://oc.ussc.edu/pub/rinex/205/file/iecc/	Bonanza (Spain) (BON)	X

## 7.6.2 DD\_RCVR and LOTTOS projects

Software for processing mass data using shell scripts

- Graphical interfaces for scientific use

## 7.6.3 GRACE-II project

Calibration software for the altimeter of ENVISAT satellite

- Graphical interface for use by data processing operators
- System for automated data transfer to the ICM institute

## 7.6.4 STD/IEEC Group Intranet

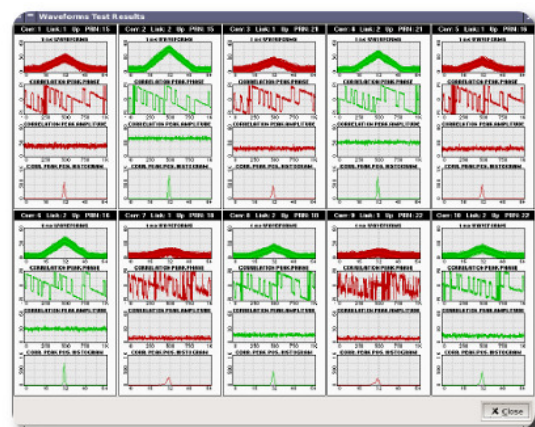
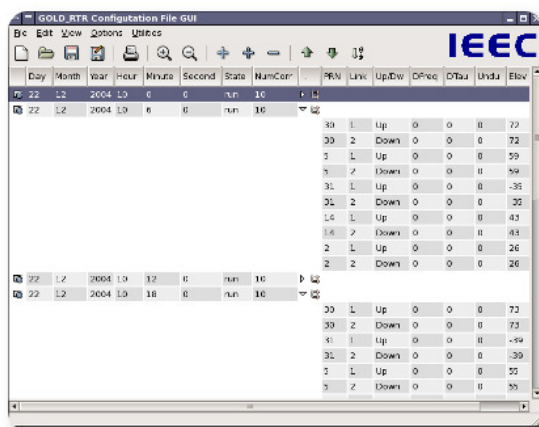
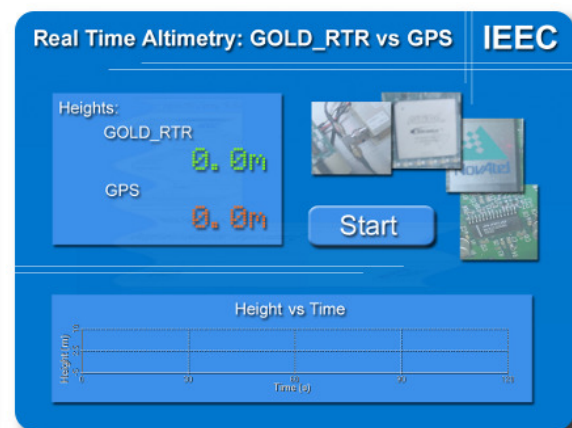
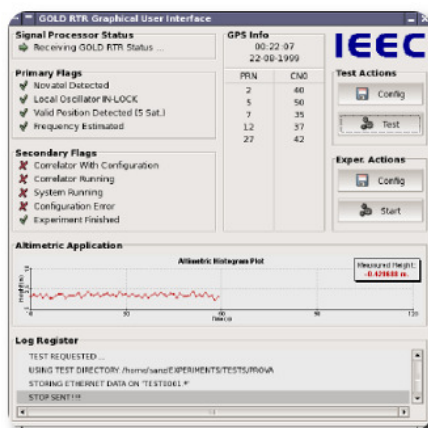
Specification and implementation of the online portal:

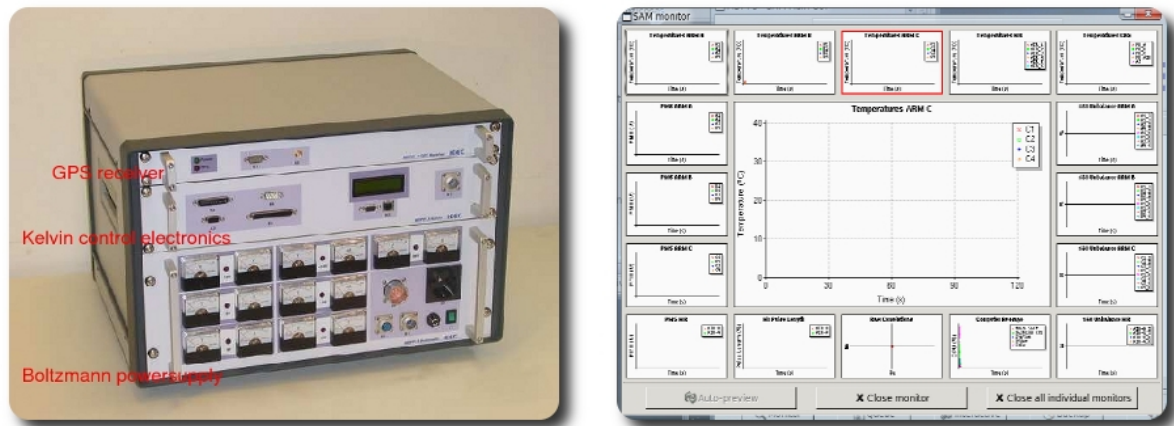
- Using by web technology such as PHP
- User Authentication
- Use secure protocols (SSL) on apache
- Accessing Data with MySQL and PostgreSQL

### 7.6.5 GOLD\_RTR (PARIS) and MDPP3 (SMOS) projects

for ALTERA programming environments:

- Communications with GPS receivers (Novatel, Ashtech).
- Software and hardware for ALTERA development boards
- Multiprocessor systems and realtime applications.
- Specification of ALTERA NIOS2 microprocessors
- Software for GNU/Linux in C and GTK
- Design of communication protocols over UDP/IP
- Transmission of data in realtime mode
- Reception and realtime storage data (12 Mbytes/sec)
- System monitoring graph in realtime mode





## 7.7 Universitat Politècnica de Catalunya, Dept. of Applied Physics (1999-2001)

Administration of Unix Systems and Microsoft Windows

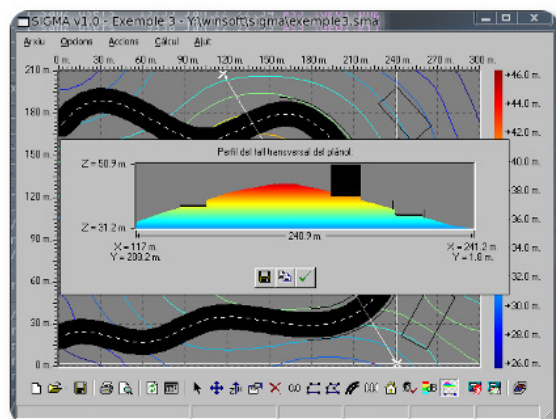
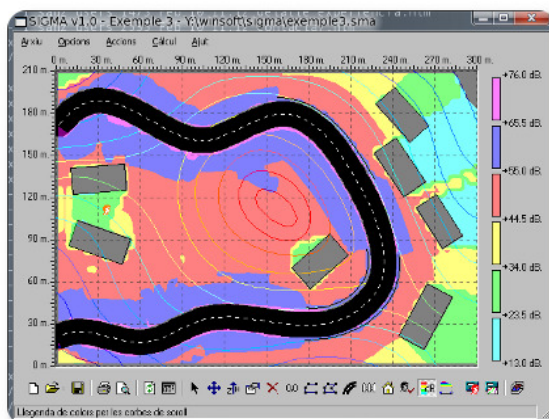
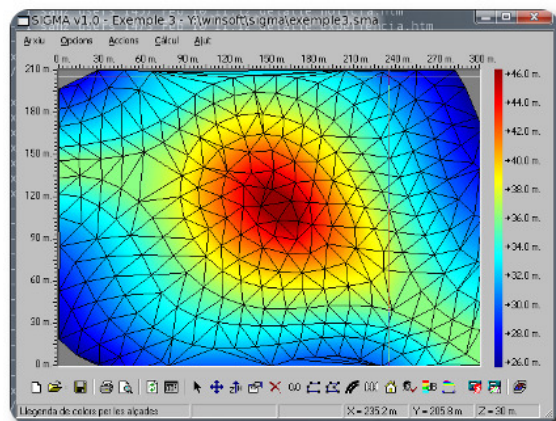
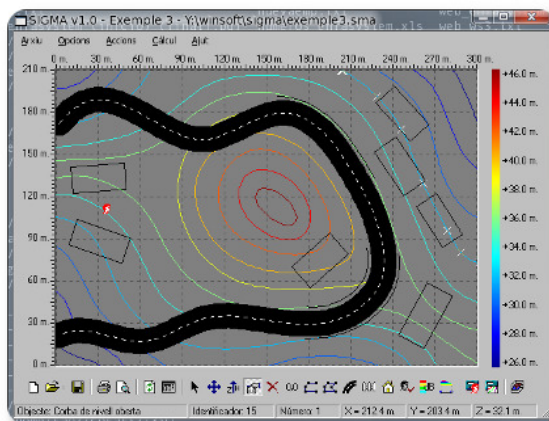
- Implementation of network security systems (SSL)
- Security Audits of computer systems department
- Software development and maintenance of the department's intranet
- Software development for the Generalitat de Catalunya (SIGMA and NivAval)
- Collaborations with the WFAE association.
- Support to users, and so on.

### 7.7.1 SIGMA, Sistema Informàtic de Gestio i Modelització Acústica

Project of an application with graphical environment for calculating levels of noise pollution:

- Develop an easy and intuitive graphical interface, using Visual Basic, to provide to the user all the necessary elements to enter the input data to the model.
- Develop a set of libraries programmed in Visual C++ to provide all the computing power and speed that only C can offer.
- To perform the topographical simulations and obtain a valid model for the model calculation, a 3D representation mechanisms were implemented using Delaunay triangulation and cubic spline interpolation.

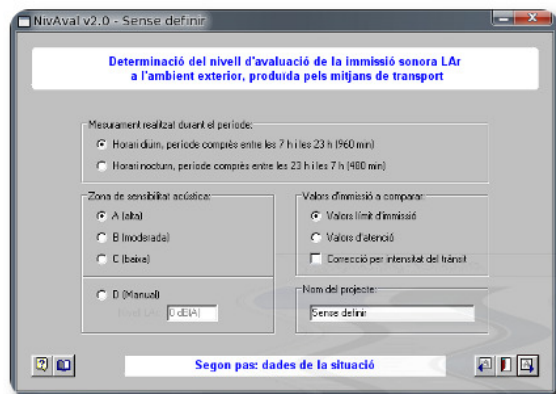


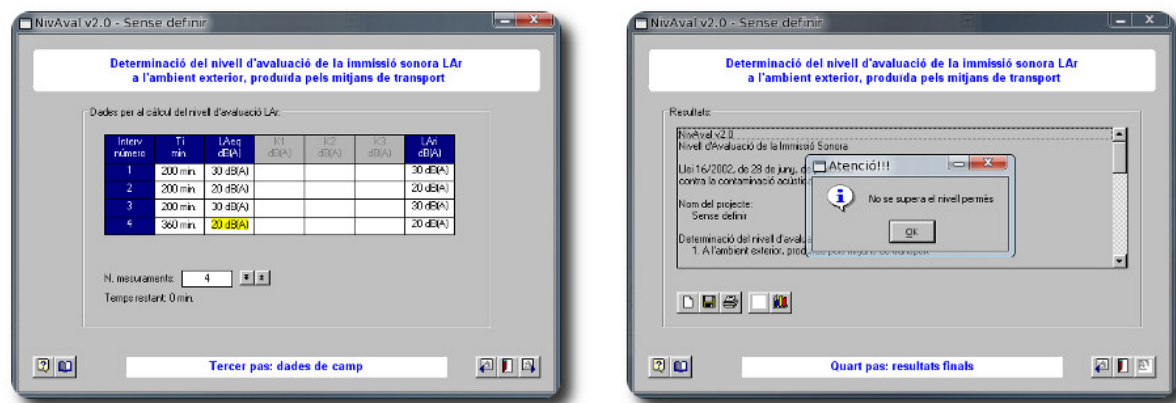


## 7.7.2 NivAval, Nivell d'Avaluació Lar

Project to evaluate the results of acquisition campaigns of noise levels using sound level meters:

- Develop a graphical interface using Visual Basic for data entry.
- Implement the model defined in the law 16/2002 of protection of noise pollution.
- Generating reports in text and graphical format highlighting the relevant information established in each case by the acoustic law.





## 7.8 INCOSE, ingeniería de contrataciones y servicios (1997-1999)

Installation and maintenance of industrial equipment.

- Programming of PLC's for industrial applications.
- Installation of electrical boards and waste treatment systems.

## 7.9 GESTHOS, gestión técnica hospitalaria (1996-1997)

Assembly and maintenance of electromedical equipment.

- Repair of medical equipment.
- Specification and implementation of equipment for technical tests.