

P08208 - RP1 Motor Module (Mechanical)

Problem Statement:

A fully functional, open source, open architecture, scalable motor module subsystem for use on the 1 kg (RP1) robotic vehicular platform. Each motor module will have the ability to drive, steer, communicate with a controller, and work cooperatively with any number of modules in a number of configurations to drive a robotic vehicular platform capable of carrying a 1kg payload.

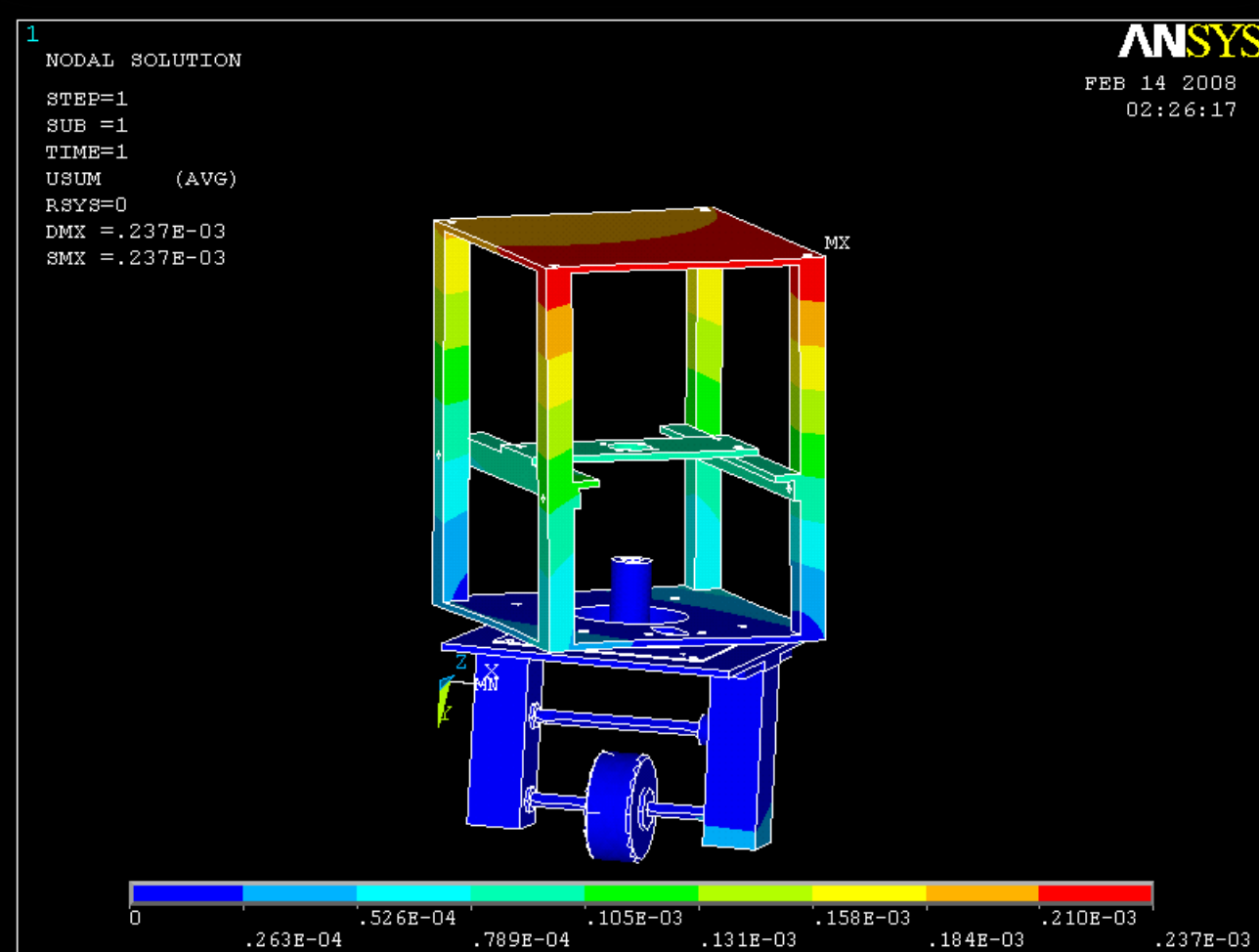
Objectives/Scope:

- Use an open source, open architecture design concept.
- Create a motor module capable of transporting a 1 kg payload.
- Design and build appropriately scaled drive, steer, yoke, and motor control systems for the motor module.
- Design for mass-production and easy assembly

Engineering Analysis:



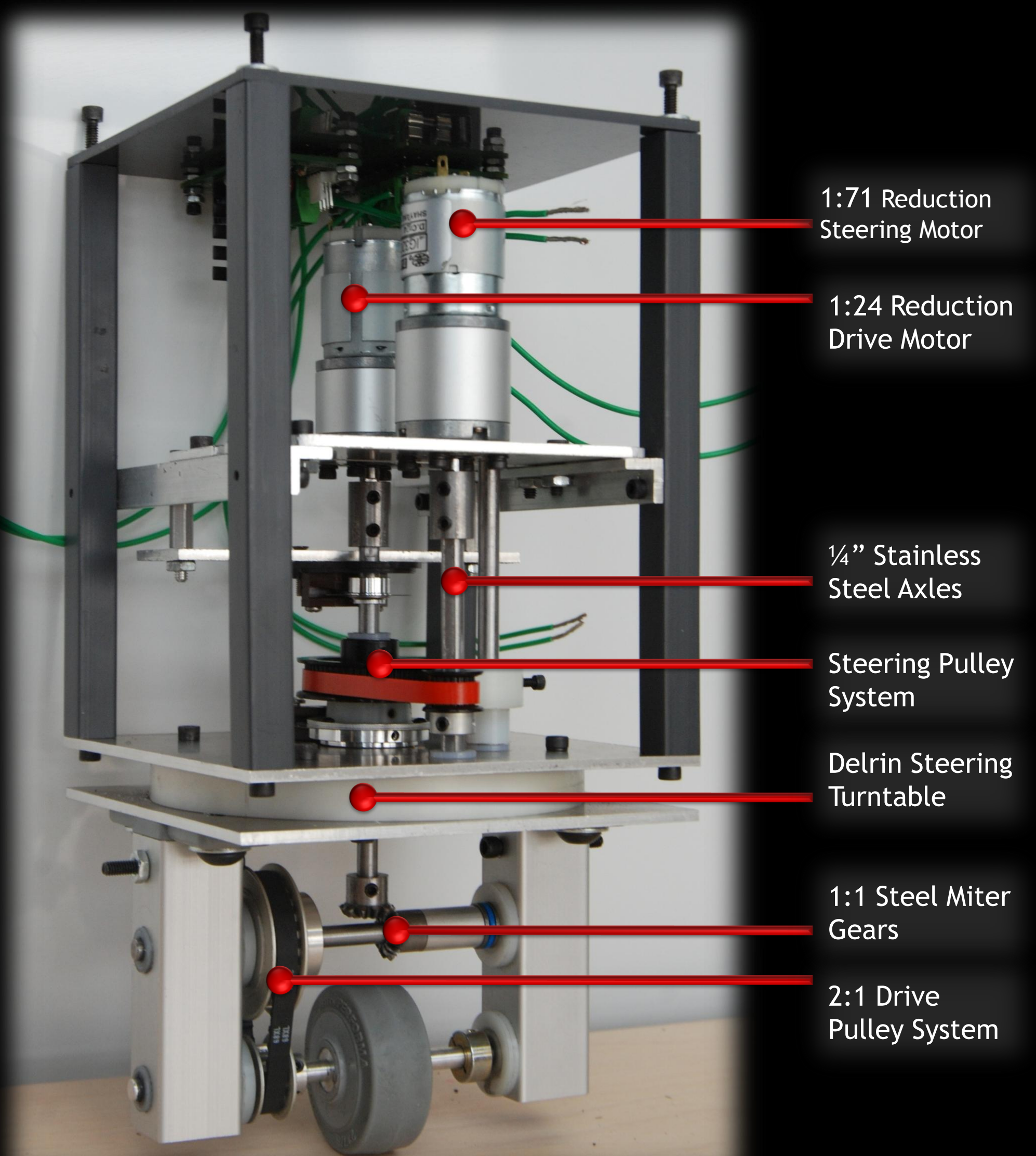
Modular motor gearbox design enables multiple operating drive parameters. This graph presents numerous speed options for efficient motor operation. Using this graph a motor can easily be selected for required operating needs.



ANSYS finite element analysis was employed on the yoke system to help validate a successful RP1 drop test.

Assumptions & Constraints:

- Design will use the drive motor from initial baseline kit: Drive Motor (Shayang Ye Industrial, IG320071-41F01).
- Design will be powered by DC power source.
- Design will be tested on 8' x 8' surface.
- Design should have infinite steering angle around a vertical axis.
- Design will be open architecture and open source
- Should be able to access any component on module with no more than 3 minutes of disassembly.
- Design should be modular.
- Motors will be driven with pulse width modulation (PWM) signal.
- Design will resemble past projects (RP 100 and RP 10)
- Design will be able to withstand fall from a table top and maintain functionality.
- Design must apply design for manufacture and assembly (DFMA) concepts.

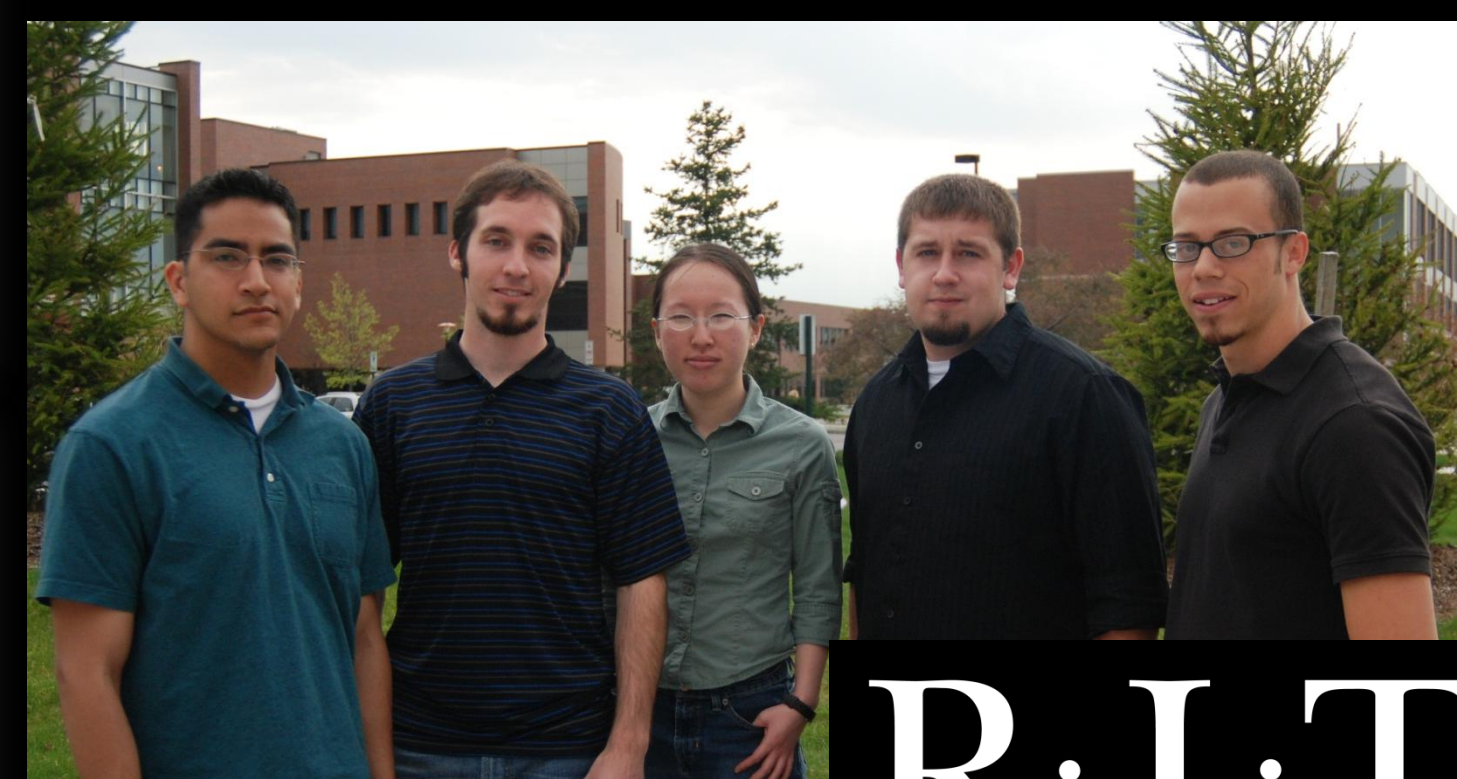


Core Group Members: (listed from left to right)

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Wendy Fung (ME) - Project Lead & Systems
James Edick (ME) - Yoke
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Thanks for assistance on the project:

Dr. Walter (Faculty Guide), Dr. Hensel (Customer), Prof. Slack, Dr. Phillips, Dr. Melton, Prof. Hawker, Dr. Yang, Mr. VanDerveer, Mr. Kosciol, Jason Kenyon (TA), Jasen Lomnick (TA)



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