Chair of Computer Graphics and Visualization
TUM School of Computation, Information and Technology
Technical University of Munich

TUM

CHRONOQUEUE

Computer Games Laboratory Course (IN7106)
Project Theme: "Duplicate"

What is ChronoQueue?

ChronoQueue is an action-packed multiplayer arena game where players are competing to be the winner by being the last player surviving the fight with the other players. The game is played in rounds where each round has a time limit. Players control identical robots with different colors, and attack each other with their attack abilities.

Attack Types

Players can attack their opponents by using their melee and ranged attacks. Attacks create a slow down effect on the player they hit, and knock them back a short distance. Different types of attacks have different uses and impacts:

- **Headbutt:** A light melee attack with constant damage and a short range.
- **Charged Punch:** Another melee attack charging and releasing a punch. Charging this attack longer results in more damage and longer attack range.
- **Rocket:** A ranged attack that also deals damage proportional to the time charged. The released bullet has no range limit, but it stops at the first obstacle it hits.

Round Structure

Each round of ChronoQueue is played by 2-4 players, and goes on until either only one player is alive or the round ends after 120 seconds. During the round, with changing intervals, Players' **Phantoms** are spawned. The Phantoms are the unique mechanic of our game.
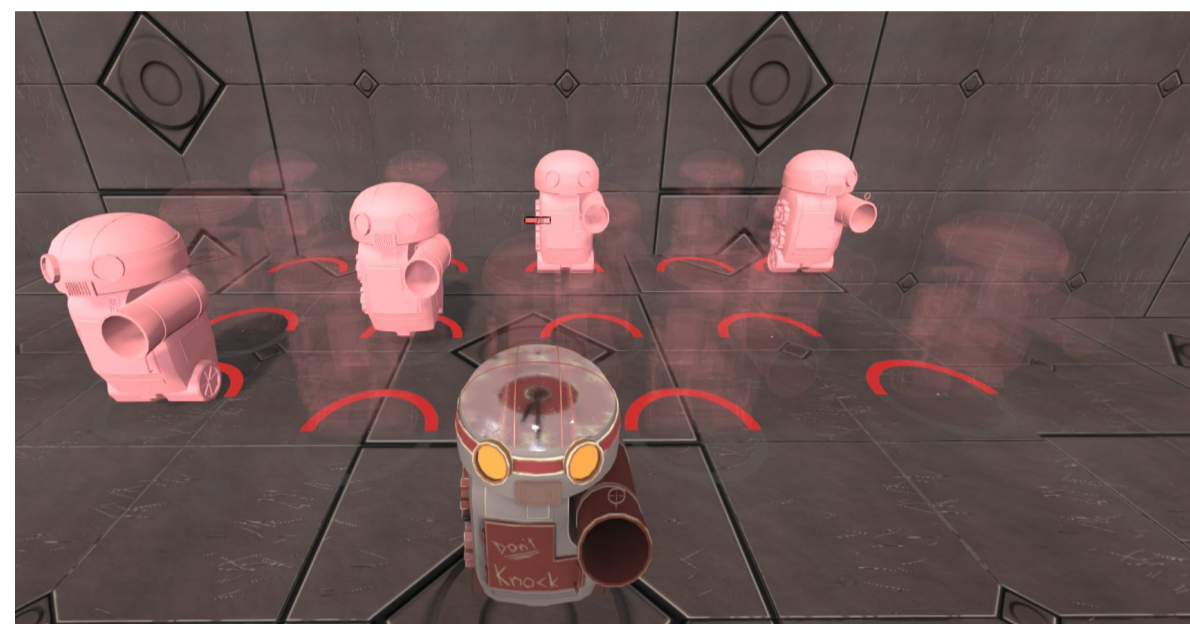
Player with own phantoms and revenants.

Phantoms, Revenants, ChronoGates

As the round progresses, players keep receiving phantoms. The phantoms are the images of past selves of the players; they imitate the actions of their player since the beginning of the round. This growing army of phantoms is called a **ChronoQueue**.

Since Phantoms are ineffective as they are, they need to be activated into **Revenants** in order to impact the current state. Players can place their **ChronoGate**s on their walking path and when the Phantom walks through it, it gets activated for 5 seconds. ChronoGates have a cooldown period after being placed, they can be picked up after this duration.

Revenants' attacks will be hitting the players and other active revenants during their activation period. **This includes the owner of the Revenant and their own Revenants!**

Development Process

For the development of ChronoQueue, we followed the structure of the course. We made progress based on our schedule and delivered intermediary results for our milestones.

We started with a design phase where we brainstormed ideas and discussed them to filter, mix and match. Once we decided on the core idea, we made a design document outlining the important requirements and set a deadline for the intended features.

After the design, we made an analog prototype trying to capture our intended game experience. This helped us make significant changes before committing to a codebase.

Then we developed our game, adding features and fixing bugs, fine tuning and balancing the gameplay parameters, until our Alpha Release. After the release, we had Playtesting sessions with test participants and planned our changes for our final release based on their feedback.

All our textures, models, animations and levels were created by our team member Fabian. We decided that a steampunk theme would be appropriate and engaging for our game idea.

Development Tools

For our project, we decided on an early stage that we want to use free and open-source Godot Engine for development. We found Godot Engine and its own language GDScript to be sufficient and practical for our use case.

The Phantom Mechanics

The technical highlight of our project is the Phantom mechanic. To implement this, we implemented a shared state storage that keeps the player states at each time step. A phantoms spawning at a later time will point to the initial state and set the stored properties to itself. It will then keep iterating and repeating this process, which enables it to basically replay the player's actions and positions.

Players using their melee attacks to hit each other on our newest arena.

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