



Cardiff School of Computer Science &
Informatics

CM2303 - One Semester Individual Project
Initial Plan
40 Credits

**Investigation into the application of Beacon
technology in the entertainment industry.**

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Project Description

Beacons (or iBeacons as Apple have branded their implementation) are a low cost, low power, location positioning system. Reliant on Bluetooth Low Energy (BLE), a Beacon continuously transmits a Universal Unique Identifier (UUID) allowing Bluetooth ready devices to trigger an action specific to the UUID upon receiving the transmission.

Beacon technologies are being increasingly employed in a retail context. Apple has recently deployed iBeacons to its American retail stores, offering their shoppers contextually aware information and promotions. Other retailers are also trialling the new hardware; for example, an Eastleigh based shopping centre was the first in the UK to install Beacons and integrate software into a pre-existing “SmartRewards” app (Ben Rossi, 2014). Mark Robinson, owner of the centre gave his view; “There’s a real buzz within the retail industry about the potential of location-based technology to help engage with and market services to the public.”

This project aims to explore opportunities for Beacon integration in an entertainment venue context; with the primary focus on festivals. Over the coming years I believe we will see an influx of Beacon technology integrated into festivals; offering immersive, contextual and beneficial services to the vast amount of smart phone users attending these events. I aim to investigate to what extent off the shelf equipment can support the following example services:

- An interactive map that can locate individual and groups of users
- Heat maps to display high and low densities of users within a venue allowing informed and precise crowd control
- Live queue times, able to calculate volume of customers and estimate dynamic waiting times

I wish to acquire primary statistical and subjective data for researching user interactions with Beacon powered applications. I plan to do this in conjunction with a UCAS Open Day, offering visiting students and parents the option to download an Android app as a secondary guide for the Computer Science and Informatics Department. I will measure and evaluate user interaction, assessing benefits and hindrances regarding the technology. I will produce a questionnaire for comparing subjective reviews to statistical data acquired. This research will drive my primary objective: “Explore Beacon integration opportunities for entertainment venues...”

From a personal standpoint, I wish to further my experience and knowledge in Android, experiment with advanced Java features and explore Server-Client architecture. I want to release an Android application to the Google Play store intended for controlled testing and user analysis. The Play store will aid widespread distribution, testing and reviews. Though this process I hope to gain knowledge in end-to-end Android development with 3rd party hardware.

Project Aims & Objectives

1. To explore Beacon integration opportunities for entertainment venues with particular attention to outdoor Festivals; aiming to determine if off-the-shelf retail focused hardware can be used in this context.
 - a. What Beacon enabled systems are already being developed?
 - b. Explore opportunities for innovation.
 - c. Develop prototype Android applications to support investigation.
 - d. Can this work with off-the-shelf hardware?

2. To investigate and compare Beacon deployment methods
 - a. Determine suitable approaches and investigate obstacles in real-world deployment.
 - b. Determine range and accuracy limitations.

3. To analyse user interaction with Beacon driven mobile functionalities.
 - a. Perform usability and system testing at a UCAS Open Day for basic functionalities.
 - b. A comparison of surveys & feedback vs. statistical evidence.
 - c. Evaluate and summarise results.

Work Plan

Supervisor Meetings

Meetings have been scheduled with my supervisor at 4pm every Tuesday. I believe this will add structure to the investigation and weekly reviews will be of great benefit to progress made.

Weekly Objectives

Week 1	Initial Beacon testing and small-scale experiments. Compile Initial Plan
Week 2	Research opportunities for user analysis available to me. Research current Beacon systems and applications. Research Client – Server architecture
Week 3	Design software for Android app targeting controlled user and system analysis.
Week 4 & 5	Implement Android app, supporting functionalities for recognising Beacons and pushing location specific notifications to user devices. Test and Release app.
Week 6	Perform research and analysis of users with app. Further controlled Beacon testing to support objective 2. Explore opportunities for innovation at festivals
Week 7	Design software for prototype Android applications to support objective 1.
Week 8 & 9 & Easter Break	Implement prototype Android applications
Week 10-12	Exhaustive testing, analysis and review of advanced Beacon functionalities Produce final report

References

Ben Rossi, *First UK shopping centre implements Beacon technology*. Available from: <
<http://www.information-age.com/technology/applications-and-development/123457806/first-uk-shopping-centre-implements-beacon-technology>> [28
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