

CSCI 4302/5302: Advanced Robotics
Homework 1: due 1. February, 11:59 p.m. to Moodle.

Learning objective: Design a robotic platform under practical constraints.

Design a $\frac{1}{8}^{\text{th}}$ -scale or $\frac{1}{10}^{\text{th}}$ -scale vehicle capable of autonomous driving within cost constraints that would optimize for reliability and speed. You may form teams of two if you like, but you must make note of your teammate and you must both submit your assignment separately. Your design must meet the following Minimum Requirements:

1. Sensing: Ability to sense walls the width of corridors in the engineering center and as narrow as twice the vehicle's width; can operate without significant blur at 5 m/s. *Note: we will be discussing this in greater detail in lecture on Thursday, 26. Jan.*
2. Electronics: Capable of driving itself independently of "shore power" for at least twenty minutes.
3. Computation: At least 1 GHz, quad-core processor; at least 64 GB storage; at least 1 GB memory.
4. Mechanical: All sensors, electronics and compute mounted on a four-wheeled vehicle.
5. Safety: At least capable of being remotely killed from within 5m line-of-sight.
6. Budget: \$500.

Deliverables:

1. Bill of materials (BOM) with links to your vendor. Include quantity of components and price per component as well as a final cost.
2. Notes on the BOM for each item that affect your design meeting the Minimum Requirements.
3. One-page writeup of your design suggesting feasibility for driving in optimal conditions indoors.
4. A sketch of how you anticipate your vehicle would appear.

Suggested Reading:

- Sparkfun Autonomous Vehicle Competition
- Formula One-Tenth