Developing, Analyzing, and Evaluating Self-Drive Algorithms

NSF Self-Drive REU 2022

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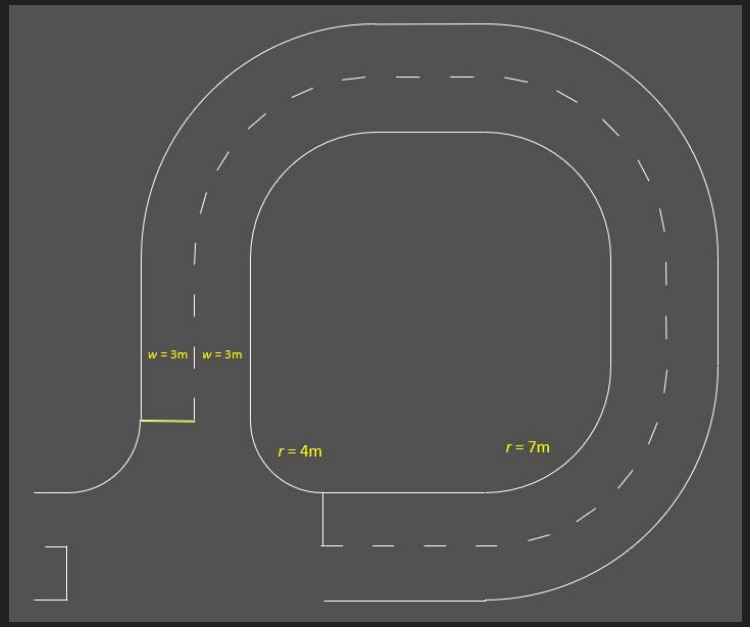
Introduction

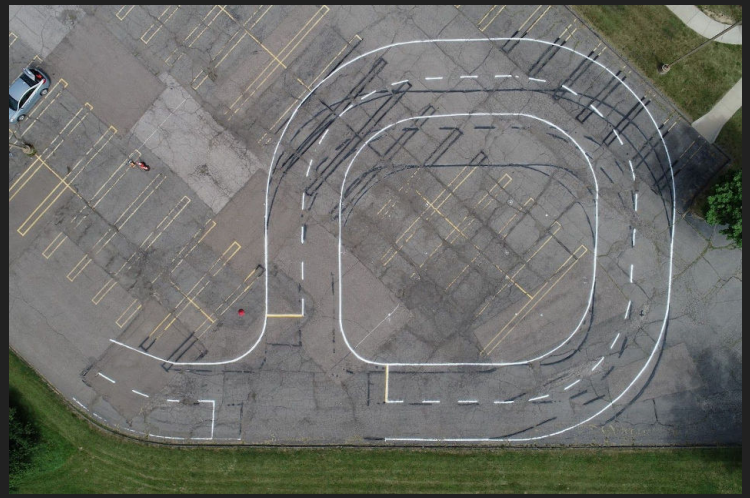
Equipment


TURNING RADIUS
150 in. (381 cm)
HEIGHT:
73 in.
(185.4 cm)
LENGTH:
103 in.
(262 cm)
WIDTH:
55.5 in.
(141 cm)

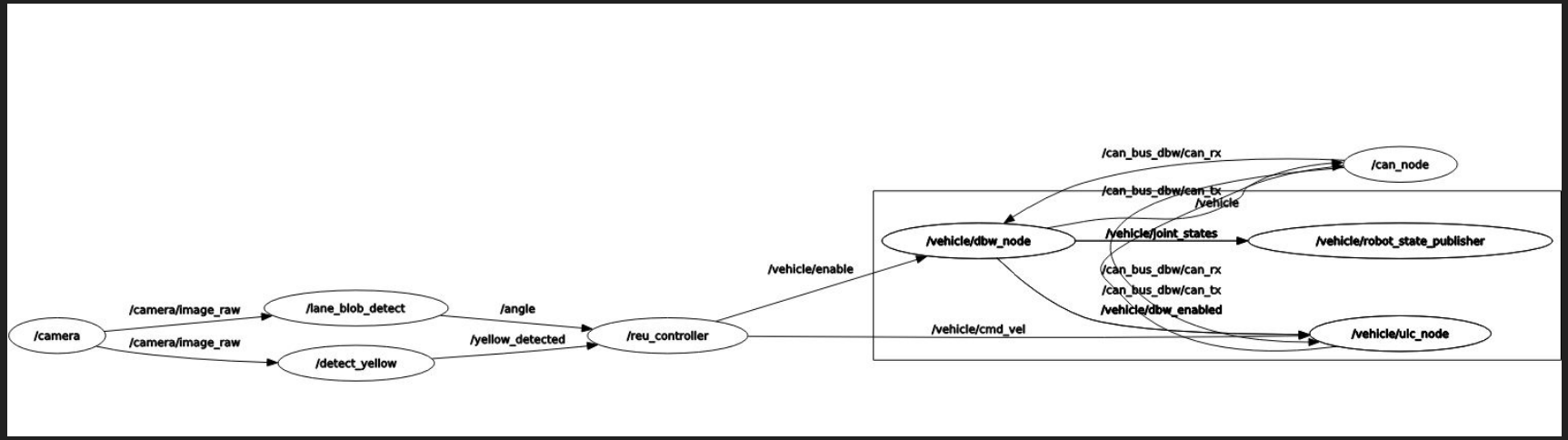

mako

Course



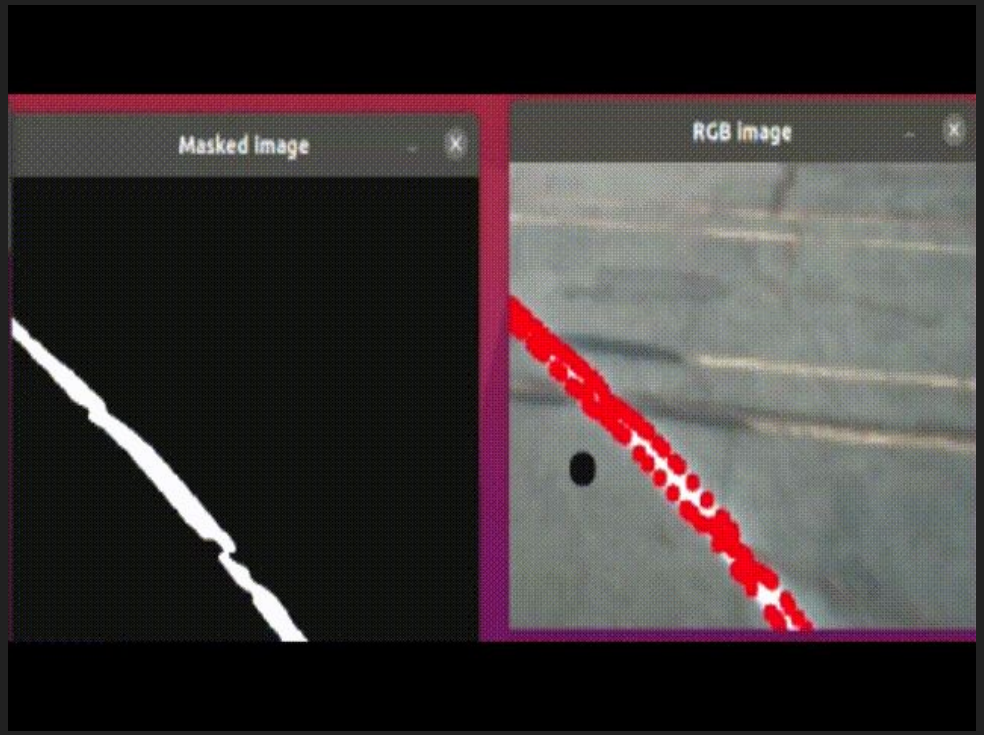


ROS Node Structure



Filtering

Blob Detection Code Running



Hough Line Code Running

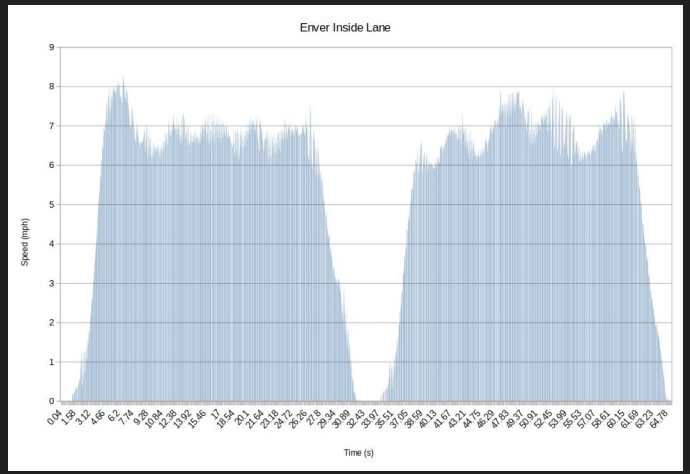
Spring Code Running

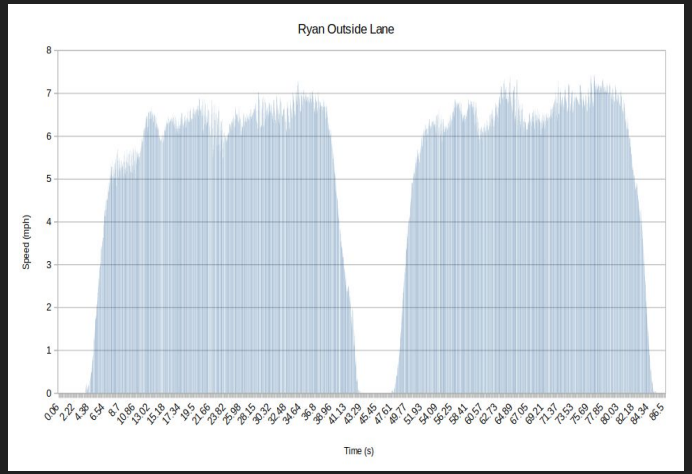
Vehicle Testing

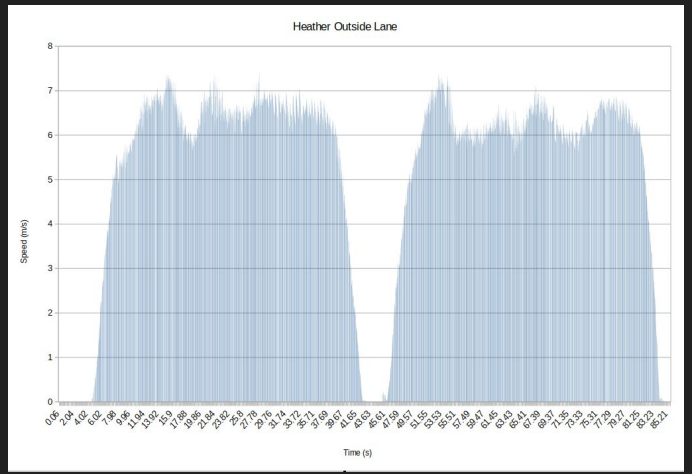
Challenges Pt 1

Challenges Pt 2

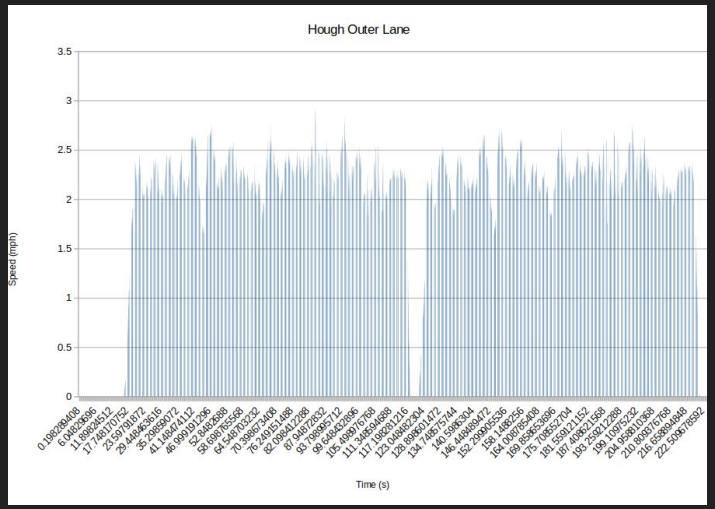
Human Driver Results

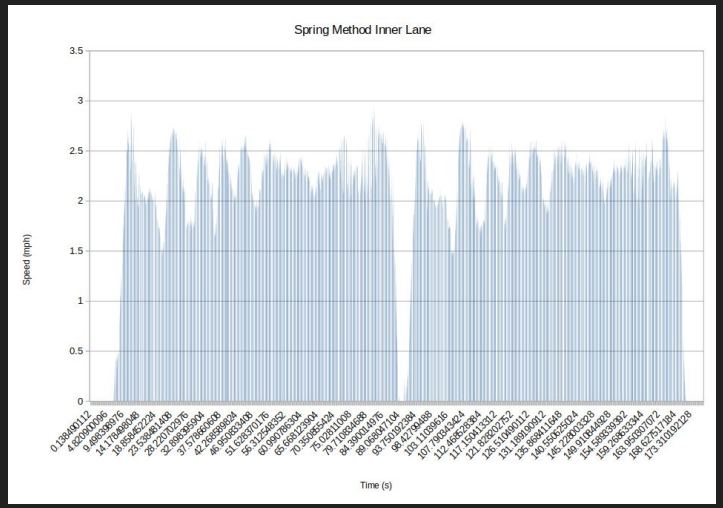


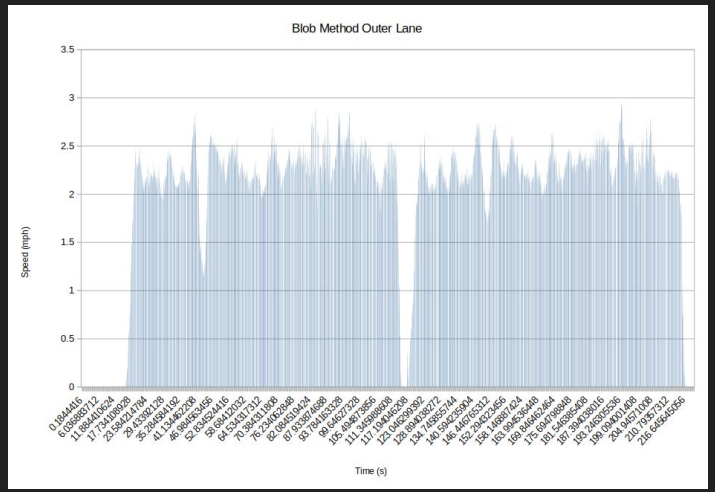




Lane Following Algorithm Results







Testing Results

	Blob Method		Hough Method		Spring Method		Human Driver	
Inner or Outer Lane	Inner	Outer	Inner	Outer	Inner	Outer	Inner	Outer
Percent Success	100%*	33.33%*	20%*	33.33%	50%	100%	100%	100%
Time for 2 Laps	160.42s	200.44s	171.80s	204.99s	164.40s	195.59s	63.17s	80.98s
Average Speed	2.164 mph	2.211 mph	2.170 mph	2.184 mph	2.171 mph	2.188 mph	5.843 mph	5.738 mph
Distance Above or Below Speed Limit	2.337 m	3.197 m	2.413 m	2.048 m	2.740 m	3.162 m	46.28 m	18.148 m
Number of Line Touches	5	1	3	3	3	6	0	0
Number of Lane Departures	0	0	1	0	0	0	0	0

Conclusion

Overall:

- 3 successful lane-following algorithms under certain conditions
  - Weather and lighting, road conditions
- Spring for inner, Blob for outer

Future:

- Develop more accurate algorithms that work under any condition