SE Asian Ubicomp and ALife: Roaming and Homing with TechnoSphere 2.0 Computational Companions

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Abstract

We consider the increasingly blurred boundaries between what has been termed the online/offline binary through a discussion of the design and first stage implementation of a ubiquitous ALife project, TechnoSphere 2.0. This series of Android applications (apps) use augmented reality, GPS, 2D and 3D printing to create mixed reality environments in which the lives, artificial and otherwise, of people and online creatures, as well as online and offline spaces, are blended. The design of these apps is situated in the specific ubiquitous computing (ubicomp) environment, the milieu, of Hong Kong and South East Asia.

Author Keywords

Ubicomp; artificial life; case studies; GPS; augmented reality; 3D print

ACM Classification Keywords

Design [**] (D.2.2) Methodologies [**]

Introduction

In TechnoSphere 2.0, we explore contemporary ideas of offline 'making' and ubicomp to design mixed reality experiences that blend offline with online.

TechnoSphere 2.0 is a redesign of a 1990s web-based artificial life (ALife) project. This was a fully functioning ALife simulation, but one that users could not alter [1], [2]. It supported limited online-only interaction between creatures within an ALife world, rather than people interacting with creatures or one another. We also made a real-time 3D version for the UK's National Media Museum that physically brought people together to design creatures via touch screens. Offline discussions between people making creatures during visits to the museum were evident; but the online/offline binary remained, as people's actions did not impact the ALife environment.

The TechnoSphere 2.0 Creature Create app enables users to make a carnivore or herbivore by selecting a head, body, wheels and eyes and texturing them by picking from a selection of patterns. The creature is visible from all angles as it spins in real-time 3D as choices are made or altered. Once satisfied, users name the creature, and it is ready to be inserted into the AR apps.
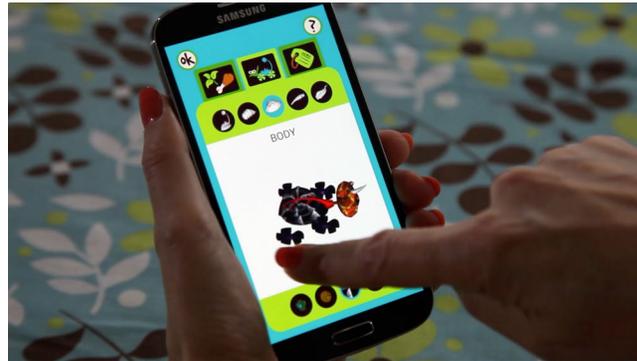

Figure 1. Designing a creature using the Creature Create app. The creature can be rotated and textured in realtime 3D.

TechnoSphere 2.0 is a series of interconnected mobile Android apps that enable people to create creatures in 3D on mobile devices then bring those creatures into human offline spaces using augmented reality (AR) and 3D print. Our AR apps are experiments through which we test hypotheses that mixed reality, i.e. the blurring of the boundaries between offline and online, opens up possibilities for more affective experiences between human and ALife creature. Jane McGonigal argues that ubicomp game design "formulates hypotheses about the value and feasibility of ubiquitous computing" [3], positioning prototype games as experiments to suggest that so-called playtests of these prototypes "provide citable proof of these hypotheses" [3]. Our project, like many described in the ubicomp literature, is currently a prototype, developed using practice-based research to design ALife processes.

Causal coupling of online/offline worlds

Central to our designs is the materialization of ubiquitous ALife that brings together the online and offline. For example, responding to the needs of an online creature may change the offline behavior of a person connected to it. Concurrently, people's offline activities and location might impact the behaviors of online creatures, for example, human exercise can unexpectedly impact the fitness of a creature. Gilles Simondon refers to such unveiling of hidden potentials as moving from the abstract to the concrete [4]. Isabelle Stengers describes this concretization as 'making' [5] and draws on Simondon, using 'making' to describe the process of 'transduction'. For both Stengers and Simondon, transduction, the process through which entities emerge is, importantly, not an emergence *into* a context, environment or milieu that is then changed by them, rather entities emerge *with* their context, into an environment of individuation, what Stengers calls the "causality of coupling" [5]. TechnoSphere 2.0 creatures emerge with their milieu, our design methodology is based on the premise that the context and process of making matters. Rather than conflating ideas of ubiquity and ALife with a sense of universality, we situate the making of TechnoSphere 2.0 in the environment of SE Asia to reveal the complexities of relationships between humans and their ALife creatures and their individuation.

Blurred boundaries between offline and online worlds
TechnoSphere 2.0 AR apps use mobile devices' built-in cameras to display live video and overlay it with computer-generated graphics such as an ALife creature made on the same device. People co-create a shared world with their creature by arranging pre-designed fiducial markers in their offline world that anchor corresponding 3D virtual objects, such as a tree or watering hole. In the first AR app, a creature can be seen moving around a table or other flat surface. By

Figure 3: 3D paper tree made from 2D paper print and used as fiduciary marker to display virtual AR tree.

adding the fiduciary marker for a watering hole or a food source to the table top, a human user creates the conditions for a creature to carry out actions such as eating or drinking, creating navigable paths for the creature to follow or along which to race with another creature. Whether, or to what extent a creature will take advantage of these human interventions will always depend on the creature's ALife engine that couples the human-defined tabletop world to virtual creatures. The inputs from human participants affect the creatures and their environment, concretizing previously un-realised potentials of the ALife creature and their milieu.

Specificities of a South East Asian Milieu

Being based in Hong Kong has influenced both our understanding of ubicomp and the design of our apps. We consider what Dourish and Mainwaring term the "third conception of colonialism: as a knowledge enterprise" in which they include ubicomp [6]. Salen and Zimmerman observe that "Games reflect cultural values… the internal structures of a game rules - forms of interaction, material forms" [7]. While we do not consider our designs to be games, as such, but rather, as Leino differentiates, 'playful works' [8], our apps have drawn on Salen and Zimmerman's ideas and are made "in dialogue with the larger cultural values of the community for which the game is designed [6], emerging simultaneously with the milieu. Throughout the design we have been aware of the "central conundrum posed by the fact that [Mark] Weiser's vision of the future is, by this point, not only an old one, but also a very American one" [6]. Our designs for

location-based experiences have been informed by close observation of how smartphones are used in Hong Kong. Our practice-based research revealed the propensity for socialising to take place outside the home, in public spaces of the city like malls and parks. Furthermore, the practices of walking, offline, through public space in Hong Kong, whilst simultaneously 'being online' is the modi operandi of the majority of Hong Kongers. We therefore believe that mobile device practices in Hong Kong enable an extension of mobile leisure and gaming experiences from domestic space into public spaces.

Private lives, privately owned public spaces
Scholars such as Xing [9] have noted the increasing tendency internationally to use privately owned public space (POPS) such as shopping malls for social interaction as well as consumption. Hong Kong's dense population, where average living space per person is 10 square meters [10], results in widespread lack of privacy at home and a concurrent use of POPS for socialising, doing homework, strolling and eating out.

Widespread use of Hong Kong's public parks and POPS rooftop gardens by people of all ages occurs mainly from September to December. Elders populate the parks in the early mornings doing tai chi and other exercises, and on Sundays most of Hong Kong's 270,000 foreign domestic workers, almost all women, gather in parks and public places to socialise. Outdoor POPS and parks are considered safe, day and night, patrolled by private security guards, enabling a variety of ubicomp apps and games.

In our design for TechnoSphere's "Walk In the Park" app, people can go to malls, outdoor POPS or the park to exercise their creature. As they walk, so does the creature, tethered to its human by GPS. The creature is seen scampering close by, via AR. Sharing the human's fitness data from mobile apps like MyFitness impacts the fitness and ALife of the creature.

"Walk In the Park" is designed to blend with existing practices of human and nonhuman animals, such as the gathering of large numbers of people and their dogs to play together in specific Hong Kong parks. In response, we have designed a visibility/privacy feature. If people choose to be visible over the network as they stroll then they can see each other's creatures in a blended online/offline space via AR.

Figure 2: Composite simulation of the Walk in the Park app with sketch of tethered creature seen using AR.

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Conclusion
TechnoSphere 2.0 is constantly emerging as humans move around the urban landscape of Hong Kong with their mobile devices shadowed by any TechnoSphere 2.0 creature that lives on their device. TechnoSphere 2.0 is an example of what Stengers calls the new practical relationship between artifact and its maker. This is a relationship of "making", of "transduction", in which creativity and invention are unhinged from humans. The coupling of ALife and ubicomp in TechnoSphere 2.0 and the blending of online and offline worlds allow participants to partially 'see' an emergence in which they are entangled. As this ubicomp concretizes and adopts a particular structure, it "brings about the emergence of both individual and milieu" [4]

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