

Development of an Arcade Racing Game for Android and iOS



Client Overview

- Client is an industry-leading video game developer and publisher at the forefront of the free-to-play, games as a service model. Their games have been played by more than 120 million people worldwide on mobile and they are trailblazers of the F2P and cross-play movements.



Key Requirements

- The client wanted to develop an arcade-style mobile car racing game targeted for iOS and Android devices. The game offered single-player and multiplayer modes, allowing players to compete in a variety of race formats, including time trials, sprints, and circuit races. Players earned XP by winning races, performing stunts, and completing challenges. Accumulating XP allowed players to unlock new cars, customizations, and racetracks and city zones. The game's progression system introduced prerequisites for races based on engine capacity, creating a sense of achievement as players move through the game.



Game Features

- **Single-Player Campaign:** A series of races and challenges that take players through different environments, from city streets to desert landscapes. Players unlock new tracks and cars as they progress.
- **Multiplayer Mode:** Compete with friends or other players worldwide in real-time races. Players can join daily and weekly tournaments and climb the leaderboards.
- **XP and Rewards:** Players earn XP through races and achievements, unlocking new cars, customization options, and other game features.
- **Car Customization:** Players can customize their cars with different paint jobs, decals, and performance upgrades to improve speed, handling, and acceleration.
- **Prerequisites for Races:** Races have specific requirements based on engine capacity, which encourages players to unlock and upgrade various cars.
- **Intuitive Controls:** The game uses touch and tilt controls to steer, accelerate, and brake, allowing for quick learning and smooth gameplay.



Challenges Faced During Development

- **Optimization for Mobile Platforms:** Ensuring the game runs smoothly on a wide range of devices, from low-end to high-end smartphones and tablets, was a significant challenge. The development team needed to balance graphical fidelity with performance optimization.
- **Multiplayer Synchronization:** Building a stable and responsive multiplayer mode required careful synchronization of game state across different devices. Latency and connectivity issues had to be addressed to ensure a seamless experience.
- **Monetization Strategy:** The team had to find a monetization strategy that balanced generating revenue with maintaining a positive player experience. This involved considering in-app purchases, advertisements, and a premium model.
- **Game Balance and Progression:** Creating a progression system that felt rewarding without being overly grindy required careful tuning. The team had to ensure that unlocking new cars and racetracks felt achievable while providing a sense of accomplishment.
- **Diverse Content:** To keep players engaged, the team needed to create a variety of tracks, cars, and customization options. This required significant effort in designing and testing content to ensure it met quality standards.
- **User Experience and Controls:** Designing intuitive and responsive controls for a mobile platform was a key challenge. The team needed to ensure that the controls were easy to learn but provided enough depth for skilled players.
- **Testing and QA:** With a game of this scale, extensive testing and quality assurance were necessary to ensure a bug-free experience. The team had to conduct thorough testing across different devices and network conditions.



Our Solution

To meet the demands of developing an arcade car racing game for mobile platforms, our development team chose Unity Engine for its flexibility, extensive toolset, and cross-platform capabilities.

Unity Engine was selected for the following reasons:

- **Cross-Platform Development:** Unity allowed the team to develop the game for both iOS and Android simultaneously, saving time and resources.
- **Rich Ecosystem:** Unity's Asset Store provided a wealth of assets, shaders, and plugins, allowing the team to accelerate development and focus on customization.
- **Advanced Physics and Graphics:** Unity's built-in physics engine and support for advanced graphics features enabled the team to create a visually appealing racing game with realistic car behaviour and effects.

Optimization Techniques for Mobile Devices

Given the diversity of mobile hardware, from high-end devices to budget smartphones, optimizing the game was crucial for a smooth experience. The team employed the following techniques:

- **Texture Optimization:** The team reduced texture resolutions for distant objects and applied texture compression to minimize memory usage. Mipmapping was used to ensure textures were rendered at appropriate resolutions based on distance from the camera.
- **Level of Detail (LOD):** Objects in the game had multiple levels of detail. The engine would render simpler versions of objects when viewed from a distance, reducing the load on the GPU and maintaining smooth frame rates.
- **Dynamic Batching and Culling:** The team used Unity's dynamic batching to reduce draw calls, improving rendering efficiency. Occlusion culling was implemented to prevent rendering objects that were not visible to the camera, further reducing resource usage.
- **Optimized Shaders and Lighting:** Custom shaders were created to balance visual quality and performance. The team used simplified lighting models for most objects, with detailed lighting applied only to key elements like cars and track surfaces. Baking static lighting into textures further reduced real-time processing requirements.

- **Memory Management:** Efficient memory management techniques, such as object pooling, were employed to prevent excessive memory allocation and deallocation during gameplay. This reduced the chances of performance bottlenecks and crashes.
- **Asset Bundling and Compression:** The game assets were bundled and compressed to reduce the overall size of the game and decrease loading times. This was especially useful for minimizing download size and ensuring the game could be played on devices with limited storage capacity.
- **Quality Settings and Device-Specific Adjustments:** The team implemented quality settings that allowed the game to adjust visual fidelity based on the capabilities of the device. This ensured that high-end devices could enjoy enhanced graphics, while lower-end devices could still run the game smoothly.

Conclusion: The team was able to deliver a compelling arcade racing experience that was accessible to a wide audience, regardless of their mobile device's specifications. The title emerged as a successful arcade car racing game, combining engaging gameplay, a rewarding progression system, and robust multiplayer functionality. Despite the challenges faced during development, the team delivered a polished and enjoyable gaming experience that continues to attract players worldwide.



USA

Cupertino | Princeton
Toll-free: +1-888-207-5969

INDIA

Chennai | Bengaluru | Mumbai | Hyderabad
Toll-free: 1800-123-1191

SINGAPORE

Singapore
Ph: +65 6812 7888

UK

London
Ph: +44 1420300014