Scramble: Co-Located, Real-Time, Locative Word Game

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ABSTRACT

In this article, we describe a collaborative word game that is being created for cell phones as part of the Mobile Digital Commons Network research project being led by Principal Investigators Sara Diamond (Ontario College of Art and Design) and Michael Longford (Concordia University). The first iteration has been built and tested and further iterations with harder and easier levels of gameplay are being planned.

TECHNICAL INNOVATION

Research Engineer Daviid Gautier (Hexagram/Concordia) used the Mobile Experience Engine (MEE) to develop an underlying functionality for a co-located experience. He created an application which runs on multiple phones and displays the user's location within a delimited physical space (e.g. a city park) as a dot on the screen. As the user moves, their dot moves on the screen. Two separate physical spaces were overlaid so that three users in one city and three in another can all see each other interacting in the virtual space of the screen.

The technology used for this application is straight forward. First, the information sent from the GPS satellites to the user's GPS receiver (giving the location of the receiver in physical coordinate terms: longitude and latitude) is transformed into pixel space on the mobile device. The physical to pixel space transform is based on a central, reference point (established at the beginning of the experience) used as a base for the clipping plane (delimiting the area of interest, or the 'playing field') and a pre-computed ratio (in meters per pixel) is used to scale the physical space into the screen space. By doing this spatial transformation, we assure that the respective location data shared by all users is not directly tied to their physical coordinates (in Montreal or Toronto, for example) but rather to their relative position from the centre; in other words, users are mapped onto the same space - the pixel space.

After being computed, the pixel coordinate of the user is then sent over the Internet (via the GPRS network) to the MDCN database server. Other remote users then query that database (over the network) to retrieve the pixel coordinates of each user and use this information to refresh the position of each user's avatar on their mobile device screen. As a result, each users has the same information on their screens.

BRAINSTORMING

A research team[1] reviewed this functionality and then sat down to devise a meaningful user experience that could take advantage of and extend it. Several scenarios were explored, including games modeled on scrabble, boggle, tag and football as well as co-creative experiences like recombinant poetry. It was decided to pursue the simplest experience and add levels of complexity after refining and user testing.

Some of the features discussed included:

- having six players, three in Montreal and three in Toronto
- all see the same screen

[1] The researchers included OCAD faculty Geoffrey Shea, David McIntosh and Paula Gardner, staff member Ken Leung and research assistants Jenny Ziemianin and Peter Todd.

- players are colour-coded by city (e.g. red in Toronto, blue in Montreal)
- each player is assigned a letter instead of a dot on the screen
- the physical game space should be an open area roughly 50 x 100 feet
- players can recognize their own letter by a visual clue (e.g. flashing, glowing)
- a timer challenges players to form the word within 60 seconds at which time a snapshot of the screen is taken, they are advised that round one is finished and players are reassigned new letters
- voice communication should be considered on later levels (or between levels)
- additional non-player, non-moving letters could be introduced to add complexity, forcing players to conform to less conventional orientations of the word (e.g. diagonal, serpentine)
- the number of letters could be reduced to introducing an element of musical chairs

SCRAMBLE: THE GAME

By replacing dots on the screen with letters a simple locative spelling game could be developed. Daviid was able to provide this technical modification by the next meeting and demonstration two days later. Users in Montreal and Toronto (some working in pairs and some individually)[2] were assigned four letters – two in each location. They were then challenged to arrange themselves in space to form the only possible word.

After testing they had these observations about the experience:

- the first challenge was to determine how far one must move before having a visible affect on the screen (currently set to 5 meters/pixel)
- next, which direction on the screen corresponded to which direction in the physical space (i.e. north was not necessarily 'up')
- players in Toronto talked and then shouted suggestions to each other until they were out of range
- some experimented with finding the edge of the playing field (about six block from edge to edge)
- some Toronto players thought the Montreal player seemed to be moving inordinately fast
- one Montreal player/letter disappeared from the screen on both Toronto phones briefly (5 seconds)
- it was reassuring to be seeing some movement, even when one's own character was standing still or seemed a little unresponsive
- we were informed that each phone had a 'set reference GPS location' function, allowing it to define its own playing field (in other words, each user could be in a different location, a few feet or a hundred miles away from the others)
- the game interface would occasionally be replaced by the phone's speed-dial interface for a second or two – seemingly a 'crash'
- one Toronto player/letter ('C') continued to move around on the screen, even when GPS connection was lost

Some thoughts for further iterations:

- one play of the game should include up to ten levels, each with a 60 second maximum play
- each level could have new elements to increase complexity
- letters should be bigger and on a white background and the screen should be set to 'bright'
- the orientation of the field could align differently with the screen at some levels (i.e. going north could be 'up' on one level and then southeast is 'up' on another)
- the scale could change (e.g. the playing field going from 50 feet to 500 feet) between levels
- the six letters should spell one single word, but multiple solutions could be possible later, forcing users to coordinate and signal their chosen solution
- a grid on the screen could be used to guide players how to align their letters (horizontal, vertical, etc.)(i.e. six squares in the centre of the screen imply that the six letters should line up there)
- obstacles in the field (e.g. a pond) or on the screen (e.g. a worm-hole, below) could complicate the solution

[2] Included Shea, Gardner, Leung, Todd and Gauthier.

- players could push virtual objects around the map space (e.g. blocks, puzzle pieces) to build larger structures. This could work as either a collaborative game (build something with other players) or a competitive game (build something faster than all other players)
- when a subsequent level starts, user's reference GPS points could be reset so their existing relation to other players (say, standing in a line) is disrupted, or the game could slowly migrate across the city (i.e. each playing field centre point is 100 meters further east)
- resetting reference GPS points could be introduced within a level as a punishment (say, for stepping on a worm-hole) or as a gameplay strategy by the player
- voice communication between players could be introduced
- a connectivity status tool could be devised that would display a player's own Internet connection speed and stability at any given time – useful for investigating whether peculiarities during game testing are due to connectivity issues or application code

SUMMARY

So far the experience was quite satisfying. Some basic refinements should be added (like increasing the number of players to six) and it should be properly user tested. Additional functionality (suggested above or through participatory users input) should be reviewed and implemented in the short-term, resources permitting.