DriveRight VR: Interactive Driver Education Simulator

Overview
DriveRight VR is a first-person virtual reality driving simulator that teaches permit and driver's license rules through immersive control, real-time behavior tracking, and consequence-based learning. The system verifies safe-driving habits (scanning, full stops, signaling) using VR head tracking and vehicle telemetry rather than relying only on multiple-choice answers.

Purpose & Audience
Goal: Build correct real-world driving habits aligned with DMV standards by requiring the same observations and decisions tested on permit and behind-the-wheel exams.
Target Audience: Teen and first-time drivers (ages 15–18), permit holders, and driving schools.

Core VR Gameplay & Safety Validation Features
• **VR First-Person Driving:** Player drives from the driver's seat with steering, acceleration, and braking.
• **Head & Gaze Tracking:** Confirms real scanning behavior:
– Left turns require left → center → right checks before proceeding.
– Crosswalks require looking toward pedestrians and cyclists.
– Lane changes require mirror check, turn signal, and shoulder check.
• **Complete Stop Detection:** Vehicle speed must reach 0 for a minimum dwell time at stop signs and red lights; rolling stops trigger citations or collisions.
• **Speed & Zone Enforcement:** School zones, construction zones, and residential limits dynamically adjust hazards.
• **Right-of-Way Logic:** Four-way stops, unprotected left turns, yields, and roundabouts validated against DMV rules.
• **Following Distance:** Time-headway checks reinforce the 2–3 second rule with sudden-braking tests.
• **Decision Prompts:** Critical moments pause gameplay and present three realistic choices; outcomes are simulated in real time.
• **Immediate Feedback:** Each outcome explains the exact rule violated or followed.

User Flow
Start & VR Comfort Setup → Tutorial Drive → Free Drive with Scenario Triggers → Decision Prompt → Outcome Simulation → Rule Explanation → Continue or Retry → End-of-Session Performance Report.

User Interface & Visual Design
Minimal in-car HUD (speed, posted limit, turn signals, alerts). Decision prompts appear as clear VR overlays with large text and simple inputs. Visual cues guide attention without breaking immersion.

Technical Overview
Stack: JavaScript, Three.js, WebXR (VR), HTML/CSS overlays; optional physics engine.
Architecture: Driving Controller, Vehicle Telemetry, Head/Gaze Validator, Scenario Manager, Decision Engine, Outcome Simulator, Feedback & Reporting System.
Data Model: Scenario objects map triggers to required checks, decisions, and outcomes; player state logs head movements, full stops, signaling, speed compliance, and errors.

Future Applications & Real-World Impact
DriveRight VR is designed to scale beyond a classroom project. In the future, the system could be adopted by California driving schools or state agencies as a certified training tool. Logged driving behaviors and validated scenario performance could count toward required behind-the-wheel practice hours or, with regulatory approval, serve as part of a standardized virtual driving exam. This positions DriveRight VR as a safer, data-driven supplement—or alternative—to traditional driver testing.

Conclusion
By combining VR immersion, behavioral validation, and rule-based decision logic, DriveRight VR transforms

driver education from memorization into habit formation while demonstrating a technically ambitious and socially impactful application of computer science.