Ethics of Case Studies in Robotics and Automation

Instructors: [Office Hours]
Professor Siobhan Oca (she/her) [Wilkinson 303, by appointment]

Prerequisites: None

Course Description

As engineers, we are responsible for the outcomes of our systems and technologies. As robotic and autonomous systems are implemented at larger scales, understanding the context, relevance, and implementation of these systems is critical. Knowing how we interact and use systems can help us avoid ethical pitfalls and develop effective, safe, and equitable technologies.

This course connects key ethics principles of trust, bias/equity, surveillance/privacy and safety with real life case studies that consider technical options/opportunities, policy effects, and regulatory efficacy. Additionally, this course helps students identify and envision action of their values in their future engineering practice. The goal of this course is for students to develop a deeper understanding of how ethics applies to the decisions they will make as engineers developing robotic tools and autonomous systems. Additionally, this course sheds light on how companies and regulators work in different contexts in the US to effectively manage the emergence of autonomy in our hospitals, highways, and many other areas of our lives.

Learning Objectives

At the end of this course, students should be able to . .

- Describe how trust too much trust or too little trust affect the utility and efficacy of emerging autonomous technologies
- Shopping trust versus being trustworthy
- Describe how trust can be encouraged or discouraged in the development of autonomous technologies, including the effect of mistakes
- Detail what aspects of emerging technologies affect the bias in creation and implementation and how this can/cannot be avoided
- Describe how emerging technologies could help or exacerbate fairness and equity in society and how this could be affected by companies and government interventions
- Identify and articulate the benefits and drawbacks of autonomous technologies in the context of climate change/sustainability

- Evaluate a system/sequential effects of specific autonomous technologies on climate impacts
- Describe what aspects of emerging technologies affect privacy and surveillance of an individual or group, and by whom (company, government, parent,etc)
- Describe different stakeholders in privacy and surveillance of emerging technologies and what their incentives are
- Describe the value of privacy to an individual and group and, generally, what right to privacy exists in the USA today
- Identify and articulate the benefits and drawbacks of surveillance in the context of autonomous technologies
- Describe how regulation could affect privacy, trust, and surveillance of consumers
- Define different regulators, their objectives, and general efficacy in regulating emerging autonomous technology
- Research and describe a case study not discussed in class through the lens of at least two ethical principles and stakeholders

General Topics

Trust and Trustworthiness

- Autonomous Vehicles
- Evolving autonomous systems like medical robotics and decision support

Bias, Fairness, and Equity

- Embedded algorithmic bias
- Fairness and economic inequality

Surveillance and Privacy

- Surveillance capitalism
- Value of Privacy, Right to Privacy

Safety and Regulation

- Drawbacks and strengths of different regulators historically and today
- Vehicle Regulators: FHTSA, Medical Regulators: FDA, Airline Regulators: FAA

Grading

50% Reflections

20% Participation

10% Case Study Proposal

20% Case Study Submission

Assessments

Reflections

Weekly reflections of 300 words will be used to help students reflect upon how the readings reflect their own experiences with technology and any positive and/or negative ethical implications that resonate with them from the readings or class discussion. They need to be submitted to the assignments section of Canvas by Friday midnight. These formative reflections will be graded for completion, with feedback given before class.

Assignments submitted within two days of the deadline, but late, will receive a maximum 80%. The two lowest assignment grades will be dropped.

Participation

Individual students and the group benefit from active participation of the whole class in discussion and class activities. Individual students benefit from hearing the in-depth perspectives of our in class guest speakers. Class activities require students being present and open to sharing their ideas and perspective. Because of this, students are required to attend class and for 100% participation should miss no more than 2 days of class.

Case Study

Students will research a case study that was not used in class and write a 5 page paper summarizing the case study objectively and describing each side of an ethical argument with sourced material, such as news articles, company white papers, government regulations, etc. A separate 2 page description of your perspective based on the case study, using ethical frameworks discussed in class, is also required.

Course Expectations

It is the expectation that students, TAs, and the instructor will regard each other with mutual respect. Students will abide by the Duke Community Standard:

I will not lie, cheat, or steal in my academic endeavors;
I will conduct myself honorably in all my endeavors;
and I will act if the Standard is compromised.

Absences and Late Work

Absence due to illness will need to be reported within the same day of missed lecture or assignment deadline by submitting a Short Term Illness Notification Form (STINF); late work will not be accepted and will be assigned a 0, unless proper STINF documentation is supplied. Varsity athletes must comply with all regulations given by Trinity College. In addition to these formalities, students need to communicate with the instructor in person or by email.

Extenuating circumstances (such as family emergencies) that will prevent a student from attending class or lab or reaching assignment deadlines should be discussed with the instructor as soon as possible and will be accommodated on a case-by-case basis.

Disability Statement

Students with disabilities who believe they may need class accommodations should read through the Student Disability Access Office webpage (in particular, the Rights and Responsibilities for Students section) or contact the Office directly at (919) 668-1267. Note that accommodation requests should be submitted very early in the semester.