

How to Host a Pervasive Game

Supporting Face-to-Face Interactions in Live-Action Roleplaying

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Abstract. We describe a ubiquitous computing gaming environment that supports live-action roleplaying. This environment is designed to enhance live-action games and provide a testing ground for our sociability enhancing mobile ad-hoc network applications.

1 Introduction

"You are invited to the Bauer mansion for dinner and to help solve a murder." Invitations like this one have been sent out by the millions, inviting friends and family to a multiplayer murder mystery party, often from the best-selling "How to Host a Murder" series of games. At these parties the players gather at a friend's house for dinner imagining it to be a mansion in the 1930's. The party goers often dress up and interact as characters and spend an enjoyable evening together solving a murder mystery.

Multi-player games such as these are based on social interactions as the key feature contributing to the players' enjoyment. Although the earliest documented live-action variants of board games date back to 735AD, when games of chess were played with real people, they remained rare until recently. In the last two decades live versions of roleplaying games such as Hasbro's Dungeons and Dragons and White Wolf's Vampire, the Masquerade have become extremely popular, according to our own estimates there are over 100,000 regular players of live-action roleplaying (LARP) games worldwide.

Multi-player and LARP games have evolved over time to incorporate generally available technology. Originally these games were traditional board games such as Clue or 221B Baker Street. With the general acceptance of videocassette recorders (VCR) these games adopted the television and the VCR as support tools that could interact with the players and enhance the realism of the game.

Today we are surrounded by a wide array of computing and communication technologies. It is a widely held notion that we are moving towards a networked world of possibly billions of interconnected intelligent devices that permeate the physical world. This vision, which is referred to as Pervasive Computing, leads to a world where the physical and digital space fuse together, where data and information

diffuse throughout every part of the physical world. We are interested in how pervasive technology can be incorporated into multi-player LARP games and what effect this will have on the character and nature of games.

We define a Pervasive Game as a LARP game that is augmented with computing and communication technology in a way that combines the physical and digital space together. In a Pervasive Game, the technology is not the focus of the game but rather the technology supports the game. Although technology is ubiquitous in a Pervasive Game, its role is a supporting one and thus the technology is kept as unobtrusive as possible.

In this paper we are proposing a game, *Pervasive Clue*, played with personal digital assistants (PDAs) that will support game play and sociability in the game. We intend to use *Pervasive Clue* as a reusable testing environment, varying the rules and PDA applications in order to test various hypotheses in a controlled and limited environment that is informative and enjoyable for both the players and researchers.

2 Pervasive Clue

Pervasive Clue is a live-action roleplaying game based loosely on Hasbro's classic board game Clue augmented with short-range radio frequency (RF) PDA devices. The goal of Pervasive Clue is to discover who killed the host, Mr. Bauer, where it was done and what was the murder weapon. Solving the murder is done through the discovery of clues, when a player feels they can solve the crime they are allowed to make an accusation. If any of the crime facts (murderer, location or weapon) are incorrect the player is eliminated.

Up to six players will gather in a campus building set up as the Bauer household. Each player will assume a role similar to the 1930's archetypes used in the classic board game Clue. These roles are: the mysterious and vain femme fatale, the monocle-wearing retired war veteran, the faithful(?) maid to the Bauer household, a balding businessman in a suit, an elderly gossip mongering spinster and the absent-minded professor. As this is a roleplaying game an award will be given to the best roleplayer. However, roleplaying will not directly affect the gathering of clues.

The game building will contain ten rooms. Nine rooms will contain clues and be possible crime scenes, the tenth is a central meeting room, containing refreshments and seating, for the players to meet, talk and roleplay. Due the nature of the game, clues found in Pervasive Clue are always negative clues, i.e. "the murder weapon was not the candlestick" or "the murder did not take place in the study." Players are each equipped with a *Cluefinder*, an RF enabled PDA device with a large magnifying glass attached. Although the magnifying glass is entirely cosmetic its design illustrates the function of the device, how it is used and promotes use of the Cluefinder as a roleplaying prop. Each room contains up to 3 hidden clues. Each clue has a physical representation (i.e. knife, book, candlestick) as well as a hidden short range RF beacon <1 foot, broadcasting its clue. These clue beacons are similar in function to the close range proximity beacons described in [1]. Players find game clues by searching a room with the Cluefinders and coming within 1 foot of the beacon.

Players are allowed to search a room for up to 5 minutes. After searching a room the players must return to the main room and stay there for at least 5 minutes (although they may stay in the central room longer if they choose.) Every 10 minutes

the Cluefinder will determine a new room the player is allowed to enter. This determination replaces the die roll that decides player movement in traditional Clue. Players may also gain clues by exchanging them with other players. The rules of the game do not restrict a player's ability to give or trade clues with other players. However, the rules also do not enforce agreements between players nor do they force the players to be truthful about the clues they provide.

Although social encounters can occur in any of the rooms the majority of the encounters are likely to occur in the main room. During these encounters the Cluefinder PDA will perform its most important role, helping to establish and support player face-to-face interactions. The Cluefinder PDA accomplishes its task of promoting sociability by applying modified versions of applications we have already developed that support sociability in real world face-to-face encounters. These include: an application for finding nearby people based on their public profile [2]; an application for trading items that uses a game-theoretic approach to suggest exchanges that are favorable to both parties involved [3]; an application for capturing and disseminating reputation information about people for use in evaluating a player's trustworthiness based on his or her behavior (like cheating or lying) in past games [4].

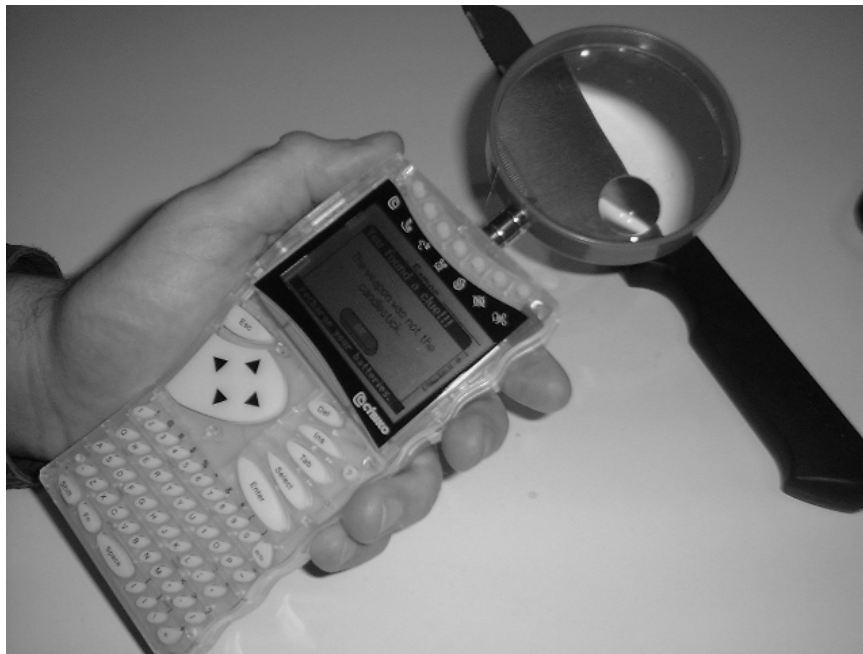


Figure 1 Cluefinder Prototype

This following example illustrates the Cluefinder supporting game play in Pervasive Clue: *The businessman player has just returned to the central room after investigating the Study. After a quick snack, he decides to see who might be willing to trade some clues regarding the location of the crime. The Cluefinder introduction application suggests he talk with the player playing the role of the femme fatale who*

has just entered the room. The Cluefinder trade-broker system suggests that he might consider offering to trade some of the information he has just discovered in the Study. The Cluefinder reputation system warns him though, that femme fatales are not to be trusted.

We must stress that although from a research perspective the sociability enhancing applications are the focus, to the players of the game the devices and the applications play a supporting role. In the above example the Cluefinder applications made suggestions but took no game actions. For example, the Cluefinder might suggest a possibly beneficial trade of clues, but it is up to the players to act upon it or to ignore it. The Cluefinder knows what clues the player has discovered by search, yet trades are only made by players outside of the Cluefinders, in the physical space. The players might choose to inform the Cluefinder application about information gained in the physical space to enable the Cluefinder to reason on it but that choice is left up to the player. Much as in the real world, players often will have reasons for not providing information to their personal devices including: distrust of the device, distrust of the information, roleplaying or just not wanting the information to be used by the Cluefinder as a basis for decision making. The game features of the technology playing a supporting role and the technology only having complete information from the digital space distinguishes Pervasive Games from other games, they are not computer games but rather computer- augmented games.

3 Augmenting Social Interactions

One of our primary research assumptions is that PDAs in wireless ad hoc networks, such as the one in Pervasive Clue, can augment social interactions. This assumption is based on our belief that a PDA or a mobile phone is much more than an electronic device you carry around. It becomes part of you as it goes everywhere you go and you personalize it with information that is critical for you to have at your fingertips. To support this general hypothesis we have designed several applications for RF-enabled PDAs. The PROEM application [2], in the real world is a profile-based introduction system, yet in Pervasive Clue PROEM helps players identify whom to talk with, based on which player is best suited to provide information needed to solve the murder. Likewise the WALID system [3], was originally designed as a wireless ad hoc task trading application. As Pervasive Clue is a task-oriented domain, a modified WALID system exchanges clues instead of tasks, and we are assured that WALID will propose optimal clue trades. DIOGENES [4], our distributed reputation server designed to support Wearable Communities, will attempt to live up to its namesake and "search the [game]world for an honest man" with whom to exchange clues.

The sociability augmenting applications we have developed leverage the contextual information of proximity. As we have limited the transmission range on our RF devices to under 15 feet, when two personal devices are in communication they know their owners are in each others social space and can communicate face-to-face. We expect the applications described above to give a tremendous advantage to those game players who use them.

As Pervasive Clue is a test bed, we developed several variants of the basic game designed to illustrate the utility of our sociability enhancing applications. One variant

is the single liar version of Pervasive Clue where only the murderer is allowed to lie. This variant should illustrate the functionality of the DIOGENES distributed reputation server as the players as a group learn which player is providing the misleading clues, without each of them having to be duped along the way. Another variant will allow complex clues, consisting of several pieces of information. Under these circumstances, not all clues will be of equal weight. It seems likely that the WALID system modified for clue trading will be very useful in determining a deal that is pareto-optimal and as balanced as possible to both parties. The two applications mentioned are both face-to-face "facilitating" applications. PROEM is in a different category as it is a face-to-face "enabling" application. It allows users to broadcast information about themselves and find other users with desirable characteristics. To illustrate the utility of PROEM a variant is being considered where clues are not located all in the same building but rather distributed across the campus. PROEM as an introduction application is designed to enable encounters finding other players with whom it might be beneficial to meet up with and trade clues.

4 Status and Future Research Issues

We are in the process of implementing Pervasive Clue and expect completion of an initial version by the end of the year. The implementation is based upon our mobile peer-to-peer application development toolkit described in [5]. This toolkit facilitates the development of decentralized applications for mobile ad hoc network environments. Although results from using this toolkit have been promising, it seems likely that an extension to the toolkit might be beneficial to support the needs of developing pervasive games. We expect Pervasive Clue to provide valuable insight into the limitations and possible extensions of the toolkit.

Aside from our planned exploration into the environment of pervasive games, we see the following research issues to be open and worthy of further examination:

- What features make pervasive computer games fun for the players? What are the pitfalls to avoid that detract from player enjoyment?
- How can we measure the effectiveness or effect of pervasive technology in games?
- What makes a game a "hit"? How does it vary among demographics?
- What are the characteristics of pervasive games? Can we use these characteristics to categorize pervasive games?
- What are the core set of applications needed by all pervasive games?

5 Conclusion

There is a broad range of potential pervasive games and almost any game that can be modified to be played in a live action manner can be made into a pervasive game. Pervasive Clue is our initial entry into the genre but it seems likely in the future that we will experiment with other pervasive games as the need arises. Our hope is that a

symbiosis will exist between pervasive games and real world mobile peer-to-peer systems with each providing benefits to the other.

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