

Laser Tag Game Documentation

1. Game Setup and Preparation:

1.1 Equipment Setup:

❖ **Phasers (Guns):**

Players carry a handheld device known as a "phaser," which emits infrared beams or laser lights used to "tag" opponents.

❖ **Sensors (Vests & Helmets):**

Players wear lightweight vests or harnesses with built-in infrared (IR) sensors or Light Dependent Resistors (LDRs) that detect hits when a player is shot. These sensors light up or vibrate upon being tagged.

❖ **Score Tracking System:**

Tracks and displays individual and team scores, recording hits and eliminations.

❖ **Arena:**

The game takes place in a darkened, obstacle-filled arena, often enhanced with neon lighting and sound effects to create an immersive experience.

1.2 Team Formation

Players are typically split into two or more teams (e.g., Red vs. Blue).

Each team may have specific roles, such as offence, defence, or special units, depending on the game mode.

1.3 Objective Selection:

❖ **Free –For-All:**

Each player competes individually, aiming to tag as many opponents as possible.

❖ **Team Deathmatch:**

Teams compete to score points by tagging members of the opposing team.

❖ **Domination:**

Teams capture and control strategic points on the map to earn points over time.

❖ **Base Attack/Defend:**

One team defends its base, while the other attempts to capture or destroy it.

2. Game Flow

2.1 Game Start:

- Players enter the arena and take positions.
- A countdown timer initiates the game with a “3-2-1-Go!” prompt.
- After the countdown, players’ phasers and sensors activate, and objective information is displayed (e.g., "Capture the Flag").

2.2 Active Play Phase

❖ **Navigation:**

Players move through the arena, using obstacles for cover.

❖ **Tagging:**

Players aim their phasers at opponents’ sensors to score points.

❖ **Outcomes vary by mode:**

- In some modes, a hit temporarily deactivates the tagged player’s phaser or requires them to respawn.
- Other modes may allow multiple hits (lives) before a player is fully eliminated.

➤ **Special Features (Optional):**

❖ **Power-ups:**

Some arenas have stations providing temporary boosts (e.g., rapid-fire, shields).

❖ **Base Interactions:**

If objectives like flag capture or base defence are in play, players interact with those specific arena areas.

2.3 Scoring:

❖ **Points System:** Points are awarded based on:

- Successful hits on opponents.
- Completing objectives (e.g., capturing a flag, holding a base).
- Teamwork elements, like assisting with objectives.
- Penalties may be applied for “friendly fire” (tagging teammates).

❖ **Feedback System:**

- Vests may vibrate, light up, or sound an alarm when a player is tagged.
- Phasers may display information like score, health, or remaining ammo.

3. Game Structure

3.1 Game Modes:

❖ **Team Battle:**

Teams compete to score the highest points or achieve specific objectives.

❖ **Free-for-All:**

Every player competes individually to tag as many opponents as possible.

❖ **Base Capture:**

Teams attempt to tag and capture the opposing team's base while defending their own.

❖ **King of the Hill:**

Players or teams hold a designated area to earn points over time.

❖ **Capture the Flag:**

Teams work to capture the opponent's flag and return it to their base while defending their own.

❖ **Domination:**

Teams or individuals compete to control various points on the map, earning points for holding these locations.

❖ **Zombie Mode:**

A few players start as "zombies," tagging regular players to turn them into zombies. The game continues until all players are converted or the timer ends.

3.2 **Game Mechanics:**

❖ **Respawn Mechanism:**

After being hit, players may need to wait briefly before rejoining the action. This time varies by game mode.

❖ **Health System:**

Players have a set amount of "lives" or health points. A hit reduces health, and once depleted, players are eliminated or need to respawn.

❖ **Ammo Limits:**

Some modes limit shots, requiring players to reload at designated points or after a cooldown period.

❖ **Power-ups:**

Placed strategically around the arena, power-ups offer temporary advantages, like increased damage or invulnerability.

4. Game End

4.1 **Game Over Trigger:**

❖ **The game ends when:**

A team reaches a set number of points.

The time limit runs out.

An objective is achieved (e.g., flag captured or base defended).

4.2 Post-Game Summary:

- ❖ **After the game, players exit the arena to review performance details:**
 - Individual scores are displayed, including hits, eliminations, and objectives.
 - Team scores are displayed in team-based modes.
 - Top performers or those with special achievements (e.g., MVP, best defender) are recognized.

4.3 Game Review & Feedback:

- Players may receive feedback on accuracy, strategy, and teamwork.
- Some arenas offer scorecards that players can view or print.

5. Arena Design

5.1 Layout:

The arena includes obstacles like walls, pillars, ramps, and tunnels, creating spots for cover, ambush, and defence.

- ❖ **Base Areas:**

Key locations for modes involving base defense or capture, these are clearly marked and placed strategically.

5.2 Lighting & Atmosphere:

- ❖ **Dark lighting:**

Often combined with neon or blacklight elements to create a futuristic theme.

- ❖ **Sound Effects & Music:**

Background music and sound effects add immersion, marking events like hits, power-ups, or game updates.

6. Game Dynamics & Tactics

6.1 Team Tactics:

- ❖ **Offense vs. Defense:**

Teams should strategize their approach for attacking and defending objectives.

- ❖ **Communication:**

Effective communication among teammates is vital for success, especially in team-based modes.

- ❖ **Flanking & Ambushing:**

Players can utilize arena obstacles to surprise opponents with flanking or ambush tactics.

6.2 Player Strategy:

- ❖ **Accuracy Over Quantity:**

Players should aim carefully, as some modes limit shots or penalise missed attempts.

❖ **Mobility:**

Constant movement reduces the chance of being tagged. Players should use obstacles strategically and avoid predictable patterns.

❖ **Power-up Use:**

Controlling power-up stations and timing their use can provide a tactical advantage.

7. Game Customization

❖ **Custom Rule sets:**

Some arenas offer customized rules, allowing adjustments to:

- Number of lives.
- Power-up availability.
- Time limits and score goals.
- Game objectives.

❖ **Theme Integration:**

Certain arenas adopt themes (e.g., space, military) and tailor rules or objectives accordingly.

8. Development Details

8.1 Hardware & Sensors:

❖ **ESP32 Boards:**

The game system utilises ESP32 boards to manage communication and control functions.

❖ **LDR and IR Sensors:**

Infrared sensors or Light Dependent Resistors (LDRs) are integrated into vests to detect hits and record successful tags.

❖ **Laser Lights for Phasers:**

Phasers are equipped with laser lights for visual feedback during tagging.

8.2 Communication:

❖ **ESP-NOW Protocol:**

ESP-NOW is used for low-latency communication between devices, enabling fast data transmission for real-time gameplay.

❖ **WiFi Network:**

The entire system relies on WiFi for stable, synchronized communication across the arena.