Augmented and Alternate Reality Game Design Patterns

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Abstract
The realm of alternate reality games is young, cutting-edge, with forms as varied and divergent as the evolving technologies that birth them. One of the distinguishing characteristics of augmented reality as a technology is the ability to register virtual objects, concepts and information onto the natural world. It is not limited to images overlaid onto a persons vision, but can also include any delivered information that aligns with their current reality, such as audio narration that takes into account their view and any occlusions, or the representation of the physical position of entities—either real or virtual—in relation to their own. This paper describes the spectrum of current augmentation as well as design patterns for collaborative experiences within them, ranging from the complete replacement of place and entities with those that exist only inside a computer to those that exist completely in the mind of the players.

Author Keywords
Alternate reality games; augmented reality games; collaboration; games; design patterns

ACM Classification Keywords
H.5.1 [Multimedia Information Systems]: Artificial, augmented and virtual realities.; H.8.0 [Personal Computing]: Games.
General Terms
Design; Standardization

Introduction
Augmented reality has finally entered the public vernacular, although its current realizations are limited largely to games on smartphones that overlay game elements over video. It is described by Carmigniani and Furht as “a real-time direct or indirect view of a physical real-world environment that has been enhanced / augmented by adding virtual computer-generated information to it” [2]. Researchers at Georgia Tech have pioneered the use of marker-based tracking in ARHrrrr! like elevating this somewhat limited use to include spatial relations of the user as a game mechanic, instead of solely the orientation of the device [3]. Another example of a game that upsets the status quo is Graeme Devines Super Unicorn Puzzler [6]. In this ostensibly terrible puzzler, players are informed that they have been targeted as part of a larger operation and that operatives will find them if they do not move from their current location. Using a GPS like this generalizes well, and furthermore is an prime example of the intersection between augmented reality and alternate reality games. This excursion from typical ARGs in the design space only highlights the larger gap in theory and practice: games requiring collaboration between multiple players.

Requiring multiple participants to collaborate opens the door to a wide variety of games, some which have only been marginally explored. Players that choose to engage in these games do so by exploring, understanding and overcoming artificial constraints in these new augmented versions of reality. The underlying strategies and patterns reveal core research areas that would benefit education, research and entertainment as well as further the understanding of its potential as an expressive medium.

Design Pattern Propositions
With these new domains comes the need for new ways of understanding and categorizing their possibility space, in a manner that doesn’t limit the spectrum of augmentation and the experiences falling within them. The factors that vary between multiplayer Augmented/Alternate Reality Games include the level of cooperation, the means and motivation of participants and the degree of collaboration. The following proposed categories are suggestions, and are by no means exhaustive:

Social Boundaries
New players can join or drop without deep impact on others. Involves discovery and recognition of being “in the game” as well as the opportunity to forge alliances or rivalries either as characters or as yourself. Game mechanics can be quite simple, such as Foursquare, with its simple reward of mayor status for possessing the largest number of check-ins for a particular location amongst your social circle.

Agents and Operators
One player subset has access to information, including location of entities and status of events. Physical access to the game world is experienced by a different “agent” subset which must move, act and otherwise change the world directly. ARGs frequently make use of the stratification within their userbase between these two roles to drive a wider—if less directly engaged—interaction. A good example of this is I Love Bees, in which a relatively small subset of total viewers/players actually went to pay phones to receive the calls, but a much larger operator base was able to communicate with them to provide puzzle solutions of staggering complexity in an
astonishingly short time.

**Field and Foundry**
One player creates virtual content, scenarios and assists the player that is in the “field”, e.g. located outside using GPS and some viewer. In this pattern, the foundry role has access to resources and possibly a more creative role than in the Agent and Operator pattern. They also usually experience a more virtualized and informational context than the Agents out in the field. Examples of this include Stafford and Piekarski’s *Hand of God* AR setup [7] where one user would point to a map which may have other information overlaid, and the agent in the field would see the hand literally appear, disembodied, to point at the location the Operator is indicating.

**Team vs the Machine**
Cooperative play where the players are pitted against an automated scenario, such as a search and locate or a scavenger hunt. In this situation, all players are on the same team, but are working against more pervasive opposition controlled by AI, or are trying to succeed within the win conditions established by the game mechanics, such as a time-attack game. An example of this is Morrison’s map experiments [5].

**Symmetrical Team**
Two or more similarly composed teams have the same objective and must collaborate and compete to win. Examples include *Capture the Flag* and other games usually played without augmentation. The augmentation allows any of the above patterns to be applied to an individual team, such as a mission controller and several agents.

**Asymmetrical Team**
Two or more similarly composed teams with different objectives driven by a unifying game mechanic. Examples include *Ditch*, *Zombies*, and other games usually played without augmentation. Augmentation allows different interfaces and roles within teams. In these experiences players have the authority to affect gamespace in a competitively collaborative process. The information and tools they have at their disposal may also vary.

**Spy Games**
Like many similar non-virtual games (*Mafia*), one player or group is informed of a counter-objective that the others must discover and work against. This pattern takes advantage of the large amount of non-verbal information that is often used in games like *poker* or roleplaying but which is otherwise lost in virtual worlds.

**Further Considerations**
In the end, we transform our world. In “Re-place-ing Space”, Harrison and Dourish contemplate the difference between space and the meaning imparted on them by inhabitants [4]. Augmented reality games have the potential to empower players to forge new relationships, address real life issues and further redefine their world, especially when the techniques and core mechanics are placed in the hands of amateurs. How can authoring a game become a game itself? While creating a placeless game is possible, the full emotional potency can be unlocked by games that integrate personal history, locations relevant to the player, and the player’s knowledge of other’s personalities and relationships as demonstrated by [1]. It is impossible to import a locative game to your surroundings in quite the same way that you can escape your surroundings into *The Old Republic* through a traditional computer game.
Workshop Goals

Our goal is to engage and further cultivate a structured discourse with other researchers who are investigating the potential of mixed reality games. By examining these key issues in design relating to mixed reality, we expect new types of games can be discovered. In addition to exploring new patterns, we put forth the following questions:

- How can not only place be augmented, but personality and history as well?
- Can mapping out key mechanics and describing them provide opportunities for both creation and participation in ARGs?
- Do these proposed design patterns map in a useful and consistent way to existing augmented / alternate reality games?
- What are the operational domains of “augmented” and “alternate” in the context of collaborative games?
- Is there an equivalent of an uncanny valley when incorporating strangers and real life interactions into an ARG?

Author Bios

John Murray is a PhD student studying computer science at the Expressive Intelligence Studio at UC Santa Cruz. His research explores applications and theory for augmented reality technologies, including natural user interfaces and alternate reality gaming. His work also investigates how artificial intelligence and machine learning techniques can be applied to extend our creative reach.

Jacob Garbe is a Masters student in Digital Arts and New Media at UC Santa Cruz. He has recently worked with mixed reality projection and augmented reality interfaces for nonlinear narrative. His current projects involve databases updated by AR action to create game mechanics and reveal narrative, as well as virtual interfaces that visibly change physical objects.

References