Computational Robotics Computer Vision Project Proposal:

# Street Sign Recognition

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**Learning Goals:**

Abby: I want to gain comfort in learning about and implementing an algorithm through self-directed learning. I am also hoping to be able to establish a workflow and implementation plan that allows plenty of time to document the project.

Vienna: Become familiar with an object recognition algorithm (it would be cool to learn more about neural networks), understand some differences between image and video processing, and create a write up that looks professional.

**Algorithms and Computer Vision Areas to Explore:**

We plan to use OpenCV to collect data from the Neato camera, and then we'll use an SVM algorithm for object classification. We'd like to do a little more initial research into SVM to better understand how it would work for sign recognition. In addition to linear groupings within images, it has a linear kernel option that can detect an object that projects from a plane and we're curious about whether this feature might be applicable to sign recognition.

**Components of the Algorithm to Implement Ourselves:**

We would like to implement the SVM algorithm as much as possible by writing our own code (with mathematical help from researched sources). Luckily, there are also resources out there for implementation ideas should we get stuck.

**MVP:**

Our initial goal is to implement object recognition based on a training dataset, potentially using part or all of the German Traffic Sign Recognition Benchmark (GTSRB) dataset. The neato should be able to identify several types of signs and respond to a stop sign accordingly.

**Stretch Goal:**

Our stretch goal is to make the neato respond to more complex signs (such as turn signs or speed limit signs).

**Risks:**

- OpenCV and Scikit are new libraries for us
- Establishing a workflow between the Gazebo simulated world and OpenCV

**What We'd Like From the Teaching Team:**

In the last couple of projects, we have really appreciated professors' and ninja's willingness to answer our questions as they come up over email or by impromptu zoom call, especially since we can't always make it to office hours when we have other classes at the same time. We plan

to keep asking questions in this manner to try to stay on top of our learning goals!