ECE 5390 Practicum Assignment 7a

Equivalent Gear Train Model

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# Introduction

Practicum 7 explores mathematically modeling a real gear train from a motor exposed to the class.

The rest of this report is organized as follows. Section 2 covers the derivation of gear ratios, angular position, and angular speed.

# Deriving Equations for the System

The motor box featured a gear train system as modeled in **Figure 1**. The equivalent gear ratio can be derived as:

The data in **Table 1** can be used to determine the equivalent gear ratio

. The equivalent ratio can be used to determine the output angular position as well:

Finally, considering the angular speed :

Table 1: Experimental data

|  |  |
| --- | --- |
| Gear Section | Teeth |
| N1 | 9 |
| N2 | 24 |
| N3 | 7 |
| N4 | 26 |

Chart, box and whisker chart

Description automatically generated

Fig. 1: Gear train model

# Discussion and Conclusion

Practicum 7 is a good introduction to basic gear trains and discusses all pertinent measurable aspects excluding torque, which is only another simple derivation.