Augmented and Virtual Reality and Autonomous Vehicles

These exercises are intended to help you master and remember the material discussed in lectures and explored in labs. In future semesters, we may make some or all of these exercises required, but for now they remain optional. We suggest that you do them as we go over the material, but you may also want to use them to review concepts before the exam.

We suggest that you use this version rather than the version without solutions to solve the problems before looking at the version with solutions. Many studies have shown that people often trick themselves into believing that they know how to solve a problem if they are presented with the answer before they try to solve the problem themselves.

1. [L23] Imagine that in five or ten years, augmented reality goggles become widely available and inexpensive, leveraging personalized Internet search over Wifi to enable rapid and flexible presentation of material, including 2D and 3D visual data as well as audio (transcribed to text and presented on the surface of the goggles, for example). Should students be allowed to wear such goggles during exams?

2. [L23] Should people be allowed to have their limbs amputated in order to be replaced with brain-controlled prosthetics that are stronger, faster, more resilient, and more powerful than the originals?

3. [L23] The Chinese government (for example) regulates the amount of time that a young person is allowed to play video games. Should governments also regulate the amount of time that a young person spends in virtual reality?

4. [L24] Let’s say that the stopping distance for a particular vehicle traveling at 12 meters/second on a dry earth road is 26 meters. What is the stopping distance for the same vehicle traveling on dry asphalt? Packed snow? (Use the formula and table given in L24 to answer these questions.)

5. [L24] Explain why an autonomous vehicle must solve a path planning problem in order to parallel park between two parked vehicles.

6. [L24] Explain why “brittleness” of machine-learning models—production of incorrect results when input data don’t match the model’s training exactly—is more of an issue for controlling autonomous vehicles than it is for recommending movies.