

I Like Frank: A Mixed Reality Game for 3G Phones

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Introduction

Location-based games are a new form of entertainment played out on the city streets. Players equipped with handheld or wearable interfaces move through the city. Sensors capture information about their current context, including their location, and this is used to deliver a gaming experience that changes according to where they are, what they are doing and potentially how they are feeling. In collaborative games this information is also transmitted to other players who may also be on the streets or on-line. The net result is a gaming experience that is interwoven with the player's everyday experience of the city.

Location-based games are an exciting commercial prospect, directly extending current wireless (but usually disconnected and location independent) games for mobile phones. They also raise new challenges for research including dealing with the inherent uncertainties of wireless communications and positioning systems such as GPS; developing hybrid architectures that support data sharing between mobile devices and more traditional consoles and PCs over both fixed and wireless networks; and establishing new kinds of content configuration and orchestration services [1].

This article reports on an experimental game called I Like Frank that was developed for a mixture of 3G mobile phones and PCs, and discusses how it has informed the design of new configuration and orchestration services for location-based games. I Like Frank is the latest in a series of touring experiences that mix games and live performance that have been developed by the Mixed Reality Laboratory and the artists group Blast Theory. Previous examples include Can You See Me Now? in which online players were chased through a 3D virtual model of a city by street players who, equipped by handheld computers with wireless networking and GPS, has to run through the actual city streets in order to catch them [2]; and Uncle Roy All Around You, a game in which street players and online players journeyed through a city in search of an elusive character called Uncle Roy [3].

An overview of I Like Frank

I Like Frank also explores the relationship between street players in a real city and remote online players in a virtual model of that city. Further developing the theme of Uncle Roy All Around You, players are in search of a missing person, Frank. Social interaction between players is the governing principle of the game, but most importantly it is a work about loss and absence; Frank is never found, he is permanently missing. The Internet, the player's device and the virtual world all serve to create people who are both there and not there at the same time.

I Like Frank was developed during a three month residency supported by the Government of South Australia as part of the Thinkers in Residence scheme and premiered at the Adelaide Fringe Festival in 2004 where it ran for ten days, for up to seven hours a day, during which time it was experienced by 450 street players. We now describe the structure of I Like Frank, before turning out attention to the new services that supported its configuration and orchestration.

I Like Frank consists of three phases: an initial phase in which street and online players find their orientation within the game; a middle phase in which they pair up, journey through the city, engaging one another in various tasks on the way; and a final phase in which they reach their destination to experience the payoff.

Phase 1: orientating street and online players to the game

Street players purchase a ticket for an experience that will last for up to an hour. On arrival at the venue they hand over all of their personal possessions including bags, wallets, mobile phones and keys, in exchange for a mobile phone, a ritual that is intended to increase their sense of anticipation, vulnerability, dependence on the game, and to increase susceptibility to viewing the city in a different light. A member of the front-of-house staff then briefs them that their goal is to find Frank and explains how to use the mobile phone to play the game. They are then led out of the building and into the game.

This first phase of game takes place in the relatively safe environment of a university campus. Their mobile phone displays a map of the surrounding area and their first task is to find a red marker on this map and get to the physical location that it indicates. The red marker is on the edge of the campus, leading into the centre of the city. As the street player walks through the campus, they receive regular text messages on their phone in the voice of the game, describing a relationship with Frank and how they need help from the player to find him. For example:

“Welcome to Adelaide. I'm happy that you could make it. I want you to help me find Frank. He was here at one time, with me.”

The player indicates when they have reached their red marker by declaring ‘I am here’ on their map. By the time, they should be competent in using the phone interface, oriented within the city and in an appropriate frame of mind for the next phase.

The phone interface consists of a map, a message bar at the top of the screen, and two pop-up menus operated by the phone's soft keys, as shown in Figure 1. The menu on the right allows the player to zoom in or out of the map, and to declare their position to the system by selecting “I am here”. The phone interface shows a small section of the map, with the player's location indicated by cross hairs in the centre. As the player walks, they are instructed to use the joystick on the phone to move the cross hairs to reflect their movement. On releasing the joystick, the map repositions itself to indicate the new position with the player once again at the centre, and informs the game system of this movement. This constant repositioning of the map and occasional explicit declarations of position constitute the games' positioning system, an approach called ‘self-reported positioning’ [3]. Text messages appear on a panel drawn over the map. The player can reply with an audio message, in which case the phone makes a call to a voice mail service, allowing the player to leave a fifteen second long message before hanging up.



Figure 1. The phone interface

The phone used was a Motorola a835. This particular model of phone and firmware supported J2ME MIDP 1.0 java programs, and although it had a sizeable memory card, only 128Kb of memory was permitted per ‘midlet.jar’ file, while 512Kb of run-time memory could be allocated. This limitation imposed considerable restrictions on the nature of the client software that could be installed upon the device. For example, to achieve the desired resolution of map, the image had to be tiled and the required pieces loaded into memory only when needed and then unloaded afterwards. Furthermore, this meant that the client could not have any other media associated with it, for example sound or video files, although the hardware was more than capable of displaying them ordinarily.

We now turn to an online player's experience during this first phase of the game. Online players connect to the game over the Internet, downloading a Shockwave 3D movie from the game website. They then create

a username and password, with which they may play as many times as they wish, and are then held in a queue until there is space for them to join the game (only 15 online players are admitted at a time in order to keep network traffic within acceptable levels for players using dial-up connections).

Online players explore a 3D model of the city using the interface shown in figure 2. They are embodied as an avatar and steer this using the arrow keys on their keyboard. They encounter other online players and send them public text messages. They can zoom out of the model to a bird's eye view to see the positions of all the players in the game. They also receive a timed set of text messages from the voice of the game, similar to those received by a street player. These messages explain that the online player should assist in the search for Frank, and informs them that their first task is to search the virtual city model to find a specific photograph that is embedded within it and that marks an important place. The city model is populated with photo objects. Entering one of these triggers the display of a photograph from the actual city streets taken at this location. As with the street players, the aim of this section is to establish the back-story, introduce online players to their interface, and familiarise them with the (in this case virtual) city.

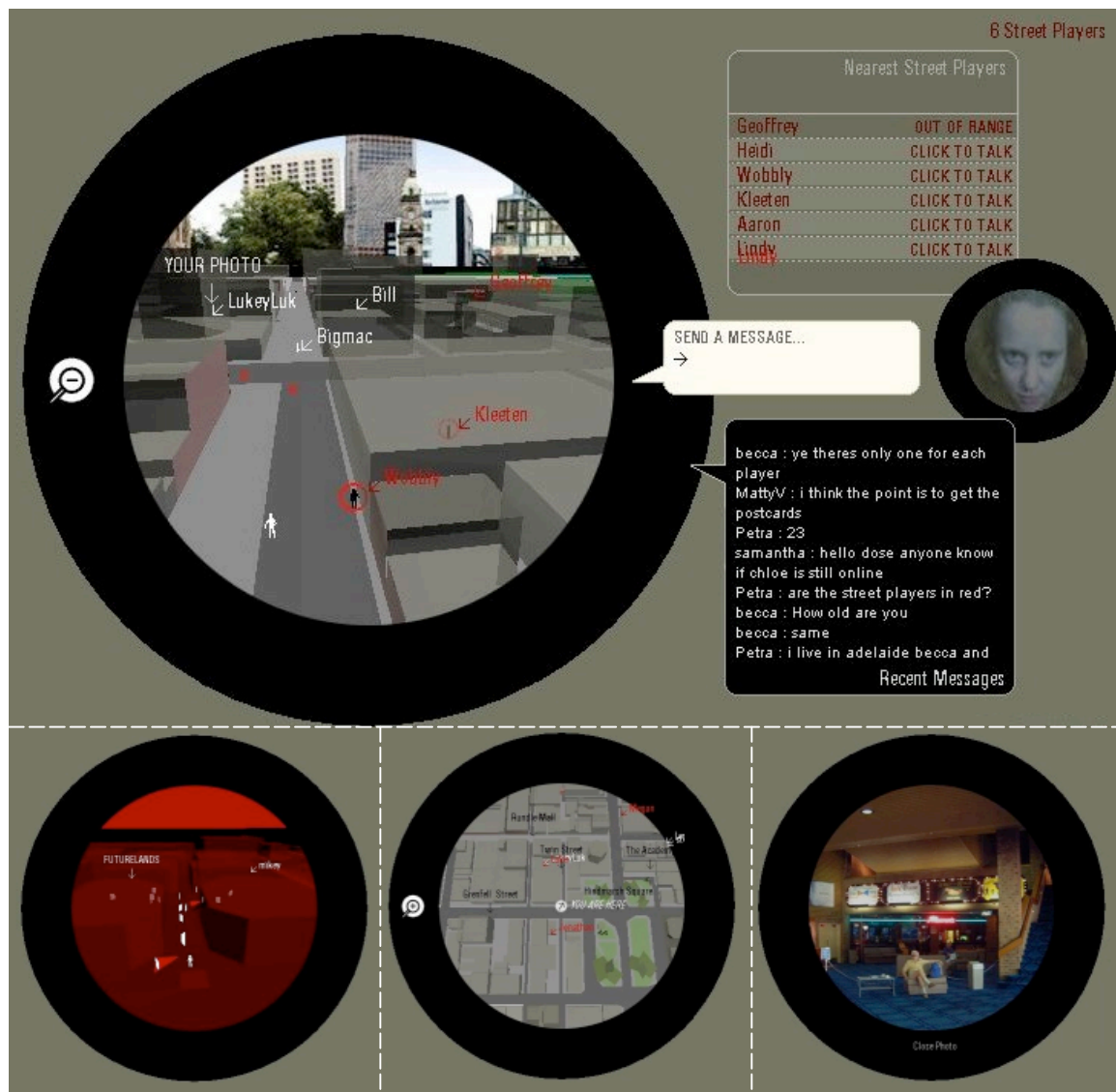


Figure 2. The Online Interface. Top, the normal view. Below from left, Futurelands, the zoomed out view, a photograph

Phase 2: Negotiating the city and retrieving postcards

Once the street player has declared themselves to be at their red marker they enter the second phase of the game in which they explore the streets of Adelaide in search of Frank. Whenever they declare their position to the game they receive a new text message in return which, in the voice of the game, provides them with a clue as to where to go to next. In this way each street player undertakes a journey through the city, following a trail of clues. The clues are pre-programmed, attached to different zones of the game area and are designed to be ambiguous, supporting multiple interpretations. For example:

“Frank never took education seriously. Get off the campus.”

“We toured the Grand Lodge, trying the handles of locked rooms.”

Street players now also begin to see online players on their phone map, represented as icons that show their corresponding positions within the virtual city. Street players and online players can communicate, with text messages sent to the street player and audio messages returned to the online players. It soon becomes clear that online players may be able to help guide the street player to their destination, but only if the street player will first perform a task on their behalf.

Once an online player has found their particular photograph within the virtual city they too enter the second phase of the game. The game instructs them that a physical postcard is hidden at this location in the city and that they need to find a street player and to bring them here in order to retrieve it and post it back to them. At this point, avatars representing the street players appear in the 3D city model. Online players also get access to other details of the current street players in the game, including their name, gender, a brief description and a photograph that was taken when they were inducted into the game. If an online player can get close to one of these avatars they can send text messages to this player, listen to their audio replies, and in this way can try to establish a relationship of trust with them and then guide them to find the postcard. However, this is not an easy task, as retrieving a postcard for an online player may appear to be a distraction from their main task of finding Frank.

Postcards were hidden at four locations in the city, at a bar in a pub, in a pool hall, and in the saddle bags of two bicycles, one chained up at the end of an alley and the other outside a post office as shown in Figure 3 left. Having found the postcard, the online player gives the street player their address using a text message, which the street player then writes on the postcard. Retrieving a postcard involves the street player crossing the boundaries of normal behaviour, requiring considerable trust in the online player and demonstrating one of the ways in which location-based games can interweave the fictional world of a game with the reality of the physical world.



Figure 3. A postcard location (left) and Futurelands (right)

Phase 3: Futurelands, the final destination

The clue trail eventually leads the street player south through the city, avoiding the main thoroughfares and taking a meandering route, peppered with memories of Frank and allowing time for contemplation. The clues increasingly point them towards a particular area of town, an office complex called “Futurelands”,

and finally lead the player to this location. When they reach the road opposite Futurelands, they receive a call on their phone. Answering the phone the street player discovers that this is a video call, and that they can see themselves on the screen, filmed by somebody they cannot see hidden on the other side of the road. An actor makes this video call, and instructs the street player to enter Futurelands, using the video link to guide them. Still using the video call, the street player is instructed to sit down on a bench in a quiet leafy paved courtyard. Once there, the performer asks them to answer the question written on their postcard, or asks them the question personally if they never retrieved a postcard. The question is one of the following:

“Is there someone who you saw briefly who you’ve never forgotten?”

“Who do you think of when you are alone?”

Having completed this interaction, the performer reads a script describing his last meeting with Frank. The street player is then asked to leave their postcard on the bench, and return to the venue as the game has been completed. If the player does not reach Futurelands in the allotted time, then a text message informs them that the game is over, and that they should return to the venue anyway. Completed postcards, including the answer to the above question, are collected and posted to the relevant online player.

When the street player reaches Futurelands, their avatar disappears from the virtual world. Any online players for whom they retrieved a postcard are now given the option of entering a virtual equivalent of Futurelands (see figure 2). Here they listen to a pre-recorded audio message similar to the performance heard by the street player before leaving the game. Eventually they will receive the postcard that the street player left behind on the bench at Futurelands.

In these ways, I Like Frank interweaves pre-programmed gameplay with live performance and social interaction, and mixes an online virtual world with a physical city to create a unique combination of game and theatre, that challenges players to explore issues of loss, remoteness, memory and trust within the city.

Configuring and orchestrating I Like Frank

We now consider how I Like Frank was realised, focusing on how content was configured and on how the experience was orchestrated from behind the scenes.

Due to the small footprint of the mobile phone client, all game content, for example the text messages from the voice of the game, was served from a central game server, and triggered by the client reporting its position over the network. This server was responsible for managing the shared game state, including the positions of all players, handling text and audio messaging, serving clues, storing persistent game information (players details and state) in an SQL database, admitting online players to the game, and communicating with remote clients including street players’ interfaces implemented in Java and online players’ interfaces implemented in Shockwave.

Configuring content using ColourMaps

The text clues and red-marker locations that comprised the core location-based content for I Like Frank were configured using a mechanism called ColourMaps in which an artist directly paints regions of content over an image such as a map of the game zone. Each region is coloured in a different colour and each colour is associated with content via an XML file. The ColourMap is also used to load specific objects, such as the red markers and the locations of postcards, into the system. As a player moves around the city and generates a position update using the “I am here” function, the ColourMap is sampled at the given location and the retrieved colour is then used to look up the relevant content and return it to the player.

The main advantages of ColourMaps are that artists can use familiar tools such as PhotoShop to create content for themselves, and that adopting a raster-based approach to specifying content regions through free-hand colouring, as opposed to a vector-based approach in which locations are defined by discrete shapes, provides fine grained control over exactly matching content to the shape of the city streets. This approach enabled rapid creation, testing and refinement of the content that formed the core of I Like Frank, a process that is vital in creating a nuanced experience for the players. Indeed, during testing, the content was refined on a daily basis, usually overnight. Part of a ColourMap that was created for I Like Frank is shown in Figure 4 (left).

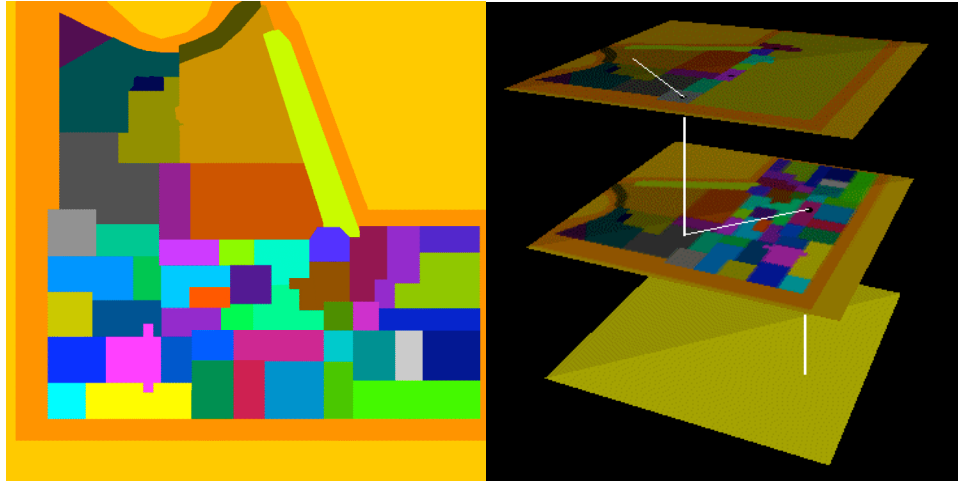


Figure 4. Left, a colour map. Right, game levels using three ColourMaps

Multi-level ColourMaps

I Like Frank introduced the concept of using multiple ColourMaps to support the different phases of the game. We introduced this concept to the artists through the metaphor of a three dimensional ColourMap consisting of three plateaus, each one representing a level, and constructed using a two dimensional ColourMap (figure 4 right). The first level (top) can be thought of as a training level, with the clue trail made up of clear clues to introduce the street player to the concepts of the game as they move through the relatively safe environments of the university campus in search of the red marker. Coloured regions for the university provided background narrative for the game, whereas regions in the city indicated that the player had moved too far for this stage, and sent them back towards the markers. The marker acts as a hole in the ColourMap, through which the player falls onto the phase two ColourMap (middle). This redefines the clues for the entire city, providing a non-linear narrative for the clue trail, along which the player can take any route they wish, but ultimately being driven towards the end game at Futurelands. The nature of this system means that if a player wishes to deviate from the trail in order to retrieve a postcard for an online player, they can rejoin it from any location. The third and final ColourMap (bottom) consists of one coloured region for the city, the intention being to keep the player in the same location but with something to read while the performer gets into position for the final payoff.

Digging in ColourMaps

Our early experience showed that one of the biggest concerns raised by players was that the voice of the game was obviously automated. One of the reasons for this was repetition of clues in the ColourMap. In particular, a player would receive the same clue each time they re-entered a region, causing frustration as in some cases the player had traversed the region several times and was in need of a more definite clue.

To avoid this problem, the concept of digging in the ColourMap was introduced. Here one can imagine that the ColourMap, instead of being a two-dimensional image, has a certain thickness to it, consisting of a stack of clues through which each user can dig a layer at a time.

The clues in I Like Frank were layered so that each colour represented a structure of as many as eight different clues. The first clue was often ambiguous, encouraging players to follow diversions, and drawing on the history of the local environment. However, on repeatedly declaring their position to be in the same location, the player would receive clues that were evermore geographically specific and that included precise instructions as to where to go next.

When the street player requests a clue in a region, the system serves the clue, and then removes that layer of colour so that it is no longer available for this particular player, requiring the game server to maintain the level reached by each individual player in each defined region. When the street player is next in this particular region, they can then dig deeper into the colour strata to find the next, easier clue. The last clue can be thought of as the bedrock, given enough clues it is unlikely that the street player will reach this, but if they do then it is a very obvious clue that is repeated.

Orchestrating I Like Frank

A complex real-time performance such as I like Frank is not a plug-and-play experience that unfolds automatically once the software has been downloaded and launched. Rather, it requires extensive and ongoing behind-the-scenes orchestration work by performers and technical crew to ensure that players are delivered a coherent and engaging experience that unfolds as planned, with the correct timing, and where any technical difficulties are smoothly managed with minimal disruption. These included performers and crew who were located in a central control room and as well as those who were roaming the streets so that they could deal directly with street players if necessary.

The orchestration of I Like Frank has to address a number of specific concerns. One obvious bottle neck within the game structure is the end-game performance; with only one performer being available and taking five minutes per interaction, careful management of players arriving at Futurelands has to be undertaken so that they do not encounter other players or feel as if they are left hanging around. Another concern is players becoming lost, not understanding the goals or objectives of the game, or experiencing hardware or software crashes. In this case, a street performer has to find the errant player, take whatever action is necessary and send them on their way again.

We developed two interfaces to support orchestration. The main interface was operated in the control room and allowed a member of the technical staff to monitor directly all aspects of the game. This is shown in Figure 5, left. A map gives an overview of the locations of all players in the game, with a panel showing the stage of the game for each street player and the amount time remaining to them. The operator could retrieve more information about a specific player, including all messages sent to and from the player, both by online players and by the voice of the game. Finally, this interface allowed the operator to manually “upgrade” players to different phases, for example letting online players into Futurelands; give a street player extra time in the game; and to flag a street player as requiring a video call. The operator could also supplement the automated game messages with hand crafted messages if a street player needed stalling, speeding up, or just required more directed and individual advice about what to do.

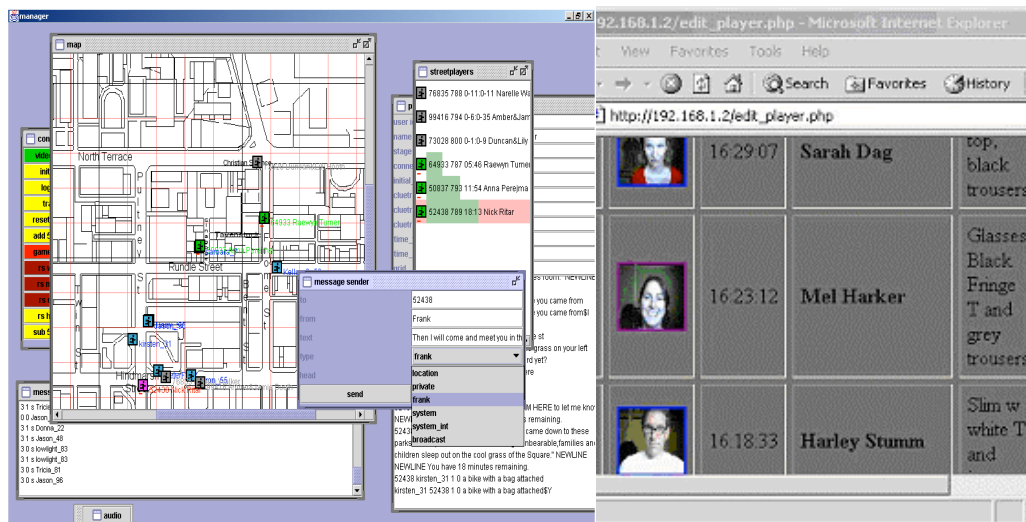


Figure 5. The control room (left) and PDA (right) orchestration interfaces

Our second interface, shown in figure 5 right, was designed for the performers on the street. These were equipped with walkie-talkies, through which they were made aware of street players entering and leaving the game; however identifying a player in a crowded street with just a textual description still remained a problem. We therefore equipped these performers with handheld computers with wireless communications and created a simple web based interface to the player database. This meant that the performers had access to the descriptions and most importantly the photographs of the players they were trying to find, and could check their status in the game without occupying the walkie-talkie channel for valuable minutes.

Summary

We have presented I Like Frank, a location-based mixed reality performance using 3G phones. We have seen how relatively simple interaction technologies, messaging and location reporting, combined with flexible content authoring and orchestration services enabled the creation of a rich and powerful mixed reality environment to bring street players and online players together. In contrast to conventional computer games, I Like Frank, embodies an approach in which digital content is carefully embedded into the fabric of a city and complex social interactions among players, showing how location-based games can directly draw on the real-world as content. At the same time, I Like Frank also shows that there may be a need to carefully support players who have been sent out into a real-city to play such a game, requiring sophisticated processes and supporting services for orchestration.

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