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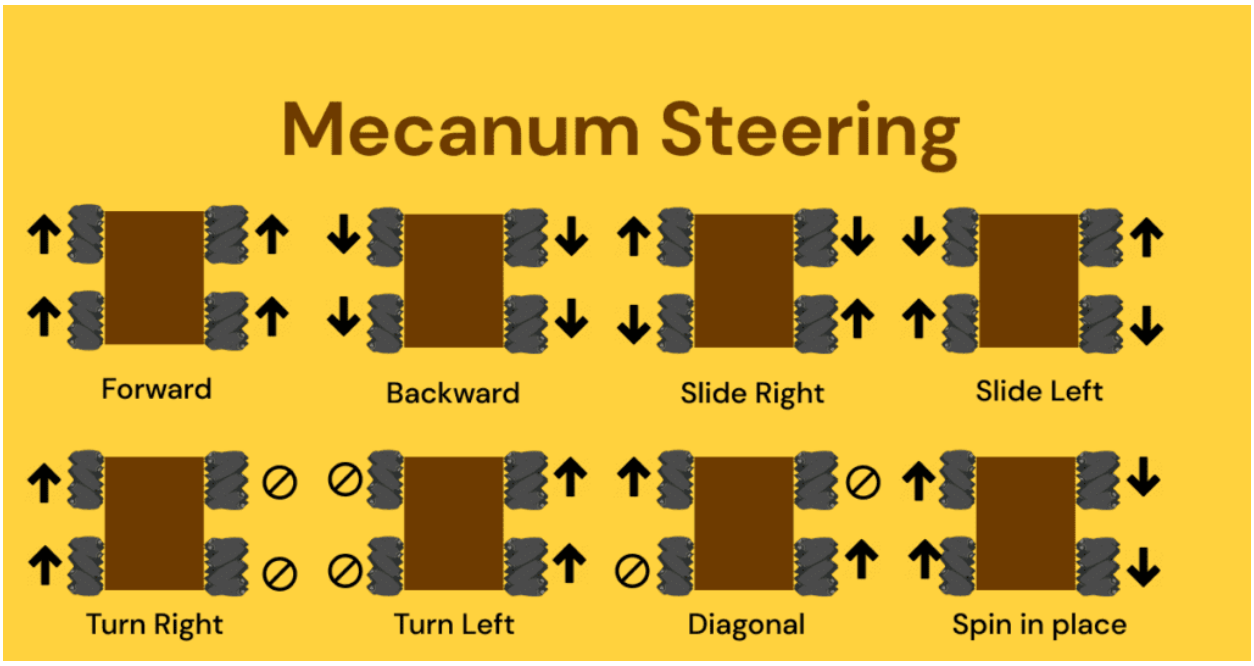
Class	RoboDive

Mecanum steering for obstacle avoidance



Mecanum wheels consist of rollers mounted at an angle (typically 45°) around the wheel's circumference. This design enables the bot to move in any direction—forward, backward, sideways, and diagonally—without needing to rotate first.

Justification

1. **Omnidirectional Mobility:**

Mecanum wheels enable the bot to make lateral or diagonal movements, allowing it to sidestep obstacles effortlessly without changing its orientation.

2. **Enhanced Maneuverability**

Mecanum steering can pivot in place or move directly around obstacles unlike differential or Ackermann steering which may require complex path planning.

3. **Efficiency in quick turns**

The ability to make immediate directional changes reduces the time and complexity of navigation.

Disadvantages

- **Power loss**

Mecanum wheels suffer from reduced efficiency because some of the force is directed at an angle.

- **Uneven Terrain**

Mecanum wheels perform best on flat surfaces and can struggle on uneven terrain.

Overall

Mecanum steering is ideal for obstacle avoidance scenarios where agility and precision are key. Its omnidirectional capabilities ensure the bot can react quickly to obstacles without extensive path planning.

Anti-Ackermann Steering

Anti-Ackermann steering is a configuration where the inner wheel of a turn turns at a **smaller angle** than the outer wheel, opposite to the Ackermann steering geometry. This results in the wheels' turning angles diverging rather than converging during a turn.

Applications

Anti-Ackermann steering is primarily used in **high-performance racing vehicles**, including Formula 1 cars and some off-road vehicles. The choice of Anti-

Ackermann is tailored for scenarios where maximizing grip and stability during high-speed cornering or uneven load distribution is critical.

- **High-Speed Racing**
  - In racing, the load on the tires shifts significantly during sharp turns.
  - Anti-Ackermann steering compensates by aligning the outer wheel more sharply, which bears more load due to weight transfer during cornering.
  - This prevents the inner wheel from scrubbing (dragging against the surface), improving grip and cornering efficiency.
- **Off-Road Vehicles**
  - In off-road scenarios, uneven terrains can cause variable traction on different wheels.
  - Anti-Ackermann geometry ensures better control and traction by prioritizing the wheel that has more grip.
- **Drifting and Controlled Oversteer**
  - Drifting vehicles sometimes use Anti-Ackermann geometry to achieve controlled oversteer.
  - By turning the outer wheel sharper, the rear of the vehicle can swing out more predictably, enhancing control during high-angle drifts.

Issues

- Not applicable for low speed high precision turns.
- and only usable for niche situations

OVERALL

Anti-Ackermann steering is a specialized geometry designed for scenarios like high-speed racing and drifting, where dynamic weight distribution and optimal tire grip are crucial. It sacrifices low-speed efficiency and ease of maneuvering for precision and performance under extreme conditions.