Introduction

Presented to the IEE First European Workshop on Location Based Services, London, 16 September 2002

Intelligent Inhabited Environments as Location Based Services

Intelligent Inhabited Environments Group

http://iieg.essex.ac.uk

Essex University

- parkland of 200 acres
- Royal Charter in 1965
- 5,926 students
- 25% post graduates
- 24% overseas (120 countries)
IIEG Work?

**Primary Research Focus** - the creation of intelligent (learning) mechanisms that can be embedded into networked devices making up everyday living environments (targeting so called Ambient Intelligence, Pervasive and Ubiquitous Computing).

**Secondary Research Focus** - Network Infrastructures, HMI, novel sensors / effectors

**Funded Projects**
- eGadgets
- careAgents
- Social

**Test Beds** - evolving experimental environments for testing our ideas...
- iDorm
- "Tomorrow’s World“ Set
- mDorm
- iFlat

IIEs - What Are They?

**Inhabited Intelligent Environments (IIE)**

- Living Environments (home, work, commerce, transport etc) where **physical services** (e.g. lighting, entertainment, security) rather than information are provided to people by networked computer based devices.
- The vision is that the world will be populated with billions of such tiny service providing computers – a highly dynamic and complex world.
- Embedded Intelligence is needed to shield users from the technology (orchestrate the often unique combinations of available devices to programme the services the user wants)
**An Example: Intelligent Dormitory (iDorm)**

- Multi-function space laid out like a student dormitory

**Appliances:**
- Multimedia PC
- Desk lamp
- Bed lamp
- Room Heater
- Room Cooler
- Window Blind
- Active lock
- Ceiling lights
- Telephone
- TV
- DVD
- CD Player
- Desk
- Chair
- Bed
- Mood Cube

**Miscellaneous sensing:**
- Actuators’ state
- Occupancy
- Location
- Window state
- Indoor light level
- Outdoor light level
- Indoor humidity
- Time

**Interconnected via heterogeneous networking**

**All appliances / systems provide services to users**

---

**iDorm Communication Structure**

- iDorm uses five different network protocols:
  - IEEE 802.11b
  - Bluetooth
  - 1-Wire (Dallas Semiconductors)
  - IPv4
  - LonTalk (Lonworks)

- Two Communication schemes
  - XML based messaging built around HTTP based central server
  - ACL based messaging based around DIBAL distributed architecture
**Interfacing Mechanism**

- Wap
- PDA (3rd Gen Mobile Emulation)
- Voice
- Web based VRML
- Implicit (natural)

**LBS in Inhabited Intelligent Environments**

**Potential LBS Environments**
- Home
- Work Place (e.g. office)
- Public Spaces (e.g. Hospitals, clubs)
- Transport (car)

LBS in IIEs target control, not information
LBS IIE Mechanisms

- **Location mechanisms**
  - iButtons and tags
  - RF (Bluetooth)

User requirements, as rule-sets, follow user to differing locations via network, in mobile or PDA

Ubiquitous Computing & Ambient Intelligence

- **Ubiquitous** (or Pervasive) **Computing** offers the vision for populating the world with billions of computers embedded into physical systems all offering numerous services (some unique) to people.
- **Embedding intelligence into appliances** reduces technical & cost barriers by providing a mechanism for pervasive computing devices to adapt (self-program/learn) to the the often unique needs of the user and location.
- **Mobile devices** (eg phones, pdas etc) offer the means for the users preferences to be transported (and updated) between locations, adapting to available services (plus with interface and id functions)

**Current technology**
offers small cheap networked devices e.g. TINI board (Java/web based)
Investigating use of 3G mobile devices as LBS interfaces (via PDA / phone Bluetooth / GSM).

Investigating migrating current embedded-agents (& rule learning) in gadgets and appliances to 3G mobiles.

Investigating network architectures (e.g. hierarchical gateway, fully distributed etc).

Investigating Languages from inter-device (e.g. Dibal) to programming (e.g. Java)

**eGadgets**: everyday objects, augmented with computation, sensing, communication & intelligence

**cAgents**: involves internet-linked intelligent rooms in Essex (iDorm) & Korea (Sweetroom)

**Location Based Service Research Direction**

**new iFlat under construction**

**Some References**


ISTAG (EU) “Scenarios for Ambient Intelligent in 2010 see www.cordis.lu/ist/istag.htm

**Any Questions?**

This work was made possible by funding from the EU 5th Framework and the UK-Korean Scientific Fund

More information can be found on: http://iieg.essex.ac.uk

**eGadgets**: everyday objects, augmented with computation, sensing, communication & intelligence

**cAgents**: involves internet-linked intelligent rooms in Essex (iDorm) & Korea (Sweetroom)

**Location Based Service Research Direction**

**new iFlat under construction**

**Some References**


ISTAG (EU) “Scenarios for Ambient Intelligent in 2010 see www.cordis.lu/ist/istag.htm

**Any Questions?**

This work was made possible by funding from the EU 5th Framework and the UK-Korean Scientific Fund

More information can be found on: http://iieg.essex.ac.uk