

# **“ PROJECT ON 3D ACTION GAMING ”**

5th SEMESTER MID-SEM PROJECT REPORT

FOR THE DEGREE OF

**BACHELOR OF TECHNOLOGY**

In

**INFORMATION TECHNOLOGY  
(B.Tech in IT)**

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November, 2015

## CANDIDATES' DECLARATION

We hereby declare that the work presented in this project report entitled “ **PROJECT ON 3D ACTION GAMING** ”, submitted towards completion of 5th Semester Mid-Sem report of B.Tech. (IT) at Indian Institute of Information Technology, Allahabad, is an authenticated record of our original work carried out from July 2015 to Dec 2015 under the guidance of **Prof. Shekhar Verma**.

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## CERTIFICATE FROM SUPERVISOR

I do hereby declare that the mini project work prepared under my supervision by B.Tech group titled “**PROJECT ON 3D ACTION GAMING** ” be accepted in the fulfillment of the requirements of the mini project work of Bachelor of Technology in Information Technology, 5th semester. This is to certify that the above statement made by the candidate is correct to the best of my knowledge.

Date : November 17, 2015  
Place : Allahabad

Dr. Shekhar Verma  
Professor, IIITA

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We also owe a great deal of gratitude to the mini project evaluation committee members for their valuable insights that helps us to view the project in the new light.

Place : IIIT Allahabad

Date : November 17, 2015

Mini Project gaming group

B.Tech IT, 5th semester

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## **ABSTRACT**

Implementing a 3D multi player game consisting of integrating various components such as Network, Game engine, Computer Graphics and Artificial Intelligence.

Besides its technical aspects, social(user friendliness) and economic factors were also taken into consideration while determining the requirements. Later on, we combined the research data with some of the requirements criteria to come up with some very vague design guidelines which can be found in this report.

### **Basic idea behind the project :**

The proposed game will be a computer game version with intranet connectivity where the players will be able to play the game in the single mode as well as in the multiplayer mode. The game will deal with artificial intelligence logics and will be intended for multiplayer use. Due to the nature of the game, the graphics will be in 3D.

This 3D multiplayer shooting action game is also implemented by the concepts of Computer Networking, Artificial Intelligence and Graphics and Visual Computing where

- we use networking protocols to connect the players through the server.
- We apply different AI logics for different “states” of the player.
- we use OpenGL in the creation of different elements of the game.

## **INTRODUCTION**

Multiplayer Games continue to be a popular and lucrative sector of the gaming market.

With few exceptions, playing games by oneself is an artifact of the computer age. Before this, most “games” be they on the tabletop or in the field required the involvement of other people. After a few decades in solitary confinement, technology is allowing today’s gamer to return to the good old days of social games.

With this advancement in the technology from the day to day life, we took all these points into account and we implement the game which is played using the intranet connections.

We believe that our idea, whose details are provided below, is innovative in this respect, especially regarding the standard approaches.

## **PROBLEM DEFINITION**

- Multiplayer games based on Client -Server networking architecture, usually a server is a dedicated host that runs the game. A client is a player's computer connected to a game server. The client and server communicate with each other by sending small data packets at a high frequency. Clients only communicate with the game server and not between each other unlike in a peer-to-peer application.

We are trying to implement our proposed game by using peer-to-peer model to overcome the disadvantages faced in the client-server networking model.

In the client-server model, the server takes all the connections and if the server goes down then all the connections will be lost which results in force quit of the game whereas in the peer-to-peer model, even if the server goes down it does not matter as all other systems(clients) are connected to each other which enables to continue our gaming without any problems.

- Since implementing multiplayer games in a 3D environment is a difficult task, even then the reason that multiplayer games have become so popular is that a person can play his game with other people interactively. The 3D feature is an add-on to the environment.

# **GOAL**

- Maintaining the game-state consistent
- Ordering the events
- Increasing interactive responsiveness
- Our game is designed in various modules to enable efficient code management where we introduce all the fields in one platform so that we can learn something about interaction between three different fields rather than working on one.
- The game to be implemented in this project should be capable of supporting more than a player simultaneously.
- Furthermore, the players in the game are expected to interact with each other which attracts a large number of people where the game provide facilities in which one player's action should affect others.
- The game will be played in a 3D atmosphere that is rendered as realistic as possible.
- High quality 3D graphics are created and played without much of a network concern.



## **MOTIVATION**

- In the gaming market, creative ideas are more likely to survive since they have a capability of leaving a stronger impact.
- In many fields we cannot go beyond certain extent whereas in the gaming field we have a chance to think out of the box and elevate our thoughts.
- Our passion is to explore and innovate our ongoing semester courses which increases our learning curve to the maximum extent.

## LITERATURE SURVEY

S.NO	TITLE	YEAR	JOURNAL/ CONFERENCE	OBJECTIVE	CHALLENGE(S) DEALT
1	Survey on transport layer protocol: TCP and UDP [1]	2012	International Journal of Computer Applications	<p>This paper presents a comprehensive survey on the two most popular transport layer protocols; TCP and UDP.</p> <p>The aim is to understand the key terminologies of TCP and UDP to understand the key differences between them.</p> <p>This paper lists out the functions and basic operations of both protocols(TCP and UDP) and finally a comparison between the two protocols is presented.</p>	After analysing the most popular transport layer protocols namely TCP and UDP, the best suitable network protocol for implementing our proposed game is UDP as this is faster in comparison to TCP.
2	TCP vs UDP Performance Evaluation for CBR Traffic on wireless Multihop Networks [2]	2009	Seminar in University of Patras by Department of Electrical and Computer Engineering	TCP and UDP are studied as different transport layer alternatives and their performance is evaluated with respect to QoS	The analysis tells about the transmission time in both the cases. The transmission time grows too large in the case of TCP whereas it is not

				(Quality of Service)	high comparatively.
3	Peer-to-peer networks and computation: Current trends and future perspectives [3]	2011	Article by Model Institute of Engineering and Technology on Computing and Informatics	This research papers examines the state-of-the-art in the area of P2P networks/computation	Analysis brings to an idea of implementing our intranet connectivity by using the concept of hybrid peer-to-peer network model.
4	Towards General Game-Playing Robots:Models,Arc hitechure and Game Controller [4]	2013	The University of New South Wales, Sydney	This paper takes the first step towards general game-playing robots, which extend t capability to AI systems that play games in the real world.	We learnt to dealt with the form of general intelligence that enables the player to autonomously adapt to new and possibly radically different situations.
5	A Multiple Mobile Robots Path Planning Algorithm based on A-star and Dijkstra Algorithm [5]	2014	College of Computer and Information Engineering, Tianjin Normal University	Through the analysis and comparison of A-star algorithm, path planning algorithm supporting multiple robots run parallel in a static and dynamic obstacles coexisting environment is studied	Study of widely used heuristic search algorithm. A-star is used for planning moves of the computer-controlled player and also path finding with minimum cost.
6	Implementing Surfaces in OpenGL [6]	2006	University of Waterloo in the partial fulfilment of the requirement for the degree of Master of Mathematics	Exploring OpenGL powerful visual effects and functionality such as applying lightning, surface material properties, different textures etc.	Solved the problem of implementing a surface either from a real world data set or from explicit or implicit functions by using OpenGL technique.

## **GAME PLAN AND RULES :**

- It is a 3D shooting action game.
- Each Player has a health bar and infinite number of bullets.
- If player gets shot, then the health bar decreases.
- Once the health bar is completely over, then the player dies.
- Maximum number of players limit is M ( $M = 4$ ).
- Each player can move in any direction.
- Players can change their location within the boundaries of the field.
- In the field, there are rigid walls for hiding during an attack.
- Bullets can be fired in any direction by left clicking the mouse.

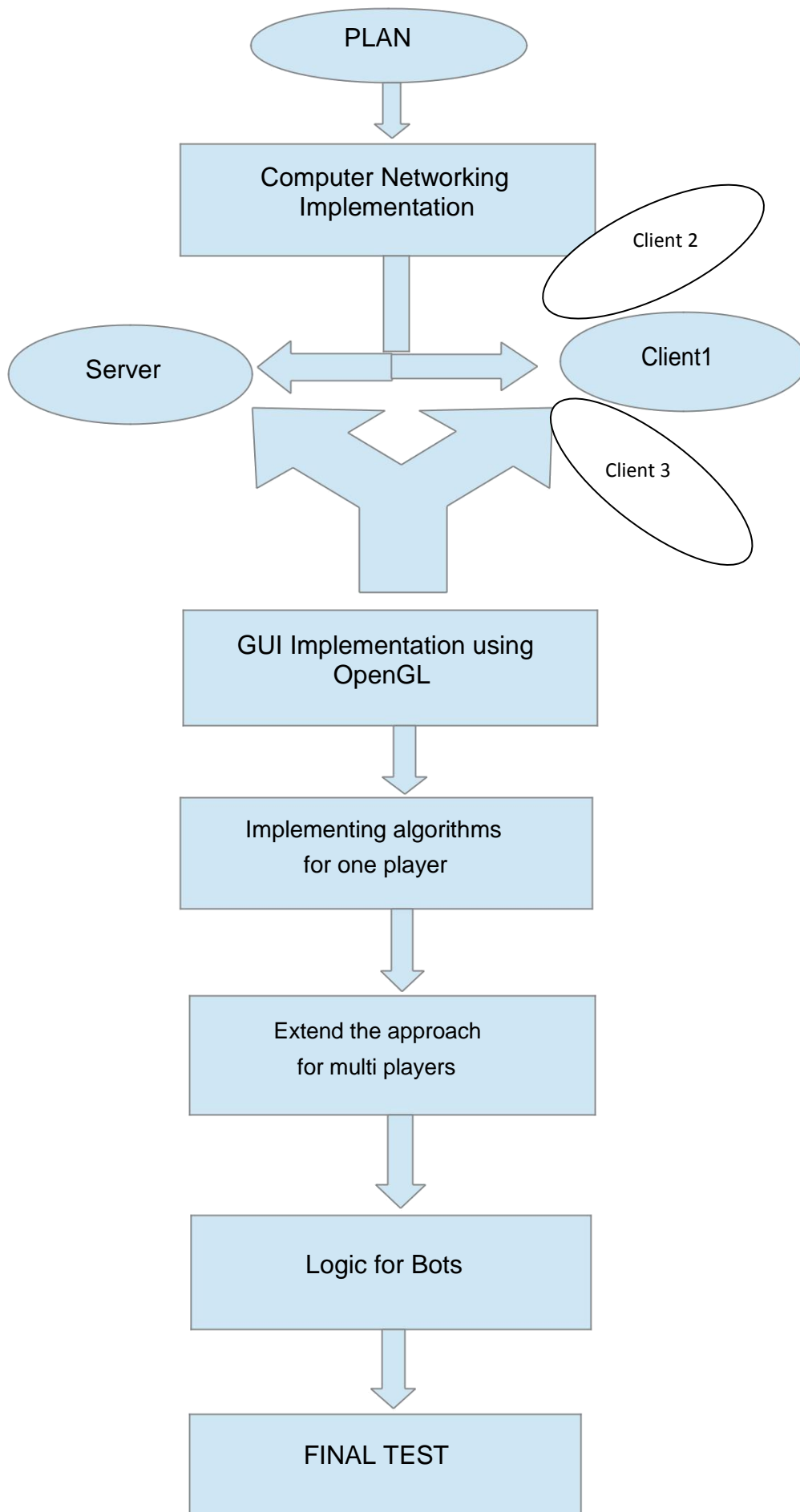
## **USER CHARACTERISTICS**

- All game players from all over the world will be a potential user for this product.
- There is no age limit.
- The only constraint for the users is being familiar with the rules of the game.

**“The more skilled players we attract,**

**The more qualified agents we will offer..”**

# PROPOSED APPROACH / METHODOLOGY



## **EXPLANATION OF OUR APPROACH**

- First we have tested the UDP network without any GUI (just sending and receiving the messages)
- Then we have implemented GUI and made the necessary algorithms for player motion and shooting.
- Then we have tested our game for 2 or more players (no bot).
- Then we have implemented AI algorithms for bot.
- Finally we have tested our game with all the components.

# **SOFTWARE REQUIREMENTS**

## **GUI**

- OpenGL is used in creating the client GUI interface.
- The players and the game environment are drawn by programming OpenGL in c++ .
- We used the basic structures, textures, inbuilt functions of the OpenGL in creation of body of player, obstacles, walls and other necessary elements of game.
- Libraries : OpenGL GLUT library

## **NETWORKING**

- We have used socket programming in which UDP is used as our networking method in c++.
- Peer to peer networking model
- Libraries : Socket libraries

## **ARTIFICIAL INTELLIGENCE**

- We started with GUI and we made the necessary algorithms for player motion and shooting in c++.

- We implemented AI algorithms for bot.

## **NON FUNCTIONAL SYSTEM REQUIREMENTS**

Platform : Linux

User Interface : GUI Graphics

Scalability : The System will be able to handle 1 user profile

## **WORK DONE TILL MID SEMESTER**

- We have tested the UDP network without any GUI (just sending and receiving the messages).
- Then we have done GUI part for structure creation of different elements.
- We made the necessary algorithms for player motion and shooting using AI logics.

## **COMPUTER NETWORKING PART**

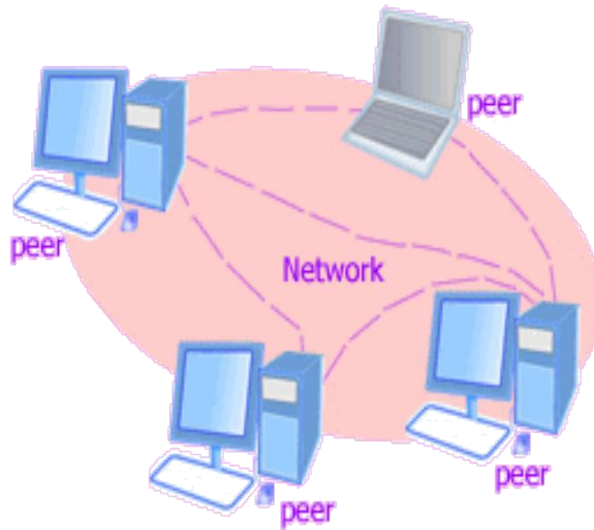
The P2P model is relatively a new architecture and its utilization in multiplayer game implementations is still a hot research subject. Some researchers believe that it has various advantages over existing architectures and that it will lead to the development of multiplayer games with a much higher interactive responsiveness.

In a P2P network, every node has the same responsibility and privilege as every other node on the network. Considering its utilization in multiplayer game development, it is indicated in several research papers that the P2P model has the following advantages:

- computation is spread over the whole P2P network, therefore the average workload is less than that of the server's in a client-server model



- the consumed bandwidth is reduced: when there is a client-to-client communication in the client-server model, the message has to go through the server thus doubling the consumed bandwidth.



## PEER TO PEER NETWORK MODEL

UDP is used as our networking method. After every 't' time the packages will be exchanged between the players. Every package has player id and sequence number enclosed in it. Whenever the player receive the package of other player then the former will send the acknowledgment package of the same sequence number and if latter does not receive the acknowledgment package within some time then he sends the package again.

If a player gets disconnected during the game then the game will still go on for other players however this player will still try to send and receive the packages from other players. However if the player doesn't send any acknowledgment packages or his own packages for sometime then the player will be disconnected permanently. But the probability of this happening is very low each player is sending and receiving data from every other player.

Initially our game is created by a server with whom the other players will be connected. After all the players has been created then the server will send the addresses of every player to every other player thus setting up a peer to peer server.

## **GRAPHICS PART**

- The players and the game environment are designed by programming in OpenGL using c++.
- We use the basic structures, textures, inbuilt functions of the OpenGL in the creation of body of the players, obstacles, walls and other necessary elements of game.

## **ARTIFICIAL INTELLIGENCE PART**

- We simulate intelligence in each of individual units rather than a single intelligence unit.
- We will apply different AI logics for different “states” of the player.
- We need to maximize the life expectancy of the bot.
- To compute the expected score for any action all possible moves and weight of the possible outcome with the probability of the player doing that move will be used.

## **BASIC AI LOGIC**

```
If(targetInRange == true)
{
    fireAtTarget();
}

else if(bulletComingTowardsMe == true)
{
    moveAwayFromBullet();
}

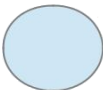
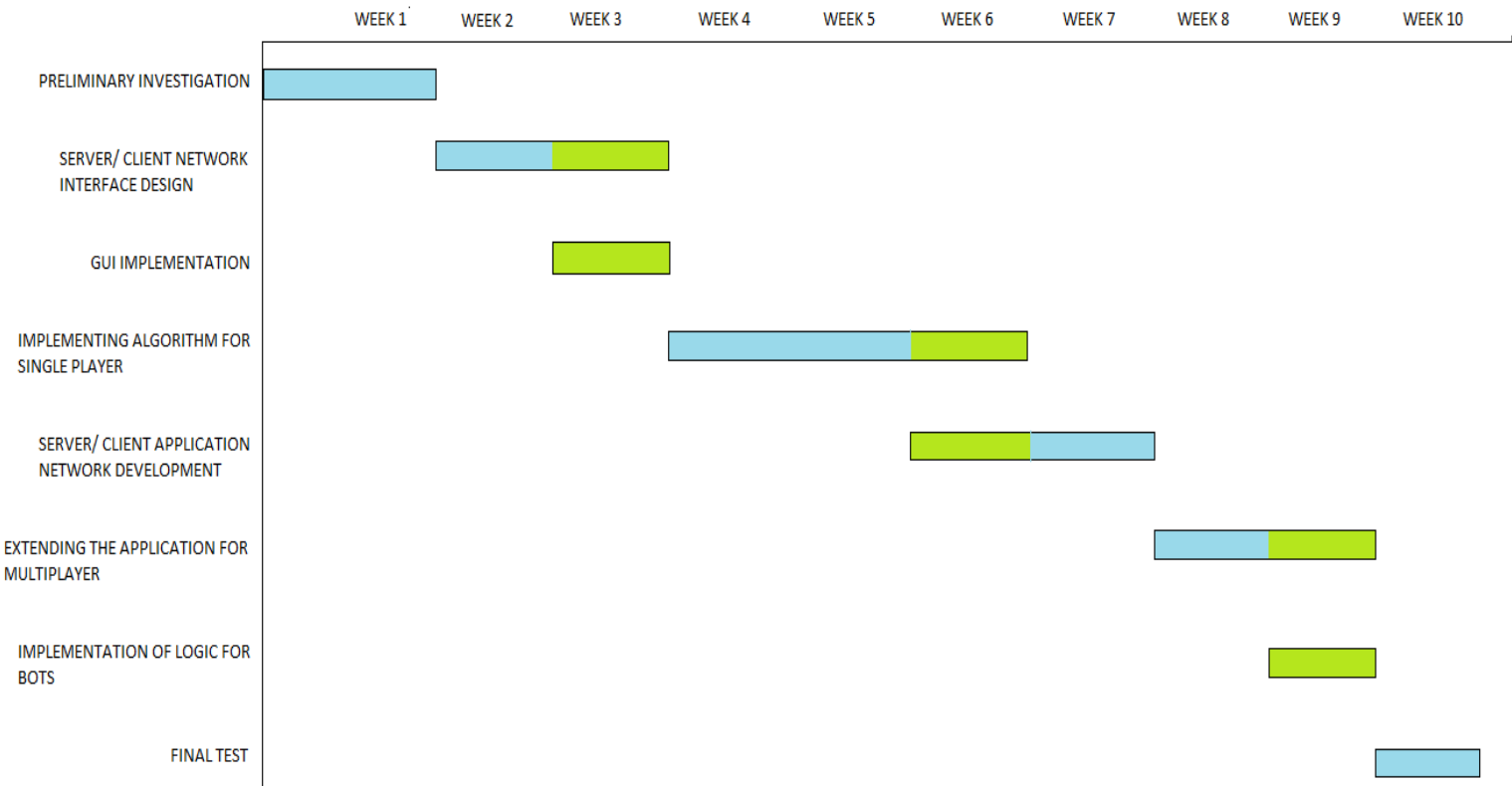
else
{
    wanderAround();
}
```

## **EXPLANATION OF THE LOGIC**

We play the game in such a way that :

- When the target is within our reach  
then we fire at the target.
  
- When the bullet is coming towards me  
then we move away from the bullet.
  
- Or else till any of the above actions takes place,  
we wander around in search of our competitor to kill or save  
ourselves from others.

# ACTIVITY TIME CHART



## **RESULTS AND ANALYSIS**

The final version of the proposed game delivers the following features :

- A game that retains fun and simplicity and contain attractive graphics and user interface to attract the players.
- The real time experience of commercial multiplayer games is available in the game that allows more than one players to play a game simultaneously over a network.
- A computer controlled opponent – that strongly challenge the human players in the game. This functionality makes the game more interesting and challenging.

## **FUTURE SCOPE OF THE WORK**

- To be able to support a great number of players, the effective transmission of game data is exposed to network connection speed constraints, which greatly affects the project design.
- To increase the number of levels along with increased features like audio, control settings, etc.
- Adding game menu, where the players are given the option to create server, change controls, set difficulty levels, etc.
- Support for team match between two teams.
- Adding many more weapons to make the game more challenging.
- Gaming is a booming business. If we can develop this game to develop a thrilling experience to gamers, we can enter into the world of online gaming.

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## **SUGGESTIONS OF BOARD MEMBERS**







