⚙️ Drivetrain Objectives & Checklist

📌 Objectives

You should know how to:

- Construct a structurally strong and functional drivetrain that reflects your CAD design.
- Implement a functional gear ratio that matches your performance goals (e.g., torque vs. speed).
- Justify design choices in terms of mechanical efficiency, weight distribution, and stability

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🔍 Key Considerations

⚙️ Gears

- What is the gear ratio of your drive train? Considering the input driving gear teeth to the output driven gear teeth, explain how this affects torque and velocity.
    - *Ex*: A 12-tooth gear driving a 36-tooth gear is a 3:1 gear ratio (increased torque, reduced speed).
- Check for excessive tightness in the gears. Ensure smooth rotation without grinding.
- Check that gears on the same axle are aligned correctly and rotate without wobble.
- Check whether your drivetrain can resist twisting forces during movement or turns.

🚗 Wheels

- Front and rear wheels must be parallel to each other to prevent unwanted veering.
- Ensure that there is enough space between wheels and structural parts for free rotation.
- Spin each wheel manually — it should spin freely without resistance or rubbing.

🔌 Motors

- Verify that the motor's output shaft is correctly transmitting power to the drive axles to gears or the wheel directly.

- Manage cables so that wires are away from moving parts to prevent cable entanglement.

🧠 CAD vs. Physical Build

- Any changes from your CAD model must be clearly explained with reasoning (e.g., parts unavailable, build stability issues) in your Notebook

- **CAD Validation**: Recheck the CAD model after build completion and annotate any necessary adjustments or corrections.

✅ Checklist

- ☐ Gear ratio is implemented and can be justified
- ☐ All gears are securely fastened and properly aligned
- ☐ Wheels are aligned, mounted securely, and spin freely without friction
- ☐ Motors are attached correctly to the gears/wheels
- ☐ Cables are managed safely and do not interfere with any moving parts
- ☐ Drive train has symmetric design for balanced weight and maneuverability
- ☐ Final build matches the CAD model or includes justified changes documented in the notebook

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📓 Notebook Requirements

Include:

- A photo of your completed drivetrain.
- A screenshot of your CAD model.
- A written explanation of your gear ratio, including gear teeth counts and purpose.
- Explain your design decisions (e.g., faster turning, increased pushing power).