

Hi Steve,

I’m drafting two complementary papers and would love to bring you on board as co-author—especially for the technical piece that showcases Nav2 in a real, heavy-duty truck. Below is a concise outline (with links) so you can quickly see where your expertise fits and decide if it aligns with your goals.

Planned Publications

- Paper 1 – “Embedding Nav2: A Practical Methodology”

A hands-on guide to hardware + software integration for custom robots, aimed at helping new adopters accelerate deployment.

- Paper 2 – “Nav2 in a Real Agricultural Truck: Motion-Planning Benchmark vs Human Driver”
Focuses on off-road sugar-cane transport, comparing planner output to professional-driver behaviour.



I was thinking in working at first, with paper 2 with you.

- Key Contributions of Paper 2
Real-world validation

Demonstrate that Nav2 can safely and smoothly handle a 27-ton agricultural truck on rough terrain.

Field-test results (Already have logs, ros2 bags)
Two obstacle-avoidance runs on a straight crop path with stacked barrels:

- Run A – <https://lnkd.in/dRgeXRKD>
- Run B – https://lnkd.in/d_4NT5nK

Human-driver benchmark (To be done/optimized)

- 10–15 manoeuvres logged in ROS 2 bags (emergency braking, straight-line deviation, circuit turns, figure-eight paths).
- Only one-type manoeuvre tested with Nav2 on site due to track-time limits (links above); the remainder will be reproduced in simulation for comparison.

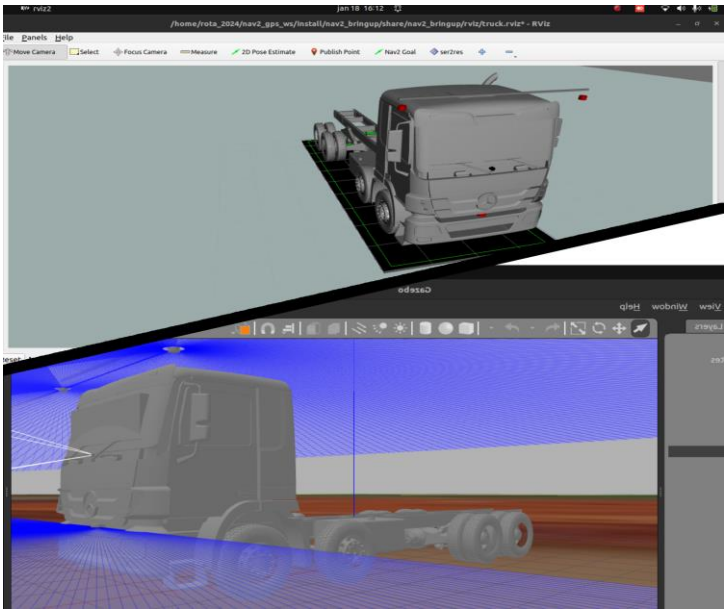
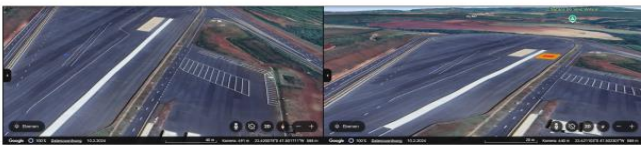


Figure 4: Teste com obstáculos dinâmicos para desvio de obstáculos



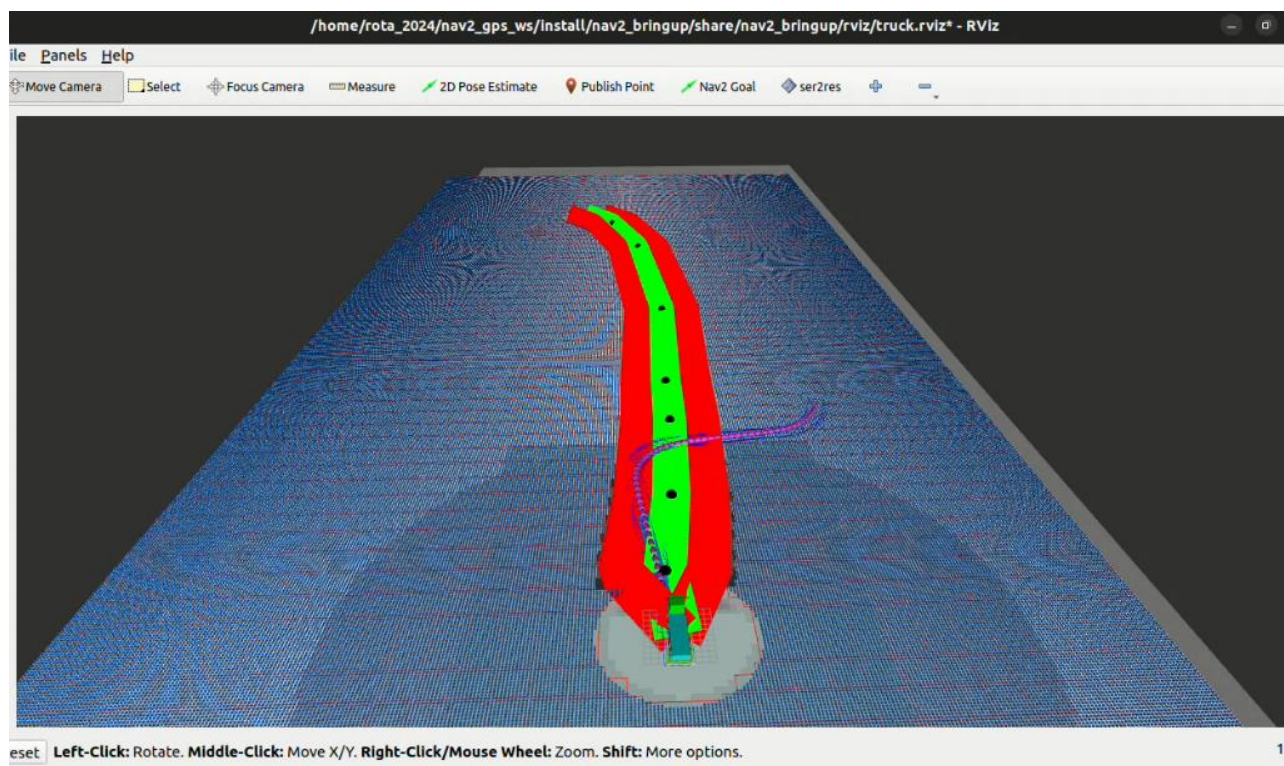
Planner fine-tuning

Table 5: Comparison: Human Driver vs. Nav2-based Navigation			
Metric	Human Driver (Field)	Nav2 (Simulation)	Notes / Observed Gaps
Average Obstacle Clearance	0.94 m	0.83 m	Slightly more conservative driving by human
Trajectory Smoothness (Jerk)	2.9 m/s ³	3.7 m/s ³	Nav2 exhibits higher variability
Total Energy Estimate	13.2 kJ (est.)	14.5 kJ	CAN-bus based approximation (field)
Max Deviation from Path	0.21 m	0.34 m	Nav2 shows higher lateral error
Emergency Stops Triggered	0	1	Nav2 halted on false positive
Test Executability	Confirmed	Simulated Replay	Onboard test infeasible

All numerical values in this table are hypothetical and presented for illustrative only. Actual results may vary.

for heavy vehicles (To be done/optimized)

- ML-based relaunch system to bias cost functions toward safety metrics (time-to-collision, trajectory smoothness).
- Virtual Lane overlay to keep the truck centred in preferred1 corridors while still allowing obstacle avoidance – demo video: <https://youtu.be/arb1afcrT-8>



Data availability (Already Have)

All ROS 2 bags, maps, and evaluation scripts are ready for processing; I'm happy to share raw data or early figures.

☐ Collaboration Opportunities

- Your insight on Nav2 internals will strengthen the experimental design and help **refine planner parameters for large, slow-to-turn platforms + Machine Learning Param Optimizer**. I believe that adjusting the Behavior Tree can also bring us benefits, as well as using nice FSM with nav2 that I checked: <https://tinyurl.com/FSM-Nav2>
- If you're interested, **we could co-develop the Virtual Lane plugin** and publish it alongside the paper.
- The project has momentum: Mercedes-Benz just submitted Phase 2 funding, and I am also in other project of my university team, we are adopting Nav2 for F1Tenth and RoboRace.

☐ Next Steps

I've attached my PhD qualification document and slide deck so you can see the broader research arc: https://drive.google.com/drive/folders/1BC_JrYGeYr9OXKXb2XIS9EbldDH7spQ0?usp=sharing . Let me know if the scope resonates with you or if you'd suggest tweaks. **Happy to adapt the skeleton before we dive deeper.**

Looking forward to hearing your thoughts!

Best regards,
Marcus Vinicius