

Digital places: location-based digital practices in higher education using Bluetooth Beacons

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Digital Places: Location-based Digital Practices in Higher Education using Bluetooth Beacons

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Bluetooth beacons overview

- Real-world examples
 - within education
 - outside education
- Potential Use-cases within (higher) education
- Technical considerations

Bluetooth Beacons: An Overview

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Small device that transmit a signal over Bluetooth

- Can be a unique ID number, URL, or both
- Signals picked up by app on smart device
 - URL can be opened directly from notification area
 - Unique ID triggers a specified action within an app (if known ID)
- Adjustable transmission strength means area that receives a signal can be fine-tuned
 - Short-range for very local actions
 - Long-range for more general actions



iBeacon



Eddystone

Bluetooth Beacons: An Overview

- Distance from beacons can also be used to trigger actions
 - Display wider contextual info when far from beacon, giving increase detail when closer
- Signal strength from multiple beacons can be used to calculate exact position in a space, i.e. Micro-location
 - Works similar to GPS
 - 'Trilateration' calculates distance from each beacon and therefore location
 - needs three beacons to work, but more beacons increases accuracy









- Simple identifier format means that the same beacon can trigger different actions in different apps.
- Signal effectively becomes a 'public good' if it is there for one purpose, it can't (easily) be restricted from other purposes
 - Students can create their own apps that use the existing beacon infrastructure

Real-world examples

Real-world Examples: Education Attendance monitoring
 CampusM app

<u>CampusM</u> app

Contextualised campus tours

- <u>University of Bradford</u> open days
- <u>University of Edinburgh</u> & <u>Sheffield</u> <u>Hallam University</u> library tours

Real-world Examples: Education

- Restricting device features by time and location (<u>Thompson</u>, <u>2013</u>)
- Adding digital layer to physical learning zones (<u>McDonald &</u> <u>Glover, 2016</u>)
- Location-based digital storytelling for Theatre and Drama (<u>Texas State Uni.</u>)

Real-world Examples: Outside Education

Wayfinding

- Airports
 - Sports and Entertainment venues
- Retail
- Disability support

Event attendance tracking Conferences

Real-world Examples: Outside Education

Self-guided tours

- <u>Museums</u>
- City walks
- <u>Art projects</u>

- Proximity Marketing
 - Inside shops
 - Outside shops

Potential Use Cases in (Higher) Education

Potential Use: Highly Contextual Information

- Location-specific, personalised information provided at relevant points within a space
- May change according to direction of movement, distance to beacon or intent

Example

A student walking towards or past the library is notified about reserved books being available and outstanding loans.

As they enter the library they are notified of new resources related to their studies Potential Use: Creative 'Subversion' of Shared Spaces

- Beacon infrastructure intended for one purpose is used by staff and/or students for another.
- Could be courserelated or entirely independent

Example

A university installs beacons to support wayfinding around campus. A group of art students work with some computing students to create a virtual art gallery using the beacons, while other students create an **Alternate Reality Game** (ARG)

Potential Use: Serendipitous Learning

- Unanticipated learning opportunities are created in spaces through the fleeting presence of individuals
- Beacons provide
 information on
 people's work which
 could lead to
 conversations and
 new connections.

Example

Staff ID cards contain a beacon that transmits information about their work. As they move around campus, other people (perhaps in a cafe) can use this to explore new ideas and change their own thinking. Potential Use: Information Discovery

- An additional layer of digital information is added to a location or object or area within it
- Different content can be displayed based on proximity, movement through a space, personal interest, time, etc.

Example

Art students attach beacons to their work at their graduate show that link to further information about the work, its creation, and inspiration.

Attendees can access this as they look at the artworks to find out more about the student and their work

Considerations Before Implementing

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Equity of experience

- Do all students have a mobile device?
- Are there any disability issues?

Privacy

Does the way the beacon is used violate user privacy?

Considerations Before Implementing

Security

Could the beacons or app be abused by a malicious person?

Over-reliance

Could long-term use cause people to become too reliant on the beacons?

Considerations Before Implementing

Intrusiveness

Will people become fatigued or annoyed by too frequent notifications?

Maintenance

How will the infrastructure be monitored and maintained?



Summary

- Beacons offer a way to layer digital
 information and interactions onto
 physical locations
 Already in use in a range of
 - environments
- Can support a variety of formal and informal learning opportunities
- Some careful planning required for deployment, but no insurmountable issues.





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