



# Can Humanoid Robots be the Future for Supporting Mankind ?

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## ABSTRACT

Humanoid robots have been a topic of interest and fascination for decades, and with the recent advancements in technology, they are becoming increasingly prevalent in our society. This research paper explores the potential of humanoid robots to become the future for mankind. The paper examines the current state of humanoid robot technology, including their capabilities and limitations. It also explores the ethical considerations associated with the development and use of humanoid robots. Finally the paper considers the potential benefits and drawbacks of a where humanoid robots are a dominant presence in our lives. The current state of humanoid robot technology is promising, with robots that are increasingly human like in their appearance and capabilities. However, there are still technical challenges to overcome, including improving their power consumption, mobility and affordability. Additionally, as humanoid robots become more advanced, they are blur the line between machines and humans, raising important ethical considerations about their development and use.

**KEYWORDS:** Humanoid robots, Artificial intelligence, benefits to mankind

## 1. INTRODUCTION

The development of humanoid robots has long been a topic of science fiction, but with the advances in robotics and artificial intelligence, it is becoming a reality. These robots, have the potential to revolutionize various aspects of our lives and could serve as a means of supporting mankind in a wide range of domains. At the same time, there are many potential benefits to the development of humanoid robots, such as their ability to perform tasks that are difficult or dangerous for humans, their potential to provide care and assistance to the elderly and disabled, and their capacity to improve the quality of life for many people.

Given the potential benefits and drawbacks, it is important to examine the question of whether humanoid robots can be the future for supporting mankind in a comprehensive and thoughtful way. This paper seeks to explore this question "can humanoid robots be the future for supporting mankind" by examining the current state of humanoid robot technology, discussing the ethical implications of their development and use.

## STRUCTURE OF PAPER

The paper is organized as follows: In Section 1, the introduction of the paper is provided along with the structure, important terms, objectives and overall

description. In Section 2 we discuss about humanoid robots. In Section 3 we have the complete information about historical innovations of robots Section 4 shares information about trending humanoid robots Section 5 tells us about the growth of humanoid robots in daily life Section 6 tells us about the ethical considerations, In section 7 we have talked about impacts of humanoid robots, followed by research methodology in section 8. In section 9, survey questionnaire and results are shown, In section 10 we have done testing on obtained data followed by findings in section 11 and In section 12 we have provided conclusion followed by bibliography respectively.

## 2. WHAT IS A HUMANOID ROBOT?

Humanoid robots are machines designed to mimic human physical appearance and behavior. They are equipped with sensors and artificial intelligence algorithms that enable them to interact with the environment and perform tasks that require human like capabilities such as grasping objects, walking and communicating with people.

These robots often use sensors, cameras, and other advanced technologies to perceive their environment and interact with people and objects. They can be programmed to perform a wide range of tasks from simple household chores to more complex medical procedures.

While humanoid robots are still relatively new technology, they are increasingly being used in fields such as healthcare, education and entertainment. Some of the most well-known examples of humanoid robots include ASIMO, developed by Honda, and Pepper, developed by Soft Bank Robotics.

## 3. HISTORICAL INNOVATIONS OF ROBOTS

The history of robots can be traced back to ancient civilization, where various types of automatons were created for religious or entertainment purpose. However, it was not until the 20<sup>th</sup> century that robots as we know them today began to emerge. Here are some of the key historical innovations in the development of robots:

I. **Unimate:** In 1961, Unimate became the first industrial robot. Developed by George Devol and Joseph Engelberger, the robot was used for tasks

such as die-casting and spot welding in the automotive industry.

- II. **Shakey:** Shakey, developed in the late 1960s, was the first mobile robot with the ability to perceive its environment and navigate through it. It was used for tasks such as exploring planetary surfaces and inspecting nuclear power plants.
- III. **The Stanford Cart:** It was developed in the 1970s, was a mobile robot that could navigate its environment using computer vision and was used for tasks such as carrying groceries and mail.
- IV. **ASIMO:** Developed by Honda in 2000, ASIMO is a humanoid robot that is capable of walking on two legs and performing a variety of tasks. It has been used in fields such as healthcare and education.
- V. **Roomba:** It developed by iRobot in 2002, is a popular robot vacuum cleaner that used sensors to navigate and clean floors.

Overall, the historical innovations in robotics have paved the way for the development of increasingly advanced and capable robots that are now used in a wide range of applications.

## 4. TRENDING HUMANOID ROBOTS

- I. **Sophia:** Developed by Hanson Robotics, Sophia is a humanoid robot with a human-like face and the ability to express emotions. She has been used in various events and media appearances, including being granted citizenship in Saudi Arabia in 2017.
- II. **Spot:** It is a quadruped robot developed by Boston Dynamics that has recently gained popularity for its use in a variety of applications, such as monitoring construction sites, delivering packages, and inspecting power plants.
- III. **ASIMO:** Despite being introduced over two decades ago, Honda's ASIMO is still considered one of the most advanced humanoid robots, and its capabilities and technologies continue to inspire research and development.
- IV. **Pepper:** Developed by SoftBank Robotics, it has become increasingly popular in recent years for its use in customer service and retail settings, as well as for its ability to interact with people in a variety of contexts.
- V. **Atlas:** Boston Dynamics' Atlas robot has also continued to gain attention and popularity for its

advanced capabilities , including its ability to perform acrobatic maneuvers and navigate complex environments .

It's important to note that the top trending humanoid robots can vary depending on factors such as their recent developments , applications and media exposure

## 5. GROWTH OF HUMANOID ROBOTS IN DAILY LIFE

There are variety of ways that humanoid robots are currently being used in daily life ,and many more potential applications in the future

- **Healthcare:** Humanoid robots are being used in health care to provide assistance to patients and health care providers . for eg , robots can help with tasks such as lifting patients ,delivering medications , and monitoring vital signs

According to a report by Research And Markets , the global market for medical robots is expected to grow at CAGR of 22.36% from 2020 to 2027 . This includes both humanoid and non humanoid robots .

- **Education :** Humanoid robots are being used in schools and universities to assist with teaching and learning .for eg ,robots can be used to help students learn a foreign language or to assist with science experiments .

The market for educational robots is expected to grow at a CAGR of 22.4% from 2021 to 2028, according to a report by verified Market Research.

- **Hospitality:** These robots are being used in hotels and restaurants to assist with tasks such as greeting guests, taking orders ,and delivering food and drinks .

According to a report by Grand View Research , the global market for service robots is expected to grow at a CAGR of 22.5% from 2020 to 2027

- **Manufacturing:** They are being used in manufacturing to perform tasks such as assembly and welding. They can work in hazardous or hard to reach areas can work continuously without breaks . The global for industrial robots is expected to grow at a CAGR of 9.8% from 2020 to 2025.

- **Entertainment :** These are used in theme parks and museums .They can interact with visitors and provide a unique and engaging experience

- **Personal Assistance:** These robots are developed to help with tasks such as shopping , cleaning and managing schedules .

## 6. ETHICAL CONSIDERATIONS

The widespread use of humanoid robots to support mankind raises a number of ethical considerations that need to be carefully considerations :

- **Robot Rights and Protections :** As humanoid robots become more advanced and human-like there questions their rights and protections ,for eg should they be treated as individuals with their own rights , or as machines that are the property of their owners ?
- **Job Displacement :**The increased use of humanoid robots could lead to job displacement particularly in industries that rely heavily on manual labor .This could lead to economic disruption and social unrest , particularly if displaced workers are unable to find new employment opportunities .
- **Bias and Discrimination :** These robots may be programmed with biases or stereotypes that could perpetuate discrimination against certain groups .This could lead to issues such as unequal access to health care or education .
- **Privacy and Surveillance :** These robots may be equipped with cameras or other sensors that could be used for surveillance purpose . This raises concerns about privacy and the potential for abuse by those in positions of power .
- **Safety and Liability :** As humanoid robots become more autonomous and capable of making decisions , there are questions about who is responsible if something goes wrong , for eg if a robot injures a person or damages property , who is liable for the damage ?

## 7. IMPACTS

### Advantages of Humanoid robots supporting mankind :

- a. **Improved Efficiency :** Humanoid robots can perform tasks quickly and accurately , which can lead to increased productivity and efficiency in various industries
- b. **Improved Safety :**These robots can be designed to work in hazardous or dangerous environments , reducing the risk of injury to human workers.

- c. Enhanced Healthcare :These robots can provide assistance to people with disabilities help with therapy ,or perform tasks in medical settings
- d. Increased accessibility : Humanoid robots can provide assistance to people who may have limited mobility or other physical challenges ,increasing their independence and quality of life .
- e. Improved Education : These robots can be used as educational tools , providing a hands on learning experience for students .

**Disadvantages of Humanoid robots supporting mankind**

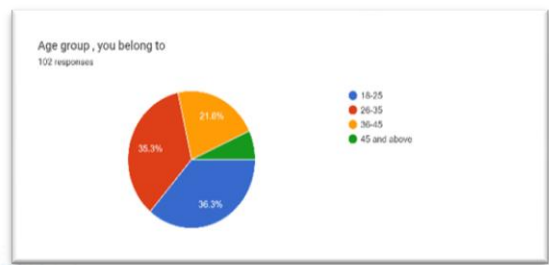
- a. Job displacement: As Humanoid robots become more advanced, they may replace human workers , leading to job loss and economic disruption .
- b. Lack of Emotional Intelligence : These robots lack the ability to empathize with humans or understand human emotions , which can lead to lack of trust and a sense of disconnection between humans and robots .
- c. Dependence on Technology : Over-reliance on humanoid robots can lead to a loss of skills and knowledge in certain areas , as humans become less proficient at tasks that are being performed by robots .
- d. Safety Concerns : Humanoid robots can malfunction ,causing injury or damage to property.
- e. Ethical Concerns : The use of humanoid robots raises ethical concerns about privacy autonomy and accountability

**8.RESEARCH METHODOLOGIES**

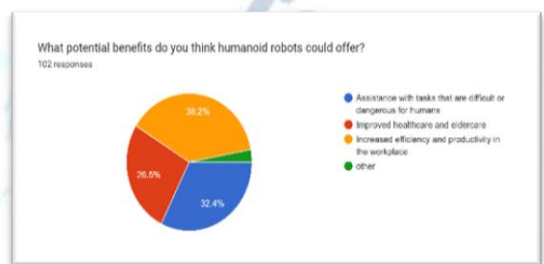
A model may include both descriptive and analytical components. A descriptive model's logical relationships can be examined, and conclusions can be drawn to reason about the system. Nonetheless, the logical analysis yields quite different conclusions than a quantitative chemical investigation of system properties. We first conducted a poll of people utilizing an online form creator and data collection service to acquire information regarding people's awareness

**9. SURVEY QUESTIONNAIRE AND RESULTS**

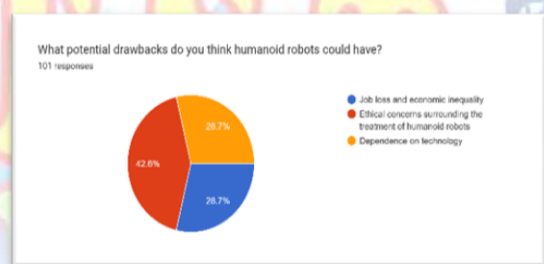
1. Age group , you belong to



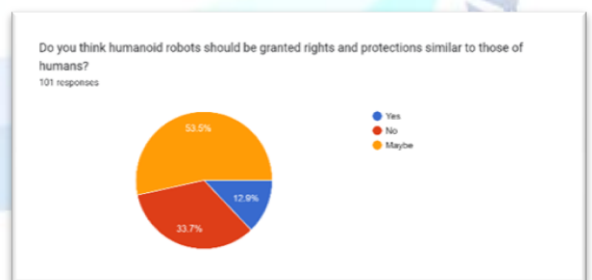
2. What potential benefits do you think humanoid robots could offer?



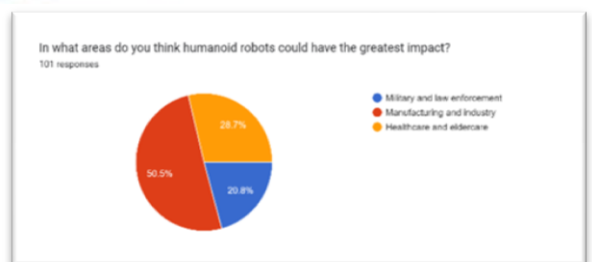
3. What potential drawbacks do you think humanoid robots could have ?



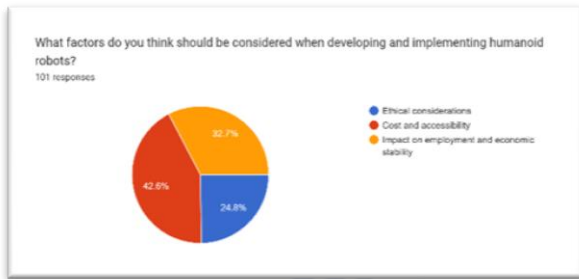
4. Do you think humanoid robots should be granted rights and protections similar to those of humans ?



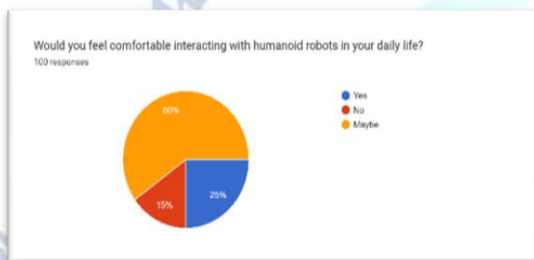
5. In what areas do you think humanoid robots could have the greatest impact ?



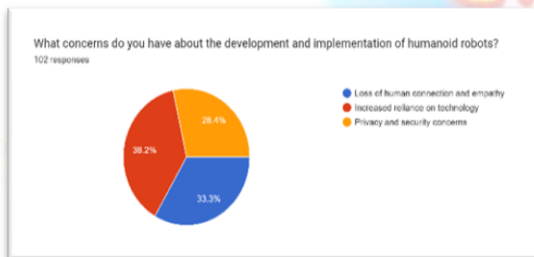
6. What factors do you think should be considered when developing and implementing humanoid robots ?



7. Would you feel comfortable interacting with humanoid robots in your daily life ?



8. What concerns do you have about the development and implementation of humanoid robots ?



## 10 . TESTING

Hypothesis testing is a sort of statistical reasoning that includes analysing data from a sample to derive inferences about a population parameter or probability distribution. First, a hypothesis is created regarding the parameter or distribution. This is known as the null hypothesis, abbreviated as H<sub>0</sub>. After that, an alternative hypothesis (denoted H<sub>a</sub>) is defined, which is the polar opposite of the null hypothesis. Using sample data, the hypothesis-testing technique determines whether or not H<sub>0</sub> may be rejected. The statistical conclusion is that the alternative hypothesis H<sub>a</sub> is true if H<sub>0</sub> is rejected. For this paper,

Null hypothesis (H<sub>0</sub>): Humanoid robots can be the future for supporting mankind

Alternative hypothesis (H<sub>a</sub>): Humanoid robots can't be the future for supporting mankind

## 10.1 DESCRIPTIVE STATISTICS

Descriptive statistics is a means of describing features of a data set by generating summaries about data samples.

- Level of significance

The chance of rejecting the null hypothesis when it is true is the significance level(also known as alpha or  $\alpha$ ). A significance level of 0.05, for example, means there's a 5% probability of discovering a difference when there isn't one. Lower significance levels indicate that more evidence is required to reject the null hypothesis.

- Level of confidence

The confidence level indicates the probability that the location of a statistical parameter (such as the arithmetic mean) measured in a sample survey is also true for the entire population.

Data obtained through survey :

Sr. no	Data
1	36.3
2	38.2
3	42.6
4	53.5
5	50.5
6	42.6
7	60
8	38.2

Descriptive Analysis	
Mean	45.2375
Standard Error	3.008139998
Median	42.6
Mode	38.2
Standard Deviation	8.508304767
Sample Variance	72.39125
Kurtosis	-0.692881391
Skewness	0.76673502
Range	23.7
Minimum	36.3
Maximum	60
Sum	361.9
Count	8
Largest(1)	60
Smallest(1)	36.3
Confidence Level(95.0%)	7.113120792

A t-score (t-value) is the number of standard deviations away from the t-mean. distribution's.

The formula to find t-score is:  $t = (x-\mu) / (s/\sqrt{n})$  where x is the sample mean,  $\mu$  is the hypothesized mean, s is the sample standard deviation, and n is the sample size.

The p-value, also known as the probability value, indicates how probable your data is to have happened under the null hypothesis. Once we know the value of t, we can find the corresponding p-value. If the p-value is less than some alpha level (common choices are .01, .05, and .10) then we can reject the null hypothesis and conclude that smart devices are not secure and cannot be trusted with our privacy.

Calculating t-value:

Step 1: Determine what the null and alternative hypotheses are.

Null hypothesis (H0): Humanoid robots can be the future for supporting mankind

Alternative hypothesis (Ha): Humanoid robots can't be the future for supporting mankind

Step 2: Find the test statistic.

In this case, the hypothesized mean value is considered 0.\*

$$t = (x-\mu) / (s/\sqrt{n}) = (45.23-0) / (8.50/\sqrt{8}) \\ = 15.050$$

$$t\text{-value} = 15.050$$

Calculating p-value:

Step 3: Calculate the test statistic's p- value.

The t-Distribution table with n-1 degrees of freedom is used to calculate the p-value. In this paper, the sample size is n = 8, so n- 1 = 7

By plugging the observed value in the calculator, it returns a p-value. In this case, the p-value returned is less than 0.00001.

Since this p-value is less than our chosen alpha level of 0.05, we can reject the null hypothesis. Thus, we have sufficient evidence to say that humanoid robots can't be the future for supporting mankind

## 11. FINDINGS

The question of whether humanoid robots can be the future for supporting mankind is a complex one ,and the answer depends on a variety of factors . Based on current research and developments in robotics , here are some key findings :

- Potential benefits : Humanoid robots have the potential to offer numerous benefits , such as increased productivity , improved safety ,and enhanced precision in certain industries . They can also provide assistance to individuals with disabilities or the elderly.
- Ethical considerations : The use of humanoid robots raises ethical considerations ,such as questions about the role of robots in society ,the potential impact on human jobs , and the responsibility for the actions of robots .
- Technical limitations : Despite recent advances in robotics , there are still technical limitations to the abilities of humanoid robots . They may not be able to perform certain tasks as well as humans , and the cost of development and maintenance can be high .
- Uncertainty about future developments : The field of robotics is rapidly evolving and it is difficult to predict the future development and impact of humanoid robots on society

Basically, while humanoid robots have the potential to offer many benefits, there are also ethical and technical considerations that need to be taken into account . Further research and development are needed to determine the extent to which humanoid robots can support mankind in the future .

## 12. CONCLUSION

In conclusion , the question of whether humanoid robots can be the future for supporting mankind is a complex and multifaceted one. While there are potential benefits to the use of humanoid robots in certain industries and applications , there are also ethical and technical considerations that need to be taken into account .Some of the benefits include increased productivity , improved safety and assistance for individuals with disabilities or the elderly .However , ethical considerations include the impact on human jobs and the responsibility for the actions of robots .Technical limitations of current robotics technology also need to be considered .

### Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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