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EDITORIAL

Special issue on Responsible Robotics: Introduction

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Robot applications in our personal and professional lives are increasing at a rapid pace. Manufacturing robots are transforming grocery store warehouses and online shopping distribution centers. Robotized dairy farms with robots to milk cows, clean stalls, and feed animals are re-conceptualizing the practice of farming. Robot greeters in stores, banks and hospitals, are re-inventing the 'personal touch' in marketing. The responsible use of robots may have incredible benefits for humanity, from monitoring and repairing climate change destruction to the replacing of humans in dangerous, life threatening tasks. Despite the success and efficiency that robots promise to bring, however, there are societal and ethical issues that need to be addressed if robotics is to thrive in academia and industry.

Some of the concerns in relation to the robotics and automation of today focus on the potential loss of jobs, the quality of jobs available, privacy concerns for data collected, and human rights issues when targeting vulnerable demographics as users/consumers of robots (e.g. children, elderly persons, hospital patients), to name a few. To exacerbate these issues consumers have little trust in many technology companies when the dominant corporations continue to prove themselves unworthy of society's trust by demonstrating a lack of concern for privacy, coercion, and democracy or democratic process. If robotics is truly to succeed in making our world a better place, the public must be able to place their trust in the designers, developers, implementers and regulators of robot technologies. To do this, we must engage in the responsible research and innovation of robot development processes as well as the resulting products of such processes; what has come to be known as *responsible robotics*.

Responsible robotics is a term that has recently 'come into vogue', yet the understanding of what*responsible robotics* means is still in development. In recent years, research courses,[1] workshops,[2] and articles[3] have been dedicated to the topic. This area of research is aimed at shining a light on how academia, industry and policy makers should anticipate and account for possible negative side effects of new and emerging robot applications. To do this it is necessary to uncover the ethical issues at stake, explain how/why these issues are problematic, and explore ways in which they can be mitigated or prevented. Thus, responsible robotics has an enormous task ahead to both raise awareness of possible harms as well as assist in their prevention.

The co-editors of this special issue, Aimee van Wynsberghe and Noel Sharkey, are also the co-founders of the Foundation for Responsible Robotics (FRR), a not-for-profit organization established in the Netherlands in 2016,[4] dedicated to bridging the policy gap between technical and ethical work happening in robotics. The FRR defines responsible robotics as: the responsible design, development, use, implementation, and regulation of robotics in society. Before moving forward there are two caveats of our definition we wish to explain;

1. The word 'robotics' over 'robot' has been chosen to indicate that it ought to cover the study of robots writ large rather than the study on one application area, sector, or stage of development. While we agree that some domains are more morally charged than others (healthcare versus factory for example) we assert that every application and every domain will have novel ethical

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[1] IDEA League summer school on responsible robotics, see https://idealeague.org/blog-summer-school-responsible-robotics-and-ai/ (retrieved Sept 5, 2020).

[2] https://nias-lorentz.nl/pervious-nias/ and https://responsiblerobotics.org/event/connected-robots-for-health-challenges-for-responsible-robot-design-brocher-foundation-workshop/.

[3] See Murphy, R., & Woods, D. D. (2009). Beyond Asimov: The three laws of responsible robotics. IEEE Intelligent Systems, 24(4), 14–20.

[4] See responsiblerobotics.org (retrieved Sept 5, 2020).

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and societal issues to address. Moreover, by addressing the study of robotics we wish to draw attention to the idea that the overall practice of robotics (in academia or industry) will create ethical concerns that warrant immediate attention, such as: the impact of development practices on (in)equality; the discarding of robots and the environmental impact; the impact of robots on urban planning; new educational programs in Universities; the choice of robots as male/female, black/white, to name a few.

2. We stand against the notion that a robot or robots can be responsible for a mishap or other impactful issues. Rather, responsibility and thus accountability for the consequences of choices related to design, development, implementation, and regulation must always land at the feet of the humans involved. Without getting into the metaphysical weeds here we wish to assert that an artefact cannot be held responsible for the consequences of its action. As scholars before, for example Johanna Bryson and Deborah Johnson to name a few, have rightly pointed out, robots are the product of our own making; the materials used, the kind of intelligence they have, and the way they will acquire this intelligence is all a product of human decision making. Thus, the 'responsibility' we are making reference to in our definition of responsible robotics is that pertaining to the humans involved in design, development, use, implementation, and/or regulation.

To be sure, these are claims that the co-editors of this special issue are putting on the table, open for further debate and discussion. The intention is to facilitate open discussion as constructive colleagues.

As seen in this collection of papers, the topic of responsible robotics spans across application domains and stages of development. There are a host of questions facing designers and developers of robots, such as, the type of robotic identity that is most responsible for a robot to bear (Arnold and Scheutz, p. 271) or whether a robot can be trained to be 'good' (Sharkey, p. 197). And, there are a wealth of questions related to the responsible implementation of robotics, such as: the ethics of mixed traffic as autonomous vehicles enter our streets (Nyholm and Smits, p. 249) and the multiple questions surrounding the use of robots in urban spaces, aka urban robots, and how such robots can be designed responsibly to uphold societal values (Nagenborg, p. 259). To be sure, responsible robotics covers a wider area than robot ethics, it also encompasses regulatory and policy making concerns. In this issue, Liu and Zawieska (p. 235) discuss the notion of responsible robotics from a human rights perspective, relevant for such policy making deliberations. Finally, there are meta-ethical debates still to be had about the ontological status of robots and if, how, and/or to what extent responsibility can be extended to them (Gunkel, p. 221) and furthermore what responsibility we humans should have towards the robots (Miller, p. 211).

Despite the appeal of the name one may still ponder the question: what is responsible robotics? As we can already see from this collection of articles, the answer evolves as the technology changes and as more technological impacts become apparent. The first step towards an answer, however, must acknowledge that it is up to us—the humans behind the robots—to be accountable for the responsible and ethical development of this technological innovation.[5] Addressing ethical issues in robotics means proactively taking stock of the impact these innovations will have on societal values like safety, security, privacy, and well-being. With robots coming into our homes, cities, and factories, we can no longer wait for bad things to happen in order to fix them. We must do the hard task of getting it right the first time. Our families, the environment, and our society can't afford to be broken by poorly designed and implemented robotics. This special issue, and its contributions, are a step in the direction towards getting it right, a step towards responsible robotics.

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[5] This is why the Foundation for Responsible Robotics has developed and piloted a Quality Mark for Robotics and AI applications, for more see https://responsiblerobotics.org/quality-mark/ (Retrieved Sept 7, 2020).