CS 4002 Robots and Society Midterm Exam, Spring 2022

Although this is a take home exam, please remember that the honor code is in effect. You are not to discuss this exam in any way, shape or form with anyone else (within the class or otherwise) until the exam has been submitted at the end of the scheduled examination period.

Please pay close attention to the directions below. Answers that fail to adhere to these instructions will be considered non-responsive and marked down accordingly.

The written portion of your exam is due Tuesday March 15, 2022 @9:30AM EDT via Canvas. You are expected to submit a single PDF or Word file with your answers to each of the exam questions. The text must be in Times New Roman font, 12 pt, single-spaced with 1” margins. Note that each question is given a maximum number of pages.

Question 1. (30 points total)

The spread of the pandemic has prompted governments around the world to leverage existing technological capabilities to address issues such as enforcing social distancing rules and contact tracing. In particular, many governments (i.e. the United States, China, Italy, etc.) have used drones to monitor citizens’ activities, from ensuring that people are wearing appropriate PPE to checking whether people in quarantine are indeed self-isolating at home. For instance, the police department at Westport, Connecticut announced a plan to use Dragonfly’s drones to detect covid-19 symptoms and enforce social distancing (click here for a video on Dragonfly’s drones).

Conduct an ethical analysis on the use of drones for this specific application.

1A. 10 pts. Perform an act utilitarianism analysis including a stakeholder analysis involving at least 4 different stakeholders. Show the calculation that you used to lead to your conclusion as to what is the correct course of action (and state what that course of action is). (maximum 1 page)

1B. 10 pts. Now analyze the situation using the Kantian deontological framework. Apply the categorical imperative using one of the two forms shown in class to justify the course of action you arrive at (and as before state what that course of action is). (maximum ½ page)

1C. 10 pts. Now what would you recommend as the correct course of action for you to advocate? Why? What are two counterarguments for the course of action you choose and how do you respond to them? (maximum ½ page)
**Question 2. (30 points total)**

Read this article: [https://spectrum.ieee.org/covid-robot](https://spectrum.ieee.org/covid-robot)

You are one of a panel of physicians who is advising the government on the appropriate Covid long-term protection method. A bill has just been proposed in the House of Representatives for the government to purchase and distribute oral sampling robots to cities with a high population density. Oral sampling robots can autonomously acquire samples that are qualified for the PCR test from patients. Furthermore, they are equipped with safety mechanisms (built into the software) that ensure the robot uses appropriate force during the procedure. The bill suggests that the usage of oral sampling robots will speed up Covid testing efforts and alleviate the impact of labor shortages. The oral sampling robot is a recent invention. Emergency Use Authorization is possible for these devices, but the clinical trial required for approval has not yet been completed. Nonetheless it takes time to build these machines so being proactive could ensure that they can be deployed nationally as soon as they pass the test, but if the test fails the money the Congress would allot for this effort will be wasted. Waiting however may lead to the death of a number of healthcare workers that this machine could have protected. The bill is currently under review in the House and you are asked to provide an opinion on whether this is a good measure or not.

2A. Are you in favor of or against the proactive funding of oral sampling robots used to collect testing samples from covid patients (Yes or No)? (0 pts) (1 word – YES or NO)

2B. Provide a Logos-based justification for your position. Why is this position logos-based? (10 pts) (max ½ page)

2C. Provide a Pathos-based justification for your position. Why is this position pathos-based? (10 pts) (max ½ page)

2D. Provide an Ethos-based justification for your position. Why is this position ethos-based? (10 pts) (max ½ page)

Draw on your class readings as needed to provide solid justifications for each of the above.

**Question 3. (20 points total)**

Robotic pets entered the market in the 1990s, with some of the first examples being Hasbro’s Furby (1998) and Sony’s AIBO (1999). These pets often take the appearance of animals and include robotic mechanisms that allow them to independently move, sense, and communicate. While simple at first, their behaviors have grown increasingly complex and lifelike thanks to advancements in machine learning.

Robotic pets today have a wide variety of uses. Some are used by therapists for interaction and calming exercises, and others are used as companions to combat loneliness experienced by elders. Some studies have even shown that robotic pets can decrease anxiety and behavioral problems in dementia patients. These groups can especially benefit from robotic pets, as these pets can provide constant attention and “love” to their owners without needing to be fed, groomed, walked, etc. However, the effectiveness of these toys is often measured by how “real” the users perceive it to be. Some studies have found that children who play with robotic toys believe they have feelings. There are also questions about whether elders can recognize that
robotic pets aren’t “real”, and some people have raised concerns about these robotic pets replacing human interaction altogether. Modern robotic pets are also equipped with cameras, raising some questions about privacy. In the wrong hands, robotic pets could also be used to apply peer pressure or manipulate their owners.

Realizing the possible benefits and dangers, develop guidelines using the four Lessig forces (legislative, economic, social, and technological) for the use of robotic pets.

In this context, concisely:

3A. (10 pts) Articulate one policy recommendation for each of the four force categories (4 total) that restricts the use of robotic pets. Include an additional sentence justifying why each one specifically belongs to the particular Lessig force category you associate it with. (1 page max)

3B. (10 pts) Articulate one policy recommendation for each of the four force categories (4 total) that incentivizes the use of robotic pets. Include an additional sentence justifying why it specifically belongs to the particular Lessig force category you associate it with. (1 page max)

**Question 4. (20 points total)**

Asimov proposed four laws of robotics:

0. A robot may not injure humanity or, through inaction, allow humanity to come to harm

1. A robot may not injure a human being, or through inaction, allow a human being to come to harm, except where that would conflict with the zeroth law

2. A robot must obey the orders given to it by human beings except where such orders would conflict with the first law.

3. A robot must protect its own existence as long as such protection does not conflict with the first or second law.

We saw in our class readings that people have tried to extend them by adding laws 5 and 6 for example. But maybe this is wrong-headed.

4A. (10 pts). But as we can see, we are only concerned about the impact robots may have on humanity and completely disregard their impact on other animals and living beings. Consider speciesism which is defined as “the assumption of human superiority leading to the exploitation of animals.”

State your position on the morality of speciesism and defend it. Are we better than other animals? Justify your position, including counterarguments. (Maximum ½ page)
4B. (10 pts). Now suppose we add a -1 Law to Asimov’s Laws of Robotics and keep the other four (but modifying the zeroth law as we did when it was added to the first 3 by Asimov).

Now the new laws are:

-1. A robot may not injure any animal species or, through inaction, allow an animal species to come to harm.

0. A robot may not injure humanity or, through inaction, allow humanity to come to harm, except where that would conflict with the -1th law.

1. A robot may not injure a human being, or through inaction, allow a human being to come to harm, except where that would conflict with the zeroth law.

2. A robot must obey the orders given to it by human beings except where such orders would conflict with the first law.

3. A robot must protect its own existence as long as such protection does not conflict with the first or second law.

Speculate on the consequences of this addition to the laws: (Maximum ¾ page total)

4B.1) Are the laws more ethical than before? Is your answer consistent with your position on speciesism you stated in part A above? Argue your case. (5 pts)

4B.2) Would you qualify the -1th law in some way to apply only to some subset of animals? Why or why not? (5 pts)