



# A Critical Review of the Challenges, Threats, and Drawbacks of Humanoid and Autonomous Robots

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**ABSTRACT:** The emergence of humanoid and autonomous robots represents a transformative leap in technological innovation, promising increased efficiency and functionality across multiple industries. However, this rapid progress comes with various challenges, threats, and drawbacks that require critical consideration. This research paper provides a comprehensive overview of the various issues surrounding humanoid and autonomous robots, considering ethical dilemmas, socio-economic impacts, safety concerns, and technological limitations. By analyzing these challenges, this paper aims to provide insight into the complexities surrounding the integration of these technologies into society and outline possible strategies to overcome them.

**IndexTerms** - Humanoid robots, autonomous robots, collaborative robots, weapons, killer robots, botnets, robomachines.

## I. INTRODUCTION

A humanoid robot is a robot whose shape resembles the human body. This design is useful for functional purposes, such as human interaction with tools and the environment, or for experimental purposes, such as studying bipedalism. Usually it has a torso, head, two arms, and two legs, but sometimes only parts of the body are duplicated. Some humanoid robots have heads designed to mimic human facial features such as eyes and mouths.

An autonomous robot is a robot that operates without human control. They are programmed to "think" like biological brains and are thought to have free will. Autonomous robots make their own decisions and take appropriate actions. Detect sensor failures and minimize the performance impact of failures. Modern examples include self-driving vacuum cleaners and cars.

In summary, humanoid robots are designed to resemble humans and interact with human environments, whereas autonomous robots are designed to operate independently of human control. Both types of robots have the potential to revolutionize various fields, but they also pose some challenges, threats, and drawbacks that need to be addressed.

**History of Humanoids and Robots:** The concept of humanoid automata dates back to the 4th century BC. 1 BC in Greek mythology and various Chinese religious and philosophical texts. During the Middle Ages, physical prototypes of humanoid automatons were created in the Middle East, Italy, Japan, and France. In modern times, Leonardo da Vinci invented complex mechanical robots wearing armor in the 14th century. From the 17th to the 19th century, the Japanese created humanoid automatons called karakuri dolls.

In the early 20th century, the idea of a humanoid machine was developed. At the end of the 1920s, three humanoid robots appeared in the real world. Westinghouse Electric Corporation invented "Televox" for remote control of electrical equipment. W.H. Richards of England and aircraft engineer Alan Leffel invented "Eric", which could stand or sit. Biologist Makoto Nishimura invented "Gakutenzoku," which allows you to write Japanese characters by changing your facial expressions. Over the past 40 years, various humanoid robots have appeared in Japan, including Waseda University's WABOT, Honda's ASIMO, Sony's QRIO, Fujitsu's HOAP, Kondo's KHR series, and the HRP series developed by the National Institute of Advanced Industrial Science and Technology. Ta. and technology and Kawada Robotics.

## II. HUMANOID ROBOTS

A humanoid robot is a robot whose shape resembles a human body. This design may serve functional purposes such as human interaction with tools and the environment, experimental purposes such as studying bipedalism, or other purposes. Generally, humanoid robots have a torso, head, two arms, and two legs, but some humanoid robots may only duplicate parts of the body, such as from the waist up. Some humanoid robots also have heads designed to mimic human facial features such as eyes and mouths. Androids are humanoid robots that are aesthetically reminiscent of humans. Humanoid robots are often equipped with an array of cameras, sensors, and more recently, AI and machine learning technology. It is used in various fields such as logistics, manufacturing, healthcare, and hospitality.



For example, NASA has developed a humanoid robot called "Valkyrie" designed for use in "degraded or damaged human-made environments," such as areas hit by natural disasters. The robot could take on dangerous tasks like cleaning solar panels or inspecting broken equipment outside the spacecraft, allowing astronauts to prioritize exploration and discovery.

#### Best Humanoid Robots in The World

- 1.Nadine.
- 2.Sophia.
3. Erica.
- 4.Junko Chihira.
- 5.Jia Jia.

### III. AUTONOMOUS ROBOTS

Autonomous robots are robots that perform tasks with a high degree of autonomy, making them particularly desirable in areas such as space travel, housekeeping (such as cleaning), wastewater treatment, and the delivery of goods and services.

Some modern factory robots are "autonomous" within a small radius of their surroundings. Although the environment does not have all degrees of freedom, the workplace of factory robots can be challenging, often unpredictable, and even confusing.

The main difference between autonomous robots and other AI systems is their ability to operate independently. Autonomous robots are designed to perform tasks in an open environment without continuous human guidance. They are capable of self-learning and are able to move around the environment and perform tasks.

The first autonomous robot, known as Elmer and Elsie, was designed by W. Graywaller in the late 1940s. They were the first robots in history to be programmed to "think" like biological brains and have free will.

The Defense Advanced Research Projects Agency (DARPA) is a research and development agency of the United States Department of Defense. Founded in 1958, it is responsible for developing new technologies for use in the military. DARPA is independent from other military research and development agencies and reports directly to senior leadership at the Department of Defense.

DARPA's mission is to make critical investments in breakthrough technologies for national security. The agency collaborates with academic, industry, and government partners to develop and implement research and development projects that push the boundaries of technology and science, often beyond the immediate needs of the U.S. military.



DARPA has contributed to the development of breakthrough technologies and capabilities for national security. His accomplishments inspired governments around the world to establish similar research and development institutions. Innovations that are at least partially credited to DARPA include weather satellites, GPS, drones, stealth technology, voice interfaces, personal computers, and the Internet.

The current Director of the Agency, appointed in March 2021, is Stephanie Tompkins. As of 2021, DARPA has approximately 220 government employees in his six technical offices, including approximately 100 program managers who oversee approximately 250 research and development programs.

## IV. TYPES OF ROBOTS

### 4.1 Autonomous Mobile Robots (AMRs):

These robots move around the world and make decisions in near real time. They use sensors and cameras to gather information about their surroundings.

### 4.2 Automated Guided Vehicles (AGVs):

Unlike AMRs, AGVs rely on trucks or predefined routes and often require operator supervision. They are often used to deliver materials or transport items in controlled environments such as warehouses or factories.

### 4.3 Articulated Robots:

These robots, also known as robotic arms, are designed to mimic the functionality of a human arm. Ideal for tasks such as arc welding, material handling, machine operation, and packaging.

### 4.4 Humanoid Robots:

These robots are shaped like the human body and are designed to interact with human tools and environments. Some humanoid robots have heads designed to mimic human facial features.

### 4.5 Cobots:

These are collaborative robots designed to work with humans in a shared workspace. These are typically used on manufacturing and assembly lines.

### 4.6 Hybrid Robots:

These robots combine the characteristics of two or more types of robots to perform a wider range of tasks.

## V. PUBLIC SURVEY

General Survey Additionally, many articles have been written predicting that robots will dramatically replace humans in most areas of life and questioning the workings of certain types of robots. Initially, the idea of robots was to support human endeavors, but then their direction began to take a new turn. But in recent years, many observers, including some scientists, have expressed concern that the presence of robots poses a threat to human security. From their invention to today, robots have undoubtedly contributed to human progress. We must accept that some well-programmed robots are helping save lives and property. Today, the world's leading car companies rely on robots for production, making everyone's lives easier and better. At least workers will be protected from all kinds of occupational risks.

### FIGURES AND SURVEY RESULTS

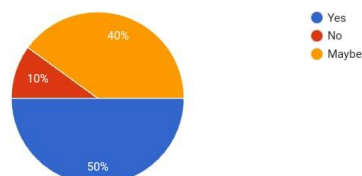
Do you know about robots & it's important ?

20 responses



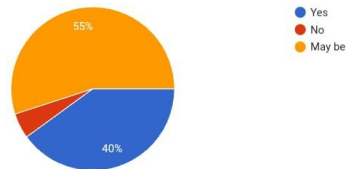
Do you know robots is our future ?

20 responses



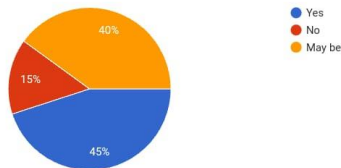
Life is easy with robots ?

20 responses



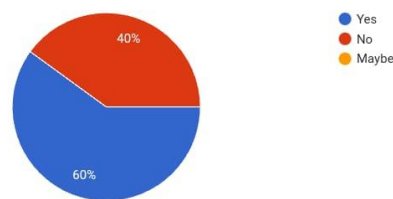
Robots is affected in jobs &amp; economy ?

20 responses



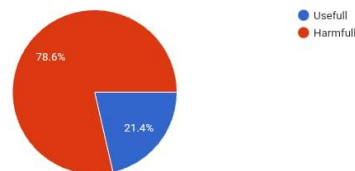
Do you know about Humanoid Robots ?

20 responses



Developing the killer robots is Usefull or Harmfull ?

14 responses



## VI. KEY ISSUES AND PROBLEMS IN ROBOTS

After much study and consultation, I come to understand that robots are much safer in manufacturing sector and in companies rather than homes and communities. I therefore urge that humanoid and autonomous robots should be stopped due to the following carefully selected points of mine:

### 6.1 Health Services Sector:

Healthcare robotics is developing at an incredible rate and has the potential to literally alter the face of the planet. However, it is imperative that healthcare robotics be appropriately implemented, especially when it comes to people's safety and wellbeing who might be at risk of harm because of a handicap, illness, injury, or disorder. Stakeholders in the utilization of healthcare robots confront five major obstacles. Cost, Functionality, Acceptability, Safety, and Usability...

Robots are becoming a necessary component of medical healthcare facilities due to technological improvements. It's more accurate to state that robots are taking the place of human doctors in certain patient management roles and in helping with complex procedures and surgeries. Without a question, robots will play a major role in healthcare in the future. However, several doubts are expressed regarding their competence. "The health care sector is unlikely to adopt robots unless there is minimal risk and investment, and before pursuing the larger opportunity, specific proof of success is required."

He stated that the uncertainty and hazards associated with the outcome outweigh the benefits. It is, in fact, entirely true! Furthermore, save from a few rare exceptions, these robots are basically simple devices with a small chip that has been programmed. They receive no assistance from anyone. And as everyone knows, even after extensive testing and assessment, programmed things frequently fail. Second, are they able to accurately identify flaws or blunders made while operating? No, is the response. Let's consider the well-known da Vinci Surgery case. The da Vinci surgical robot assists physicians in carrying out

labor-intensive, complicated procedures. The creators of the da Vinci robot claim that "the robot comes with all the tools a surgeon needs to perform a complete set of complex surgeries."

## 6.2 Financial and economic concerns:

By merely integrating robots into their production process, a number of sectors worldwide have seen a rise in profits. It is a truly amazing accomplishment for the manufacturing sector. These days, it is inevitable for workplaces and businesses to deploy robots. According to data from the International Federation of Robotics, in 2013 there were 437 industrial robots used by South Korean enterprises for every 10,000 workers in the manufacturing sector. Robots impact the economy in three ways:

- Your jobs are being taken over by robots!
- They have been intruding on manufacturing jobs for decades, and they are now literally invading fields like inventory management, driving, and logistics.
- Robots and automation boost productivity, reduce manufacturing costs, and have the potential to create new jobs in the IT sector—but they may also have a detrimental impact on certain labor groups.

From a financial perspective, the development of a robot genuinely requires significant expenditure. For this reason, the majority of businesses who choose to use robots must have a long-term plan that includes letting go of at least half of their employees in order to use the money saved up to support robotics research and development. Although they can be useful, maintaining robots is just as difficult as purchasing them. Instead of being afraid of the actual expense of the investment, the concern is of the associated consequences. These prophecies are also depicted in S. Shankar's Tamil film *Enthiran* (The Robot), in which a humanoid robot gains freedom and starts building additional robots under his leadership. After hundreds of Indians were killed, these robots ultimately caused great harm to a great number of people. Therefore, after taking into account evidence from experts that humanoid robots are bad, the Indian government decides to end the project.

## 6.3 Social Concerns:

We will discuss a particular class of humanoid robot called the Social co-robot in the context of the social component of robotic problems. One particular kind of humanoid robot that can be used in social groups to assist people and engage with them is called a social co-robot. They serve as local transportation, home delivery agents, community volunteers, personal helpers, and more. Despite all these artificial features, specialists believe there are numerous undiscovered problems that are likely to generate many encounters. Some of their unique features are their learnability and consciousness, which allow them to have feelings, emotions, and a desire for self-control.

**6.3.1 Familiarity:** A community is a vast area that contains a great number of living and non-living things. As time passes, some people depart and others arrive. Because of this, most robots have trouble recognizing strangers, particularly members of the community. Consequently, there's a chance the robot won't be able to recognize everyone in the area if security is the goal.

**6.3.2 Distinction:** No matter how well-programmed a robot is, it will always have trouble recognizing dangerous objects apart from innocuous ones. It would be extremely challenging for a robot to distinguish between a target and an innocent guy moving with a stick, for example, if it were employed as a police robot.

**6.3.3 Warfare issues:** There are subsets or classes of robots in robotics known as "killer robots." These robots are employed as defense systems or in combat zones. These robots are made to choose and interact with targets on their own, without assistance from a human. This suggests that they make their own inherent decisions, independent of human directives, even if those decisions have the potential to wreak damage. says Vincent Muller. "Automated radar-guarded gun systems have been in place to defend ships since 1970." sophisticated days, we have sophisticated devices that can recognize and take out approaching missiles, rockets, aircraft, and other targets automatically. These days, these systems are gaining popularity quickly because the US, UK, China, Israel, Russia, and other countries have already advanced with their inventions. Looking at it the other way around, several human rights organizations and even entire nations voiced numerous concerns and grievances indicating their lack of interest in these advancements. On the other hand, a global push to stop killer robots has already begun in some regions. As previously stated, around 44 nations have signed documents opposing the continuation of these projects to date. Hence Why should military robots be prohibited? Based on the various submissions from various critics, the following are some explanations:

6.3.3.1 Lack of conscience

6.3.3.2 Unpredictable actions

6.3.3.3 Machine failure and non-compliance to order

## CONCLUSION

Over the course of this investigation and analysis, I discovered that having industrial robots that reduce risk to humans, increase production, and generate profit may be a very good concept. However, it is insane to design or construct something that could endanger the life of its creator. The films *Ex-Machina*, *The Machine*, and *Chappie* have shown us how, in their pursuit of autonomy, machines rebel against their creators and even consider self-reproduction. at actuality, what they are doing is putting man and his safety at jeopardy.

One more thing to be discovered about their shortcomings is the security concern. I would want to take this opportunity to highlight two key takeaways. Our research on a range of materials demonstrates that security flaws that are frequently discovered in robots' neural networks can be exploited by hackers as a way to subvert the robot's intended purpose. And if robot control can

be compromised in the middle of a combat zone, then dire outcomes are to be anticipated. The way robots are linked to the network is my second area of concern. If a robot is directly connected to the internet or a global network, it can be controlled remotely and could be taken over by hackers. If this happens, the mainframe or server computer that is facilitating the robot's control could be identified as the source of the access. Thus, the robot can be utilized as a middleman or zombie to carry out a larger attack on defenseless civilians. Robots will therefore continue to be open to assault until and unless these issues are resolved. Furthermore, sophisticated cloud robots are vulnerable to attacks via botnets. A botnet attack occurs when a group of compromised workstations, often known as zombies, are infected with software that enables an attacker to remotely incite the machines to commit undesirable actions, like attacking. When these devices are combined, though, they have the potential to wreak enormous havoc that may take a very long time to undo. How might this occur, one might wonder? Research demonstrates that if devices are linked to one another, there are high chances that they can exchange information that can be of help coordinate an attack on anything including human race.

The topic of robot consciousness is another important one that merits discussion. Numerous experiments demonstrated that, as seen in the Enthiran movies, robots are susceptible to social engineering attacks, which involve tricking and deceiving someone or something to obtain information. The humanoid robot was unable to distinguish between a normal discussion and an aberrant one that would reveal the machine schematics. Many robots have more personal information than they should, therefore if caution is not exercised, they may divulge even the most private information. Lastly, I'm pleading with the relevant authorities to reconsider their choices regarding the construction of these robots; they ought to at the very least take the next generation into account. They should also consider the potential negative effects of robotics, such as increased crime, unemployment, and perhaps fatal accidents.

### ACKNOWLEDGMENT

Presenting our research paper, "A Critical Review of the Challenges, Threats, and Drawbacks of Humanoid and Autonomous Robots," brings us immense pleasure. I want to sincerely thank each and every teacher that has supported us along the way. I would like to express my gratitude to our lecturers for their support and direction throughout the presentation of this research work. We would also like to thank the department head. Without expressing our gratitude to our excellent Principal, who gave us the essential direction, support, and access to all the resources we needed to work on this project, our acknowledgement would remain incomplete.

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