Stabilising a vehicle during high speed cornering

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Overview

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Problem and Motivation

- When cornering, the mass of a vehicle generates an inertial force in the original direction of motion
- Most of this is compensated by the grip of the tyres, and the suspension system shifts the weight accordingly, but these can only do so much without losing traction
- Gyroscopic forces from a built-in flywheel could aid in keeping the car stable
Selected Related Works

• A new active gyrostabiliser system for ride control of marine vehicles (N.C. Townsend, A.J. Murphy and R.A. Shenoi, 2006)
• Space Station Control Moment Gyroscope Lessons Learned (C. Gurrisi et. al, 2010)
Project Goals

- Integrate a servo-mounted flywheel into a remote control car to act as a gyroscopic stabiliser
- Control it via a small embedded computer board using gyroscope sensors, logging chassis orientation and suspension travel as the stability parameters
- Design and construct a software system to control movement and spinning speed of the gyroscope assembly
- Experimentally test the effect of the gyroscopic forces on vehicle stability during high speed cornering – no flywheel, stationary (single axis) flywheel, dynamic flywheel
Timeline

1. Review current research in the area (16 Aug - 21 Aug)
2. Obtain parts and build the test RC vehicle (23 Aug - 3 Sep)
3. Plan and design the control algorithm (3 Sep - 5 Sep)
4. Program and test the vehicle’s flywheel control system (5 Sep - 10 Sep)
5. Experiments and observations (11 Sep - 15 Sep)
6. Results and interpretation (16 Sep - 20 Sep)
7. Write final report, final presentation (20 Sep - 28 Oct)
Questions?