

# Development Log

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## Project Goal

To build an agent (MyAgent.py) that navigates racetracks efficiently using a rule-based approach. The goal is to avoid crashes, especially in tight curves, while maintaining as high a speed as possible.

## Agent Design Overview

The agent relies on 5 LIDAR sensor readings:

left, mid\_left, center, mid\_right, right

These represent distances to walls around the car. Based on these values and the car's velocity, the agent selects from directional and speed-based actions.

## Core Logic Components

Metric	Result
Max Speed	0.550
Average Speed	0.201
Behavior in Curves	Slow in small curves, faster in wide ones

## Strengths

- The car rarely crashes even on tight spirals.
- Maintains safe lateral spacing using side LIDAR and balance.

## Weaknesses

- Too cautious in small curves, especially at low speed.
- Doesn't differentiate between tight and wide turns.
- Never uses full allowed speed caps at 0.5.

## Future Improvements

- Incorporate mid\_left and mid\_right to detect curve direction and open space.
- allow higher velocity when curves are wide.
- Add acceleration boosters in straight segments.
- Consider switching to a learning-based agent for adaptive speed control.

Track: 8 (Spiral)

Iterations:

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Iteration 1. Velocity: 0.05, LIDAR: [0.68, 0.98, 1.2, 1.4, 2.6], Action: ('straight', 'accelerate'), TotalReward: 0.02  
Iteration 2. Velocity: 0.00, LIDAR: [0.7, 1.1, 1.3, 1.5, 2.9], Action: ('right', 'brake'), TotalReward: 0.03  
Iteration 3. Velocity: 0.05, LIDAR: [0.69, 1.0, 1.2, 1.5, 2.8], Action: ('straight', 'accelerate'), TotalReward: 0.05  
Iteration 4. Velocity: 0.00, LIDAR: [0.71, 1.1, 1.3, 1.6, 3.1], Action: ('right', 'brake'), TotalReward: 0.06  
Iteration 5. Velocity: 0.05, LIDAR: [0.7, 1.1, 1.3, 1.6, 3.0], Action: ('straight', 'accelerate'), TotalReward: 0.08

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Iteration 571. Velocity: 0.25, LIDAR: [1.5, 2.5, 2.8, 3.1, 1.4], Action: ('right', 'coast'), TotalReward: 99.21  
Iteration 572. Velocity: 0.30, LIDAR: [1.4, 2.2, 2.5, 2.8, 3.8], Action: ('straight', 'accelerate'), TotalReward: 99.44  
Iteration 573. Velocity: 0.25, LIDAR: [1.4, 2.1, 2.4, 2.7, 3.6], Action: ('right', 'brake'), TotalReward: 99.67  
Iteration 574. Velocity: 0.20, LIDAR: [1.4, 2.1, 2.4, 2.6, 3.5], Action: ('right', 'brake'), TotalReward: 99.86  
Iteration 575. Velocity: 0.15, LIDAR: [1.5, 2.1, 2.3, 2.6, 3.5], Action: ('right', 'brake'), TotalReward: 125.53

### **Final Summary:**

Total Iterations: 575  
Total Reward: 125.53  
Average Speed: 0.213  
Max Speed: 0.550