Effects of Adaptive Time Delay on Quality of Experience in First Person Shooter Games
Samin Shahriar Tokey, James Cannon, Saketh Dinasarapu, Ao Jiang, Hanzalah Qamar, Mark Claypool

Introduction
• FPS games are affected by network latency
• Higher latency degrades responsiveness
• Latency can affect fairness
• Time delay can improve fairness by making all players experience same latency
• Adaptive time delay improves responsiveness and player experience by adding latency to the low latency player only during interaction

Methodology
The Study
• A single player shooter game was developed
• Latency simulation was added by delaying inputs
• Adaptive time delay was implemented
• Users played short 75s rounds
• Player's performance was measured and logged by the game

The Game - Zombiefield
• Single player zombie shooter made with Unreal Engine 5.1
• 2 Types of zombies were used
  • Standard (Local)
  • Networked
• Input delay was used to simulate latency

Latency Simulation
• Whenever player had latency, there were input delay on every player action

Adaptive Time Delay
• For adaptive time delay, ray is shot from the players chest to all the networked Zombies chest.

Experimental Design
• Total of 16 main rounds were played with 1 practice round.
• Each round lasts 75 seconds.
• Two questions were asked at the end of each round:
  1. Rate your Quality of Experience for this round - (1) Low to (5) High – A slider was used.
  2. Was this experience acceptable? (Yes/No)
• Configs were shuffled each session
• Latency Conditions: none, fixed and adaptive

Game Screenshot

Adaptive Time Delay

Analysis

Demographics

Quality of Experience

Acceptability

Most users found the experience acceptable for QoE above 3

Future Work

Short Term
• Use an advanced detection technique which covers the entire avatar of the opponent
• Thoroughly evaluate various adaptation strategy

Medium Term
• Implement adaptive time delay on large multiplayer game modes
• Improving adaptive time delay activation method to support various types of weapon

Long Term
• Evaluate effectiveness of adaptive time delay for different genres
• Combine adaptive time delay with other latency compensation techniques