



## Senior Design Project in Electrical & Computer Engineering



# Autonomous Ground Vehicle

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Sponsors: C2CEN & NAVCEN

**Problem Statement:** Design and build an autonomous ground vehicle capable of participating in the Intelligent Ground Vehicle Competition (IGVC). To qualify for the IGVC, the vehicle must meet requirements in eight criteria: length, width, height, mechanical E-stop, wireless E-stop, max speed, lane following, obstacle avoidance, and waypoint navigation.



Virginia Tech AGV  
Johnny-5: 2006

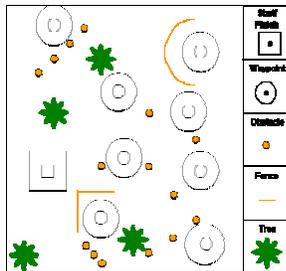


Initial Test Vehicle



University of Michigan-Dearborn: SMART 2005

**Project Design:** Construct autonomous ground vehicle to meet qualification requirements. The mechanical and propulsion system will consist of an aluminum frame, 4 ATV wheels, and a tank drive system. The power system will consist of 3-12 volt batteries, 1-9 volt battery, and laptop power. Lastly, the autonomous navigation system will consist of a Dell laptop, 2 Creative webcams, SICK laser range-finder, Honeywell electronic compass, and a Trimble DGPS system. There will be a waterproof casing provided for the autonomous navigation system.



Practice map for 2007  
Navigation Challenge

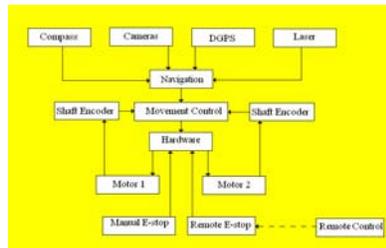
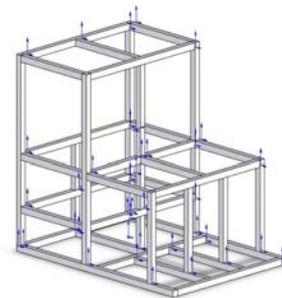


Diagram of Autonomous  
Navigation Interactions



Proposed Final Vehicle Frame

### Project Plan:

- March 9<sup>th</sup> – Complete vehicle frame
- March 30<sup>th</sup> – Solve vehicle transfer function
- April 20<sup>th</sup> – Complete testing of vehicle control system
- May 4<sup>th</sup> – Complete Autonomous Ground Vehicle
- May 23rd- Graduate
- June 8<sup>th</sup> – Participate in IGVC

**Project Goals:** Design and construct an autonomous ground vehicle to participate in the 15<sup>th</sup> Annual IGVC.