Product Requirements Document (PRD)

PRD — AI RACE ENGINEER SIMULATOR

Product Overview

An LLM-powered multi-agent system that simulates F1 race engineering decisions by analyzing telemetry data and providing natural language strategy recommendations with human-like reasoning.

Core Features

Telemetry Analysis Agent

- Ingests real-time or historical telemetry (speed, throttle, brake, tire temps)
- Detects anomalies and performance degradation patterns
- Tracks lap-by-lap performance metrics

Strategy Prediction Agent

- Predicts tire degradation curves based on compound, track, temperature, and driving style
- Calculates optimal pit windows considering undercut/overcut opportunities
- Simulates race scenarios with different strategy options

Communication Agent

- Translates technical data into race engineer-style natural language
- Provides contextual explanations for strategy decisions
- Generates real-time recommendations with tradeoff analysis

Verstappen Style Simulator

- Models aggressive driving characteristics (early braking, pointy front-end preference)

- Compares optimal strategies for aggressive vs. conservative driving styles
- Adjusts tire degradation models based on driving aggression metrics

User Stories

- As a user, I can upload race telemetry and receive lap-by-lap strategy recommendations
- As a user, I can ask "Why pit now?" and receive multi-factor explanations (tire deg, traffic, weather)
- As a user, I can compare how Verstappen's style changes pit timing vs. a baseline driver

Success Metrics

- Prediction accuracy: tire degradation within ±3 laps of actual pit stops
- Explanation quality: coherent natural language with 3+ reasoning factors
- Response time: <5 seconds for strategy recommendations

Out of Scope (V1)

- Live race data streaming
- Multi-car race simulation
- Mechanical failure prediction