Beyond the Pandas: Enhancing the Visitor Experience at Edinburgh Zoo

Abstract
The application of an app to guide visitors to specific exhibits within Edinburgh Zoo is described. The value of this app to both the visitor and to the zoo management was recognised in a case study. Subsequent discussions with the zoo identified a range of further benefits that could be afforded by technological solutions of this type. The most important of these are discussed.

Author Keywords
Smart tourism; Personalisation; Context awareness; Pervasive computing; Ubiquitous computing; Data mining; Online learning; Gamification; Conservation.

ACM Classification Keywords
H.1.2 User/Machine Systems; H.2.8 Database Applications; H.5.2 User Interfaces; H.5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous; I.2.6 Learning; I.2.11 Distributed Artificial Intelligence; I.5.4 Applications; K.3.1 Computer Uses in Education; K.4.1 Public Policy Issues; K.4.2 Social issues.

Introduction
In December 2011 two giant pandas arrived at Edinburgh Zoo [2], on lease from the People’s Republic of China, generating considerable public interest. As the only pandas in the UK, they rapidly overshadowed the other claims to fame of Edinburgh Zoo, such as it being...
the only zoo in the UK to house koala bears and the first zoo in the world to house and breed penguins. In September 2015 Edinburgh Zoo was a host venue for Explorathon’15, a Europe-wide event disseminating a variety of scientific research to the public, with a particular emphasis on engaging young people. As part of this event the authors deployed a location based service called Science Safari to encourage the public to visit the various research exhibits located around the zoo. Following this event we have been reflecting with the zoo on other ways in which technology could enhance the visitor experience and support the zoo in its mission to engage the public in conservation issues.

Science Safari
The Science Safari Android app was developed from the SUMMIT project [5] which rewards walkers and ramblers for visiting certain locations, such as peaks or vantage points, along recognised walking routes whilst accommodating intermittent connectivity. Geofences, identified via GPS, enable virtual rewards to be accumulated by the traveler which can subsequently be redeemed for their real equivalents. The aim of the SUMMIT project was to gamify the walking experience in a way that would contribute to the local economies of the rural areas through which these, often very well-known, paths passed. The rewards of free or discounted refreshments, accommodation, entry tickets, etc. are offered by real enterprises and visitor attractions. In this way visitors are encouraged to take advantage of facilities at villages, hostelries and historic sites that they might not otherwise have realised existed; being over a hill or slightly off the “beaten path” for instance. The SUMMIT app was developed in conjunction with Visit Fort William in the Scottish Highlands and was very well received by local businesses and shopkeepers when it was trialed on Arthur’s Seat in Edinburgh.

The Science Safari app (see screenshot in Figure 1) was a modification of the SUMMIT app which visitors to Explorathon’15 were invited to download to their Android device when they arrived at Edinburgh Zoo. Visitors downloaded the app from our own website [8] and only required a GPS connection whilst using it.

Figure 1: Screenshot from the Science Safari app.
The app recorded which exhibit sites each visitor attended along with a time-stamp. The visitor was allowed to freely tour 24 science exhibits located at 12 sites across the zoo as depicted in Figure 2.

![Figure 2: Example route taken around the exhibits with time stamps.](image)

Notional rewards were accumulated at each location and the final reward, which was dependent on how many sites had been visited, was delivered when the visitor was leaving the zoo and reconnected to the Internet to upload their data. Various rewards were offered (sweets, pens, keyrings, etc.) but by far the most popular with the children were physical badges, personalised with their name, and made for them with a manual badge-making machine whilst they watched.

**Future Potential**

From the point of view of Edinburgh Zoo, one of the most useful outcomes of the Science Safari project was that we were able to capture information about the ways in which visitors perambulated around the site (see example in Figure 2). This data is important for future planning to minimise congestion and identify where new services should be located. We intend to follow up our initial data capture with a much larger monitoring programme of visitor flows. In order to obtain data from as great a proportion of visitors as possible we will investigate methods which do not rely on the visitor possessing a portable device. RFID labels, with readers suitably located around the zoo, are likely to form the basis for this as they can be issued to all visitors and permit both indoor and outdoor monitoring. The data acquired will be mined to identify daily and/or seasonal variation and will be plotted on maps of the zoo to assist in visualisation.

Edinburgh Zoo already employs technology to enhance its offering, such as an animatronic dinosaur exhibit, visitor apps, online panda cams and the online learning system Moodle [6], through which the public can take courses in relevant subjects. We shall explore ways in which the reward-based gamification aspects of the app can be used to award certificates for successfully completing Moodle courses on conservation.

Visitors to the zoo, like any tourist, will determine their own routes around the points of interest and this variability can make it difficult to deliver relevant and understandable content to them. One way to make progress here is by recording each visitor’s individual history as they traverse the zoo and then alerting them to other related exhibits based on their individual past
history. We have developed such solutions in previous projects [1, 3, 4, 7] but not yet had an opportunity to deploy and test them in a public setting such as Edinburgh Zoo will afford us.

We are also keen to trial a personalised approach to information delivery in which the content delivered to a visitor at a given location is adapted to take account of previous content that they have already received. This is a wholly novel idea which, if successful, would avoid the tedious repetition of content that so often mars the visitor experience and also permit a unique narrative to be evolved as each exhibit adds its own chapter to the personalised story being constructed for a given visitor. Such an approach will also require the app to support identity management and privacy protection.

**Conclusion**

Zoos have the dual aims of providing recreational and educational value to their visitors. They therefore offer a unique set of challenges for public engagement. Our initial sortie into this sector has indicated tremendous scope for smart, personalised and mobile delivery of information to visitors and we have presented a number of ideas that we believe will benefit zoo management and the visitor experience by contributing to both the recreational and educational missions that zoos exist to pursue.

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**References**


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