GAMES FOR PUBLIC SPACES

INTERACTION DESIGN PROJECT III
IN III - 58

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Games for public spaces

Semester IV Project report

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Approval sheet

The project titled *Games for public spaces* by Dileep M, is approved for partial fulfilment of the requirement for the degree of 'Master of Design' in Interaction Design.

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Co-guide	:	
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Dileep M

Contents

Abstract

Socialization is the process through which humans learn to become functioning members of their society. This process introduces individuals to the norms, beliefs and behaviours of a society. It influences the behaviour of people and helps to attain a socio-cultural continuity. A culture or a society cannot exist in the absence of socialization.

Cities foster public spaces as an attempt to meet the growing need for social interaction. They are designed in such a way that people are comfortable to gather and interact with each other. Such spaces enable people to engage in diverse social activities which helps a society to grow. Places such as parks, beaches and community halls encourage people to discover commonalities and achieve socio-cultural continuity. With advancements in technology, urban landscapes have turned into hot-spots to the virtual world. This leads to atomization and privatization where people are immersed in their own virtual private spaces. Public spaces now competes with technology to sustain face to face interaction and socialization. Technologies like mobile and its connectivity shifts the human - human interaction inwards[6]. Conversations to sharing moments, almost everything is through the virtual world. The links and texts shared lacks the personal feel and emotions.

This project, titled “Games for public spaces”, focuses on how people can be motivated to interact in public spaces. Games have demonstrated their capability to depict the reality in a new perspective. The project establishes the need for people to interact and why they hold back due to various socio-cultural constraints. Several cooperative, competitive and installation based games were designed and playtested to understand what works the best in public play. Primary focus was given to privacy and security. Finally a game was proposed where participants have to find strangers and complete one more more collaborative tasks to progress through the game. Each player is made anonymous with a nickname, protecting their privacy. The tasks were designed in such a way that, like-minded people gets to do something of their interest, which can help as an ice-breaker. Tasks being cooperative in nature, helped the participants in team building skills, which inturn enabled social interaction. By designing digital game for smartphones, participants were provided with the freedom to play the game anywhere, at anytime they wanted.

Introduction

An infant comes into the world as a biological organism with animal needs — food and shelter. He or she is taught to follow the norms and beliefs held by that society, which moulds them into a social being. Without this moulding, a society cannot continue by itself, a culture cannot exist, individuals cannot overcome their own limitations. This process of moulding is called 'Socialization' [10].

Socialization prepares people for a social life. It teaches people norms, values, beliefs and behaviours shared among a group. The goal is to teach people to perform certain social roles in the group and cultivate shared values to become a functioning member of the society that they belongs to. Socialization is an influential learning process by which social and cultural continuity are attained [10][11].

William Fleeson and his colleagues tracked a group of people in three hours intervals for two weeks. The study recorded how the participants behaved and felt during every chunk of time. The researchers found that those who were "talkative" and "assertive" even the introverts were more likely to feel positive emotions such as excitement and enthusiasm. The study claimed that everyone feels positive emotions when they socialize. Humans need social experiences to learn their culture and survive[10]. Absence of socialization limits the development of a complete personality.

Socialization is an incessant process. The learning is lifelong and many researchers believes that it influences the behaviour and beliefs of adults as well as children[10]. The expressions of a culture are found in individuals socialized by their family, friends and other social networks. Enabling socialization is extremely important for a society to grow. Public spaces are one of the ways by which cities supports social interaction. A public space is a physical or virtual space, generally open, accessible and comfortable for everyone to gather and interact. Active spaces fuel successful city growth, societal sustainability and provide exposure to recognize commonalities.

The onslaught of technology trimmed face to face interactions in public spaces and created disembodied private spaces. As technology took up permanent roles in everyday routine of people, it encouraged atomization and privatization[8].

Many urban designers believe that installing a bench or a swing will bring vibrancy in the space. Unfortunately, such solutions couldn't help people to get over the initial hesitation to converse with others. There have to be persuading experiences and benefits for the people to start socializing in public space. It is important to adapt technology and encourage social interactions for societal growth. Game design have led to many interventions that created persuasive experiences for people to socialize. Researchers from North Carolina University, York University and the University of Ontario Institute of Technology studied gamers at more than 20 events in United Kingdom and Canada. The research focused on Massive Multiplayer Online Games and they found that gaming facilitated social activity between players. Gamers exhibited social behaviours like watching games, chatting online and collaborating. Games encourage socialization[4]. The focus of the project was to translate the capability of games to transfer conversations online to offline, to encourage social interaction.

Mark Nelson(2014) states that when designing for public spaces, it is crucial that the design do not try to change the existing behaviour of the people in that specific context[6]. Designs that vary significantly from what is socially acceptable in that space requires greater effort from the people to deviate from their natural behaviour[6]. People and their behaviour in various environments were studied through observations and unstructured interviews. The study was to understand what are the unspoken expectations, responses, laws and conventions within a space.

Primary research

A list of public spaces was made to investigate people's natural behaviour. Three locations were chosen to study after evaluating every space in the list on the basis of questions like "What do we want to change in the place?" and "Who utilizes the place?".

Eight apartment complexes or societies spanning across five cities were studied. These included luxurious as well as economical societies . Qualitative data was collected from users who have been resident for 3 months to 15 years. The variety in contexts and users helped to identify the pattern in natural behaviour of people. To get a better understanding of the field, the user study also tried to answer questions like "What is the current level of social interaction in societies?", "Do people consider their community to be tightly knit? Why?", "Does a tight-knit community help its people in any manner?".

Primary research showed that major social interaction happens during social events (wedding, yoga class etc.) or meetings that happens in the society. On an average such events happen less than ten times per year in apartment complexes. Residents of the same floor knows at-most two of their neighbours. Most of the relationships are at a functional level — the need to contact your neighbour in case of an emergency etc. Social life is limited to peer pocket groups involving immediate neighbours or colleagues staying in the same apartment complex. It was also found that permanent residents eventually get to know most of the residents, but migrants or short term residents have difficulty in adapting and mingling with the community. The condition is worse if the residents are from different communities.

The need for social interaction was evident from the primary research. People were interested in learning and sharing new things from others. P1, as the secretary of a society, gave an example of language workshops conducted by residents from different regions to learn new languages and tradition. The reasons ranged from finding common interests to receiving emotional support. Currently, public spaces are dominated by peer pocket groups often occupied in their own virtual private spaces. There are no inter-group interactions and intra-group interactions are reducing with the intervention of technology in the daily routine of people. Possibilities of triggering social interactions in such contexts were not explored thoroughly.

Secondary research

There had been significant amount of research on how computer games enable social interaction. Most of the existing work focuses on encouraging socialization in the virtual world through games and playful interactions. For this study, only games designed for public spaces were studied to understand the mechanics, its effect on the environment or space where they are played at and behaviour of the people or participants.

Staffan Björk et. al. describe a game titled ‘Pirates!’, using the physical space as the gameboard. The system incorporates client-server architecture to support multiple devices and proximity sensors to detect player movement in real world. The game starts with making every player the captain of their ship. After a brief tutorial, players can roam around inside a marked space, simulating sailing and complete virtual missions to earn soft currency. There is a PvP (figure 1) mode where players can compete for in-game soft currency rewards and save their game progress. The system requires people to come to the marked space to play, which limits the context and its audience. The gameplay is based on open-world concept demanding a huge investment in terms of time and effort from the players. The RPG (Role Playing Game) genre makes the game never ending, since players can level up to the maximum and still continue play. This might turn away the players in a public space, since they might not have that much time or effort to invest in such a context. The learning curve of the game is steep and is appealing to only certain kind of players who are interested in Role Playing Games. The theme of the game was not a part of the context, but appeared to have no adverse affect in participation[7]. The freedom in Open-world concept made the players curious and encouraged them to explore the game in depth.

A few installations involved group oriented multiplayer games that encourage spectators to cross their private barrier and participate. Joust, a game from Copenhagen-based indie collective called Die Gute Fabrik, requires the players to spar with motion controllers (figure 2) according to the tempo of the music. The gameplay was fun, inviting and a good icebreaker. The game was setup in an exhibition environment where the visitors were already motivated and excited to try new things. The game also required both players and hardware available to participate[15]. They also talk about how the game is not the “be-all” of social interaction, but a conveyance, just like how a dinner party is a pretext for social networking, and not solely about the food.

Figure 1. Players in battle situation around the island.

Figure 2. Protect the controller from getting tagged by other players.

Sara Said Mosleh et. al. studied the natural behaviour of people in different public contexts and developed a method called “Encouraged interaction”, where people were encouraged to interact with others in a certain way such as smiling to picking up a ball to play with a stranger. They found that the relationship between game and the environment is subjective. ‘TrainIt’ was their solution to build a collaborative play space in public environment. The game consists of a balance board integrated to the platform. There are spheres on the game board that glow once a player steps on the balance board (figure 3). As soon as the player selects his/her destination a region as well as a particular sphere will glow on the gameboard. The aim of the player is to balance himself on the board so that the sphere moves to the target region. Once another player steps in and has the same target, the game can become a competition or a cooperative task depending upon the choice of the players[6]. Installation is appealing to many as they themselves are travellers waiting to reach their destination. This contextual resemblance is what makes the game interesting. But the game lacks mechanics that trigger social interaction. The way the game has to be played might not be suitable for many such as children or elders, thus limiting the scope of the game. The game mandates the installation and also the players to be in the railway station. Hence the game cannot be played anywhere else.

‘Martians from outer space’ is a location-aware multiplayer game on public displays. In this game, the players use a turret to shoot down alien ships that hover above trying to destroy the location where the players are at(figure 4). The leader board displays the player with the highest number of hits(points). The game gets over either when all active players across locations get destroyed or when the Martians destroy target locations. The game gathered a horde of spectators trying to decode the gameplay. Since the players are not physically co-located, the opportunity of social interaction among them were absent. The gameplay sessions were long, which discouraged

Figure 3. Player controlling the sphere using the balance board.

Figure 4. Player’s turret and map view of invasion with other turret positions.

participation from spectators. The design largely focused on making the public space fun and playful rather than enabling socialization.

'Can You See Me Now?' is a game in which there are two kinds of players — performer and virtual. Performers are professional runners who are equipped with hand-held devices enabled with GPS and WiFi. Their purpose is to chase and reach a virtual player's location. When they do, they post photos of the place where they caught the player. 'Uncle Roy All Around You', is a variation of this game, which deliberately blurred the boundary between the real and virtual worlds. The goal of the game is to find a character called Uncle Roy by solving location-based puzzles. Both the games have remote online players to track progress and drive the game forward. The gameplay encouraged people to go beyond their usual behaviour such as taking a postcard from the saddlebag of a chained up bicycle on behalf of a remote online player and delivering to a deserted office. The game had the potential to turn every single element or person in the real world into a game object, which provided infinite possibilities for the gameplay's narrative. Orchestrating the experiences of players are in the hands of one another as they have full control over the game. The number of active participants, both online and offline, is very crucial for the game. The kind of coordination the players had to do for generating meaningful context for the gameplay affected the experience[17].

Figure 5. Offline participants chasing virtual players with GPS, WiFi backpack.

Janienke Sturm et. al. tried to incorporate playful persuasion and social embeddedness in their games sTail and PhotoQuest. sTail is an interactive game, where the board is displayed on the floor. When a person enters the play area, he/she is augmented with a virtual trail (figure 6) which follows the person. Players have to chase and steal other players' tail by stepping on it. By stealing the tail of others, the player can make his/her tail longer. The play area is limited in space and size. The automatic triggering of the game when people enter the play area creates a burst of curiosity and makes them participate. The drop in drop out feature of the game makes it easy for players to enter and leave at anytime. The concept of "emergent gameplay" is strong in the game as players have control over the pace and competition of the game. PhotoQuest is a casual game that is played in a mobile phone. The challenge is to find a location or an object that is nearby and then reproduce the same photograph. It is similar to geo caching, where players can create and accept challenges made by other players. Even though the game was designed for group activity, it encouraged individual quests more. The game lets the player explore the public space around them, but lacks severely in the aspect of social interaction aspect[18].

Figure 6. Projected shapes tailing the player's movement.

The Gopher game is a social, location-based game where content is created by players through peer review. The gameplay is driven by open-ended tasks predetermined by the player who creates the task. These tasks are mapped to physical locations. As players move around the location, they encounter new tasks and the players either choose to perform or reject it (figure 7). Each task has to be supplied with text and photo which are used to generate an evolving narrative related to the tasks. After a player or group of players complete a task, it can be submitted to the jury for trial. The gaming community judges whether the task is success or not. The evolving user generated content is a good feature for player retention, but can disrupt the gameplay if not moderated properly. Placing tasks at various physical

location distributes the game and prompts the players to participate. The gameplay is very long and sophisticated that players have to find dedicated time and effort to continue playing. To find such level of motivation might be difficult. The game does not consider the social aspects and focuses only on content[19].

The Red Nose game is a collaborative game played on the BBC Big Screens in various locations across the UK (figure 8). The game has small red 'blob' like shapes plotted across the big screen, which has the live feed of the location. A camera allows people in the locality to manoeuvre the blobs by pushing them around. Players have to blend all the small blobs to form a bigger one. The play area is limited to the camera's view. The score represents the entire points of the city where the game is setup. The goal is all about completion and therefore lacks in excitement of players. Since the players are far apart, there is no competition and the whole game becomes like a completion of task.

The designs discussed attempted to blend the virtual space to physical. They limited access to either hardware or location. The focus was largely on game content and did not consider any sort of social interaction which is crucial while designing for social play.

Based on the insights, two games were designed and prototyped to the behaviour of people in public spaces in India.

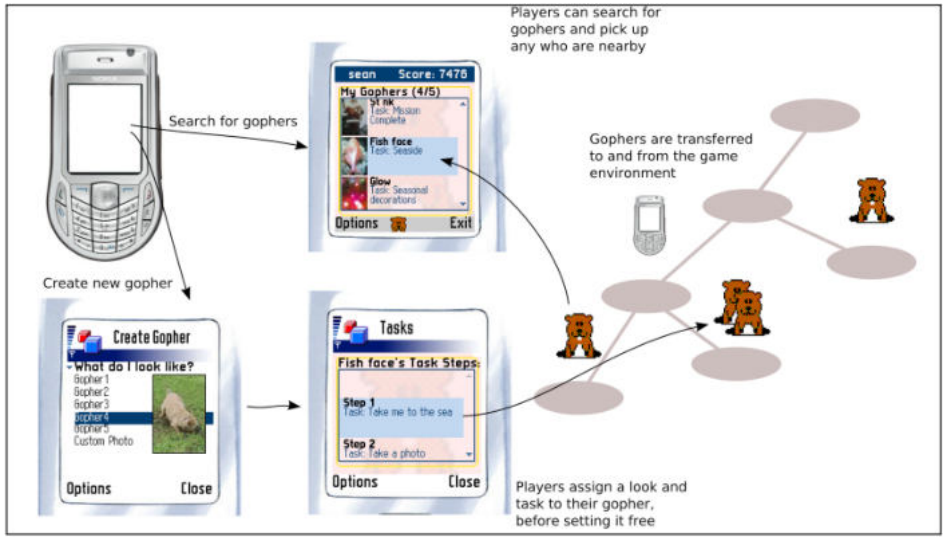

Figure 7. Gophers represents tasks or missions inside the game.

Figure 8. Participants pushing the blobs around the screen.

Theoretical background in social games

Before designing games for public spaces, it is important to understand degrees of socialization that happens in a game.

Designing for Social Play

Games have evolved as a medium for social interaction and collaboration[3]. Multiplayer games, both online and offline have provided people with a platform to share their experiences. Social interaction in games occur in six different stages. It is important to understand the degrees of socialization before designing social play. The theory helps to understand the level of socialization and effort experienced by participants throughout the play. The degrees are as follows:

First degree: 'I see you play'

This stage of socialization is passive and is like taking a tour. Players are still deciding whether they really want to associate themselves with the game. A risk of embarrassing oneself is always associated with this stage where one learns the game. However this stage helps players to overcome inhibitions by seeing others play.

Second degree: 'See me play'

Once the players get used to the experience and community, they will become more open to sharing their experiences with other players and their social circle. Initial interactions begin when players start talking about it with the intention of finding like-minded people. One-on-one interaction might not be triggered at this stage.

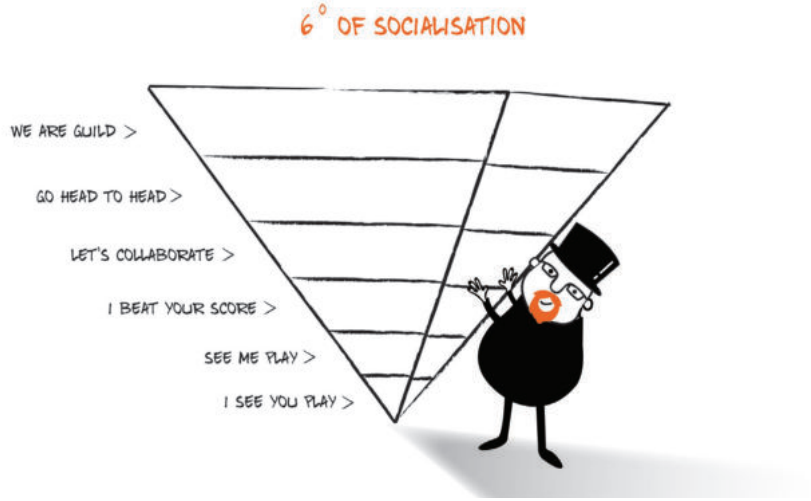

Figure 9. The six degrees of socialization[3]

Third degree: 'I Beat your score'

At this stage, players are fully engaged in the game and the communications with other players are generally mutual. It is as simple as comparing high-scores with their real-life friends or sharing and getting tips from other players. There is an element of social bragging in this level. It is about sharing the achievements with the community, initiating conversations and expecting compliments.

Fourth degree: 'Lets collaborate'

At this level, players are confident and engaged in the game. They are ready to get involved with the community. The experience of the game now depends on the involvement of other players. This in-turn leads to better dynamics and "emergent gameplay". The social engagement in this level requires a greater effort because players have to identify the benefits of collaboration and nurture those relationships. The community is built on this principle.

Fifth degree: 'Go head-to-head'

The presence of the player becomes an important aspect with the focus of the game shifting towards competition. The players collaborate to do common tasks. The experience with real people is essential to sustain the involvement of a player with the community. An active community is a consequence of engaging and competitive game.

Sixth degree: 'We are a guild'

At the sixth level, the social experience matters more than the game itself. The game becomes the medium of communication where players make real-life connections and share experience[3].

Explorations

Two games were prototyped to understand how players can be motivated to move up through the degrees of socialization. The prototypes were also tested to find optimal parameters of public games like length of session, rewards etc.

Sync

Sync is a two player cooperative game. The setup includes a balance and two sets of five blocks that each differ by only a ten grams of weight (figure 10). The game begins with the balance empty and each player gets five blocks. The goal of the game is to place all the five blocks on the balance without toppling it. Players have to synchronize time of placing the block and also decide which block to play. Each team gets five minutes to complete the game. When the team successfully places all ten blocks on the balance without toppling the balance, they win.

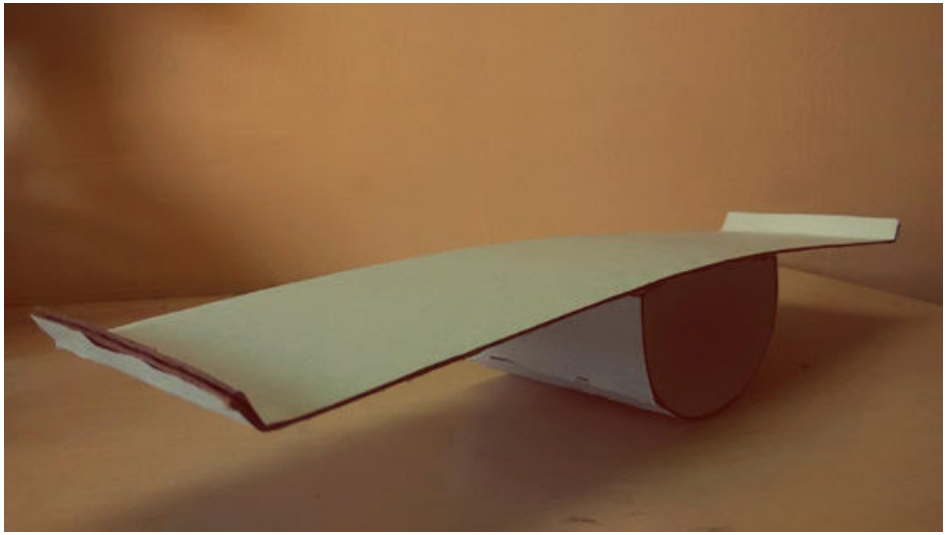

Figure 10. Mount-board prototype of Sync

They have to be careful about how and where to place the blocks so that even if the players judged the weight of the block wrong, the balance won't topple and touch the ground surface. Players can use only one hand while placing the block onto the balance and cannot place the block after half the length from their side. They are required to place them within the half where they are playing. They are also not allowed to exchange or change the blocks once placed. However, stacking of blocks are allowed.

Challenges can be increased by reducing the time for each round, forcing the players to be quick with hands and coordination. The blocks can differ more by weight, but can look more similar, making it difficult to judge before selecting the block to place.

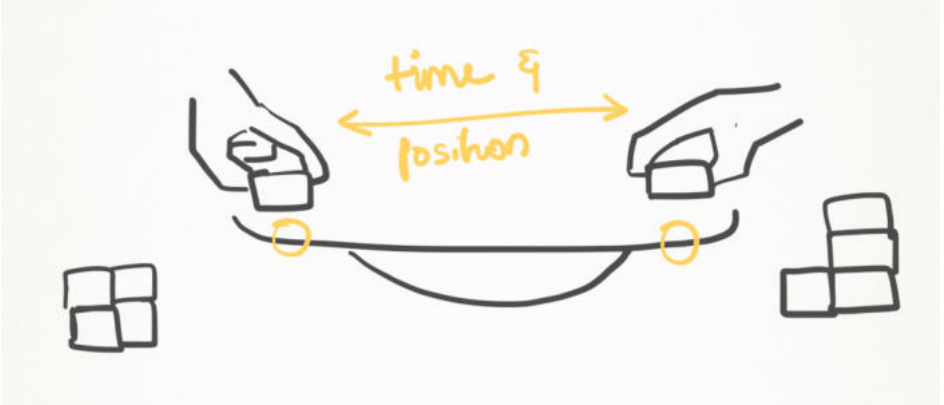

Figure 10a. Players have to decide which blocks to play in each turn and place them with utter care, so that the balance won't be disturbed. This increases the level of uncertainty and suspense.

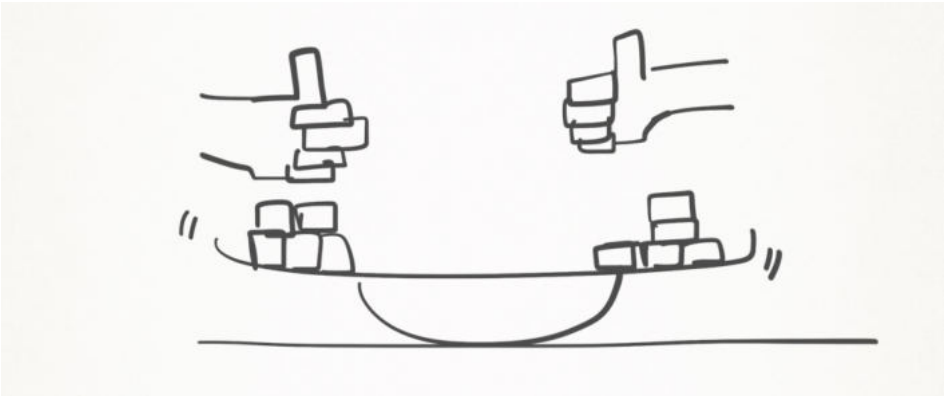

Figure 10b. The team who places all ten blocks without disturbing the balance, under five minutes, wins the game.

Plug and play

A two player or team game where players compete against each other to create certain patterns. Each player or team has four pegs that have orientation marked on them. They have to plug one peg on each quadrant on the peg board aligning them in a clockwise or anticlock-wise direction (figure 11). Only one peg can fit into one slot, allowing players to strategize by placing their peg in the same slot, popping the opponent's peg out. Whoever creates a square or rectangle pattern by placing one peg per quadrant, aligned clock-wise or anticlockwise will win.

The game begins with the peg board with pin holes is set up vertically to stand. The board is divided into four quadrants, where each quad-rant has four pin holes arranged. The aim of the players is to plug one pin per quadrant in such a way that the orientation marks on the pin heads are aligned in a cyclic manner (figure 11b).

The pace of the game is fully controlled by the players. But each round lasts for only three minutes. If after three minutes, both the players were unable to plug in all the pins with the required pattern, the game ends in draw. After the pins are arranged in the required pattern, the player should shout "plugged!" so that its clear for the other players as well as the audience that the game is over. If the player doesn't shout, the second player can pop-out his pins by placing his/her own pins on the same pin hole (figure 11c) and strategize their own win.

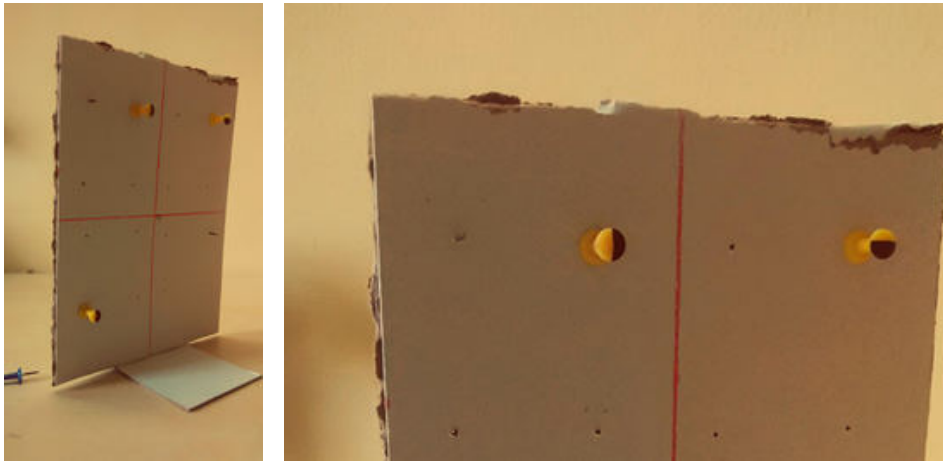

Figure 11. Mount-board prototype of Plug and Play. Pegs marked with orientation.

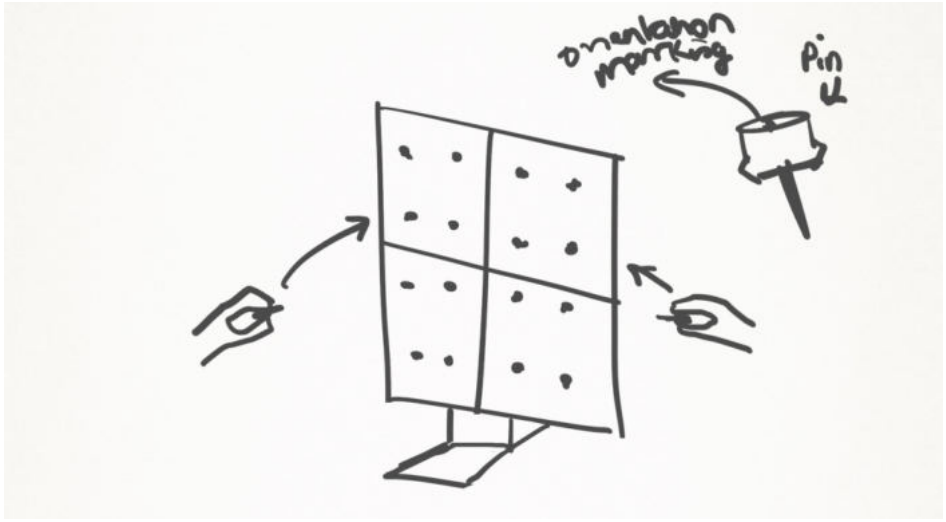

Figure 11a. Orientations are marked on the pin head and players compete with each other from the opposite sides of the board.

Players can create any pattern involving squares and rectangles. The only requirement is that the pattern should include only one pin from a quadrant and anyone should be able to draw a straight line connecting all the pins (figure 11b).

The pace of the game can be controlled by changing the number of pin holes per quadrant and/or giving more pins per player. In that way, players can devise strategies that will distract the attention of his/her opponent while the pattern is in the making. This can also be turned into a team game, with a bigger board, where a number of players have to coordinate and build sophisticated patterns to win the game. The patterns could be of the form of spiral, star, hexagon or any custom shape that the players agree upon.

In case of custom shapes, the players can even leave the pattern that is built so that it will trigger curiosity among bystanders, inviting them to play or engage with the game. The game when now played, could act as an installation art, with whatever is left from the previous game.

These games were designed independent of the context or environment where they were put up to understand people's behaviour and effect of environment in their participation or motivation levels. The games were put up in a university hostel common room for half a day. A total of twelve players were observed and interviewed for feedback.

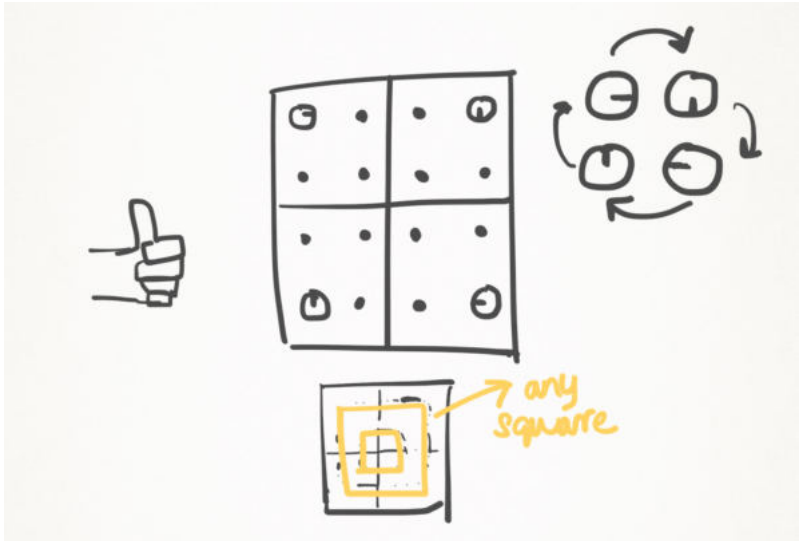

Figure 11b. Cyclic pattern of the pins and their possible placements on the board. Any square or rectangle pattern will make the player win the game.

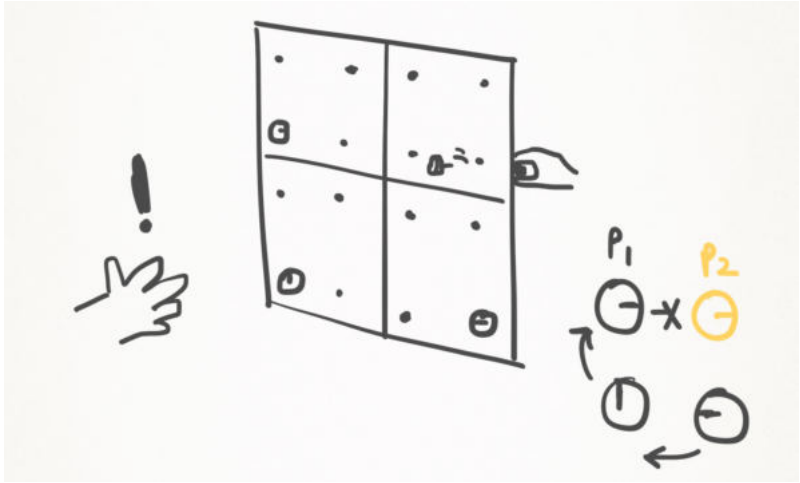

Figure 11c. Opponent player plugs his/her pin to the board to pop the other player's pin, destroying the pattern.

Observations and insights

The games were playtested with seven participants and qualitative feedback was taken through unstructured interview. From the feedback, it was found that the learning curve for a game in public spaces should be as low as possible. While players were able to pickup “Sync” easily, “Plug and play” was confusing in terms of the alignment mechanics and player turns.

Even though both games invited many spectators, they failed to convert them to participants. The session lengths were dependent on the players and had large variations. It was observed that the visual appeal of the game is crucial for triggering participation, when it is an installation. The mountboard gameboard, thumbpins and thermocol blocks gave the players an incomplete feel, which also affected the participation level.

Context independence of these games were able to create an initial curiosity among people. But players had to take more effort to deviate from their natural behaviour and interact with the game. Integrating gameplay with the environment encourages participation as it doesn’t demand significant deviation from their natural behaviour.

Social bragging and achievement at the end of the game were found to be good enough incentives that motivate players to continue playing. There were no dedicated mechanics to enable social interaction. This was done to see whether it was necessary to provide dedicated mechanics or whether socialization would initiate by itself from “emergent gameplay”. After the playtest, it was concluded that to facilitate social interaction, a dedicated game mechanic needs to be designed.

Fame a name

Insights from the initial concepts were incorporated into the design of an open-ended game - “Fame a name”. One hundred and fifty tea cups were labelled with alphabets and served in a tea shop inside a University. The alphabets were selected from a list of words to avoid pure randomness. People who bought tea became participants by default. This acted as a good trigger.

The goal of the game was to create the largest word possible using the tea cups on a mount with a scale for grading the length of words (figure 12). Incase a few letters were missing to create a word, the participants can go around and ask for tea cups with that letter from others. The borrowing mechanic was to enable social interaction.

Players who successfully created words with at-least four letters were rewarded with a coupon for free tea. They could redeem this coupon within the next twenty four hours.

The game was tested for two days. On the first day with incentive and second day without incentive to understand the effect incentives had on players.

Observations and insights

Gameplay integrated with the environment and context encourages people to participate. Something as simple as buying a tea made anyone a player,hence the effort and time needed for the game reduced significantly. The natural behaviour in the environment transcended seamlessly into the gameplay. Everyone who bought tea interacted with the game.

Figure 12. Participants coming up with their own words.

Figure 12a. Participants looking for combination of letters.

The visual appeal of the installation encouraged people nearby to interact with the game. The cup mount as well as labels designed to catch the attention of people (figure 12c).

The game was open-ended and allowed evolution of “emergent gameplay”. Emergent gameplay refers to complex situations in games that emerge from the interaction of relatively simple game mechanics. This is achieved by encouraging players to explore creative strategies and exploit them toward a goal achievement. Minecraft is a great example that incorporates emergent gameplay, by providing infinite possibilities to combine mechanics to establish their own play style. In Fame a name, people came up with their own rules and created unique words, creating curiosity among other participants. It acted as a playful pursuasion and motivated players to try different emergent mechanics like re-arranging letters, using urban or internet slang to create interesting words. This also lead to borrowing tea cups, facilitating social interaction. Participants were enthusiastic in requesting for tea cups from others to create words.

We observed that materialistic incentive did not have any significant effect on participation. There were players who did not even claim the reward after making a word. Making a word with the available cups were motivating the players.

There was no fixed round times, which allowed the participants to drop-in and out anytime. This opened up opportunities for collaboration. Several words were made through collaboration. It was found that a common task or goal often lead to collaboration, which is a good pretext for triggering social interaction.

Figure 12b. Participants discussing which word to make.

Figure 12c. Open-ended rules allowed freedom in creating new words.

Although the game was able to attract the crowd, it required the players to be in the context. The installation was valid only across a specific time and space. Repeat play of the game was weak and couldn't bring back players for a second or third time to the game.

Hence, ubiquitous computing was considered. Pervasive design allows players to interact with the game anywhere at anytime. The time and space constraint would no longer exist. The games will be present in every device that are connected and available with the players.

Project brief

A game that can be played in public spaces to discover new people and start a conversation.

Goals

Facilitate discovery of people nearby with similar interest.

Act as an "icebreaker" between people to get over the initial inhibition to interact.

Provide a platform to get to know the other participants and their interests.

Design ideas

Challenges

The challenge is finding the optimal method to initiate the game. Who should initiate the game? — a moderator? prompted by the game or due to intrinsic motivation?

Repeat play is crucial for player retention. Questions such as “How will I play the game once I get to know the stranger, if mechanics work for only strangers?” need to be answered to design mechanics that hooks players into the game.

Designing different types of rewards and studying their effects on the motivation of people to play the game. Which kind of reward encourage people to participate — materialistic or non-materialistic?

Most importantly, how to turn spectators into players. What all factors of the game can make people want to interact with the game. More the players, better the scope for socialization.

Approach

To tackle these challenges, games were designed for different contexts and users. By designing and evaluating games for different contexts, game parameters such as types of players, their behaviour etc. that overlap in every context can be found.

The following games were designed, prototyped and tested.

Caught Red!

Caught Red! is an offline multiplayer game of deductive survival genre. Players have to make the right guesses from clues to stay in the game. The game is designed for environments where people have to wait for long hours and have nothing to do such as airports, waiting rooms and so on.

Caught Red! needs a moderator to initate the game, for example staff at airport. Once the moderator announces the game, whoever interested in participating would be provided with a small card or paper where they write four to five facts about themselves. These facts are either predefined by the moderator or agreed upon by all participants. These are related to the player for example family, profession, favourite sport (figure 13) and so on that can change in every new game session (figure 13a).

Once the card is made, each player can decide one among the five facts to lie about. The goal of the game is to go around, talk to people and find who is lying about what. If a player suspects that the person he or she talking to is lying about their profession, they can request him or her to show their card. If the suspicion is right, then the player who got caught for lying cannot lie about that fact to anybody else anymore. They have to fold their card to one fifth height, which acts as the score (figure 13). The parameter at which you fold doesn’t matter. It just shows how many options are you left with, for example - that you are one down, out of five parameters.If the suspicion was wrong, then the card of the player who made the guess is shown to the other. This will prevent players asking for the card without putting an effort to guess.

Players can request for the cards only after at least three questions. The conversations can be individual or in a group. Each round lasts at least five minutes. Depending upon the number of participants and amount of waiting time left, the round time can be tweaked. At the end of a round, whoever has the least number of facts that he/she cannot lie about will win. The incentive could be a bonus service from the authority. Players can remove permanent truth facts and lie about it, if they catch at least three players lying. For example, a player who cannot lie about his/her family parameter, catches three other players for lying, he/she can restore the family parameter and can lie about it.

This game was evaluated to understand if triggering by a moderator would encourage more participation and to study the attitude of players towards materialistic incentives in such a context.

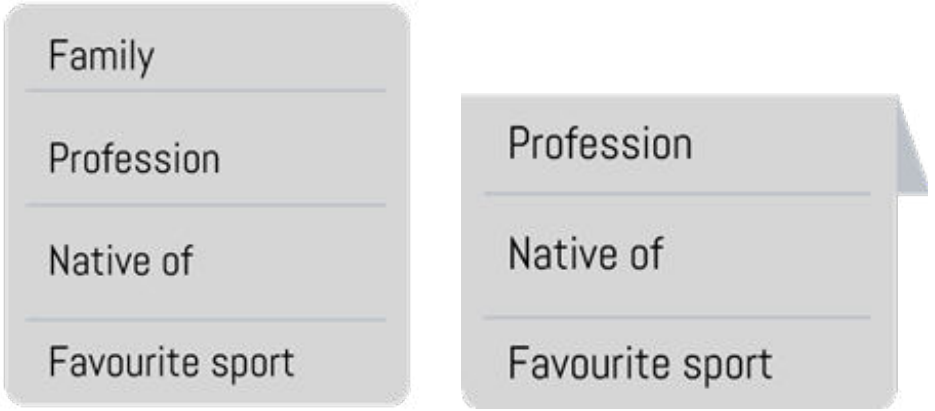

Figure 13. Cards with parameters and folded card to show the score.

Sails Up!

Sails up is a strategic guessing game designed for meet-ups, workshops and other events where people are gathered for a common goal, but are not familiar with each other. 'Sails Up!' needs to be initiated by a moderator and the incentive is that participants get to discover common interests among each other. Sails Up! allows participants to incorporate their own theme or narrative into the game such as Android programming, if the meet-up is about developing for Android. This allows flexibility and freedom in content creation, retaining the game mechanic of strategy and guessing intact.

The game begins by dividing all the attendees into two groups. Each group has a captain, who controls the movement of all others in his/her team. There are multiple rows of chairs (at least four rows) placed between both teams (figure 14) . Team with less number of players or on the left side begins the game by captain shouting a question. The captain decides the question in such a way that maximum number of

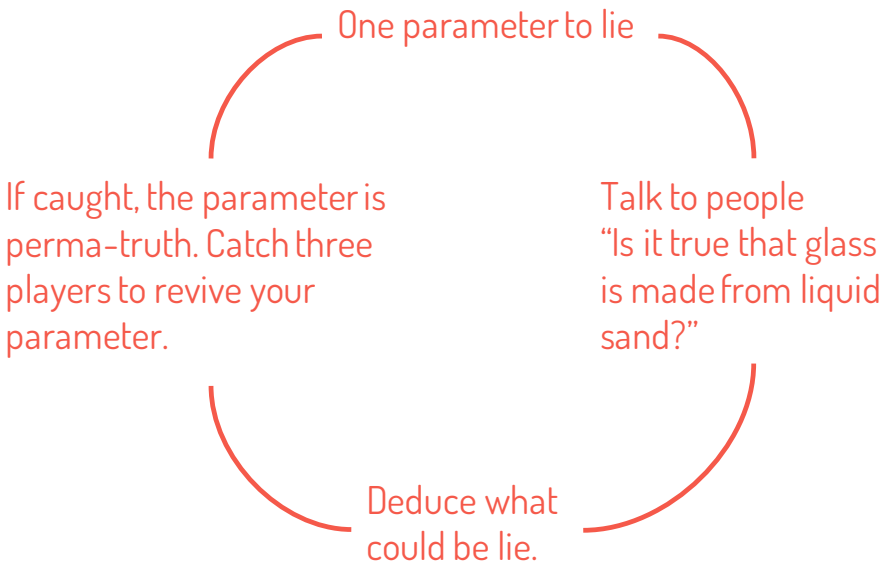

Figure 13a. Caught Red core loop example

people from his/her team are able to answer it. For example people who knows the answer to a question like “Who knows what is Lua?” can move up one row of chairs (figure 14). The other team can challenge this and ask any of the players who moved to the last row about what captain had asked. If any of the player is not able to answer the opponent’s question, have to go back to the pool of people (figure 14b).

The following illustrations show an example, where the conference is about Lua programming. There are two teams of five members each. Three columns of chairs are arranged in between the teams. Since the number of members in each team is equal, the team on the left side starts first. The captain of the team is the first person standing from the left. He/she shouts a question that he/she thinks that most of the people would know - “Who knows what is Lua?”. Three of his/her team members progress to occupy the first row of chairs. The opposing team did not challenge them this time. The turn goes to the other team and the captain calls out “Who all know how to implement OOP concepts in Lua?”. Two of his/her team members progress to occupy two chairs (figure 14a). Now the opponent team challenges this call by asking the second person how exactly you do that in Lua. Unfortunately, he/she wasn’t able to answer and had to go back to his/her previous position (figure 14b).

The captains change when he/she is challenged by the opposing team and couldn’t complete it. In such case, the captain will go back to the end of the pool, making the immediate next person the captain for the next rounds.

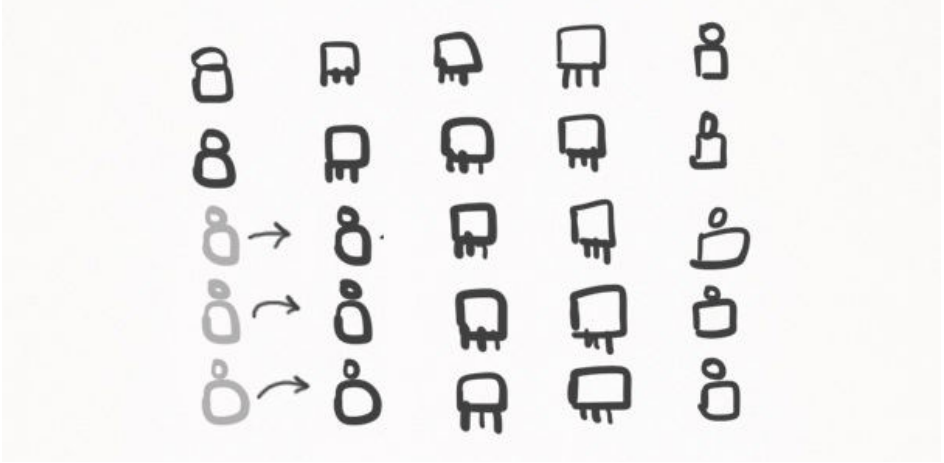

Figure 14. Team members occupying chairs and progressing through the game.

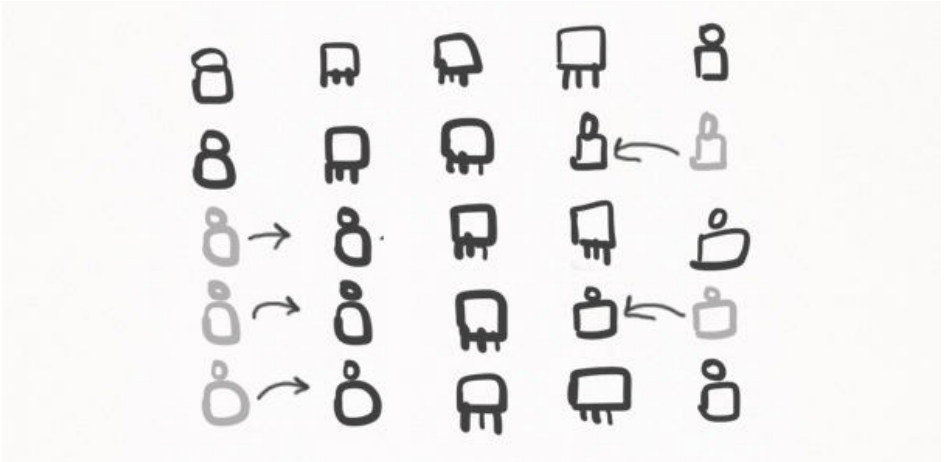

Figure 14a. The game progresses turn-wise and finally the team whose maximum number of members reach the other side, wins the game.

Captain of the team who brings the maximum number of people to the chairs in the opposite end wins the first place and the game continues with a new captain for the remaining people in the pool.

The questions and themes were left open-ended so that the content can be generated by the players according to the context. At the end of each round, people would know the interests of other participants. By this, the initial hesitation or awkwardness to start a conversation is minimized.

Pop!

Pop! is an arcade strategy game which is designed to be initiated by participants themselves. Pop! is designed for environments like cafés, restaurants and parks where people are open to meet new people and do some activities together.

The core mechanic of Sails Up! and Caught Red! were to converse with other players. Whereas Pop! involves collaborative tasks which in-turn could trigger a conversation. The game is installed at the center (figure 15) of each table in a touch device. Every table has a color assigned such as Red, Green, Blue, Yellow and so on.

Once the participant is done with the task in the context, like placing the order in-case of a restaurant, the game begins by spawning bubbles of the same color as the table in the device. Players at that table can flick the bubble to other tables by swipe gesture. The force by which it is swiped will determine the speed and bounce of the bubble.

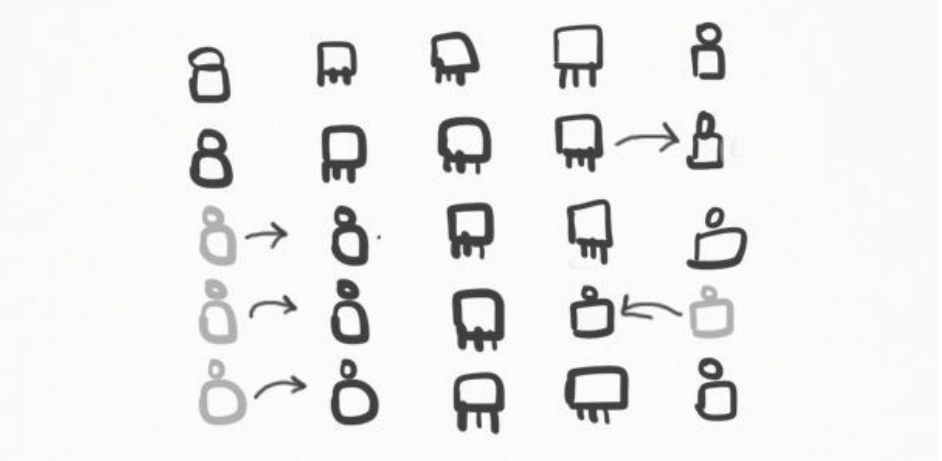

Figure 14b. Team member going back to previous position because he/she couldn't answer to the challenge raised by opponents.

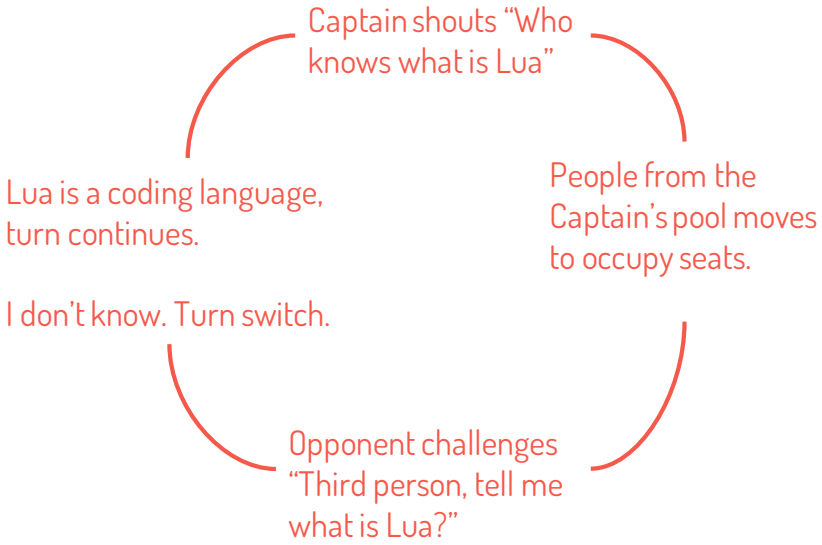

Figure 14c. Sails Up! core loop example

The bubble will reach the other tables according to the direction of the swipe. Players at that table should stop the bubble from hitting the walls of their device by tapping and holding it. The number of taps or tap and hold time will determine whether it will pop or not. Tapping and holding a bubble for longer duration will make it pop, staining the screen with the color of that bubble.

Bubbles are spawned in each device at five seconds interval. At the end of three minutes, the game finds whichever color is the most dominant across all the tables. That table wins the round. There are no single players as winners, instead the table as a whole win the rounds. Preset text messages such as “Awesome”, “Crazy!”, “Well played”, “Good game” and “Thanks” can be sent to other tables to taunt or appreciate.

A collective fun task would facilitate a conversation among all the participants. By displaying the winners at every table, an element of social bragging is incorporated into the win celebration. A service bonus like discounts could also encourage more participation.

The Hunt

The Hunt is an ubiquitous multiplayer adventure game. Its a pervasive game, where players have to initiate or will be prompted once any of the players nearby initiates the game.

At the start of a round, each player will be assigned a random awkward nickname such as “CrazyMonster32”, “Vanilla Gorilla” etc. No personal information will be visible inside the game. By tracking the GPS coordinates of every player, each player will be assigned mutual targets within a twenty five meter radius to find and complete a common task that is generated by the game.

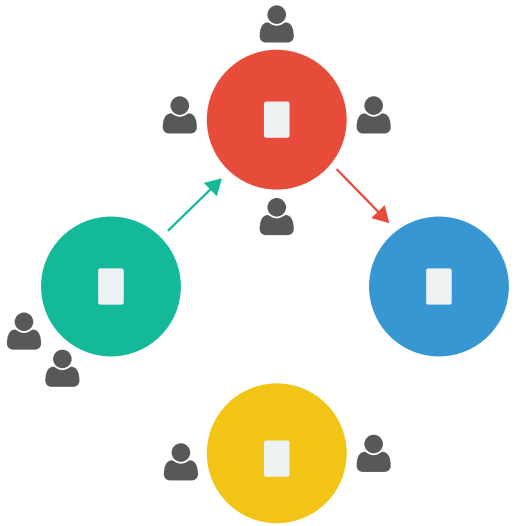

Figure 15. Cards with parameters and folded card to show the score.

Figure 15a. Pop! core loop example

The game radius is limited to twenty five meters so that everyone has a clear vision to what is happening around and can judge whether the game is played in a safe environment. As soon as the players accept to play and are assigned a target, they get a task, like “Find CrazyMonster32”. The screen will turn blue in color. Players have to walk around and judge the distance and direction from the color on the screen. The screen will turn red in color if a player is moving closer to the target and blue if they are walking in the opposite direction. Once the screen is deep red, the players have to find the target by asking the nickname to people nearby. Players can also use a one time switch by which the target’s phone produces a high frequency sound.

Once the players have found each other, a common task will be generated by the game. These tasks range from shutting down a virtual bomb (figure 16) to finding a third target together and are randomly generated for every game session. The instructions on, how to solve the task will be present in the other player’s device. Hence they have to cooperate with each other to accomplish the tasks. This will provide the players with a topic to talk about and get over the initial inhibition to converse. They don’t have to worry about each other’s interests, since the game is new to both.

After completing the task successfully, the devices will prompt for player’s original names and will move up on a leaderboard (figure 16a). The ubiquitous nature of the game along with random tasks creates an adventure for the players and can be played anywhere, anytime. Seeking players and completing tasks gives the participants the sense that is of a treasure hunt. The game can also encourage participation by prompting the players nearby to join the game if anyone in the twenty five meter radius starts a game session.

Figure 16. Task to shutdown a console panel through instructions.

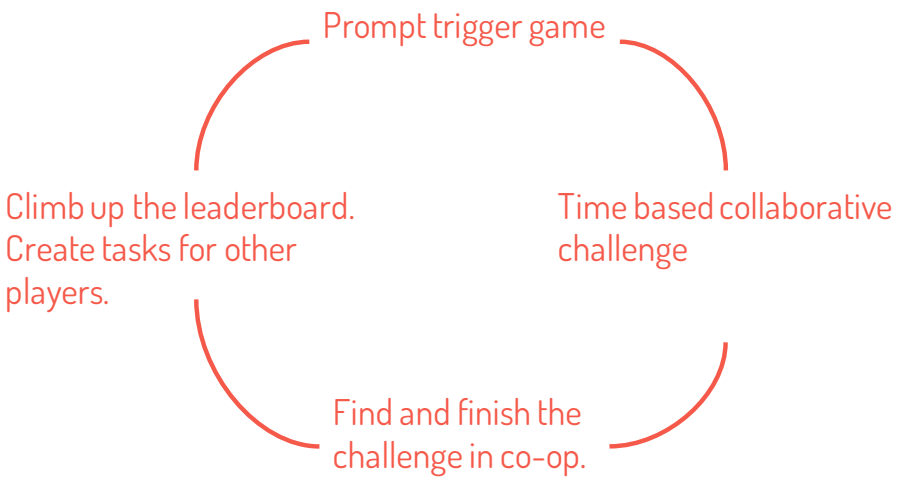

Figure 16a. The hunt core loop example

Evaluation and observations

These games were evaluated through expert review. Two game designers were involved in the evaluation. Caught Red! and The Hunt were playtested in a university hostel. Unstructured interviews were conducted with participants to collect qualitative feedback on gameplay, engagement and the game's potential to facilitate social interaction.

During playtest, we observed that a third party acting as the moderator requires more motivation than the players to initiate a game. The lack of benefits for the moderator in the game Caught Red! raised questions like "Why would I initiate a game?", "What is the role of the moderator after the has game started?". Benefits such as increased business, crowd control, managing crowd behaviour etc. can be received from the game. But this brings additional dependency and complexity in the game. The mechanics could also get affected by the moderator's affinity towards his/her benefits. Review comments from the experts supplemented the same. Privacy was a major concern. Participants were hesitant to talk about their interests which resulted in long pauses and incomplete rounds during the game.

The core mechanic to start talking to strangers in Caught Red! and Sails Up! failed to minimize the inhibition in players as the games failed to provide any tool or platform that facilitates a conversation. Especially when the game is played in contexts like meet-ups or airports where people differ in social, economical, geographical and ethnic aspects. Studying these differences to find overlaps that can be incorporated into the gameplay involves a long term research.

Caught Red! allowed players to generate the game content. This led to a variety of awkward moments among the players during play, which often helped them to get over the inhibition and start a conversation. One player lied about the places they visited and tried to talk in a foreign language. The attempt created laughs among other players, which eased up the tension between players. Expert reviews pointed out similar possibilities in the Sails Up! game.

We understood that it is important to provide tools to converse instead of designing mechanics that demands social interaction to progress through the game. This was lacking in the game Pop!, even though it supported team formation. According to the review, Pop! have the capability to bring all the players in the locality together. An exclusive mechanic that can be used by a player to start a conversation was missing.

The Hunt was playtested with two players, where they had to shutdown a virtual nuclear plant that is about to get overheat and explode by operating its console. The solution virtual key combinations were hard-coded in two instances of the game in both the player's smartphone. The game prompted the players to start the game through push notification, which grabbed the attention of players. This increased the chances of a player engaging with the game. Although the game was played in an open space, internet connectivity issues and GPS accuracy affected the players in locating each other. During this part of the game, the players were immersed in their devices, trying to find the other player. This also disconnected the player from his/her surrounding. The players took their own time to find each other, showing the lack of challenge in the initial half of the game.

The players found the random nickname interesting and helped them to break the ice between them and talk to each other. The final task was almost like reading out instructions. There were no challenges and hence the conversations did not last long.

It was evident from the playtest that a common task or goal have the potential to become a tool or pretext to start a conversation. Being context independent and available at anytime, the game enabled players to engage with it anytime at any open space.

The feedback collected from experts and players suggested that among other explorations, The Hunt has the maximum potential to bring participants together and enable socialization. Hence, it was chosen create more challenges, allow spectators and improve the overall experience.

Final design - The Hunt

The Hunt is a digital game played in smartphones. The goal of the game is to find the partner that is assigned to you and complete one or more tasks that are given, in the least amount of time.

After installing the game in the device, there are two ways to trigger it. Either start the game manually, or if there are more than two players in twenty five metre radius of a particular player, the game sends push notifications to all players to participate in the game. The auto triggering feature prompts and persuades the players to engage in social interactions (figure 16).

For the prototype, Google Play sign in verification is done for security purposes (figure 16a). This reduces a lot of fake profiles and stalkers. By verifying through Google, the game also can get details about each user, which can be used later for matchmaking and/or to provide contact details if someone wishes to keep in touch.

During the first run, the details about the game are shown along with tool tips, acting as tutorial for every single screen and feature of the game. Interests of the player are collected for efficient matchmaking (with like-minded people) and to customize the tasks generated by the game enjoyable to each player (figure 16b). The first game session is assisted by on-screen tips and help to help the player get an understanding about the game and how it works, what all it can do.

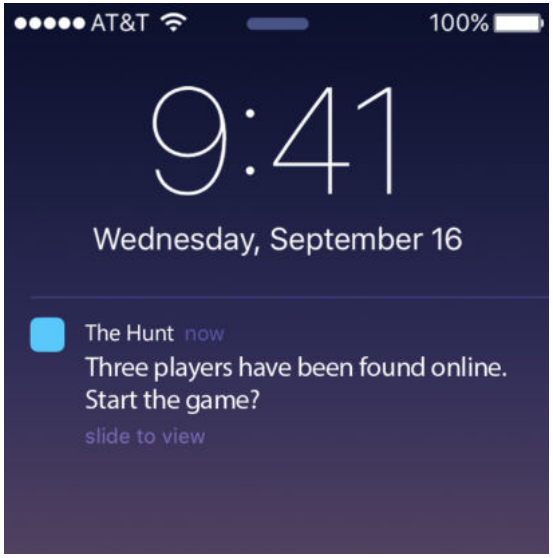

Figure 16. Push notifications on how many players are nearby.

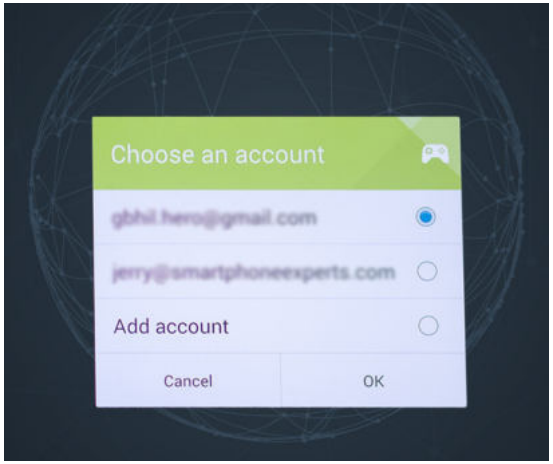

Figure 16a. Google Play sign in authorization.

The game begins when atleast two players have accepted to play. The players have to hunt down people assigned to them, before they are found by others. The playable area is within twenty five metres of the first player who initiated the game or accepted to play.

Before the game begins, each player has to input the color of their shirt (top) so as to narrow down the search and act as a clue, in case the game runs into infinite loop of not finding anyone. Each player is given a funny nick-name such as ‘Vanilla Gorilla’, ‘Crazy monster 32’ and so on. By assigning nick-names, their original identity is masked, protecting their privacy. The game session begins by making every two players mutual targets. The players have to find their partner in the least amount of time and a task will be unlocked for them to perform together.

In the hunt phase, the game incorporates “warm and cold” mechanic, in which, the closer you get to your target, players shout ‘warm’, ‘warmer’ and if you are so close to the target they will shout ‘hot’. If you are moving away from the target, they will shout ‘cold’, ‘colder’ and if you are really far away, it will be ‘freezing cold’. In this game, the mechanic is represented as a radar kind of radius, which increases in size when you are closer to the target and decreases in size when you move away from your target (figure 16b) .

Every player also has a rating associated to them that ranges from ‘Approachable’ to ‘Cool to hangout with’ (figure 16b). These ratings are on a scale of five and is rated by the other player whom you have played recently. This gives the player a head-start to take a decision on whether they are comfortable in playing the game with a particular person. If they don’t feel like playing, they can quit the game and the other player would never know with whom they were playing with, preserving privacy.

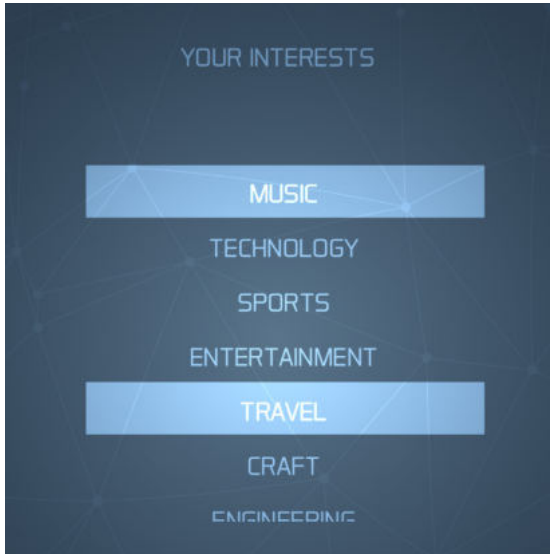

Figure 16b. Interests are categorized in a broad level to allow more possibilities in task design and matchmaking.

Figure 16b. Target, his/her rating and how closer you are to that person.

To prevent the hunt session from being too long, the game gives hints or clues such as directions to look at or the distance between the players, so that participants who are lost in searching for their target can get back in the game (figure 16c). Players can confirm his/her target by tapping on the 'Find' button to perform a virtual scan on five metre radius. If the assigned target is within five metre radius of the player, the final clue - that is the shirt's color will be shown to the player (figure 16d). The 'Find' feature has a twenty second cool down period, meaning it can only be triggered every twenty second and cannot be spammed.

With the final clue, the player can narrow down the search to a few people nearby and can address the suspects by their nick-name. The nick-names being funny, creates a laugh in others, even if they are not participating in the game. The awkwardness created by the nature of nick-names acts as a pretext to ice-breaking.

Once both players find each other, they will be presented with a task to be completed in the least possible amount of time. These tasks can vary from solving riddles (figure 16e) to gathering people around and singing a karaoke. The tasks presented are dependent on the interest matchings and/or completely netural so that both the players are on a common ground for a conversation. These tasks gets more and more daring as the players level up in the game.

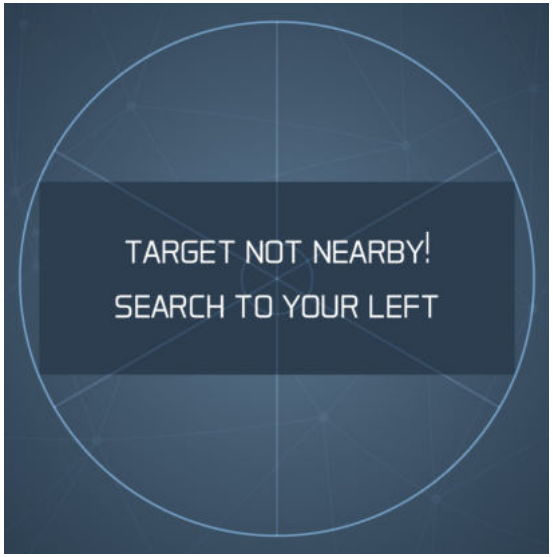

Figure 16c. Clues or hints given to narrow down the time taken for hunt phase.

Figure 16d. Final clue - the color that the target is wearing. This is shown only when the target is just 5m away from the player.

For each task players complete, they will be rewarded with a digital souvenir as a token of their meeting (figure 16f). The game asks for each other's real names to store for later, if they want to keep in touch. The names are then added to a global leaderboard, where every player can see who all did which all tasks in what time. The player who acquires one hundred souvenirs is the winner of one season and will be visible to all other players. The stats are then reset for the next season.

For persuading the players, the goal is broken into smaller milestones such as meet ten people this week, so that the one hundred souvenir doesn't sound overwhelming and impossible.

A playable prototype was build with back-end support for two players. The game was playtested to understand its potential to trigger socialization in public space.

Figure 16e. Riddles, where the answers have to be combined to open the gift box.

Figure 16f. Virtual souvenir as a token of the meeting and to keep in touch.

Prototype User experience

Figure 17a. Main screen with play and profile statistics.

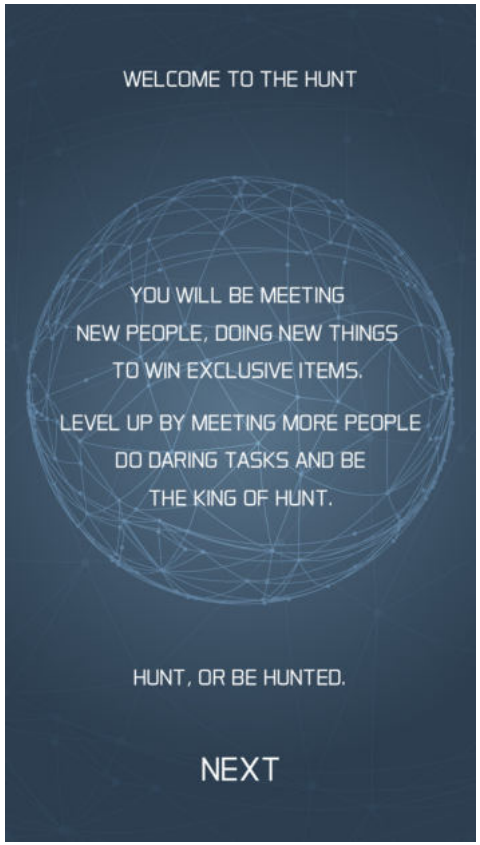

Figure 17b. First run introduction to the game and what the goals are.

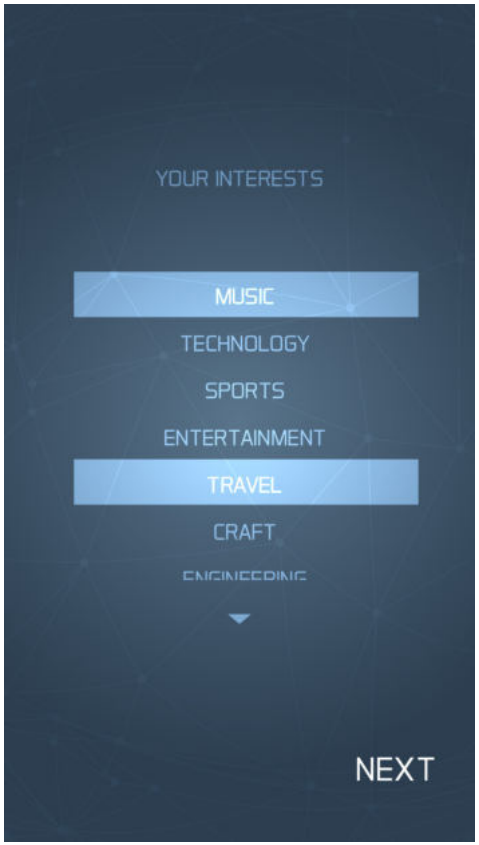

Figure 17c. Player's interests are stored for matchmaking and task design.

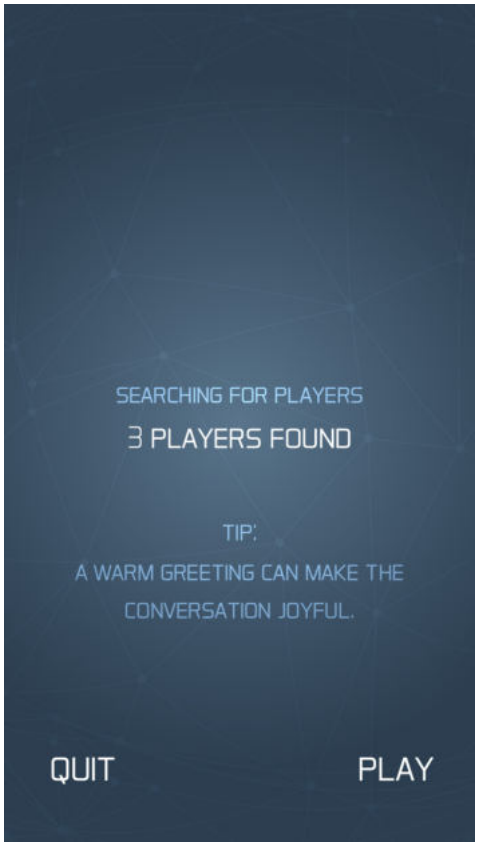

Figure 17d. Number of players found and tips on how to have ice breaking conversations with strangers.

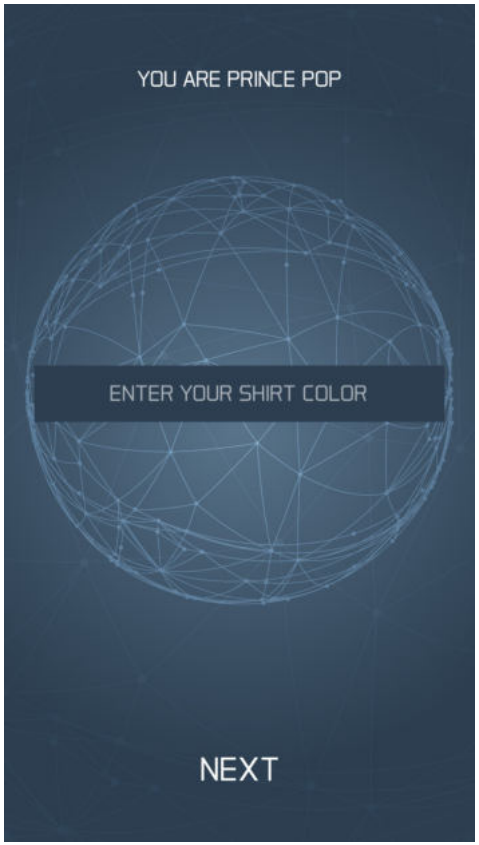

Figure 17e. Color of shirt that the player is wearing for the final clue.

Figure 17f. The target assigned and how far you are from the target. Trap is an advanced feature, where you can tag virtual GPS coordinates to find the exact location of the target if they come near to tagged coordinates.

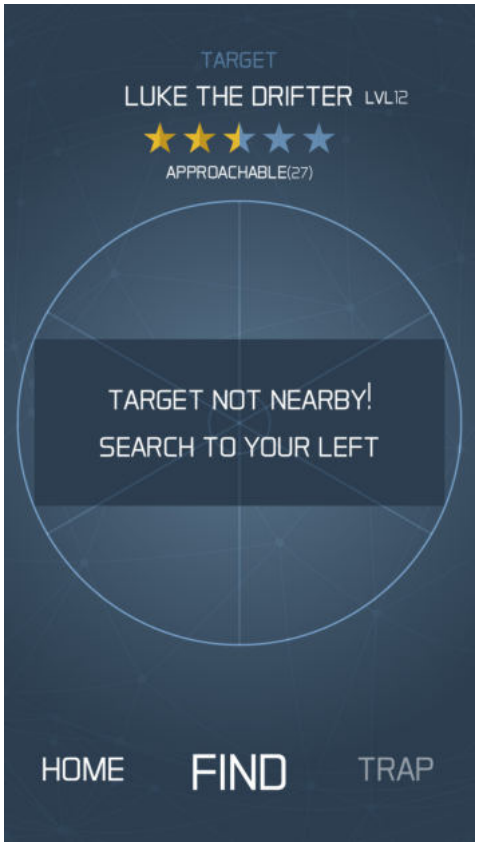

Figure 17f. Clues or hints to reduce the search time

Figure 17g. Once the target is within five metre radius, the final clue is given.

Figure 17h. Task of solving a riddle, combine the answers to open the gift box.

Figure 17i. Virtual souvenir as a token of the meeting. Game asking for real names of the players and to rate each other.

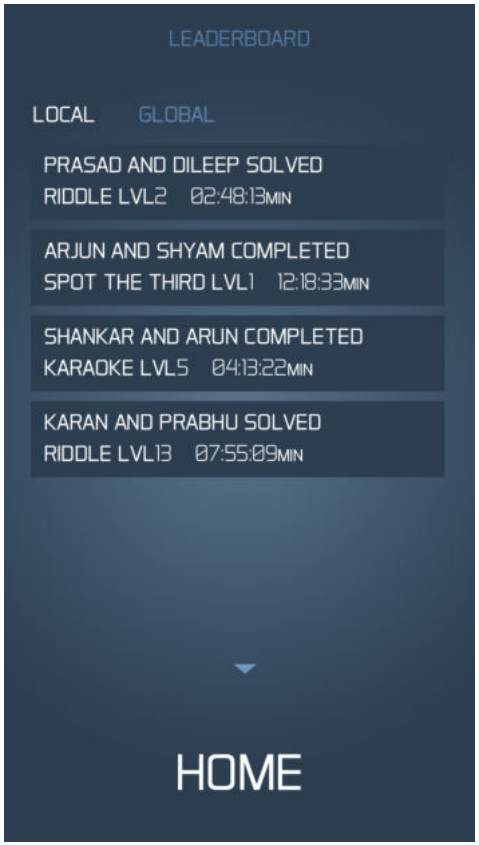

Figure 17j. Leaderboard showing other players and their task records.

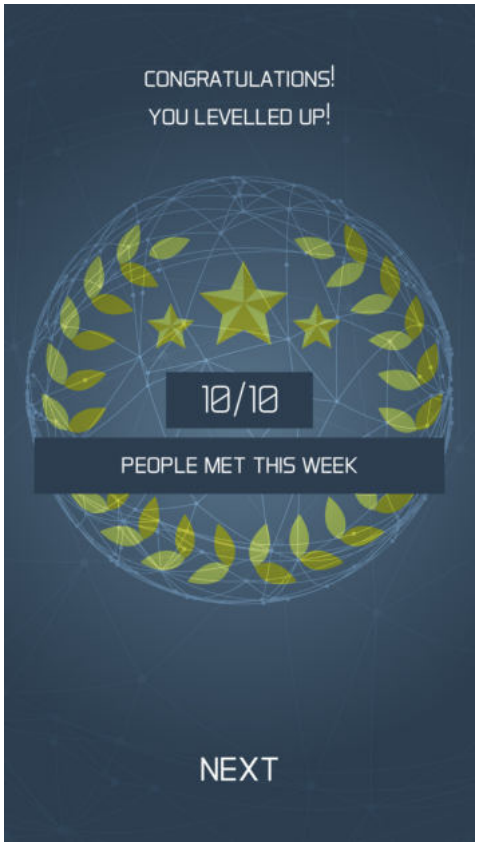

Figure 17k. Goals broken into short term milestones - like meet ten people this week.

Figure 17l. The souvenirs can be revisited to see with whom you collected it and can get in touch with them.

Figure 17m. Player statistics showing the souvenir inventory, rating and fun facts like the total distance covered while hunting.

Evaluation

The game was playtested with eight participants (six males and two females). There were distributed across four game sessions and qualitative feedback was collected through a Likert scale survey on a scale of ten *(Annexure 1)*. Some of the questions were -

I didn't notice what was happening around, while playing the game.

I couldn't tell whether I was getting tired or not.

The game caused me to interact with other players more often.

The game was also heuristically evaluated *(Annexure 2)* by two game designers. Some of the heuristic parameters were -

The game should be player first design.

Provide clear goals, present oveividiiag goal early as well as short-tens goals throughout play.

Pace the game to apply pressure but not frustrate the player. Vary the difficulty level so that the player has greater challenge as they develop mastery. Easy to learn, hard to master.

The game transports the player into a level of personal involvement emotionally and viscerally.

Insights

Playtest insights shows that the game helped participants to interact with each other more. From the qualitative feedback, it was found that three out of eight people felt that the gameplay is unique and different. Two out of eight people felt that the game helped them to interact with others more often *(Annexure 3)*. Some of the comments included -

Could implement the game in the field of HR for understanding the personality of people.

Wider the network you have, more safer is your stay in the city. The game helps you to achieve that.

There should be something more exciting to do after finding your game partner.

Some of them even suggested whether the game can be customized to have different modes like female only mode or authorize players so that only people from a specific conference or meet-up can play the game in that area. This reduces the feeling of having to play the game with a total stranger.

Expert evaluation found that the game has the potential to engage people in interacting with each other. It suggested that the nature of the tasks being collective or collaborative could work well in conferences and/or meet-ups like Comic-con, Vid-Con, even cultural festivals. It could also be scaled down to suit to premises like an office or a department building where everyone can get to know each other in a fun manner.

Some of the feedback also included suggestions for improvement in playability as well as usability. The game looked like two independent games - the hunting phase and the solving phase. If they can be made cohesive, the game will be much enjoyable. There were also suggestions about including altruism in the game which can render bigger and meaningful task results. It was also observed that the game was able to transport the players into a level of personal involvement with other participants.

Conclusion

Even though the project was only a preliminary stage to explore whether games can enable social interaction in public spaces, the successful development of this game, opens so many possibilities. The qualitative data shows that the gameplay is unique and was enjoyed by all kinds of players across genders and age group. It enabled participants to find like-minded people and facilitated their interaction through fun and collaborative tasks.

The ubiquitous nature of the game enabled people to play it anywhere at anytime they want, granting them more flexibility, freedom and possibilities. Although there were technical difficulties in the prototype, the game was able to handle two players at a time smoothly. The prototype was able to bring people together and deliver a good play experience to facilitate social interaction.

With improvements and suggestions implemented, the game can be made to accommodate more players, game modes and build a community to become a self -sustaining game. Such a community would create more challenges and tasks and will be enthusiastic to find and include more players, eventually making more people interact with each other.

Future scope

The future work includes polishing the gameplay with more game modes such as team tasks. These will support team building, factions, alliances and competition. When there is a community, the game content will be richer and diverse. Top level players can create tasks or challenges, which could be peer reviewed by other players.

The scope for the future also includes how to include passive players as well as the environment where the game is played in game dynamics. By including passive players, they will get the gist of the game and might be curious to try out and/or will enable the players with a wider population, whom might not have the game installed. By sensing the environment, the tasks can be customized to suit the space that the players are at. In such scenarios altruism can be incorporated to get meaningful results from tasks. For example, helping people at a railway station, managing crowd when there is a delay in service and so on.

Incorporate advanced privacy controls. Game modes such as female only, play with mutual friends or only with verified profiles. A moderator verified and controlled game session. These restriction would allow the players enjoy the experience without compromising their privacy and security.

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Annexure

1. Survey for measuring engagement for game

(0 - extremely disagree, 10 - extremely agree)

1. Name :
   Age :
   Gender :

2. I liked the game / I did not like the game - because

3. Any feedback / suggestions?

4. I lost track of time while playing the game.

1 2 3 4 5 6 7 8 9 10

5. I couldn't tell whether I was getting tired or not.

1 2 3 4 5 6 7 8 9 10

6. I didn't notice what was happening around, while playing the game.

1 2 3 4 5 6 7 8 9 10

7. I wanted to continue playing or play more.

1 2 3 4 5 6 7 8 9 10

8. The game doesn't require a lot of effort to play.

1 2 3 4 5 6 7 8 9 10

9. The game is very easy to understand and play.

1 2 3 4 5 6 7 8 9 10

10. The game is different from other games.

1 2 3 4 5 6 7 8 9 10

11. Theme of the game is exciting.

1 2 3 4 5 6 7 8 9 10

12. The game caused me to interact with other players more often.

1 2 3 4 5 6 7 8 9 10

2. Heuristics evaluation for playability

Gameplay

1. Player's fatigue is minimized by varying activities and pacing during game play.

2. Provide consistency between the game elements and the overarching setting and story to suspend disbelief.

3. Provide clear goals, present the goals early as well as short-tens goals throughout play.

4. There is an interesting and absorbing tutorial that mimics game play. The game is enjoyable to replay.

5. Game play should be balanced with multiple ways to win.

6. Player is taught skills early that you expect the players to use later, or right before the new skill is needed.

7. Even if the game cannot be mode-less, it should be perceived as mode-less.

8. The game is fun for the Player first, the designer second and the computer third. That is, if the non-expert player's experience isn't put first, excellent game mechanics and graphics programming triumphs are meaningless.

9. Player should not experience being penalized repetitively for the same failure.

10. The first player action is painfully obvious aiad should result in immediate positive feedback.

11. Pace the game to apply pressure but not frustrate the player. Vary the difficulty level so that the player has greater challenge as they develop mastery. Easy to learn, hard to master.

12. Challenges are positive game experiences, rather than a negative experience (results in their wanting to play more,
rather than quitting).

Game story

1. Player understands the story line as a single consistent vision.

2.The game transports the player into a level of personal involvement emotionally (e.g., scare, threat, thrill, reward, punishment) and viscerally (e.g., sounds of environment).

Mechanics

1. Game should react in a consistent, challenging, and exciting way to the player's actions (e.g., appropriate music with the action).

2. A player should always be able to identify their score/status and goal in the game.

3. Shorten the learning curve by following the trends set by the gaming industry to meet user's expectations.

4. Controls should be intuitive and mapped in a natural way. They should be customizable and default to industry standards.

Usability

1. Provide immediate feedback for user actions.

2. The Player can easily turn the game off and on, should be able to save games in different states.

3. The Player experiences the user interface as consistent (in control, color, typography, and dialogue design) but the gameplay is varied

4. The Player should experience the menu as a part of the game.
Upon initially turning the game on the Player has enough information to get started to play.

5. Players should be given context sensitive help while playing so that they do not get stuck or have to rely on a manual.

6. Players do not need to use a manual to play game.

7. The interface should be as non-intrusive to the Player as possible.

8. Make the menu layers well-organized and minimalist to the extent the menu options are intuitive.

9. Get the player involved quickly and easily with tutorials and/or progressive or adjustable difficulty levels.

10. Art should be recognizable to player and speak to its function.

3. Evaluation analysis

Sl No	3	4	5	6
m	Strongly disagree	Strongly disagree	Strongly disagree	Strongly disagree
m	Strongly disagree	Moderately agree	Slightly agree	Neutral
f	Moderately agree	Slightly agree	Moderately agree	Slightly disagree
m	Extremely agree	Slightly agree	Moderately agree	Moderately agree
m	Moderately agree	Strongly agree	Moderately agree	Strongly agree
m	Slightly agree	Neutral	Moderately agree	Slightly agree
f	Slightly agree	Moderately agree	Strongly agree	Slightly disagree
m	Moderately agree	Moderately agree	Slightly agree	Slightly disagree

Extremely disagree	0	0	0	0
Strongly disagree	2	1	1	1
Moderately disagree	0	0	0	0
Slightly disagree	0	0	0	3
Neutral	0	1	0	1
Slightly agree	2	2	2	1
Moderately agree	3	3	4	1
Strongly agree	0	1	1	1
Extremely agree	1	0	0	0
Total	8	8	8	8
Count	8			

Percentages				
Extremely disagree	0	0	0	0
Strongly disagree	0.25	0.125	0.125	0.125
Moderately disagree	0	0	0	0
Slightly disagree	0	0	0	0.375
Neutral	0	0.125	0	0.125
Slightly agree	0.25	0.25	0.25	0.125
Moderately agree	0.375	0.375	0.5	0.125
Strongly agree	0	0.125	0.125	0.125
Extremely agree	0.125	0	0	0
SUM	**1**	**1**	**1**	**1**