

Multiplayer Interactive Game for a Multi-touch Surface

Mandar N. Sarnaik

Interaction Design (2008-2010)

IDC, IIT Bombay

Project Guide Prof. Uday A.

Athavankar

Project Co-guide Prof. Phani Tetali

Initial idea of the project

To understand & Enjoy

- > World of Computer Games
- > Design behind a Computer Game
- > Game software
- > Future Trends in Gaming



Process

Ideation

Understanding computer games

User Study

Ideation / Brainstorming

Design Decision & Focus

Ideation

Freezing the idea

Idea Development

Game design

Ideation

Hardware

Software

GDD

Prototyping / Proof of concept

Testing

Process



I
d
e
a
t
i
o
n

Understanding computer games
User Study
Design Decision & Focus
Freezing the idea
Idea Development
Game design
Hardware
Software
Prototyping / Proof of concept
Testing
GDD

Ideation

Constant Ideation !

Ideas to Concepts

Simultaneous ideation and development considering the gameplay, hardware setup, rules, no. of players, age groups, etc...

Primary Research/User Studies

To understand

- > Computer Games
- > Why do people play Computer Games?
 - > Playing different Computer Games
 - > Contextual Inquiry
 - > Observing Players and their play habits
 - > Study of gaming websites / online games
 - > Visits to gaming arcades
 - > Future trends in Gaming

Playing Computer Games

I played different computer games like CS, AOE, NFS, Simcity, Casual Flash Games, Art Games, Online Games, Farmville

- > Different types of games
- > Input methods (hardware, interaction)
- > Output (feedback, interface)
- > Rules
- > Software logic and intelligence
- > Audio-visuals

Contextual Inquiry

Semi-structured interviews + observation

- > What do you do? (demographics)
- > Games you have played since childhood... (exposure to games)
- > What are your favourite games? (user choice)
- > Do you like Simcity[1] (inclination towards strategic thinking)
- > How much time do you play every day? (play habits)
- > Why do you play games? (reasons for playing games)
- > Do you like to play alone? (social interaction / multiplayer games)
- > Have you played in gaming parlours / arcades?
(effect of hardware on gaming.)
- > Do you play board games?

Gamer 1	21 years	Engineering student
Gamer 2	27 years	PG student
Gamer 3	23 years	PG student
Gamer 4	24 years	Engineer (working)
Gamer 5	20 years	Engineering student
Gamer 6	14 years	School going kid
Gamer 7	23 years	PG student
Gamer 8	24 years (Female)	PG student
Gamer 9	28 years	Scientist
Gamer 10	11 years	School going kid
Gamer 11	42 years	Hawker
Gamer	19 years	B.Com. student

Observing Play Habits

What excites the players?

Moments of excitement

Concentration levels with respect to various games

Artefacts (Mobile phones, PS3-Game Player, PC/Mouse/Headphones, Bean bags, Table-chair)

LAN Gaming (Hostels, Gaming Parlours)

Arcades 2 visits (Short activities, unique hardware, group activities, public places)



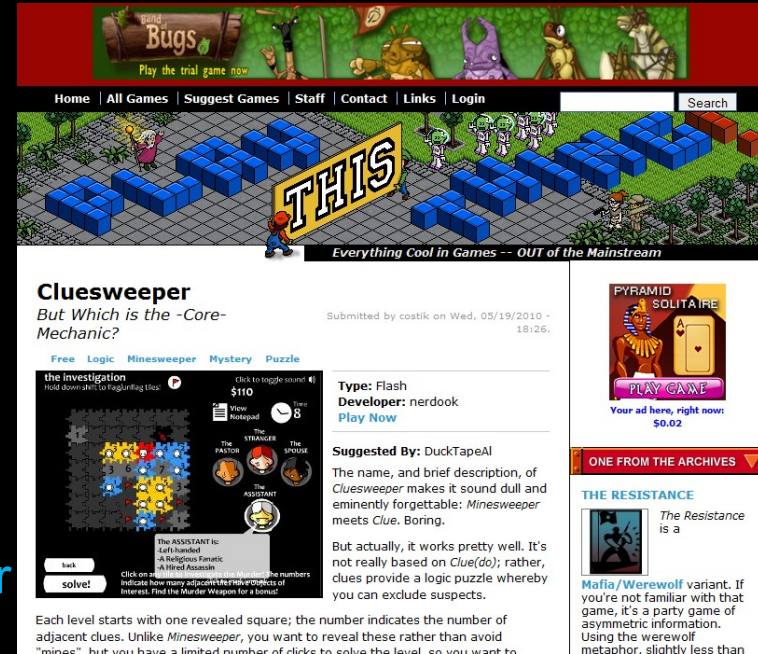
Study of Gaming Websites

Thousands of gaming websites

Millions of games online

Game Reviews

- game categories
- types of games people play most
- trends in playing online games
- how are games reviewed (criteria for reviewing)



The screenshot shows a gaming website with a navigation bar (Home, All Games, Suggest Games, Staff, Contact, Links, Login) and a search bar. The main content area features a large blue puzzle graphic with the word "THIS" in a yellow box. Below this is a review for the game "Cluesweeper".

Cluesweeper
But Which is the -Core- Mechanic?

Submitted by costik on Wed, 05/19/2010 - 18:26.

Free Logic Minesweeper Mystery Puzzle

the Investigation
Hold down shift to flag/flag list:



Click to toggle sound: \$110
View Notepad
The STRANGER
The PASTOR
The SPOUSE
The ASSISTANT
The ASSASSIN

Click on numbers to reveal the numbers
Indicate how many adjacent squares have numbers
Interest. Find the Murder Weapon for a Bonus!

Type: Flash
Developer: nerdook
[Play Now](#)

Suggested By: DuckTapeAI

The name, and brief description, of *Cluesweeper* makes it sound dull and eminently forgettable: *Minesweeper* meets *Clue*. Boring.

But actually, it works pretty well. It's not really based on *Clue*(do); rather, clues provide a logic puzzle whereby you can exclude suspects.

Each level starts with one revealed square; the number indicates the number of adjacent clues. Unlike *Minesweeper*, you want to reveal these rather than avoid "mines", but you have a limited number of clicks to solve the level, so you want to

PYRAMID SOLITAIRE
PLAY GAME
Your ad here, right now: \$0.02

ONE FROM THE ARCHIVES

THE RESISTANCE
The Resistance is a Mafia/Werewolf variant. If you're not familiar with that game, it's a party game of asymmetric information. Using the werewolf metaphor, slightly less than

Current and Future trends

Visits to gaming parlours

Nintendo Wii

Microsoft Surface

iPhone

XBOX Kinect



Findings

Game Categories

Balance of Cerebral and Physical

Action (FPS)

Adventure

Strategy

RPGs (Story based, Experiential)

Simulation

Experiential

Planning

Sports games

Fighting Games

Puzzles

Flash Games, Casual

Online games

MMORPGs

Arcade games

Console based games

Special hardware

A Taxonomy of Computer Games

-Chris Crawford

(The Art of Computer Game Design)

SKILL-AND-ACTION GAMES

Combat Games

Maze Games

Sports Games

Paddle Games

Race Games

Miscellaneous Games

STRATEGY GAMES

Adventures

D&D Games

Wargames

Games of Chance

Educational and Children's Games

Interpersonal Games

Findings Contextual Inquiry

Initiation into the world of gaming

TV video games on rent > gaming parlours > PC > Laptops > Mobile Phones

Gaming is addictive.
Youngsters are very gritty and want to finish the game asap to prove themselves.

Any new technology creates a new wave.

Choice of games

Circle of friends:
Discussions, gratification

Exposure | Availability

Realistic animation and sounds effects are more appreciated and popular

Conditioning in the world of Computer Games is an important factor.

Time spent in playing computer games

At home most parents limit the time

At hostels many tend to play for long hours.

Working professionals like short games or play for short durations.

Mobile games are a good time killer, they can be resumed as and when one is free.

Findings Contextual Inquiry

Social interaction, board games

Almost all gamers liked arcade games because these games were short and the hardware was more 'direct'.

Performing in front of the many people in these public places gave them a feeling of victory and acknowledgement.

They recalled having gone in groups / with parents to malls or funfairs and played such games.

When asked about board games, most players recall playing them during summer holidays or with relatives. Many gamers recalled playing cards where everybody in the family - young or old, played.

They remember the experiences; the people vividly and also have many stories associated with playing board games.

Playing social and board games are highly memorable activities. The memories of people are probably stronger than an event in a computer game.

Findings Contextual Inquiry

6 out of the 8 intensive gamers said that they liked multiplayer games and playing games on LAN in their hostels or in gaming parlours.

The enjoyed defeating and then teasing a real person more than defeating a computer.

'Play' the basis of all games is enjoyed more when it is a multi-player activity. E.g. Sports.

A few said that they 'liked to play without any disturbances, with full concentration'. The apparent reasons are slow players taking their own time to master the game.

Some players liked exploring the games apart from the mission they were supposed to do.

Some people like to play with games !

Findings General Observations

Based on

Playing different games, contextual inquiry, observing the play habits of players, study of gaming websites / online games

Readings on game design

Individuals' choice of games / favourite games depends upon

Peer group

Exposure to games

Age

Habits

Inherent nature and sensibilities

Computer Games highlights

Personal space and enjoy on own's own. No running after someone to play with.

Customisation possible. Flexibility.

High sensory appeal through audio and visuals. Fantasy.

Role playing. Virtual experience of unusual activities.

Stories, missions rendered as life-like scenarios.

Findings General Observations

Based on

Playing different games, contextual inquiry, observing the play habits of players, study of gaming websites / online games

Readings on game design

Interactivity in computer games

Computing power for time-keeping, record-keeping and updating

Instantaneous feedback to player actions

Interface is constantly in action

Rules get obeyed automatically

Gratification

By gaining control over the controls, by becoming skilled and expert, there is a feeling of achievement.

Records of high-scores, 'hall of fame' are motivators.

Chance to restart and forget errors/failures.

Findings General Observations

Based on

Playing different games, contextual inquiry, observing the play habits of players, study of gaming websites / online games

Readings on game design

Good Computer Games

Have interfaces with metaphors to show points/ health and resources. Some games have themes and missions;.

Some games have abstract elements which primarily don't mean anything but their behaviors are understood over a period of time by exploration. 'Frustrating games'
e.g. www.towlr.com

Gameplay and audio-visual experience

A very common gameplay can be made into a famous game by adding high quality audio-visual experience. e.g. FPS games: CS and Max Payne.

Games like chess have a very strong gameplay and hence almost negligible audio-visual experience is required.

A balance of gameplay and audio-visuals is observed in Age of Empires.

New hardware or new way of

Findings

Comparison



Board Games	Computer Games
Two or more players play against each other	Single player against the computer; computer does the thinking and processing of events and actions
Manual processing, results etc.	Computer can process results faster and forecast the opponent's moves No feeling of playing against an actual opponent.
No limit to creativity and new methods and styles of play	Computer plays based on rules
Fun in board games is derived not only out of playing the game but also out of the interactions that the players have with themselves	Partly possible in multiplayer LAN games / online games.
A major reason why we play games is because we like to play it with our friends/ with a particular friend, at a particular place, sitting together comfortably	Mostly played alone
Comments, analogies players attach to the game mechanics, remarks on a particular players' style, etc. make it a fun experience.	Legal mischief possible to a a very less degree

Design Direction

Realisation

Computer Games are interactive experiences

By changing the themes and no. of variables, new games are made

Good production and high quality audio-visual experience are time and 'skilled-resource' intensive.

By changing players' way of interacting with games, new types of games could be made.

-game hardware

e.g. input methods, sitting arrangement, hardware manipulation methods

-game participants

e.g. number of players, different roles given to different players spectators

- game interactions

e.g. input methods, natural interfaces, gesture/speech recognition, etc.

Design Brief

A game that would combine the advantages of board and computer games

A game facilitating natural input methods

A game that would boost player-player interaction, player-spectator interactions

Game Idea

Hardware Multi-touch Surface

Multiplayer game (2 or more)

No role play.

Let players play themselves

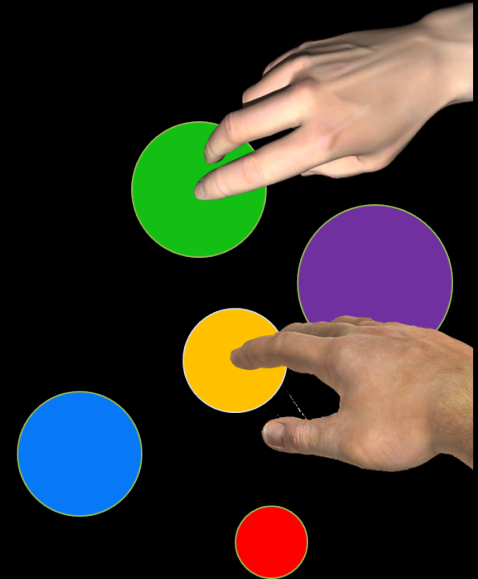
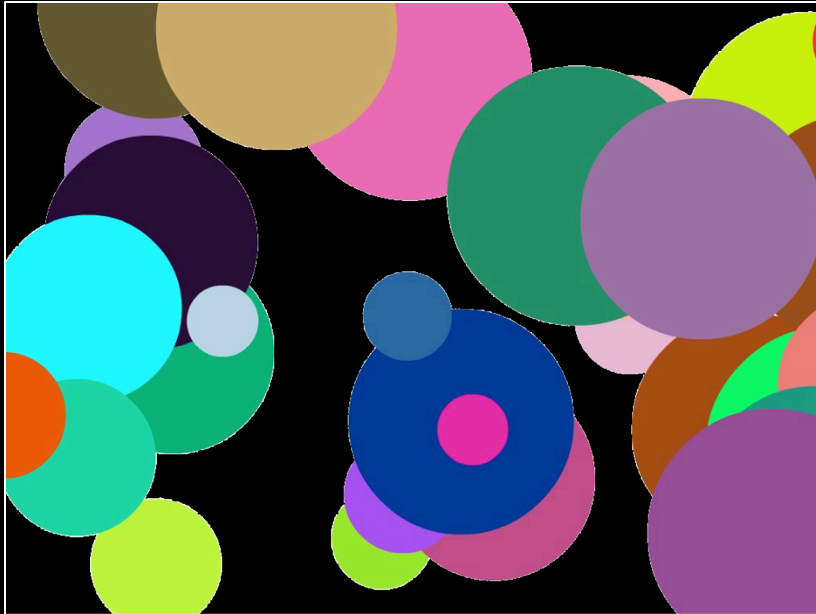
Exploiting multi-touch

Skill & Strategy.

Social Interaction

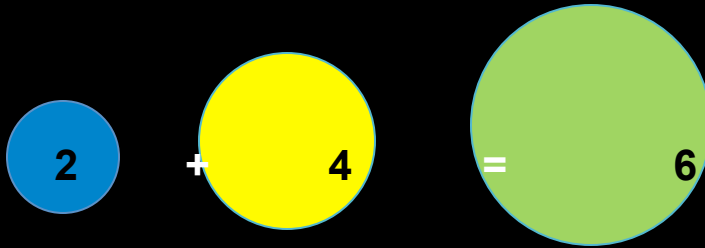
Game Ideation

Idea 1: Play with Circles



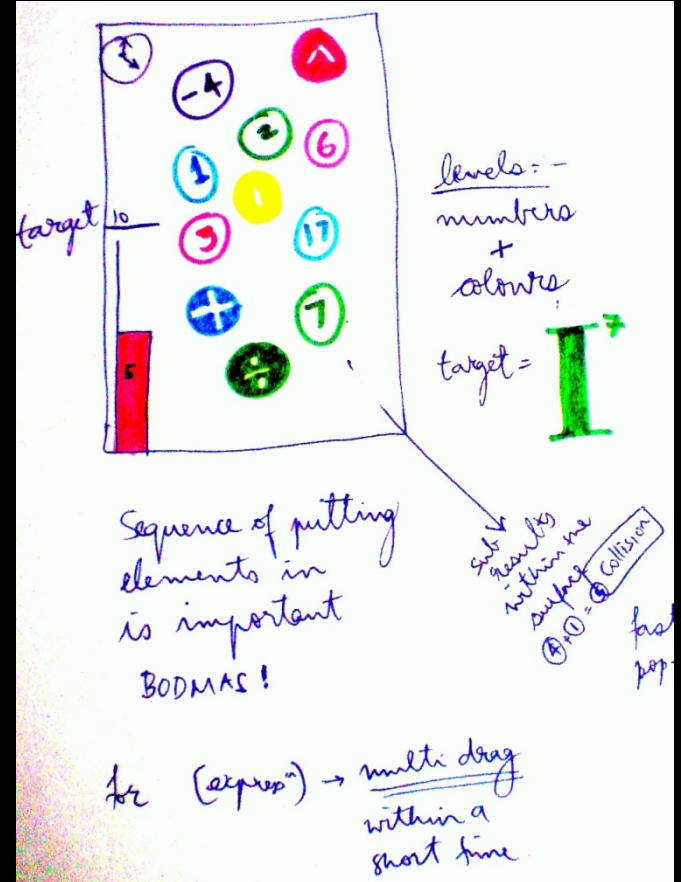
Game Ideation

Idea 2: Play with Numbers & Colours



To meet a **target**

BODMAS Rule | Multi-drag | Colour theory

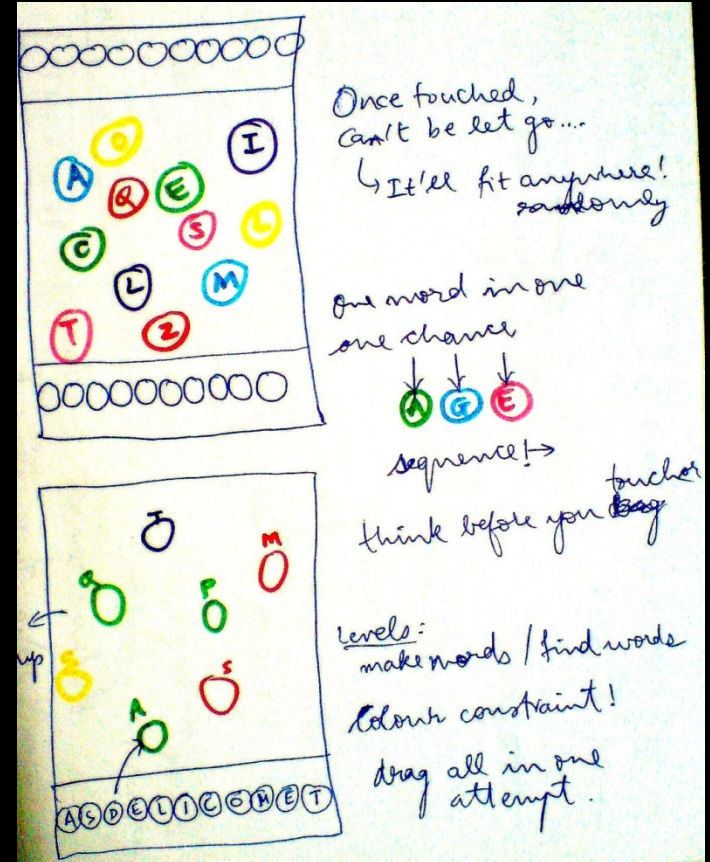


Game Ideation

Idea 3: Vocabulary Games

To make words by grabbing letters and putting them together to form a word.

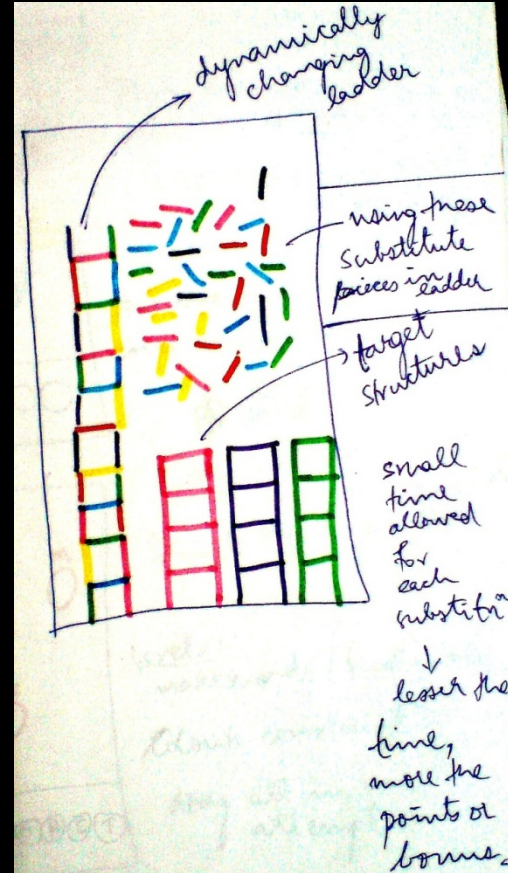
Limited pool of alphabets,
Plan and pick a letter, etc.



Game Ideation

Idea 4: Thinking, strategy games

Pick up sticks and make uni-colour ladder by replacing members in the mix-coloured ladders.

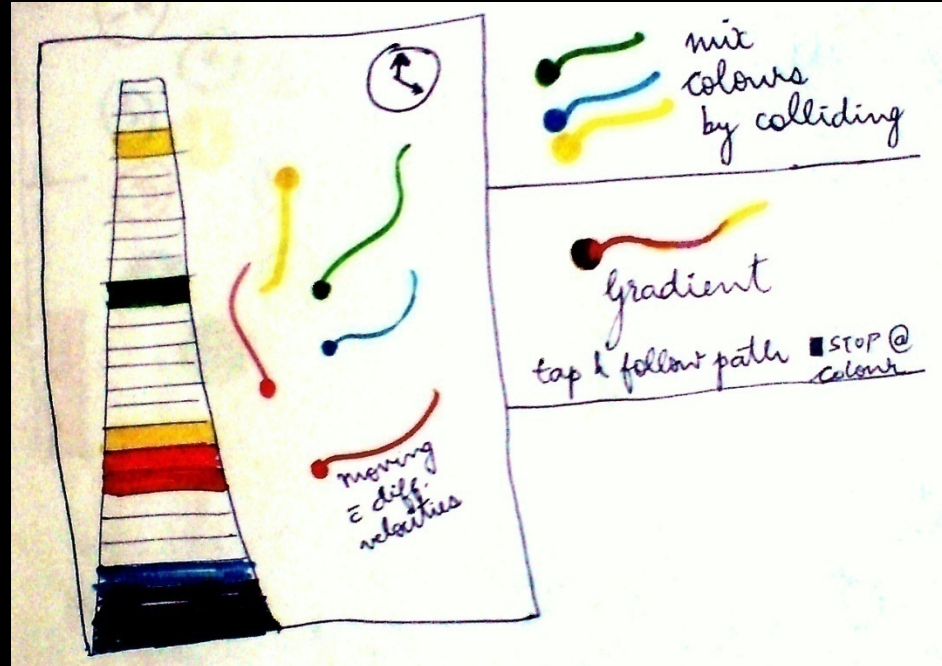


Game Ideation

Idea 5: Colour theory games

Colour strands flying.

Combine them and complete the gradient.



Paper Prototype

Cardboard cut-outs

Table

Throw = Pop-up

Multi-grab to save time, etc.



Paper Prototype

Initial testing using paper prototype indicated that the **action** of capturing balls popping up in an area common to all players was very **exciting** and gave an **adrenaline rush**.

Playable.



Speed of Play

Speed of play inversely
proportional to the strategic
thinking required

The general nature intended was a
fun, fast-paced game
demanding quick decision
making.

Final Game

[..\Prototyping\idea1circle.swf](#)

Demo of prototype

Social Interaction

Testing

Playability

Fun

Social Interaction

Game Evaluation
Criteria

Duration of play



Testing

Playability

Fun

Social
Interaction

Manday + Sanskrit + Shrestal

Game Design : Criteria

JENGA

Factors that define Degree of gameness	Game 1 1. Evaluation, (good, fair, poor) 2. Reasons for evaluation 3. Comments
Ability to attract repeat play	extremely engaging & addictive
Degree of Entertainment & fun	very high degree of entertainment & fun
Why?	→ challenging and multi-skill game. [concentration / analysis / finesse of hand movement]
Degree of Socialization 1. between players 2. between players and spectators	1. Very ^{high} because every move has a cascading effect on your next move 2. Disturbing for players but very enticing for spectators.
Level of 'play' interaction 1. Between players 2. Between teams	1. Limited [not necessary at all] 2. - NA -
Conflict: Does opponents' decision affect the first player? How much?	1. Very much [cascading effect!]
Due to conflict ✓ Due to cooperation	
Level of Education due to game (optional) 1. Direct ✓ 2. Indirect	Knowledge about balance
Equal chance of winning	yes

Balance of play based Risk and Pay-off on players decision	No direct pay-off. In fact game becomes tougher due to a risky move
Basis of play Innovation 1. Player's action ✓ 2. Graphics 3. Maintaining uncertainty 4. New Hardware or combination ✓	
Degree of Problem solving challenge 1. skill based ✓ 2. Intellect based ✓	1. ↑ Skill & control while displaying blocks 2. ↑ Judgement towards selecting a block
Articulate the challenge	
Degree of other Challenges 1. skill based 2. Intellect based	- NA -
Balance of Luck &/or Strategy	No Luck. Only strategy (?)
Appeal of fantasy / nostalgia	- NA -
Degree of Playfulness 1. Activity based ✓ 2. Manipulations based → 3. Legal mischief based →	Very high NO [luck] NO [luck]
Degree of Control over choice in Board adjustments, investments 1. In setting up 2. In middle game	Very high [off move] NO

Game Evaluation Criteria

Factors that define the degree of gameness	
Ability to attract repeat play	<i>Strong. Very addictive.</i>
Degree of Entertainment and Fun Why?	<i>High. Adrenaline rush. Fast paced mental and physical activity.</i>
Degree of socialisation 1. Between players 2. Between players and spectators	<i>High High</i>
Level of 'play' interaction 1. Between players 2. Between teams	<i>High High</i>
Conflict: Does opponent's decision affect the first player? How much?	<i>Yes. Average.</i>
Due to conflict / co-operation?	<i>Conflict / co-operation</i>
Level of education due to the game Direct / Indirect	<i>High: Indirect (agility, hand eye co-ordination, reflexes, decision making)</i>
Equal chance of winning	<i>Yes (even a slow player can</i>

Game Evaluation Criteria

Balance of play based Risk and Pay-off on players decision	<i>A player may choose to play so, wait but score more. But risk of losing a circle !</i>
Basis of play innovation 1. Player's action 2. Graphics 3. Uncertainty 4. New hardware or combination	1 - large extent 2 – not much 3 - moderate 4 - highest
Degree of problem solving challenge 1. Skill based 2. Intellect based ARTICULATE the challenge	1 - large extent: Hand-eye co-ordn., reflexes, judgement of the hardware 2 - after a few initial minutes: pattern and rules decoding, finding ways to score more
Balance of luck and/or strategy	<i>Equal</i>
Appeal of fantasy, nostalgia	<i>Good – reminds of board games / arcade games / sports.</i>
Degree of playfulness 1. Activity based 2. Manipulations based 3. Legal mischief based	1 - HIGH 2 - HIGH 3 - MODERATE
Degree of control over choice in board adjustments control	<i>Good: Players can move around and reach for the balls</i>

Game Evaluation Criteria

<p>Ability to hold interest</p> <p>1. Long time 2. Short time</p>	<p><i>Short time but repetitive</i></p>
<p>Fluctuation of tension</p> <p>1. Early game</p> <p>2. Mid game</p> <p>3. End game</p>	<p><i>High: throughout : Gradually increases.</i></p> <p><i>End is a mad rush.</i></p>
<p>Control on pace of the game</p>	<p><i>No control</i></p>
<p>Potential of frustrating opponent</p>	<p><i>High. Legal mischief and by scoring more. Verbal intimidation.</i></p>
<p>Possibility of player becoming an expert</p> <p>1. With practice</p> <p>2. With intellect</p>	<p><i>Both ways</i></p>
<p>Learnability</p>	<p><i>Quick. Though there are no rules told.</i></p>
<p>Easy to follow the score?</p>	<p><i>Very easy. Direct score board.</i></p>
<p>Watchability? What will spectators do?</p>	<p><i>High. Spectators cheer / participate / decode rules.</i></p>
<p>How age specific?</p>	<p><i>No age limit. Scope of mutual agreement between players of different ages.</i></p>

Game Evaluation Criteria

Interpretability of players' nature and profile through this play	<i>Yes. Infact players count on that while playing.</i>
Ability to generate variations 1. Structural variations 2. Graphic variations	<i>Very high. Themes could be added. Educational versions. Hardware variations: Single touch screens, mobile phones.</i>
Ability to generate levels in the game.	<i>Below average.</i>
Easy testability	<i>No. Hardware dependant.</i>
How busy are the players during the play?	<i>All players busy. Even spectators are busy.</i>
Location and hardware specific? 1. Easy to carry? 2. Easy to play in train? 3. On the bus stop?	<i>Highly specific. Large hardware set-up. Public / semi-public places like malls, resorts, clubs, schools, arcades.</i>
Ease with which Physically impaired can play this game...	<i>NOT SUITABLE FOR Visually impaired Speech/Aural impaired can play.</i>
Is all the hardware essential always? Redundant play pieces?	<i>-NA-</i>

Interface

How to play?

When advanced levels are added.

Through Audio/
animation and temporary
pop-ups.

All in all: Only essentials.



Opportunities

Public

Semi-public places

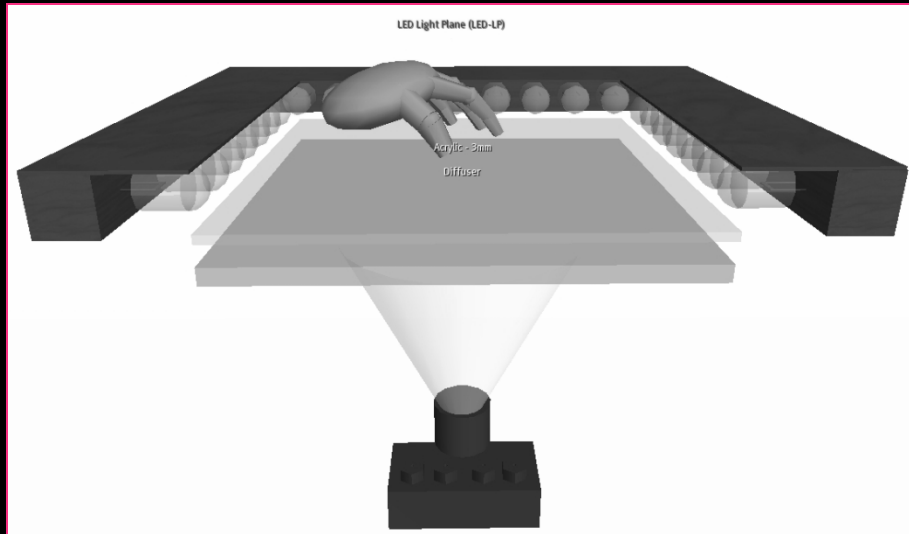
Schools

Mobile game

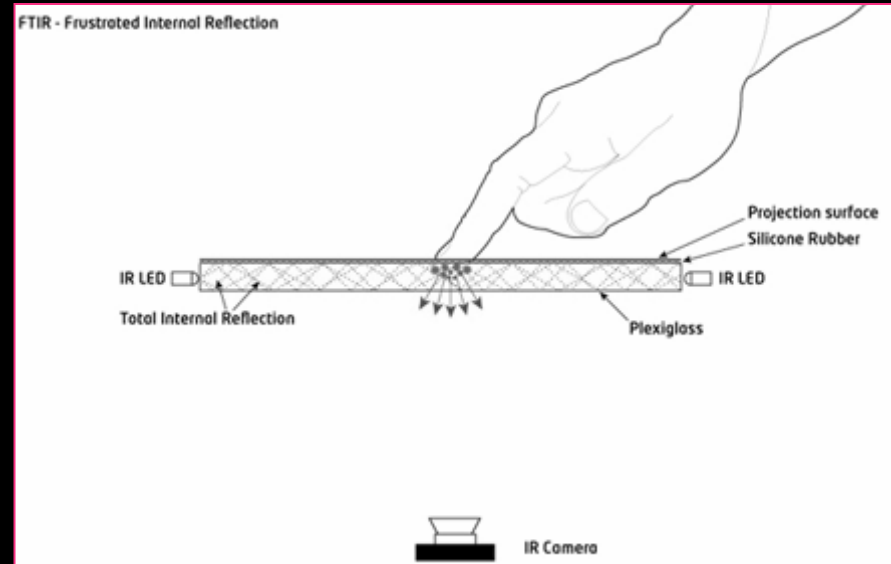


Prototyping

Touch surface



LED-LP 3D Schematic created in SecondLife
SOURCE: Pg. no. 18, Multi-Touch Technologies, NUI Group Authors,
1st edition [Community Release]: May 2009



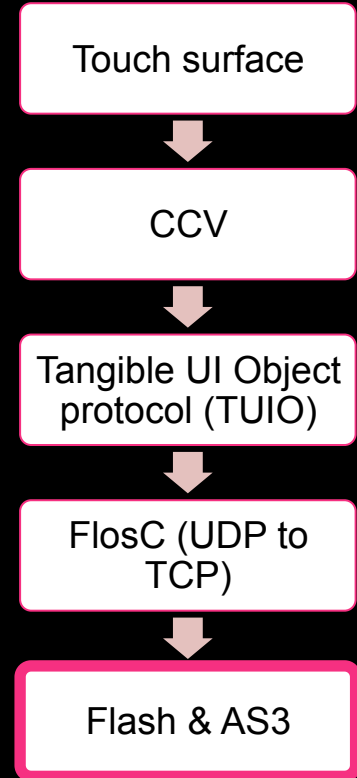
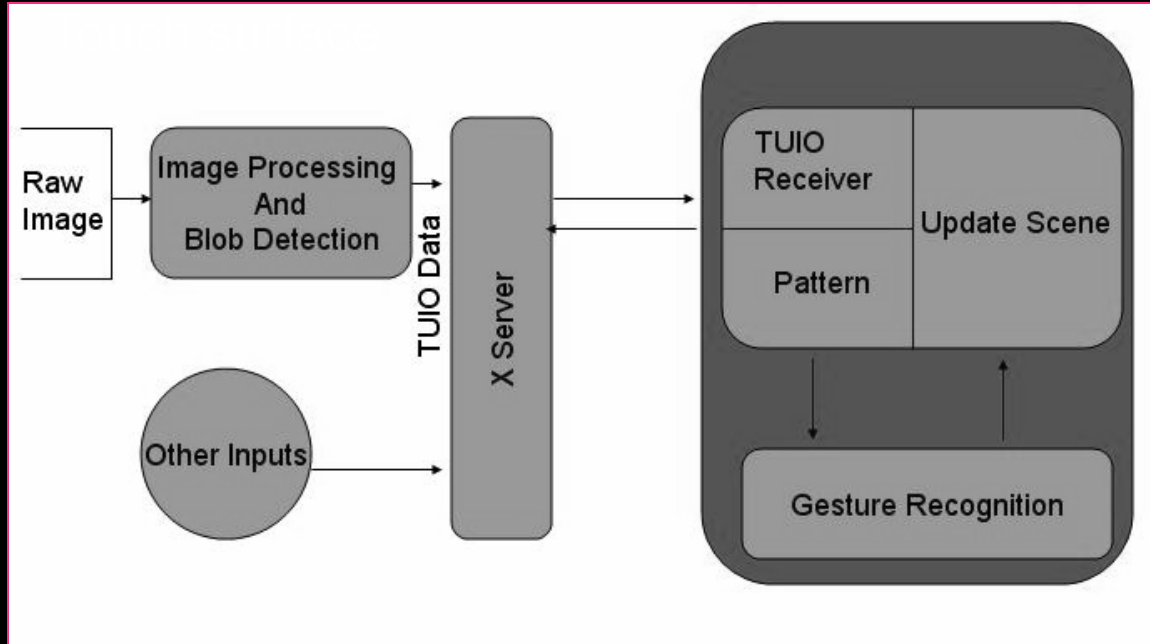
FTIR schematic diagram depicting the bare minimum of parts
needed for a FTIR setup.
SOURCE: Pg. no. 9, Multi-Touch Technologies, NUI Group
Authors,

Prototyping

Software

Workflow

Frontend



Blob detection to gesture recognition framework outline SOURCE: Pg. no. 33, Multi-Touch Technologies, NUI Group Authors, 1st edition [Community Release]: May 2009

Thank You !

Acknowledgements

My guides Prof. Uday A. Athavankar, Prof. Phani Tetali

Prof. Ravi Poovaiah, Prof. Anirudha Joshi

Kumar Ahir, Arun Nagargoje (IDC Alumni)

My batchmates at IDC.

Wonderful resources on the internet. NUI group.