UX & Accessibility Guidelines

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> **Last Updated:** December 1, 2025
> **Status:** Draft for Review

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Introduction

This document formalizes the user experience, interface design, and accessibility standards for the R-Type project. It serves as the single source of truth for designers, developers, and QA teams to ensure consistency and quality across all aspects of player interaction.

Purpose

- Define clear expectations for player sensations and game feel
- Establish UI/HUD standards for readability and clarity
- Ensure the game is accessible to players with diverse needs
- Provide measurable criteria for validation and testing

Scope

These guidelines apply to:

- Client application UI and HUD
- In-game visual and audio feedback
- Input systems (keyboard)
- Settings and configuration interfaces

Player Experience (Feel)

Overview

The R-Type experience should evoke the classic feel of arcade shooters while retaining a touch of modernity. Players should feel a balance between power, precision, tension, and reward.

Intended Player Sensations

1. Power & Agency

- **Feeling:** Players should feel in control of a powerful spacecraft capable of devastating attacks
- **Implementation:**
  - Weapons must feel impactful with satisfying visual and audio feedback
  - Player ship movement must be precise and responsive

2. Tension & Challenge

- **Feeling:** Constant awareness of danger with manageable difficulty
- **Implementation:**
  - Boss enemies must telegraph attacks clearly before execution
  - Difficulty should ramp gradually, not spike unexpectedly
  - Near-misses should be clearly distinguishable from hits

3. Clarity & Readability

- **Feeling:** Players always understand what's happening on screen
- **Implementation:**
  - Player ship, projectiles, and enemies must remain visually distinct
  - Critical threats must stand out from background elements
  - UI must never obscure gameplay-critical information

4. Flow State

- **Feeling:** Immersion in the "zone" where skill meets challenge
- **Implementation:**
  - Pacing: 10-15 seconds of calm between intense sections
  - Pattern recognition should be rewarded (enemy behaviors, waves)
  - Progression feels earned, not random

Audiovisual Feedback Rules

Player Actions

Action	Visual Feedback	Audio Feedback
Shoot	Muzzle flash, projectile trail	Crisp "pew" sound
Hit Enemy	Impact flash on enemy, particle burst	Satisfying "hit" sound, pitch varies by enemy
Destroy Enemy	Explosion animation	Explosion sound with bass
Take Damage	Red flash on ship	Impact sound, damage alarm
Death	Large explosion, fragments, fade to black	Dramatic explosion, music fade
Power-up Collect	Glow effect, UI update animation	Positive sound

Boss Enemy Threat Telegraphing

- Telegraph duration: 1000-1500ms
- Visual Cues: Flashing warning + charge anim
- Audio Cues: Loud charge + warning beep

Implementation Requirements:

- Telegraph effects must be distinct from background
- Color coding: Orange = warning, Red = imminent danger
- Animations must clearly indicate attack direction
- Audio warning must be audible above music

Difficulty & Progression

Flow State Support

1. **Pattern Design**
    - Enemy waves should follow recognizable patterns
    - First encounter of a pattern should be easier (learning phase)
    - Patterns should repeat with variations to reward mastery
2. **Pacing Structure**

```
Easy Wave (15s) → Medium Wave (20s) → Calm (10s) → Hard Wave (25s) → Boss
```

3. **Reward Timing**
    - Power-ups should appear after difficult sections
    - Score multipliers should reward continuous play without death
    - Visual rewards (particles, screen effects) for combos
4. **Difficulty Curve**
    - First 3 levels: Learning mechanics
    - Levels 4-6: Mastery and challenge
    - Level 7+: Expert play with all mechanics combined

Readability & UI/HUD

Visual Hierarchy

Priority Levels

Level 1 (Critical - Always Visible):

- Player health/shield
- Lives remaining
- Active weapon/power-up status
- Warning indicators (low health, boss alerts)

Level 2 (Important - Visible but Non-Intrusive):

- Score
- Current level/stage
- Multiplier counter

Level 3 (Secondary - Can Be Minimized):

- Settings/pause button
- Network status (multiplayer)
- FPS counter (debug mode)

Typography Rules

Minimum Sizes

- **Critical Info (HP, Lives, Shield):** 16px minimum (default), scales with HUD
- **Standard UI Text (Score, Level, Multiplier):** 14px minimum
- **Labels/Captions:** 12px minimum

Font Requirements

- **Primary Font:** High-contrast, sans-serif (e.g., "Roboto", "Inter", "Arial")
- **Accent Font (Titles):** May be stylized but must remain legible
- **Spacing:**
  - Line height: 1.4-1.6x font size
  - Letter spacing: 0-5% of font size for readability

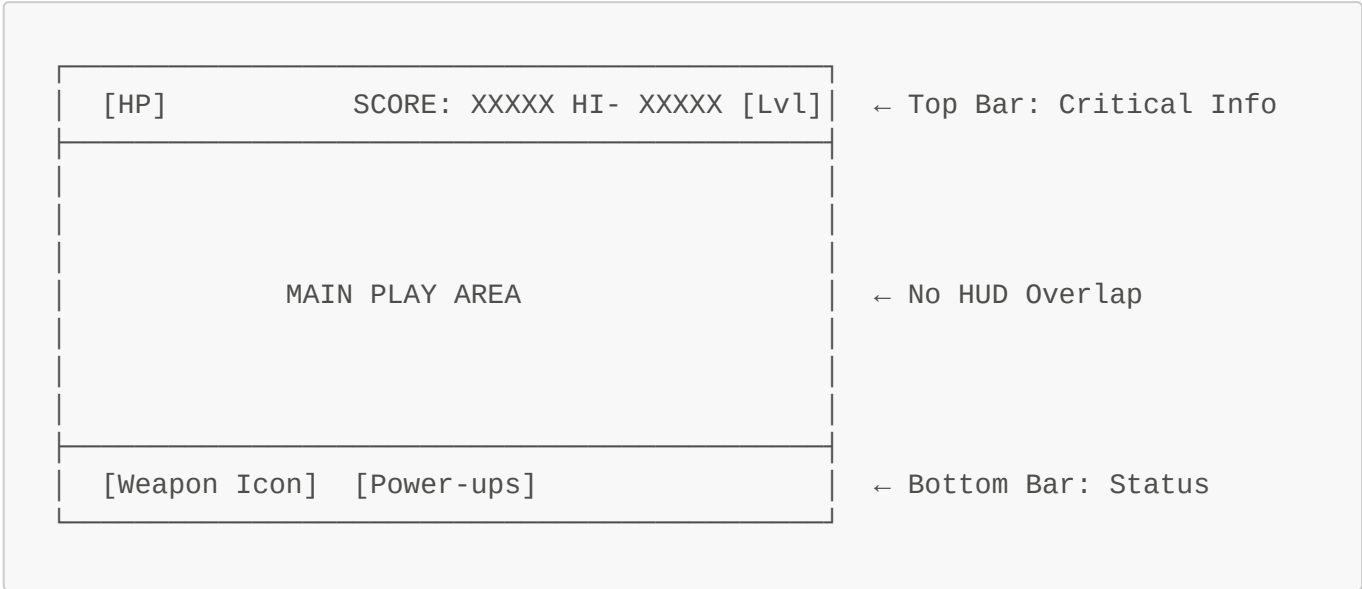
Readability Standards

- Text must pass WCAG AA contrast requirements (4.5:1 for normal text)
- Critical text should pass WCAG AAA (7:1) when possible
- Text must be readable on any background (use drop shadows, outlines, or semi-transparent backing)

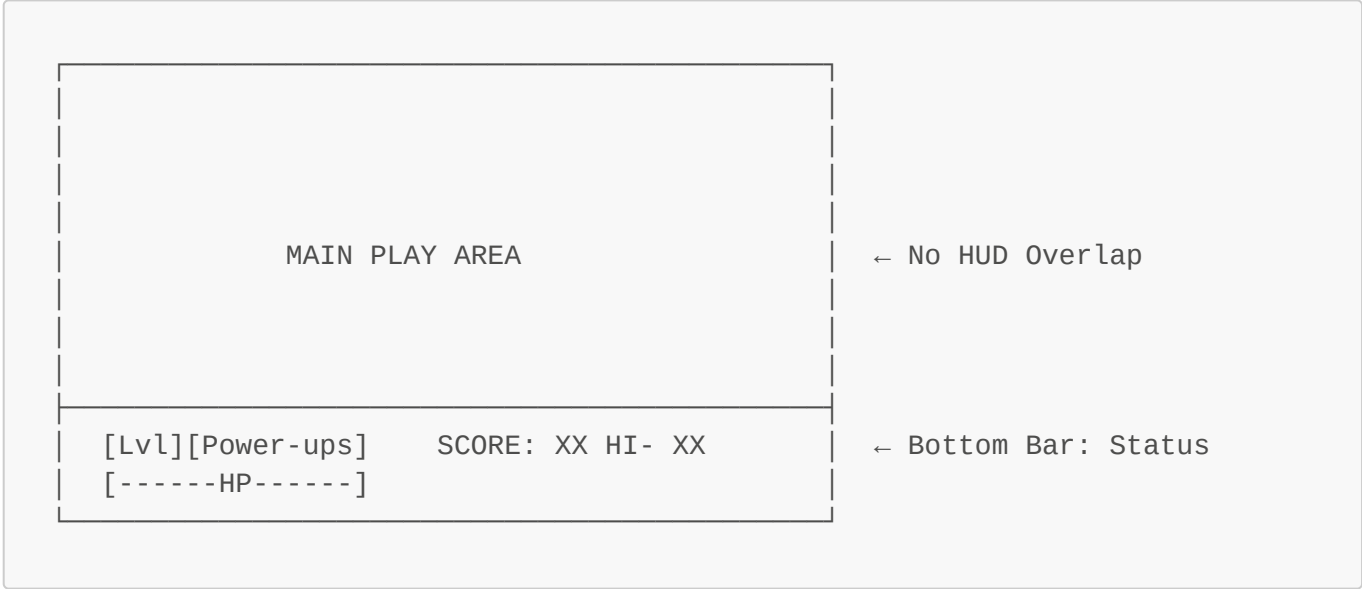
HUD Layout

Fixed Areas

First proposed layout:



Second proposed layout (alternative):



Layout Rules

1. **No Overlap:** HUD elements must NOT overlap main play area (15% top/bottom margins)
2. **Safe Zones:** Critical HUD must stay within 90% of screen (accommodate TV overscan)
3. **Symmetry:** Balance left/right elements for aesthetic coherence
4. **Anchoring:** UI elements must be anchored (not floating) for predictability

Accessibility Requirements

Overview

The game must be playable by the widest possible audience, including players with visual, auditory, motor, and cognitive disabilities.

Input Accessibility

1. Full Remapping

Requirement: Every game action must be remappable.

- **Keyboard:** All keys must be rebindable
- **Mouse:** Optional support, but not required for core gameplay

Default Layouts:

Keyboard (WASD):

```
Movement: WASD (or ZQSD for AZERTY keyboards) or Arrow Keys
Shoot: Space or Left Ctrl
Special: E or Right Shift
Pause: Esc or P
```

Implementation:

- Settings menu must show current bindings
- Rebinding must detect conflicts and warn user
- All bindings must persist between sessions

2. Input Assistance

- **Toggle Autofire:** Hold button vs. toggle option for shooting
- **Input Buffering:** Accept inputs 50ms before action is available (reduce timing frustration)

Visual Accessibility

1. HUD Scaling

Requirement: All UI elements must scale uniformly.

- **Range:** 50% - 200% of default size
- **Increments:** 25% steps (50%, 75%, 100%, 125%, 150%, 175%, 200%)
- **Preserve Layout:** Scaling must not break layout or cause overlaps

2. Colorblind Modes

Requirement: Provide at least 3 colorblind presets.

Mode	Target Condition	Implementation
Deuteranopia	Red-green (green weak)	Replace green → blue/cyan, red → magenta/orange
Protanopia	Red-green (red weak)	Replace red → dark yellow/brown, green → teal
Tritanopia	Blue-yellow	Replace blue → red/pink, yellow → cyan/white

Elements That Must Remain Distinguishable:

- Player vs. enemy projectiles
- Health (low vs. full)
- Power-up types
- Enemy types/threat levels
- Team colors (multiplayer)

Validation: Use colorblind simulation tools (e.g., Coblis, Color Oracle) to verify.

3. High Contrast Mode

- Increase contrast of all UI elements
- Thicker outlines on player/enemies/projectiles (2-3px)
- Disable or reduce particle effects
- Increase brightness of telegraphed attacks

4. Epilepsy & Flashing Effects

Requirement: Implement flashing reduction options.

- **Warning:** Display epilepsy warning on first launch

Audio Accessibility

1. Subtitles/Captions

Requirement: All dialogue and critical sound cues must have text equivalents.

- **Sound Cues:** Text indicators for off-screen events ("Explosion [left]", "Enemy approaching [behind]")
- **Formatting:**
  - Subtitle size: Scalable (same as HUD scaling)
  - Background: Semi-transparent black box for readability
  - Color coding: Optional (e.g., ally=blue, enemy=red)

2. Audio Mixing

- **Independent Volume Controls:**
  - Master volume
  - Music volume
  - SFX volume
- **Range:** 0-100% in 5% increments + Mute option

3. Visual Sound Indicators

- **On-Screen Indicators:** Optional visual cues for important sounds (explosions, enemy spawns, warnings)
- **Directional:** Arrows or icons indicating sound source direction

Motor Accessibility

1. Difficulty Settings

- **Multiple Difficulty Levels:** Easy, Normal, Hard, Expert
- **Adjustable Parameters:**
  - Enemy health
  - Enemy speed
  - Player invulnerability duration after damage
  - Number of lives

2. Pause/Slow-Motion

- **Pause Anytime:** Allow pausing during gameplay (single-player)

Cognitive Accessibility

1. Clear Tutorial

- **Progressive Disclosure:** Introduce mechanics one at a time
- **Practice Mode:** Safe environment to learn without pressure

Measurable Acceptance Criteria

Visual Contrast

Element	Minimum Contrast Ratio	Standard
Critical UI Text (HP, Lives)	7:1	WCAG AAA
Standard UI Text (Score, Labels)	4.5:1	WCAG AA
Large Text (Titles >18px)	3:1	WCAG AA
Interactive Elements (Buttons)	3:1	WCAG AA
Player vs. Background	5:1	Custom
Enemy Projectiles vs. Background	4:1	Custom

Testing Tools:

- WebAIM Contrast Checker
- Colour Contrast Analyser (CCA)

UI Size & Scaling

Metric	Default	Minimum (50% scale)	Maximum (200% scale)
Critical Text	16px	8px	32px
Standard Text	14px	7px	28px
Button Height	40px	20px	80px
Icon Size	32x32px	16x16px	64x64px

Validation:

- Test at all scale increments (50%, 75%, 100%, 125%, 150%, 175%, 200%)
- No overlapping elements at any scale
- Text remains legible at minimum scale (user testing)

Performance Targets

Metric	Target	Hardware Reference
Frame Rate	60 FPS stable	Mid-range PC (GTX 1060 / RX 580)
Loading Time	< 3s for level transitions	SSD storage
Network Latency Tolerance	Playable up to 150ms RTT	Multiplayer mode

Testing Methodology:

- Use high-precision timer for latency measurements
- Test on minimum spec hardware
- 30-minute stress test with no frame drops

Accessibility Feature Coverage

Pass/Fail Criteria

Feature	Pass Criteria	Test Method
Full Remapping	100% of game actions remappable	Manual testing + automated check
HUD Scaling	All scales (50%-200%) functional without overlap	Visual inspection at all scales
Colorblind Modes	All 3 modes implemented + validation with simulator	Coblis/Color Oracle screenshots
Subtitles	100% of audio cues have text equivalent	Audio track audit
Keyboard Navigation	All menus navigable without mouse	Unplug mouse test
Epilepsy Warning	Displayed on first launch	QA checklist
Contrast Ratios	All UI elements meet minimum contrast	Automated tool + manual spot checks

Coverage Requirements

- **Remapping Coverage:** 100% of actions
- **Subtitle Coverage:** 100% of critical sounds, 90%+ of all sounds
- **Colorblind Validation:** All 3 presets must pass simulation test
- **Keyboard Navigation:** 100% of UI accessible without mouse

Latency & Responsiveness

Input Type	Action	Max Acceptable Latency

Input Type	Action	Max Acceptable Latency
Keyboard	Movement	16ms (1 frame @ 60fps)
Keyboard	Shoot	33ms (2 frames @ 60fps)
Menu Navigation	Button press → action	100ms

Measurement:

- Use high-speed camera to measure screen response
- Test on minimum and recommended hardware
- Average over 100 samples

Developer Checklist

Quick Reference for Implementation

Use this checklist to ensure compliance with all guidelines during development and code review.

Player Experience

- ☐ All weapons have satisfying visual feedback (muzzle flash, impact effects)
- ☐ All weapons have distinct audio feedback
- ☐ Boss enemy attacks are telegraphed with visual cues (flashing, animation)
- ☐ Boss enemy attacks are telegraphed with audio cues
- ☐ Telegraph duration meets minimum requirements (1000ms major)
- ☐ Player death sequence is dramatic and clear (1-2s)
- ☐ Difficulty progression follows documented pacing structure
- ☐ Power-ups appear after difficult sections

UI/HUD Readability

- ☐ Critical info (HP, lives) is in fixed top/bottom bars
- ☐ HUD does not overlap main play area (15% margins)
- ☐ Text meets minimum size requirements (16px critical, 14px standard)
- ☐ Text contrast meets WCAG AA (4.5:1) or AAA (7:1) where possible
- ☐ Screen effects respect duration limits (≤200ms shake, ≤150ms flash)
- ☐ UI animations are smooth and brief (≤300ms)

Accessibility - Input

- ☐ All game actions are remappable (keyboard)
- ☐ Rebinding system detects and warns of conflicts
- ☐ Default key bindings are documented
- ☐ Toggle autofire option is implemented
- ☐ Input buffering is implemented (50ms window)

Accessibility - Visual

- ☐ HUD scaling is implemented (50%-200% in 25% increments)
- ☐ Scaling does not break layout at any increment
- ☐ Colorblind mode: Deuteranopia implemented
- ☐ Colorblind mode: Protanopia implemented
- ☐ Colorblind mode: Tritanopia implemented
- ☐ Colorblind modes validated with simulation tool
- ☐ High contrast mode implemented
- ☐ Epilepsy warning displayed on first launch

Accessibility - Audio

- ☐ Subtitles for all critical sound cues
- ☐ Subtitle text is scalable
- ☐ Subtitle background is semi-transparent
- ☐ Independent volume controls (master, music, SFX)
- ☐ Volume range is 0-100% with mute option
- ☐ Visual sound indicators are optional and implemented

Accessibility - Other

- ☐ Multiple difficulty levels implemented (Easy, Normal, Hard, Expert)
- ☐ Pause functionality works in single-player
- ☐ Tutorial introduces mechanics progressively

Acceptance Criteria

- ☐ All critical UI text meets 7:1 contrast ratio
- ☐ All standard UI text meets 4.5:1 contrast ratio
- ☐ Player vs. background contrast is ≥5:1
- ☐ Enemy projectiles vs. background contrast is ≥4:1
- ☐ Game maintains 60 FPS on reference hardware
- ☐ Input latency is < 50ms (measured)
- ☐ All accessibility features pass/fail tests are met
- ☐ Remapping coverage is 100%
- ☐ Subtitle coverage is ≥90%

References

Standards & Guidelines

- WCAG 2.1 Guidelines - Web Content Accessibility Guidelines
- Game Accessibility Guidelines - Industry best practices
- AbleGamers Resources - Resources for accessible game design

Testing Tools

- **Contrast Checkers:**
  - WebAIM Contrast Checker
  - Colour Contrast Analyser (CCA)
- **Colorblind Simulators:**
  - Coblis
  - Color Oracle
- **Performance Profiling:**
  - Built-in engine profiler
  - Frame timing tools (see technical documentation)

Internal Documentation

- Contributing Guidelines
- Directory Structure

Revision History

Version	Date	Author	Changes
1.0	2025-12-01	Initial Draft	Complete guideline creation

Feedback & Contributions

This is a living document. If you have suggestions, concerns, or questions about these guidelines:

1. Open an issue on the project repository
2. Tag with `documentation` and `accessibility` labels
3. Reference the specific section and guideline

All team members are encouraged to contribute to improving these standards.

Document Maintained By: Design & UX Team
Review Cycle: Quarterly or as needed for major updates
Next Review Date: March 1, 2026