

1 A Predicted Environment

| Type | Time | Position | Speed | Acc | Steer |
|-------|------|---------------------|-------|-------|--------|
| Car1 | 0 | (x: 2.5, y: 5) | 7.42 | -0.05 | -7.25 |
| | 2 | (x: 1.67, y: 18.34) | 6.37 | -0.48 | -11.10 |
| | 4 | (x: 0, y: 29.88) | 5.44 | -0.24 | 0 |
| | 6 | (x: 0, y: 40.87) | 5.09 | -0.18 | 0 |
| | 8 | (x: 0, y: 49.76) | 3.89 | -1.44 | 0 |
| Car2 | 0 | (x: -2.5, y: 15) | 0 | 0 | 0 |
| | 2 | (x: -2.5, y: 15) | 0 | 0 | 0 |
| | 4 | (x: -2.5, y: 15) | 0 | 0 | 0 |
| | 6 | (x: -2.5, y: 15) | 0 | 0 | 0 |
| | 8 | (x: -2.5, y: 15) | 0 | 0 | 0 |
| Ped1 | 0 | (x: 0.23, y: 48) | 0 | 0 | 0 |
| | 2 | (x: 0.23, y: 48) | 0 | 0 | 0 |
| | 4 | (x: 0.23, y: 48) | 0 | 0 | 0 |
| | 6 | (x: 0.23, y: 48) | 0 | 0 | 0 |
| | 8 | (x: 0.23, y: 48) | 0 | 0 | 0 |
| TL-ID | Time | Color | Blink | — | — |
| TL-0 | 0 | GREEN | False | — | — |
| | 2 | YELLOW | False | — | — |
| | 4 | YELLOW | False | — | — |
| | 6 | YELLOW | False | — | — |
| | 8 | RED | False | — | — |

2 Performance Comparison Between REDriver and Apollo6.0

| Scenario | Driver | θ | pass/total | robustness | avg time |
|---------------------------|---------------|----------|---------------|------------|----------|
| Double-Lined Junction | Apollo6.0 | - | 30/100 | 0.24 | 74.79s |
| | REDriver(6.0) | 0.0 | 84/100 | 0.78 | 50.53s |
| | REDriver(6.0) | 0.3 | 94/100 | 1.08 | 46.35s |
| | REDriver(6.0) | 0.6 | 94/100 | 1.14 | 46.95s |
| | REDriver(6.0) | 0.9 | 97/100 | 1.09 | 44.13s |
| | REDriver(6.0) | 1.2 | 87/100 | 0.83 | 51.91s |
| Single-Direction Junction | Apollo6.0 | - | 7/100 | 0.13 | 56.35s |
| | REDriver(6.0) | 0.0 | 47/100 | 0.48 | 57.18s |
| | REDriver(6.0) | 0.3 | 89/100 | 0.99 | 55.76s |
| | REDriver(6.0) | 0.6 | 91/100 | 0.93 | 56.28s |
| | REDriver(6.0) | 0.9 | 84/100 | 0.79 | 55.45s |
| | REDriver(6.0) | 1.2 | 53/100 | 0.58 | 58.51s |
| T-Junction | Apollo6.0 | - | 18/100 | 0.17 | 68.28s |
| | REDriver(6.0) | 0.0 | 39/100 | 0.44 | 62.69s |
| | REDriver(6.0) | 0.3 | 42/100 | 0.48 | 63.04s |
| | REDriver(6.0) | 0.6 | 55/100 | 0.72 | 61.24s |
| | REDriver(6.0) | 0.9 | 49/100 | 0.50 | 62.19s |
| | REDriver(6.0) | 1.2 | 31/100 | 0.42 | 63.25s |

3 Overhead of REDriver When Built on Apollo 6.0

| Scenario | Driver | θ | avg fixes | max fixes | fix (%) | avg time | max time | time (%) |
|---------------------------|---------------|----------|-----------|-----------|---------|----------|----------|----------|
| Double-Lined Junction | REDriver(6.0) | 0.0 | 23.41 | 37 | 4.61% | 1.78ms | 11.82ms | 4.95% |
| | REDriver(6.0) | 0.3 | 23.62 | 36 | 4.64% | 1.96ms | 10.85ms | 4.94% |
| | REDriver(6.0) | 0.6 | 34.58 | 53 | 6.69% | 1.96ms | 8.30ms | 4.73% |
| | REDriver(6.0) | 0.9 | 39.02 | 85 | 7.21% | 1.89ms | 10.30ms | 5.01% |
| | REDriver(6.0) | 1.2 | 106.96 | 222 | 20.45% | 2.34ms | 9.93ms | 6.06% |
| Single-Direction Junction | REDriver(6.0) | 0.0 | 13.45 | 16 | 3.30% | 1.75ms | 7.48ms | 3.95% |
| | REDriver(6.0) | 0.3 | 16.05 | 20 | 3.91% | 1.61ms | 7.58ms | 4.32% |
| | REDriver(6.0) | 0.6 | 15.87 | 21 | 3.86% | 1.54ms | 6.48ms | 4.18% |
| | REDriver(6.0) | 0.9 | 16.65 | 24 | 4.12% | 1.61ms | 7.38ms | 4.75% |
| | REDriver(6.0) | 1.2 | 172.37 | 186 | 41.84% | 1.86ms | 9.40ms | 5.12% |
| T-Junction | REDriver(6.0) | 0.0 | 34.67 | 48 | 7.00% | 1.75ms | 9.86ms | 4.82% |
| | REDriver(6.0) | 0.3 | 37.29 | 49 | 7.47% | 1.87ms | 9.77ms | 5.02% |
| | REDriver(6.0) | 0.6 | 36.58 | 53 | 7.30% | 1.88ms | 8.38ms | 4.51% |
| | REDriver(6.0) | 0.9 | 38.82 | 52 | 7.49% | 1.83ms | 11.00ms | 4.86% |
| | REDriver(6.0) | 1.2 | 208.09 | 293 | 40.09% | 1.91ms | 10.03ms | 5.60% |