How to use Ubisense RTLS in research

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agenda

• Ubisense in a nutshell
  – Company
  – Technology

• Ubisense in research and measuring behaviour projects
who are Ubisense?

• Identification & Location Solutions company
• Founded in 2002
• Internationally recognizable customer base
• More than 500 customers in 30 countries, therefrom about 200 academic customers in Europe
• Recently listed on LSE AIM

Customers

![Some customers – read more at http://www.ubisense.net/en/customers](http://www.ubisense.net/en/customers)

Partners

identification & location solutions

- RTLS?
  - We track things....
  - Accuracy and reliability

People Animals Assets Tools Inventory

Visibility Control Measurability Flexibility
RFID vs. RTLS

**Point Asset Visibility**

<table>
<thead>
<tr>
<th>Range</th>
<th>Accuracy</th>
<th>Barcode</th>
<th>Passive RFID</th>
<th>Active RFID</th>
<th>Wi-Fi</th>
<th>UWB RTLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1m</td>
<td>0.3m</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>10m</td>
<td>1m</td>
<td>YES</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>100m</td>
<td>10m</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

**Complete Visibility**

<table>
<thead>
<tr>
<th>Capabilities</th>
<th>Barcode</th>
<th>Passive RFID</th>
<th>RTLS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Close Range Precision</td>
<td>YES</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Long Range Precision</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Automatic Identification</td>
<td>NO</td>
<td>YES</td>
<td>YES</td>
</tr>
<tr>
<td>Ubiquitous &amp; Real-time</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Easily Scalable</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Multiple Applications</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
<tr>
<td>Ease of Re-configuration</td>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>
how it works

Precise 3D Location
spatial interactions

Virtual 3D Zone

Zone Containment

3D Position  Spatial Interactions  Location Aware Applications
Ubi sense Location Platform

Other Systems

Ubi sense Location Platform

.NET API & Developer

Administration GUI
Configuration GUI
Presentation GUI

Ubi sense Location Services

High Update Rate Package
Presence Detection Package
MultiTag Packages

Ubi sense Sensor Network

Optional additional receivers and sensors
RFID, radiation, temperature ...

Presence Detection Package
MultiTag Packages
some projects where Ubisense have been involved

Fall Prediction

Urban Combat Training

Museum Visitors’ Experience Analysis

Trade shows: Behaviour of visitors

... and many other universities (~ 200 in Europe)
**Problem**

Worldwide millions of elder people suffer after a fall. A fall potentially can be lethal. Analysts in US calculated the financial costs around 19B US$/year. Because of these reasons prediction of falls would help the world society. Scientists of University of South Florida research in methods to predict falls.

**The Ubisense solution**

The Ubisense RTLS was installed in two different sites. Participants were tracked using an UWB wrist band tag. Different types of participants have been analyzed e.g. male, female, dementia and non dementia. Captured data was analyzed by USF scientist.

- Change point analysis to examine if Fractal D becomes unstable over time in persons prone to falling
- Comparative analysis of Fractal D as a predictor of falls vs. SGB, MMSE, prior fall history & medication history

**Result**

Tracking data for real-time display the change of Fractal D level

Installed area: 2 sites | Accuracy: 30 cm in 3D
US Army Training Facilities, USA (Urban Combat Training)

Installed area: Multiple facilities, 17 buildings and surrounding areas in Fort Irwin | Sensors: 320 | Accuracy: 30 cm in 3D

**Problem**
Precisely locating soldiers as they move through an urban combat training facility to provide accurate after action review to improve training.

**The Ubisense Solution**
Sensors are mounted inside and outside the facility on multiple floors. Soldiers wear a tag on their shoulder. The Ubisense Sensors track the soldiers as they approach the building and as they move through the buildings from room to room. Data is then passed through to both complex visualization systems and data repositories for playback.

**Results**
Improved training for soldiers preparing for combat in urban operations. New methods for modelling IED’s expanding training options and reducing costs.
ExCeL London and The NEC Exhibition Halls, UK (Smart Space)

**Problem**
Only elaborate manual or semi-automated techniques of measuring how visitors move in exhibition halls are available.

**The Ubisense solution**
Each badge handed out to visitors contains a Ubisense Tag and allows to track the visitors throughout their visits in all exhibition halls covered by Ubisense Sensors. The Fish Real Time Measurement System based on the Ubisense Spatial Platform provides visitor traffic flows, dwell time, staff engagements, information requests and seminar attendance all of which can be cross referenced against aggregated demographic data in real time.

**Result**
Providing highly detailed measurement, analysis and benchmarking tools for organisers and exhibitors and an interactive and personalised event experience for visitors.

Accuracy: 30 cm in 3D
eMotion St. Gallen, Switzerland
(Museum Visitors’ Experience Analysis)

Installed area: 600 m² over 4 Exhibition Halls | Sensors: 20 | Accuracy: 30 cm in 3D

Problem
Though millions of people walk the halls of art museums worldwide, art psychologists, art
historians and other researchers along with exhibit curators often have little insight into
how visitors experience the artwork on display. The “eMotion: Mapping Museum
Experience” project integrating a multidisciplinary team of researchers headed by the
Institute for Research in Art and Design of the University of Applied Science Northwestern
Switzerland was to see how the perception of ‘art’ can be measured.

The Ubisense solution
The Ubisense RTLS was paired with wireless biometric sensors to determine how
museum visitors emotionally responded to the artwork. Visitors who volunteered to take
part in the survey were outfitted with a glove containing a Ubisense Tag along with
sensors to measure electric conductivity as well as the person’s pulse.

Result
Various combined data for real-time display and sonification as well as for post-processing
project description

• eMotion analyses the experience of the museum-goer experimentally.

• Core of interest is the museum architecture, the art objects, curatorial installation and how they effect and affect the behaviour of the visitors.
objectives

- Visitor
  - Visualisation of museum experience in a virtual world

- Scientific
  - the focus is on approaches from art theory addressing art perception and museums’ effectiveness

- Practical use
  - High interests for curators, museum teachers, art scientists and cultural managers

- Design and Art Research
  - Apply artistic art for research and representation
methodology

• Psychogeography
  – Focus on the environments that individuals and groups inhabit.

• Social Science Studies
  – Other important factors (experiences, expectations and other lifestyle and value contexts) will be correlated in the analysis

• Experimental and Artistic Interventions
  – In order to examine the museum as a field of influence, the effects of different conditions are compared
Ubisense RTLS

• Tag integrated into data glove
• Record of the trail
• Record of spatial interaction
• Option to measure:
  – Speed of visitor
  – Duration of stay in Pol and exhibition
visitors’ behaviour

an elderly female visitor who is not particularly interested in art

individual profile of a young, very art-interested female visitor
field of influence

- The more attention a work accumulates over the week, the more intense the representation becomes.
- The less a work is observed, the paler its field of influence.
results

Artistic
• two video projections showing the aggregated data of the embodied visitors’ reaction
• a sound installation shows the visitors’ reaction live, in real-time
• At a TFT-table the visitors can see the paths they took after entering their visitor number.
• Each active visitor can take home his own “experience map”
• ...

Scientific evaluation
• Scientific evaluations of the statistical data by psychologists, sociologists, art theorists and art historians will be completed by the end of 2012.
presentations and publications

- November, 5th, 2012, Wolfsberg, Switzerland
UBS Arts Forum, Kunstsammeln: Perspektiven und Umbrüche
"Wie hängen? Empirische Ergebnisse zur Wirkung kuratorischer Arbeit."
Presenter: Prof. Dr. Martin Tröndle

- October, 29th, 2012, Washington
Smithsonian Institution, Washington,
Presenter: Prof. Dr. Volker Kirchberg / Prof. Dr. Martin Tröndle

- October, 26th, 2012, New York
The Metropolitan Museum of Art
Multimodal Approaches to Learning.
Presenter: Prof. Dr. Martin Tröndle / Prof Dr. Volker Kirchberg

- October, 26th, 2012, New York
New York University
Re-thinking Art Exhibitions.
Presenter: Prof. Dr. Martin Tröndle / Prof. Dr. Volker Kirchberg

- October, 24th, 2012, Cambridge
M.I.T. Program in Art, Culture and Technology
The Affective Effects of Curatorial Contextuality
How curatorial arrangements effect art reception in a fine art museum
Presenter: Prof. Dr. Martin Tröndle

- October, 22nd, 2012, Chicago
Cultural Policy Center, University of Chicago
Competent Taste: cultural policy & cultural publics
Presenter: Prof. Dr. Martin Tröndle

- September, 5th-8th, 2012, Vienna
7th Conference of the Research Network, University of Music and Performing Arts Vienna,
Sociology of the Arts
Competent Taste
Presenter: Prof. Dr. Martin Tröndle


- ....

You’ll find more details on www.mapping-museum-experience.com/en
questions ?

tesekkur ederim
diomh
kam sah hamnida
dank u wel
Dankeschön
hvala
go raibh maith agat
obrigado
diolch
muchas gracias
dziękuję
tack
grazie
tapadh leibh
merci