
 University of Essex


---

## The *iDorm*: Gateway to Heterogeneous Networking Environments

Arran Holmes, Hakan Duman  
 & Anthony Pounds-Cornish  
 Presented by Arran Holmes  
 acholm@essex.ac.uk

**Presented at the International ITEA Workshop on Virtual Home Environments organised by the VHE Middleware Consortium, Paderborn, Germany, February 20-21<sup>st</sup>, 2002**


20<sup>th</sup> February 2002 © IIE Group, University of Essex Department of Computer Science


 University of Essex


---

## University of Essex

*the campus*



- Parkland of 200 acres.
- Royal Charter in 1965.
- 5,926 Students.
- 25% Post Graduates.
- 24% Overseas (120 Countries).




20<sup>th</sup> February 2002 © IIE Group, University of Essex Department of Computer Science

University of Essex

## Intelligent Inhabited Environments (IIE) Group

- 12 members comprising Ph.D. students, research assistants and senior academics.
- Formed in 1995 (drawn from embedded-computing and AI personnel traced to departments origins in 1967).

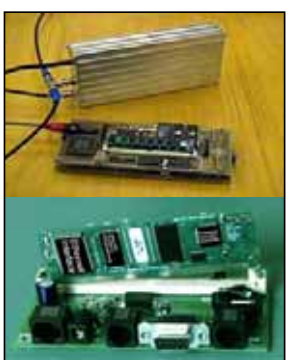
*“investigation of methods for making compact real-time intelligent embedded-agents, and their infrastructure (programming and communications) applied to intelligent-inhabited environments (e.g. intelligent-buildings)”*



20<sup>th</sup> February 2002 © IIE Group, University of Essex Department of Computer Science

University of Essex

## Intelligent Inhabited Environments (IIE) Group



### Expertise

- Compact real-time physically embedded-agents design.
- Soft Computing (fuzzy & genetic) methods.
- Agent communication & languages.
- Embedded-system design.
- Networking technology.
- Simulation.
- Mobile robots.

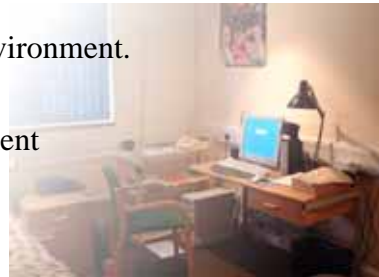
20<sup>th</sup> February 2002 © IIE Group, University of Essex Department of Computer Science



University of Essex

## The Intelligent Dormitory (*iDorm*)

- A test-bed for Intelligent Inhabited Environments Research.
- Multi-use space i.e. (study, sleep and relax).
- Multi-user environment
- Heterogeneous networking environment.
- Sensor and actuator rich.
- Open heterogeneous environment



20<sup>th</sup> February 2002

© IIE Group, University of Essex

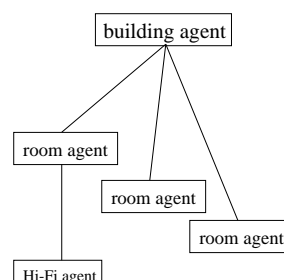
Department of  
Computer Science



University of Essex

## Gateways and Intelligent Environments

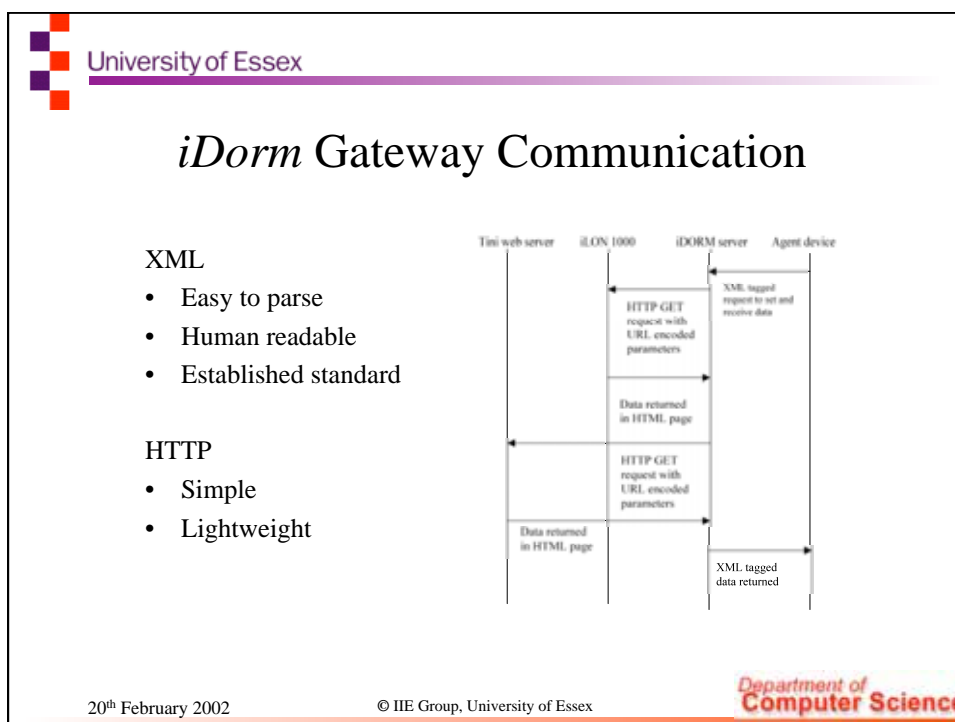
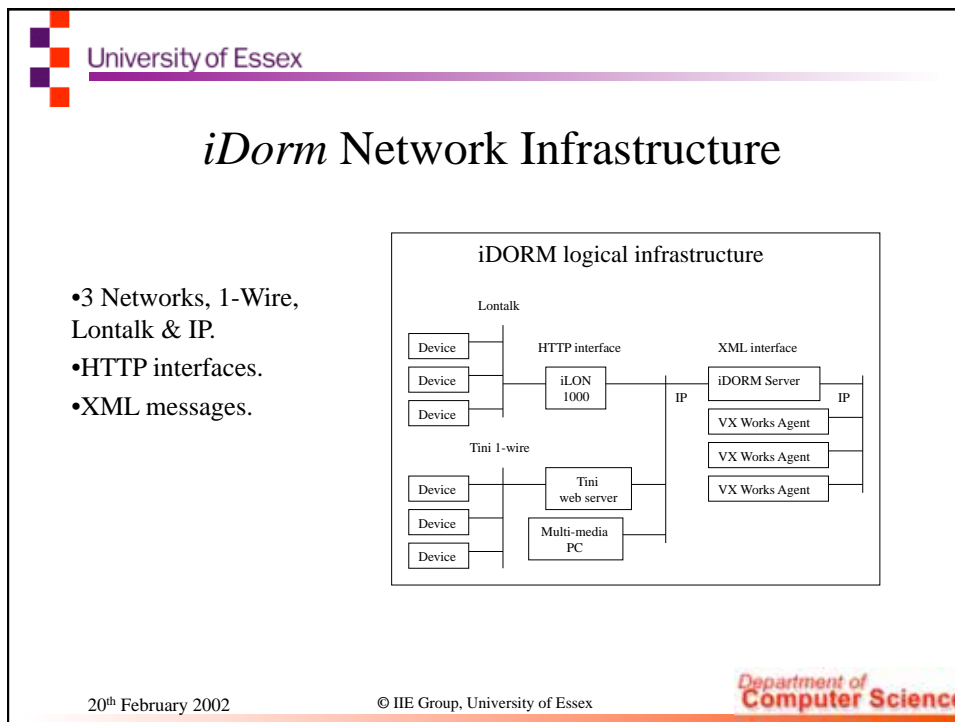
- Intelligent agents are usually deployed to control localised space (e.g. a room).
- Agent and gateways equate to the same space, rooms and buildings.
- Scalable.
- Economic.
- Gateway provides a method of accessing data mined by an agent.




20<sup>th</sup> February 2002

© IIE Group, University of Essex

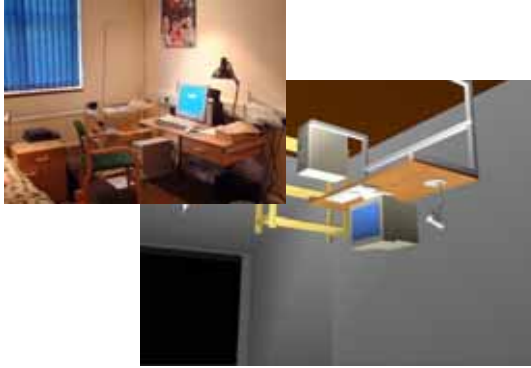
Department of  
Computer Science




 University of Essex

## *iDorm* User Interfaces

- VRML
- WAP
- WEB
- Voice Recognition
- Tangible interfaces (Switches)




20<sup>th</sup> February 2002      © IIE Group, University of Essex      Department of Computer Science

 University of Essex

## Scenarios

- Study, relaxation, sleep and entertainment scenarios.
- Manual, automatic and intelligent scenarios.
- Scenarios for the care for the elderly or infirm




20<sup>th</sup> February 2002      © IIE Group, University of Essex      Department of Computer Science

University of Essex

## Intelligent Agents

- Can extract patterns from user's behaviour.
- Help reduce cognitive load.
- Monitor and control safety systems.



**Problems with Intelligent Agents**

- **Compact** reasoning, planning & learning
- Dynamic (and sometimes numerous), non-deterministic & ad-hoc agent/people assemblies
- Particularisation versus generalisation
- Temporal processing (inc past events)
- Multi-agent cooperation or coordination
- Non-intrusive operation (with people firmly in control)
- Large input vectors
- Stimuli Focusing (ranking value of parameters)

20<sup>th</sup> February 2002      © IIE Group, University of Essex      Department of Computer Science

University of Essex

## References

- Hagras H, Colley M, Callaghan V, Clarke G, Duman H, Holmes A, "A Fuzzy Incremental Synchronous Learning Technique for Embedded-Agents Learning and Control in Intelligent Inhabited Environments", FUZZ-IEEE 2002, Hawaii.
- Sharples S, Callaghan V, Clarke, G "A Multi-Agent Architecture For Intelligent Building Sensing and Control", Int'l Sensor Review Journal, Vol 19, No. 2, May 1999
- Hagras H, Callaghan V, Colley M, Clarke G "A Hierarchical Fuzzy Genetic Agent Architecture for Intelligent Buildings Sensing and Control", RASC 2000 - International Conference on Recent Advances in Soft Computing June 29 & 30 2000, Leicester, UK
- Callaghan V, Clarke, G, Pounds-Cornish A "Buildings As Intelligent Autonomous Systems: A Model for Integrating Personal and Building Agents", The 6th International Conference on Intelligent Autonomous Systems (IAS-6), Venice, Italy; July 25 - 27, 2000
- Callaghan V, Clarke, G., Colley, M., Hagras, H. "A Soft-Computing DAI Architecture for Intelligent Buildings", Journal of Studies in Fuzziness and Soft Computing on Soft Computing Agents, Physica-Verlag-Springer, July, 2001
- Cayci F, Callaghan V, Clarke G, "DIBAL - A Distributed Intelligent Building Agent Language", The 6th International Conference on Information Systems Analysis and Synthesis (ISAS 2000), Orlando, Florida, July 2000
- Clarke G, Callaghan V, Pounds-Cornish A "Intelligent Habitats and The Future: The Interaction of People, Agents and Environmental artefacts", 4S/EASST Conference on Technoscience, Citizenship and Culture in the 21st Century, Vienna, 26-28th September 2000
- Colley, M., Clarke, G., Hagras, H, Callaghan V. "Integrated Intelligent Environments: Cooperative Robotics & Buildings" 32<sup>nd</sup> International Symposium on Robotics (ISR 2001), Seoul, Korea April 19-21, 2001.
- Hagras H, Callaghan V, Colley M, Clarke G, "A Hierarchical Fuzzy Genetic Multi-Agent Architecture for Intelligent Buildings Learning, Adaptation and Control", International Journal of Information Sciences, August 2001

20<sup>th</sup> February 2002      © IIE Group, University of Essex      Department of Computer Science