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10th of September, 2020

Challenges With Integration Of Co-Bots In Society

In the past decade or so, robots have started to play a bigger role in the commercial and industrial

sectors. According to the International Federation of Robotics (IFR), 422,000 robots were shipped

globally in 2018, amounting to $16.5 billion. IFR expects this number to grow by 12% by 2022[1]. This

indicates a growing demand for these robots in the industry. New concerns are being raised with this

growing demand. After we went through the computer revolution and did not prognosticate its impact on

society, there is more pressure to not make the same mistake with the upcoming robot revolution. So far

the majority of robots in use are in an isolated industrial setting. For example, an industrial robotic arm is

usually enclosed within a cage. Whenever a human has to enter the cage, it is made sure that the arm is

turned off so it cannot accidentally harm humans. This is not the same case for collaborative robots or

cobots. Cobots and humans usually have a major overlap in their workspaces. The major distinction

between these cobots and industrial robots is that the former is designed for direct interactions with

humans while the latter is not. For example, Miso the burger-flipping robot is designed to be incorporated

in the kitchens of restaurants and is supposed to work in close contact with humans.

In 2018, only 3% of all the robots installed were cobots - 14,000 out of 422,000. While this is a

small number, it's an increase of about 23% from 2017[1]. Assuming this rate of growth keeps on

increasing, we will see more of these cobots in our everyday life within different applications. The

increasing role of cobots in our society is accompanied by their unique challenges. Cobots, and robots in

general, are replete with sensors that can collect all sorts of data. These robots are equipped with sensors

to provide information for decision making. Since these robots work in the close vicinity of humans, they

can also easily record what humans are saying, doing, etc. The ethical question raised is how do we guarantee the privacy of the humans with whom these cobots are interacting with? We see that even with the current technology similar concerns have been raised. A few years ago, Tesco was criticized for collecting data using electronic bands on how their employees were performing and how many breaks they were taking. The fear that employees are being watched itself creates a lot of anxiety that would hamper the acceptance of cobots in society [2].

Relevant to this issue is the question of whether the data stored by cobots can be used as legal evidence? In the scenario where cobots are prevalent, each of them would be capable of recording their surroundings. Assuming we know if a robot was at the scene of a crime, can the recording from the robot be presented as evidence? If yes, then how do we protect individual privacy? If we go in the other direction, why shouldn't we use it as evidence? After all, having concrete evidence will help in the faster resolution of cases. There is no clear answer as to what should be done in these situations and this is why it is vitally important we have this conversation. We want to be more equipped to handle changes introduced by the robot revolution than we were to handle those introduced by the computer revolution. Since we are on the issue of privacy, it is important to raise the issue of what happens if the robots get hacked and hackers get control of all the sensory input. We hear about online breaches where confidential information like address, social security, income, etc get leaked. Something similar happening on a wide network of cobots could prove very dangerous. For example, hackers can record some private conversations between company employees and can use it to their advantage.

Another interesting dilemma is what happens when the robot is given conflicting commands. Given the current level of technology, the robots can not think for themselves, except for a small subset of tasks. If there are two conflicting orders given, the cobots may not necessarily be able to deduce the correct command to execute. How would we deal with the ramifications in the case such a conundrum leads to loss of life or damage to property? Also, the robots may not necessarily be able to conclude if a

task is ethical or not. If the robot is programmed to blindly follow orders, it might be tricked into actually harming humanity. There is an argument that can be made that you would have some standard moral code that would help the robot decide if a decision is ethical or not but artificial intelligence is not sophisticated enough to do that yet. One possible way to resolve this might be to have the robot not take any action if the command is out of the scope of the robot's moral code or is too vague. Even in this case, there still could be some more harm done by the robot's inaction (the robot will not follow Asimov's 1st law in this case).

One specific niche of these cobots is military robots. Most of the current robots that are in use are meant for surveillance and defense. In the future, we might see more of the offensive military robots working with human operators or even without them. Given the superior targeting capabilities and durability these robots will have, it is important to talk about their ethical behavior. Rules of war should apply to all autonomous robots. The question raised is can robots understand all rules of war in the context of a particular situation or are they too vague? One way to make sure this is true is to program these robots to not harm civilians. This extreme approach is fallible in the sense that enemy militants can use children now in the battlefield and wreak havoc on these robots. So the robot certainly needs to be smarter to identify such situations, where "identify" is an important keyword. How sure can we be in the perception capabilities of the robots? Can we be sure the robots can always distinguish between friendlies, non-combatants, and enemies? It is certainly possible that these robots may make a mistake. In such a scenario, how do we assign blame? One might argue the robot only carried out the illegal decision because of a fault in the code or some defect by the manufacturer. I don't think the answer is as easy as always blaming one entity. It's certainly possible that the robot was not designed for all scenarios. In that case, the blame should fall on the commanding officer who deployed the robot. Evident from the couple of scenarios I presented, all these issues are not black and white. They are quite convoluted and intricate.

Issues like these have to be discussed in a lot more detail as we progress towards the development of autonomous military robots.

There can be an argument made that humans also carry a certain degree of risk that is similar to cobots in general. After all, humans can harm other people by accident. So why shouldn't we introduce robots if we can determine the risk to be equal? I think this is a skewed perspective. Rather than just looking at the risk, we should also consider the long term consequences. Learning from the past, we should understand that new technologies, like these, can have a variety of social consequences. It would be wise to consider this factor as well before introducing these cobots in masses. Furthermore, comprehensive testing should be done before we integrate these robots into society. What we usually do is make sure the technology is working correctly, that is we only conduct functional testing. We need to assess how the introduction is going to affect society at large so we need to look into some means of conducting integration testing. For example, carrying out a clinical study on how autonomous vehicles affect pedestrians. This can be done in an isolated environment like K-city in South Korea, which was built to test autonomous vehicles and other new technologies. I think we need to consider innovative solutions like this as we continue to make progress for artificial intelligence and robotics.

Bibliography

1. "Industrial Robots: Robot Investment Reaches Record 16.5 Billion USD." *IFR International Federation of Robotics*, 2019, ifr.org/ifr-press-releases/news/robot-investment-reaches-record-16.5-billion-usd.
2. Richter, Alexander. "Do Privacy Concerns Prevent Employees' Acceptance of Smart Wearables and Collaborative Robots?" SICHERHEIT, 2020, https://dl.gi.de/handle/20.500.12116/31783?locale-attribute=en
3. Lin, Patrick, et al. *Robot Ethics: The Ethical and Social Implications of Robotics*. The MIT Press, 2014.
4. Hevelke, Alexander, and Julian Nida-Rümelin. "Responsibility for Crashes of Autonomous Vehicles: An Ethical Analysis." *Science and Engineering Ethics*, vol. 21, no. 3, 2014, pp. 619–630.
5. Hellström, Thomas. "On the Moral Responsibility of Military Robots." *Ethics and Information Technology*, vol. 15, no. 2, 2012, pp. 99–107.