



Biomedicine, Intelligent Systems and Educational Technology Group: PRESENT AND FUTURE

Dr. Juan Manuel Corchado, Principal Investigator



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Contents

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- R&D Projects
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Research Lines (I)

- Artificial Intelligence and Computer Sciences

Innovations in Artificial Intelligence techniques, focusing on its application in the field of Computer Sciences.

- Ambient intelligence / Ambient Assisted Living / eHealth / eInclusion

Contributions to the state of the art of the Ambient Intelligence. Practical applications for the development of Intelligent Environments. Case Studies in real scenarios (Alzheimer patients identification, location and monitoring, guiding facilities in shopping centres, routes planning and monitoring in security environments, etc.).

- Case-based Reasoning systems

New techniques in Case-based reasoning systems, and practical applications (robot navigation, CO₂ exchange, Oil Spill prediction, etc.)

- Educational Technology

Computational and Artificial Intelligence techniques in the field of e-learning

Research Lines (II)

- Agent technology and multiagent systems

New models for smart agents. New architectures for advanced open multiagent systems. Methodologies, tools and mechanisms for multiagent systems.

- Mobility and wireless networks

Advances in computational and artificial intelligence applications for mobile devices. Usability and intelligent interfaces for mobile devices. Sensor networks based on wireless technologies (bluetooth, RFID, ZigBee, Wi-Fi, UWB, WiMax)

- Analysis and design methodologies

New methodologies for modelling intelligent environments and multiagent systems. (Gaia+AUML, Gaia+Sysml, etc.)

Research Lines (III)

- Distributed artificial intelligence

Theoretical and practical concepts on distributed architectures for developing artificial intelligence solutions.

- Bioinformatics: Analysis and Classification of Microarrays data

Advanced models for analysis of microarray data. Innovative techniques for patients classification working with microarray data. Case study in real environments (Leukemia patients classification)

- Web 3D and Digital Animation

Artificial Intelligence techniques in the field of Web 3D and Digital Animation (Web 3D, Virtual Worlds, Image processing, Social simulation models in virtual organizations, etc.)

R&D Projects (I)

INTERNATIONAL PROJECTS (some relevant projects are:)

- **Iron Time: Innovative Re-Organization and Networking for Telecommunication Industry Médium Enterprises**
6^o Programa Marco del Fondo Social Europeo. From: 2005 To: 2007
Principal Resercher: D. Labate, URMET Telecomunicazioni S.p.A.
Budget: 230.000 Euros.
- **The Atlantic Meridional Transect**
UK Natural Environment Council. From: 1995 To: 2005
Principal Resercher: J. Aiken, Plymouth Marine Laboratory. Plymouth (UK).
Budget: 22 Million Pound Sterling..
- **Simulated Tactical Enviromental Bubble (STEB)**
UK Natural Environment Council. From: 1996 To: 2001
Principal Resercher: J. Aiken, Plymouth Marine Laboratory. Plymouth (UK).
Budget: 2 Million Pound Sterling.
- **KBOS, Knowledge Based Oceanographic System**
UK Natural Environment Council. From: 1993 To: 1996
Principal Resercher: J. Aiken, Plymouth Marine Laboratory. Plymouth (UK).
Budget: 2,5 Million Pound Sterling.

R&D Projects (II)

NATIONAL PROJECTS (some of our last projects are)

- **ABANSA: Arquitectura distribuida abierta con tecnología de agente para procesamientos pesados TSI-020100-2008-276**
Ministerio de Industria Turismo y Comercio, Avanza I+D
COLABORATION: ENNE DIGITAL ENTERTAINMENT FACTORY
DURATION: 2008
PRINCIPAL RESEARCHER: Juan Manuel Corchado Rodríguez.
TOTAL: 491.000,00
- **ECP: ENNE COMMUNITY PLATFORM TSI-020100-2008-136**
Ministerio de Industria Turismo y Comercio, Avanza I+D
COLABORATION: ENNE DIGITAL ENTERTAINMENT FACTORY
DURATION: 2008
PRINCIPAL RESEARCHER: Juan Manuel Corchado Rodríguez.
TOTAL: 789.000,00
- **SIAAD: SISTEMA INTEGRAL INTELIGENTE DE ASISTENCIA EN EL AMBITO DE LA DEPENDENCIA TSI-020100-2008-307**
Ministerio de Industria Turismo y Comercio, Avanza I+D
COLABORATION: GESTORES DE PROYECTOS MULTIMEDIA, S.L.
DURACIÓN: 2008
PRINCIPAL RESEARCHER: Juan Manuel Corchado Rodríguez.
TOTAL: 268.000,00
- **ALIADO (Alzheimer Intelligent Ambient Domotic system). TSI-020100-2008-296**
Ministerio de Industria Turismo y Comercio, Avanza I+D
COLABORATION: TULECOM GROUP
DURATION: 2008
PRINCIPAL RESEARCHER: Juan Manuel Corchado Rodríguez.

R&D Projects (III)

NATIONAL PROJECTS

- **Plataforma Inteligente para la Gestión Integral de Residencias Geriátricas 137/07**
Ministerio de Trabajo y Asuntos Sociales, IMSERSO
DURATION: From: 1/01/2007 To: 31/12/2008
PRINCIPAL RESEARCHER: Juan Manuel Corchado Rodríguez.
TOTAL: 35.000 ,00 Euros.
- **ALIADO (Alzheimer Intelligent Ambient Domotic system). FIT-350300-2007-84**
Ministerio de Industria Turismo y Comercio, PROFIT
COLABORATION: TULECOM GROUP
DURATION: 2007
PRINCIPAL RESEARCHER: Juan Manuel Corchado Rodríguez.
TOTAL: 96.000 ,00 Euros.
- **Advergaming On The Fly. FIT-350200-2007-12**
Ministerio de Industria Turismo y Comercio, PROFIT
COLABORATION: BABELDREAMS, S.L.
DURATION: 2007
PRINCIPAL RESEARCHER: Juan Manuel Corchado Rodríguez.
TOTAL: 22.000 ,00 Euros.
- **THOMAS METODOS, TECNICAS Y HERRAMIENTAS PARA SISTEMAS MULTIAGENTE ABIERTOS: RAZONAMIENTO, COMUNICACION Y SEGURIDAD; TIN2006-14630-C03-03. Ministerio de Ciencia y Tecnología.**
DURATION: from: noviembre 2006 to: noviembre 2009
PRINCIPAL RESEARCHER: Juan Manuel Corchado Rodríguez.
TOTAL: 128.260 ,00 Euros.

R&D Projects (IV)

NATIONAL PROJECTS

- **Integración de Comunicación Inalámbrica en una Arquitectura Multiagente; TIC2003-07369-C02-02. Ministerio de Ciencia y Tecnología.**
DURATION. From: 01-12-2003 To: 30-11-2006
PRINCIPAL RESEARCHER: Juan Manuel Corchado Rodríguez.
TOTAL: 113.160 Euros.
- **Detección, Seguimiento y Predicción de Vertidos Conteniendo Hidrocarburos en Aguas Oceánicas Utilizando Teledetección y Sistemas de Inteligencia Artificial. VEM2003-20578-C08-03.**
Ministerio de Ciencia y Tecnología.
DURATION. From: 19-12-2003 To: 18-12-2006
PRINCIPAL RESEARCHER: Jesús Torres, University of Vigo.
TOTAL: 98.210,00 Euros.
- **Sistema Inteligente de Control Empresarial, SEC2000-0249.**
CICYT.
DURATION. From: 2000 To: 2003
PRINCIPAL RESEARCHER: Juan Manuel Corchado Rodríguez.
TOTAL: 11.205.600 Pesetas.
- **Biblioteca Virtual de Textos Españoles del Siglo de Oro accesible vía Internet, CICYT- TEL99-0335-C04-03.**
CICYT.
DURATION. From: 1999 To: 2002
PRINCIPAL RESEARCHER: Pedro Cuesta, University of Vigo.
TOTAL: 10.500.000 Pesetas.

R&D Projects (V)

REGIONAL PROJECTS (SOME RELEVANT PROJECTS)

- **Plataforma Inteligente para la Gestión y Aprendizaje en Residencias Geriátricas. Ref. UPSA: U05E1A-07L01.**
Proyectos de Investigación Precompetitivos. Universidad Pontificia de Salamanca.
DURATION From: 01-01-2008 To: 31-12-2008
PRINCIPAL RESEARCHER: Javier Bajo Pérez.
TOTAL: 2.000 Euros.
- **Arquitectura Multiagente para la construcción de sistemas inalámbricos distribuidos aplicados en procesos de control. JCYL-2002-05. Ref. SA104A05.**
Junta de Castilla y León.
DURATION. From: 2004 To: 2007
PRINCIPAL RESEARCHER: Juan Manuel Corchado Rodríguez.
TOTAL: 23.000 Euros.
- **Sistema multiagente para la gestión y procesamiento de conocimiento digital. JCYL-2002-05. Ref. SA039/02.**
Junta de Castilla y León.
DURATION. From: 2001 To: 2004
PRINCIPAL RESEARCHER: Juan Manuel Corchado Rodríguez.
TOTAL: 11.381 Euros.
- **Sistema predictivo de esfuerzos pesqueros para la flota artesana gallega PGIDIT02RMA00702CT.**
Programa de Investigación Marino, Xunta de Galicia.
DURATION. From: 2002 To: 2005
PRINCIPAL RESEARCHER: Jesús Torres, University of Vigo.
TOTAL: 34.000 Euros.

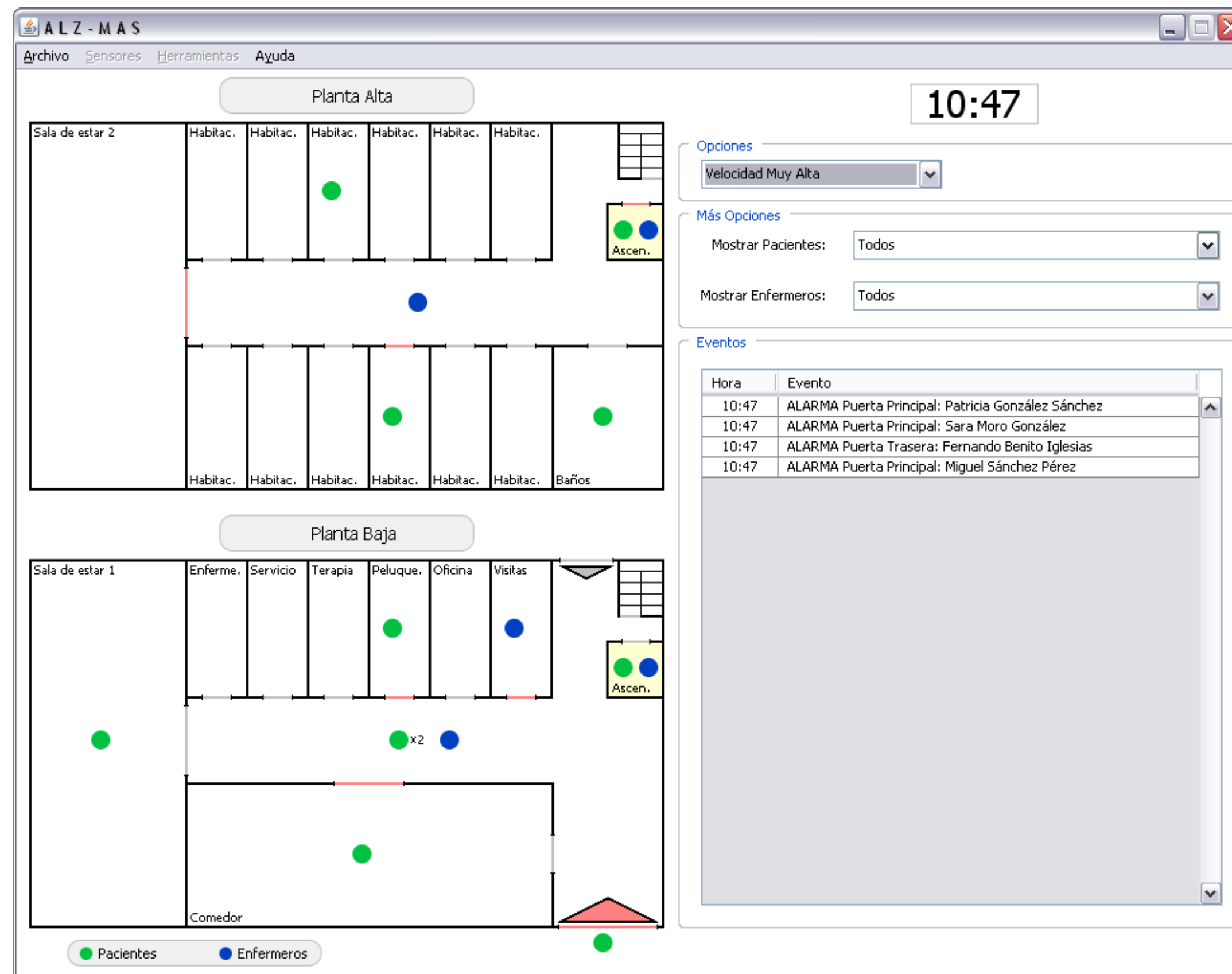
R&D Projects (VI)

REGIONAL PROJECTS (SOME RELEVANT PROJECTS)

- **Arquitectura Multiagente para la construcción de sistemas inalámbricos distribuidos aplicados en procesos de control. JCYL-2002-05. Ref. SA104A05.**
Junta de Castilla y León.
DURATION. From: 2004 To: 2007
PRINCIPAL RESEARCHER: Juan Manuel Corchado Rodríguez.
TOTAL: 23.000 Euros.
- **Sistema multiagente para la gestión y procesamiento de conocimiento digital. JCYL-2002-05. Ref. SA039/02.**
Junta de Castilla y León.
DURATION. From: 2001 To: 2004
PRINCIPAL RESEARCHER: Juan Manuel Corchado Rodríguez.
TOTAL: 11.381 Euros.
- **Desarrollo de técnicas para la predicción automática de la proliferación de la diatomea Pseudo-nitzschia spp. en las Rías Gallegas. PGIDIT00MAR30104PR.**
Programa de Investigación Marino, Xunta de Galicia.
DURATION. From: 1999 To: 2001
PRINCIPAL RESEARCHER: Jesús Torres, University of Vigo.
TOTAL: 5.990.000 Pesetas.
- **Modelado de las alteraciones neuroendocrinológicas inducidas por la ingesta dietética de plomo utilizando sistemas de inteligencia artificial. PGIDIT00MAR30104PR.**
University of Vigo
DURATION. From: January 2000 To: December 2000
PRINCIPAL RESEARCHER: María A. Lafuente - University of Vigo.
TOTAL: 900.000 Pesetas.

Ambient Intelligence – Localization/Monitoring

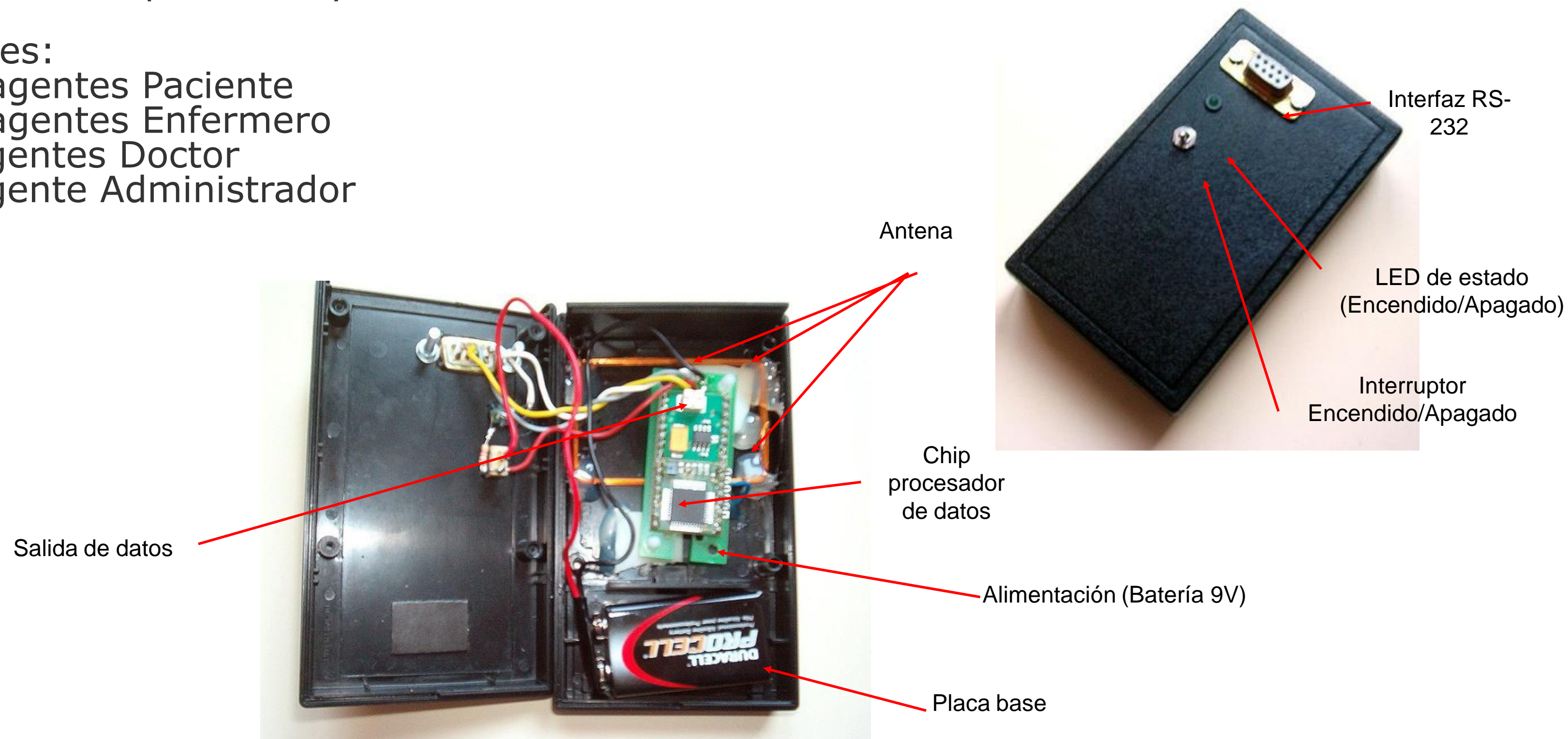
Aliado Project – ALZ-MAS



Ambient Intelligence – Localization/Monitoring

Aliado Project – ALZ-MAS

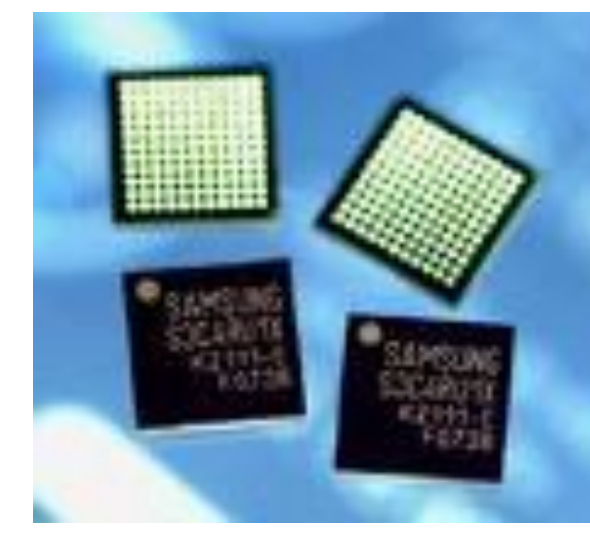
- » Hardware:
 - » Lectores RFID: puertas y ascensor
 - » Lectores RFID de control: salidas
 - » Brazaletes: pacientes y enfermeros
- » Agentes:
 - » 30 agentes Paciente
 - » 10 agentes Enfermero
 - » 2 agentes Doctor
 - » 1 agente Administrador



Ambient Intelligence – Localization/Monitoring

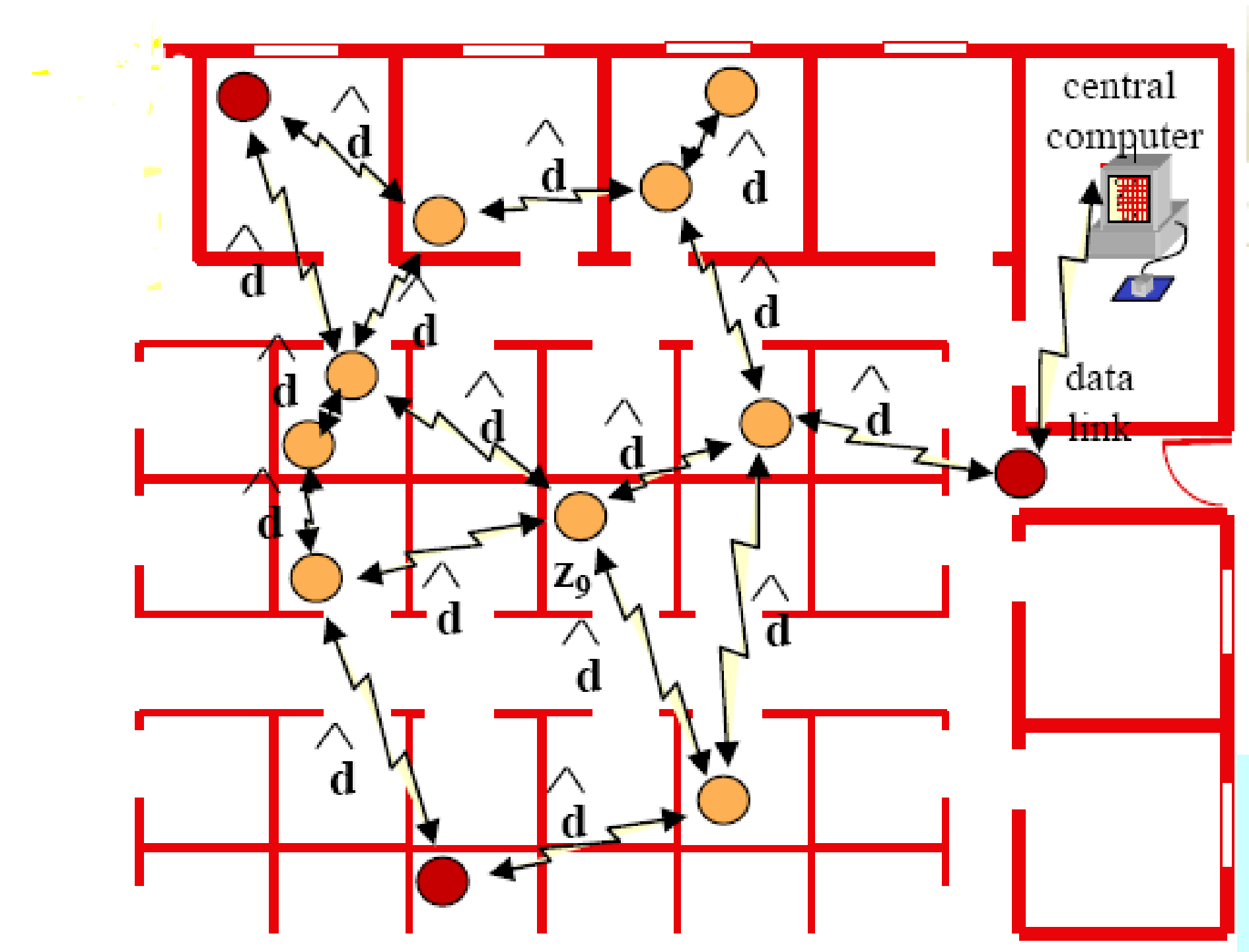
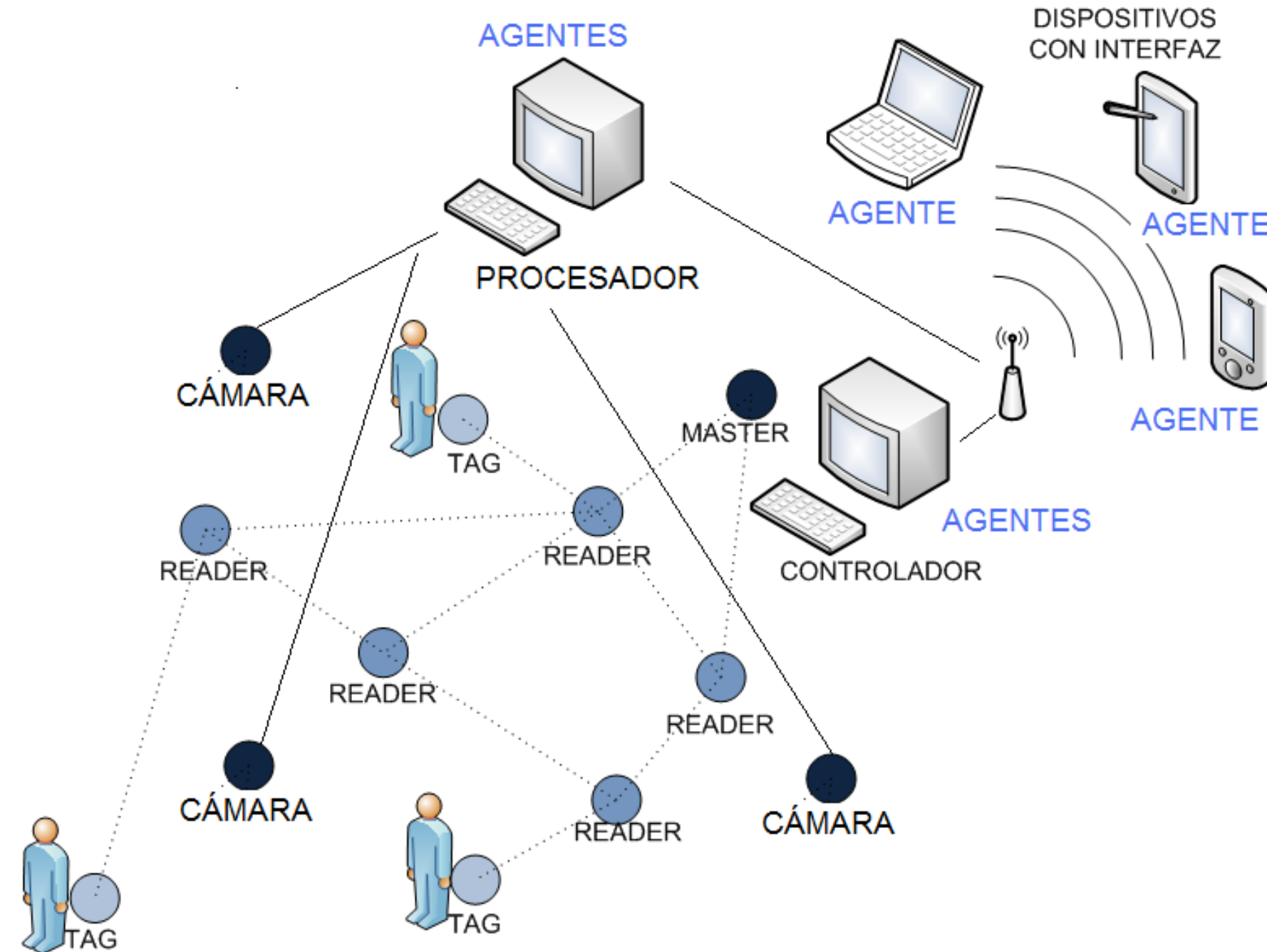
Aliado Project – ALZ-MAS

- » Sistema de localización e identificación en tiempo real.
- » Comunicaciones seguras.
- » Bajo consumo de energía (autonomía de años).
- » Precisión de hasta 30cm.
- » Funcionamiento en interiores y exteriores.
 - » RTLS- Real Time Location System
 - » Dispositivos de aproximadamente 3x3cm



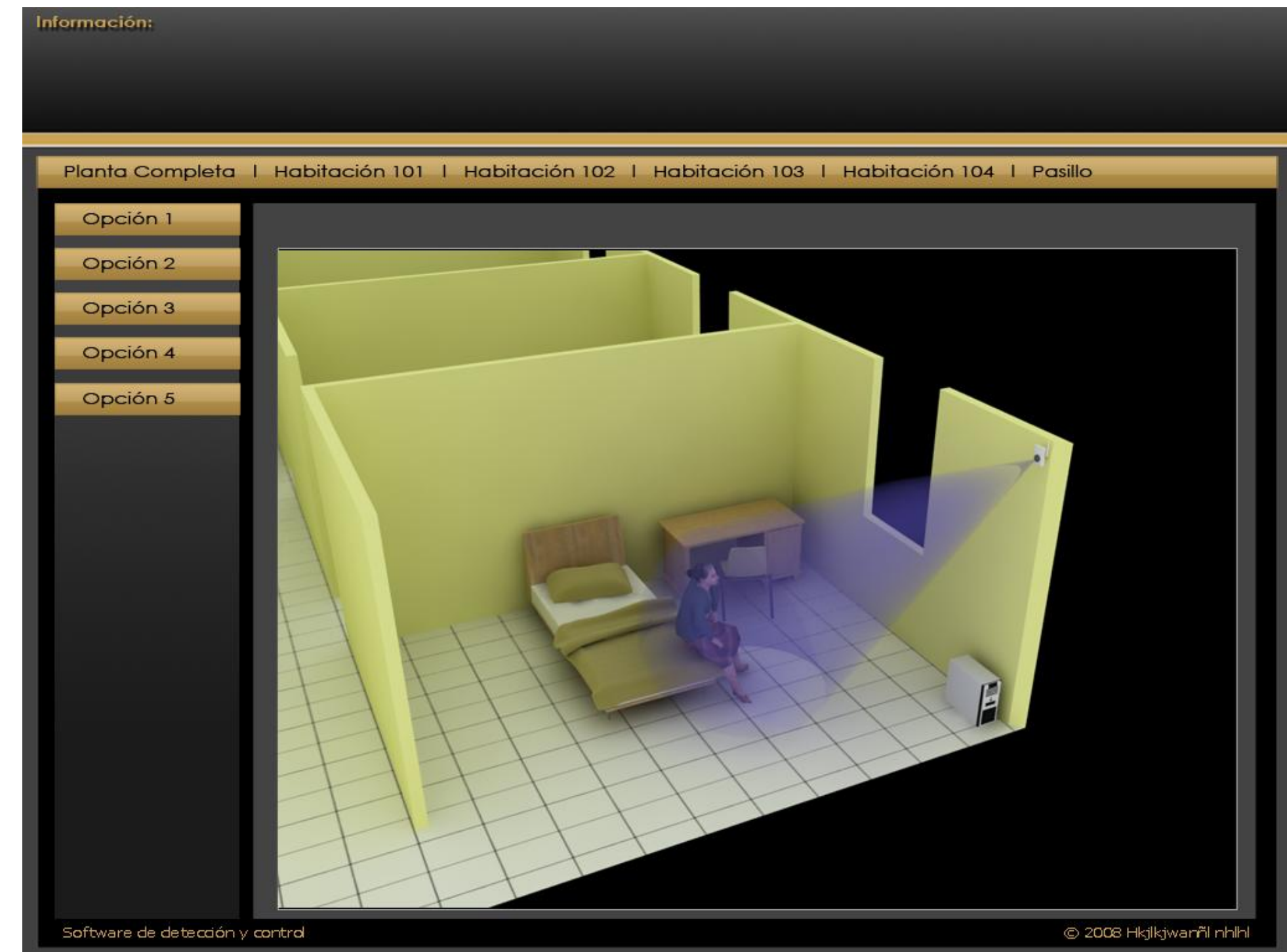
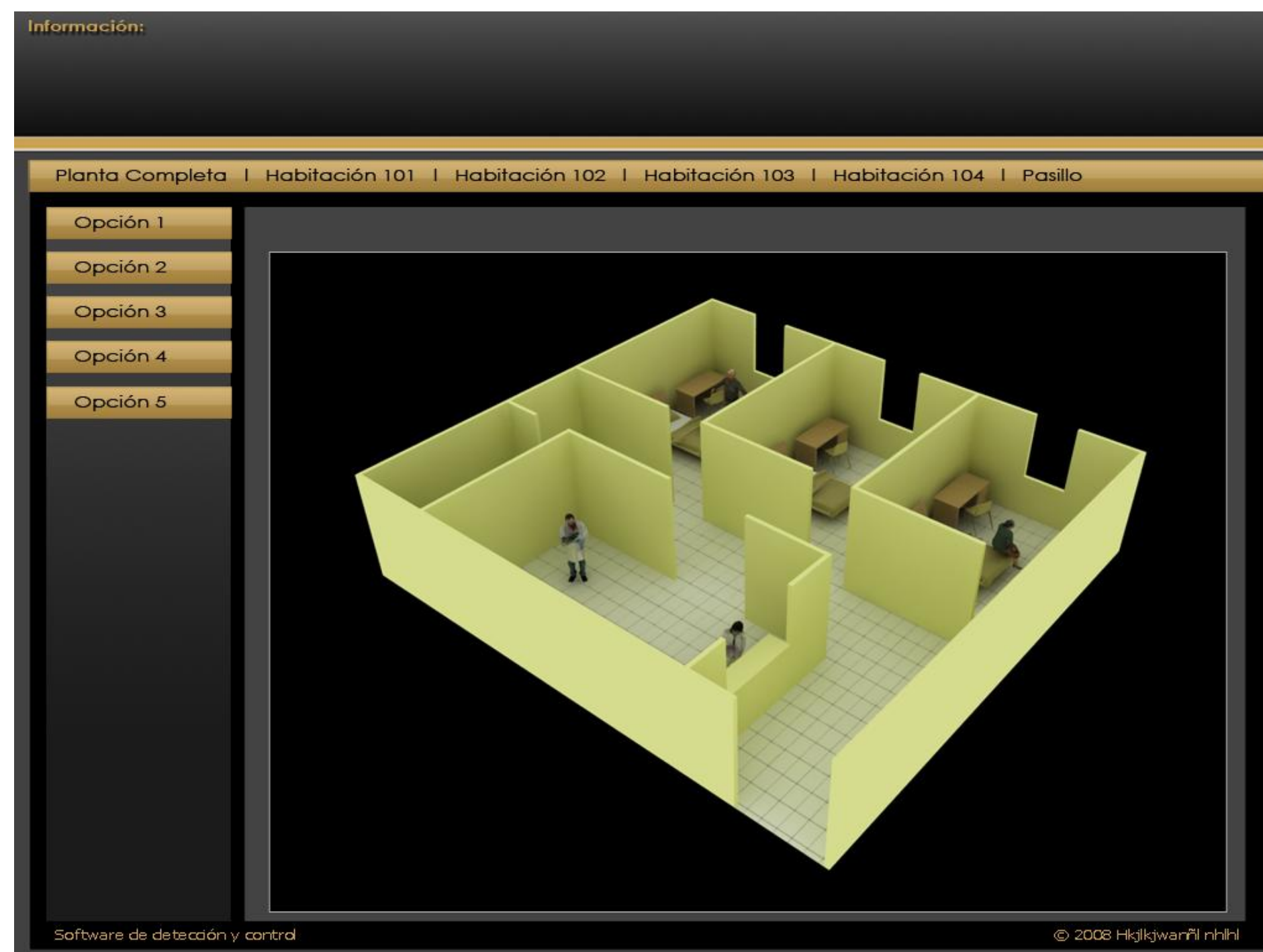
Ambient Intelligence – Localization/Monitoring

Aliado Project – ALZ-MAS



Ambient Intelligence – Localization/Monitoring

Aliado Project – ALZ-MAS



3D Digital Animation – Virtual Worlds



Education (I)

COURSES

- 7th International Workshop on Practical Applications of Agents and Multi-Agent Systems
22 marzo - 03 abril 2009
<http://gsii.usal.es/~curso-paams/>
- International Symposium on Distributed Computing and Artificial Intellegence 2008 (1297/2008/1)
17-24 Octubre 2008
iPhones Programing
<http://gsii.usal.es/~iphone/>
- Advances in Internet Security: Seventh National Conference, March 2009
<http://gsii.usal.es/~seguridad/>
- IV Course on Video Games Programming with J2ME and MIDP for mobile telephones. <http://fundacion.usal.es/moviles>
- Advanced Diploma in game programming. <http://fundacion.usal.es/diplomajuegos>
- Food Microbiology. Virtual Laboratory. <http://fundacion.usal.es/microali>
- Microbiological Water Analysis: Methods, Virtual Laboratory and Case Studies. <http://fundacion.usal.es/microaguas>
- HACCP, Food Safety. <http://fundacion.usal.es/appcc>
- Biotechnology and Genetically Modified Organisms. An Introduction. <http://fundacion.usal.es/biotecnologia>
- CERTYRED courses for Experts in IT Security. <http://cursos-seguridad.usal.es/>

Education (II)

MASTERS

- Master in e-commerce

http://master-ecom.usal.es/component/option,com_frontpage/Itemid,1/lang,en/

- Master in digital animation

<http://aitc.usal.es/>

Symposiums (I)

2009

DCAI'09: International Symposium on Distributed Computing and Artificial Intelligence 2009 Salamanca, 10th-12th June, 2009 , University of Salamanca, Spain web: <http://dcai.usal.es>

IWAAL: International Workshop of Ambient Assited Living 2009 Salamanca, 10th-12th June, 2009 , University of Salamanca, Spain web: <http://iwaal.usal.es>

IWPACBB'09: 3rd International Workshop on Practical Applications of Computational Biology & Bioinformatics, Salamanca, 10th-12th June, 2009 , University of Salamanca, Spain web: <http://iwpacbb.usal.es>

MADRINET 2009: User-Centric Technologies and Aplications Workshop Salamanca, 10th-12th June, 2009 , University of Salamanca, Spain web: <http://madrinet.usal.es>

H AIS 2009: H AIS'09 4th International Workshop on Hybrid Artificial Intelligent Systems Salamanca, 10th-12th June, 2009 , University of Salamanca, Spain web: <http://hais.usal.es>

SOCO'09: 4th International Workshop on Soft Computing Models in Industrial Applications Salamanca, 10th-12th June, 2009 , University of Salamanca, Spain web: <http://soco.usal.es>

IWANN2009: 10 th International Work-Conference on Artificial Neural Networks Salamanca, 10th-12th June, 2009 , University of Salamanca, Spain web: <http://iwann.usal.es>

PAMMS'09: 7th International Workshop on Practical Applications of Agents and Multi-Agent Systems, Salamanca, 25-27th March, 2009 , University of Salamanca, Spain web: <http://paams.usal.es>

Symposiums (II)

2008

DCAI'08: International Symposium on Distributed Computing and Artificial Intelligence 2008, Salamanca, 22th-24th October, 2008 , University of Salamanca, Spain web: <http://gsii.usal.es/~dcai>

UCAmI: 3th Symposium of Ubiquitous Computing and Ambient Intelligence 2008 Salamanca, 22th-24th October, 2008 , University of Salamanca, Spain web: <http://gsii.usal.es/~wucami>

IWPACBB'08: 2 nd International Workshop on Practical Applications of Computational Biology & Bioinformatics, Salamanca, 22th-24th October, 2008 , University of Salamanca, Spain web: <http://gsii.usal.es/~iwpacbb>

MADRINET 2008 - User-Centric Technologies and Applications Workshop Salamanca, 22th-24th October, 2008 , University of Salamanca, Spain web: <http://gsii.usal.es/~madrinet>

Symposiums (I)

2007

CAEPIA 2007: Congreso de la Asociación Española para la Inteligencia Artificial, Salamanca, 12th-17th November, 2007, University of Salamanca, Spain web: <http://caepia.usal.es>

IWPAAMS 2007: International Workshop on Practical Applications of Agents and Multiagent Systems, Salamanca, 13th of November, 2007, Pontifical University of Salamanca, Spain web: <http://www.web.upsa.es/IWPAAMS2007/es/home.html>

2006

IDEAL 2006: 7th International Conference on Intelligent Data Engineering and Automated Learning, Burgos, 20-23 of September, 2006, University of Burgos, Spain. web: <http://www2.ubu.es/ideal2006/>

IWPAAMS 2006: International Workshop on Practical Applications of Agents and Multiagent Systems, Segovia, 13th of November, 2007, University of Salamanca, Valladolid

HAIS 2006: Hybrid Artificial Intelligence Systems Workshop, Under the frame of the International Joint Conference IBERAMIA/SBIA/SBRN 2006 27th October, 2006, Ribeirão Preto, SP, Brazil web: <http://www.icmc.usp.br/iarn2006/>

Publications (I)

- More than 45 publications in international journals.
- More than 55 books and book chapters.
- Approximately 40 papers in LNCS (Springer Verlag).
- More than 80 papers in International Conferences.
- More than 10 PhD thesis advised.
- More than 10 PhD thesis in course.
- Some reference papers in international journals are:
 - In the Ambient Intelligence field we have developed a system for monitoring, guiding and controlling patients in a geriatric residences.
 - Juan M. Corchado, Javier Bajo and Ajith Abraham. (2008). GERAmI: Improving the delivery of health care. IEEE Intelligent Systems, Vol. 23, nº 2, pp. 19 - 25.
 - Juan M. Corchado, Javier Bajo, Yanira de Paz and Dante I. Tapia. (2008). Intelligent Environment for Monitoring Alzheimer Patients, Agent Technology for Health Care. Decision Support Systems, Vol 44, Issue 2, pp. 382-396.

Publications (II)

- You can find information about our research in bioinformatic and microarrays analysis in:
 - Fernando Diaz, Florentino Fdez-Riverola and Juan M. Corchado. (2006) GENE-CBR: A case-based reasoning tool for cancer diagnosis using microarray datasets. *Computational Intelligence* 22 (3-4), pp. 254-268.
 - Florentino Fdez-Riverola, Fernando Diaz and Juan M. Corchado. (2007) Reducing the memory size of a fuzzy case-based reasoning system applying rough set techniques. *IEEE SMC Transactions Part C*. 37 (1), pp. 138-146.
- Have a look at what we are doing with Agent and Multiagent Systems at:
 - Juan M. Corchado, Manuel Glez-Bedia, Yanira de Paz, Javier Bajo and Juan Francisco de Paz. (2008). Replanning mechanism for deliberative agents in dynamic changing environments. *Computational Intelligence*, Vol. 24, Issue 2, pp. 77-107.
 - Carlos Carrascosa, Javier Bajo, V. Julian, J.M. Corchado and V. Botti. (2008) Hybrid multi-agent architecture as a real-time problem-solving model. *Expert Systems with Applications* 34(1), pp. 2-17.

Future Activities and Opportunities (I)

- IST Call 5, Call 6
- CIP
- ARTEMIS, ENIAC
- AAL
- ITEA2, CELTIC
- National Calls: CENIT, AVANZA, INTERREG, PETRI
- Commercial Activities: project collaboration with ICT companies applying artificial intelligence, multiagent systems, ambient intelligence, eHealth, 3D

Future Activities and Opportunities (II)

- Participation in spanish and european technology platforms
 - NESSI
 - NEM
 - INES
 - PROMETEO
 - eVIA
 - eNEM
 - eS.INTERNET

Exploration of new possibilities in AmI, AAL, eHealth, 3D, Artificial Intelligence within the different Future of Internet initiatives.



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