

PERSPECTIVE ARTICLE

Nursing robots in healthcare: The new employee

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Abstract

The development of robots incorporating artificial general intelligence has achieved rapid advancements, with tangible changes being observed on the labor market, such as in the healthcare industry. With the expansion of research targeted at robot development, it is anticipated that robots demonstrating artificial intelligence-associated cognitive properties that reflect individuality and distinctiveness will soon be entering the care system. These nursing robots take over some of the work traditionally done by humans in the elderly and nursing care system, encountering very vulnerable elderly individuals. Therefore, there is a need to reconsider and redefine the aspects of social values, data integrity, and the dignity of working with and on people when the nursing robots are taken into account. Their introduction presents opportunities for workforce redistribution and potential benefits for employees and underscores the urgent need for clear legal regulations. In this context, employing our knowledge in social science to foster constructive cooperation between humans and intelligent machines has become more important than ever.

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1. Introduction

We are currently witnessing a global experiment in which pre-trained artificial intelligence (AI) programs are further trained and refined through interactions with human users. The hype surrounding the new machine intelligence programs is dividing our society: their development meets with great enthusiasm from some people while being badly received by others. The enthusiasm for humanoid automatons that resemble, and even surpass, humans is not new. As early as the middle of the 18th century, in the heyday of emerging mechanics, automatons created from a wide variety of materials were astonishingly similar to the original in many respects. A drummer, a flute-player, and a defecating duck, created by engineering genius Jacques de Vaucanson, had fascinated the masses.¹ Amazingly, as early as 1843, Ada Lovelace, inspired by the Analytical Machine of Charles Babbage, presented her vision of a machine capable of processing musical notes, letters, and images.² Nowadays, text-to-speech synthesis, facial recognition software, and pre-recorded audio inverse kinematics provide an impressive imitation of human characteristics that is hardly distinguishable from the original. Although modern robot technology can perfectly simulate knowledge and skills, it cannot simulate understanding.

With the advent of machine intelligence and large language models, a new technological achievement with enormous potential for unbridled change in the working society is beginning to emerge in many fields, including healthcare. AI pioneer and Nobel Prize winner Geoffrey Hinton specified: “the world is not prepared for what is coming.”³ AI can undoubtedly provide valuable services in many areas of healthcare, e.g., in medical diagnosis, electronic health records, and telemedicine. However, the impact on both the labor market (relationship with coworkers) and on the medical care (relationship with patients) must be considered.⁴ The greatest conflict arises from the continuously recording cameras and microphones, which pose major challenges to personal data protection. However, there is more to consider.

1.1. Impact of AI on the labor market

A new industrial revolution is upon us. If work is viewed merely as a source of income without any additional ideal values, then partial replacement of people with automatons is predictable. The high usability and low maintenance costs in comparison with the increasingly complex employment conditions for workers clearly put the automatons on the winning track. The increase of AI-assisted robots in the workplace is a cause for concern regarding AI-related job displacements. It is still unclear which professional sectors will be most affected. Kevin LaGrande reported in his article on the consequences of the hype that the aptitudes of AI are still limited, and automation still does not have human-like intelligence.⁵ Referring to the previous three industrial revolutions, LaGrande concluded that new technologies have caused job dislocations in the short run but in the long run have spurred many more jobs than they destroyed.⁵ Similarly, Eric Dahlin, a sociology professor at Brigham Young University in Utah, US, concluded that the rise of robots at work is no reason to panic.⁶ However, unchecked use of machine intelligence can lead to dramatic changes in society and further exacerbate social inequality.

1.2. Transparency of AI-generated programs

Manufacturers of machine learning tools argue that the data used for this purpose are selected based on the principle of plausibility. However, statistical plausibility is not truth. Consequently, the question “what is true and what is not true” becomes more important than ever. Liu and Wang checked the correctness of decompiled C code by comparing its execution output with its reference binary input program. The authors detected significant failures in de- and recompilation compared with the seed.⁷ Small errors and deviations in large amounts of data most likely have little negative impact. However, if large

amounts of quickly and uncritically composed evaluations from AI-generated manuscripts are fed back into the data pool, then the proportion of reliable sources constantly decreases. There is no direct transparency to verify the objective of a specific coding.

2. Humanoid automatons

Progress in the merged development of robots and artificial general intelligence is making incredibly rapid strides. The ultimate goal is to create a kind of human-like automaton that can perform any task that a human can. The birth of a new species is near, namely the new worker, which is tireless and almost flawless, totally reliable and selfless, multilingual but uncritical, genderless, politically correct and free-of-prejudice, easily purchased, and easily discarded. This offers the opportunity to manage a payroll without social security contributions, cost-of-living adjustments, family obligations, or annoying trade union interference. Such an opportunity can hardly be turned down.

2.1. Human-machine relationship

In the social sphere, a programmed algorithm has difficulty recognizing complex and arbitrary decisions. Human imperfection, individuality, and distinctiveness reflect our pluralistic society, whereas completely identically designed and unfailing machine simulation corresponds more to a totalitarian society. Paradoxically, AI can already be used well for high-technology weapons, while we cannot tell whether it also has the sensitivity to be used for peace talks. If a sustainable and enriching relationship between humans and intelligent machines is to be developed, further input from behavioral science is needed.⁸ The flagship of the new technology is the robot. Automatons are designed and optimized for a wide variety of activities. In particular, advanced robotics technology has created collaborative robots (CoBots) that are designed to work alongside human workers in various industries.⁹ Employers expect increased flexibility and efficiency that boost overall productivity and profit. CoBots are programmed to respond to human commands during direct human-robot interaction. It is argued that the more complex tasks are reserved for humans.⁶ The interface of cooperation with humans is not yet directly connected to the human brain.

3. Automated employees

In a user study, it was observed that humans prefer working with an emotion-aware CoBot.¹⁰ However, humanizing machine language and performance alone is not sufficient to create a humanoid automaton. Robots are expected not only to look like humans but also to behave and react intuitively (anthropomorphization).

If robots are designed to behave and react intuitively, they also need the ability to think. Already in 1950, Ludwig Wittgenstein concluded that: “has one made a combination, perhaps by playing or by chance, and now uses it as a method of doing this and that, we will say he thinks. We could also say, someone thinks when he learns in a certain way.”^{11,p292]} There is no reason to believe that robots should not have cognitive properties that reflect individuality and distinctiveness in the near future. In his book review, Jonathan Kimmelman asked: “can artificial intelligence feel distress as compared to a lobster exposed to boiling water?”^{12,p761]} Referring to this constellation, Wittgenstein wrote: “I believe that he is suffering. Do I also believe that he is not an automaton? My attitude toward him is an attitude toward the soul. I do not think that he has a soul.”^{13,p495]} So far, emotion, empathy, fear, and pain are not mathematical functions. Based on the idea that creativity is an inherent human trait, Max Frisch described in his book “Homo faber” in a more prosaic way: “the robot recognizes more accurately than humans, he works according to the pure logic of probability; he knows more about the future than we do because he calculates it. But he does not speculate, he does not dream, and he does not experience.”^{14,p75]} The question of whether a humanoid automaton is just as capable of suffering as is a creature from the phylum *Arthropoda* can certainly be understood in an ambivalent way. It depends on whether enthusiasm for technology or indifference toward fellow living beings prevails in the assessor. This way of thinking does not exactly promote appreciative interaction with one another. Some employers are already willing to treat employees like automatons that have no feelings and no rights.

3.1. Nursing robots for elderly care

In high-tech countries with an increasing proportion of elderly and care-dependent populations and a simultaneous nursing shortage, nursing robots represent a reliable option. However, the use of robots for elderly people in need of care presents a very special challenge. The proportion of older people with cognitive impairment was reported to be prevalent in two-thirds of nursing home residents.¹⁵

In general, technological development in patient care must be oriented toward patient's needs. A common technical principle that contradicts ethical principles is control versus autonomy. According to the bioethics commission, the defining characteristic of a robot is not necessarily its human-like appearance but a range of behavioral patterns and equipment with sensors that mimic the human senses of sight, hearing, and touch.¹⁶ A key problem is the current view of humanity underlying nursing robots, which can be classified as reductionist. The

friendship and empathy on which elderly care is usually based are not regarded as consumable services.⁴ The effect of being touched by a warm hand and the importance of nonverbal communication in dementia patients are difficult to achieve with nursing robots. Furthermore, a deficit-based care model does not promote independence and the preservation of one's own abilities. For patients with cognitive impairment and dementia, this approach quickly comes across as demeaning, disempowering, infantilizing, and even degrading.¹⁶ Care goals vary greatly depending on the age group and the level of health impairment. On the one hand, demanding care, such as that intended to lead to rapid rehabilitation in young orthopedic patients, can lead to a reduction in deficits in geriatric patients. On the other hand, the performance of unpleasant and embarrassing care tasks by nursing robots may be met with greater acceptance, on the assumption that indiscretion is less likely.

One should not overlook the fact that nursing robots have the discretion of a hidden camera. Hence, an important demand for the design of robotic applications is transparency of the programmed impact capacity and the underlying social concept of humanity.¹⁷

4. Mitigation strategies

Privacy risks in robot technology for elderly care must be viewed as a multidimensional phenomenon.¹⁸ In their review, Grabler and Koeszegi¹⁸ determined transparency, regulation, privacy by design, contextual integrity, and control to be important domains in the human-robot interaction. The area of application and the safety and autonomy concerns in elderly care are very diverse. Robot technology is already used to lift patients with an exoskeleton or a physical assistance robot. Programming humanoid social robots is more complex. Such robots are designed to complement the emotional needs of people who lack social interaction. Human-social robot interactions are generated by a combination of active anthropomorphic commitment from the makers and emotional needs from the users.¹⁹ In this approach, a Human-in-the-Loop system could facilitate user feedback into AI-generated solutions. Ideally, these co-design methodologies directly involve nurses, patients, and their families in the robot design process to ensure that technology is oriented toward actual needs. The PARO robot has also been in use for some time. This advanced and interactive tool was designed to stimulate patients with cognitive disorders. A study by Robinson *et al.*²⁰ residents talked to and touched the PARO robot significantly more than the resident dog. However, perceiving a nursing robot as a human being can lead to a spectrum of emotional risks, such as deception, disappointment, and reverse

manipulation.¹⁹ Bao *et al.*¹⁹ emphasized the necessity of a virtual interactive environment between humans and social robots, which plays a crucial role in mitigating potential emotional risks.

Even when dealing with highly developed robots, there is no escaping the demand for tolerance and respect in coexistence. In the emergence of a new breed of workers, there is an urgent need to reconsider and possibly redefine the value and dignity of work and workers, necessitating the development of legal frameworks that guarantee the development of constructive cooperation between humans and intelligent machines.

5. Conclusion

The influence of machine intelligence on our coexistence can no longer be ignored. While numerous progressive changes will be possible with the new AI-associated developments, the underlying vision should be viewed with caution. The value of work and the dignity of the worker have to be reconsidered and possibly redefined. In healthcare, a clear positioning of social values and orders is crucial to protect the individual needs of patients, clients, and healthcare personnel.

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Conflict of interest

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