Space Invaders

COP290: Assignment 3

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Objectives

Design a game which is :

- Multi-player on-line without a central server.
- Has a artificial intelligence component.
- Is an action game and not a simple board game.

Our choice

Space Invaders

Space Invaders

Basic Game-play

- The player will control a space ship and shoot down aliens.
- The player will be allowed to move in the 2D plane and change its orientation in that plane
- The aliens will shoot bullets at the players ship.
- On getting hit by bullets the player will lose 1 life.
- On destroying a large number of aliens, the player will get bonus lives.

Space Invaders

Multi-player

Co-op Mode

- In co-op mode, the different players will team up to fight the aliens.
- The points scored by each will be combined together.

Competitive mode

- Players will be put up against each other, every player for himself.
- Each player has its own score which will be increased on hitting the other players.

Space Invaders

Scoring Scheme

Lives

- Each player will be given 3 lives.
- On getting hit by an alien bullet or colliding with an alien, a life will be lost.
- After killing 10 aliens in a row without any waste shot, a life will be awarded.

Scoring

- On killing an alien a point would be awarded.
- On killing more and more aliens in a row, a multiplying factor associated with points would increase.

Network Design

Basic Design

- Our application will use UDP (User Datagram Protocol) to communicate between various players.
- Since our multi-player is real time, we need fast transfer of data.
- Even if some of the packets are lost due to unreliability of UDP, it won't affect much. Things change so fast (i.e. player movement) in the game that it doesn't make sense to resend a lost packet as it will contain old information.

Network Design

Idea

- Each player will have two basic threads.
- One thread for receiving data from other players.
- Second thread for sending data to other players.

Exchanging data

- We will send data from one player to all the other players as soon as a frame is rendered
- This means that we will send almost 30-60 messages every second and hence UDP is used.

Connection lost

- If a player disconnects, AI (same level) will take over the ship.
- Once the player reconnects, he will automatically gain control of his lost ship.

Concept of "server"

- When a game is setup, a randomly chosen player will act as a "temporary server".
- This player will act as the AI of the game and will send messages to all the other players accordingly.
- If a player other than this one disconnects, no change is required.
- If this player disconnects, another active player will be chosen to act as the "temporary server".

The working of the enemy/opponent will be based on the concept of finite state machines where the enemy/ opponent will transition between particular states based on the situation. Different states define different modes of operation which include attacking, dodging or fleeing.

Artificial Intelligence

Enemy

Difficulty Level : Three Difficulty levels: easy medium and hard.
Enemy: Speed of enemy and frequency of bullets fired will be a function of difficulty.

Opponent

Accuracy of the opponent, frequency of bullets fired, and dodging ability of the opponent will be a function of difficulty.

Incorporation

For games with simple entities, Entity pull systems work best where entities call on the AI system when they update themselves.

Time Line

Tentative

Date	Summary
23 March	Extensive planning and design document.
31 March	Graphics of individual components like aliens, ships etc. Basic network communication.
07 April	AI of the ships. Dealing with network outages.
14 April	AI of the aliens. Integrating AI with main game. Testing the network component.
21 April	Integration of all components together.
24 April	Rigorous testing and submission.

End

Thank You