Robotics4EU

Boosting Wider Adoption of Robotics in Europe

Panza Robotics

Citizen Survey Results

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Introduction

This report presents the results of a collaboration between Panza Robotics (SK) and the EU-funded project Robotics4EU under grant agreement No 101017283. The collaboration is part of a European wide citizen consultation on validating different robotics business ideas from a societal perspective. In total 11 robotics applications participated in the activity and took part in exploring how citizens can be engaged and give input to the development of new robotic applications.

The assessment of each of the 11 robotic solutions was performed in an online, informed survey style consultation. Here respondents were guided through the survey via an online platform providing them with informative text, pictures or video material and questions about the specific robotic solution. The platform then collected the answers from each of the individual respondents which were further analysed by the Robotics4EU project.

What is the Robotics4EU project?

The citizen consultation presented in this report is part of Robotics4EU, a 3-year project funded under the European Union's Horizon 2020 research and innovation program. The project aims to ensure a more widespread adoption of robots within the areas of healthcare, inspection and maintenance of infrastructure, agri-food, and agile production. To achieve this, the project is advocating for implementation of responsible robotics principles and raising awareness about non-technological aspects of robotics by organising community building and co-creation events bringing together the robotics community and citizens.

Why involve citizens' perspectives in the development of robots?

The collaboration between robotics developers and citizens rests on the core democratic notion that technology with the potential to have a significant impact on how we shape our future society, should not only be discussed by stakeholders, policy makers, experts, or businesses, it should also include opinions of the broader public who most likely will be directly or indirectly impacted by the changes the technology may impose over time.

There are several ways in which robot manufacturers can benefit from engaging citizens in their development processes. While citizens may not possess the technical knowledge required to build a robot, they are experts of the social worlds that new technologies will inhabit, change, or at the very least affect in some way or another. This type of expertise is equally important as professional expertise because it is what ultimately decides whether or not society will accept a new technology. Inviting citizens 'behind the stage' can help make sure that the manufacturers' solutions are aligned with society's expectations and needs. The citizens bring an 'outsider' perspective that can be an effective tool to detect and identify concerns and potential problems that would perhaps otherwise emerge only when the robot is fully developed and on the market. Thus, by adopting inclusive approaches from early in the development process, robot manufacturers will be better equipped to make informed decisions about their products and avoid costly mistakes that may ultimately render their solutions(s) unfit for society.

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Panza Robotics

Carrying out routine tasks, such as area surveillance, condition monitoring of heat, toxicity, chemicals, or predictive maintenance represents a significant part of the costs for almost every municipality or private company. The costs are getting higher if the tasks are performed in potentially hazardous or hard-to-reach areas affected by earthquakes, or places like construction sites, landfill sites, nuclear power plants, oil stations etc.

The solution is to carry out these tasks by using the robot Artaban – a universal multipurpose robotic platform designed to support these types of routine or dangerous operations across various industries. Using Artaban could play a key role in reducing costs, minimizing failure rates, and protecting the health and safety of citizens or employees.

Using smart autonomous robots will become “the new standard“ across various industries and will surely have an impact on people as well. The use of autonomous robots will encourage an expansion of knowledge, leaving a growing demand for new skilled workers and new positions in various industries. In addition, there are also environmental and low carbon economy contribution benefits, as Artaban monitors various environments and helps to predict dangerous conditions or hazardous situations.

Furthermore, Artaban reduces personal transportation and carbon emissions. It is important to create a more socially sustainable use of robots as it is not the aim to create new technology, which replaces people or cancels jobs. Rather, Panza Robotics are developing (semi) autonomous four-legged robots with embedded sensors to move around people and help them to accomplish their everyday tasks.

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Demographics

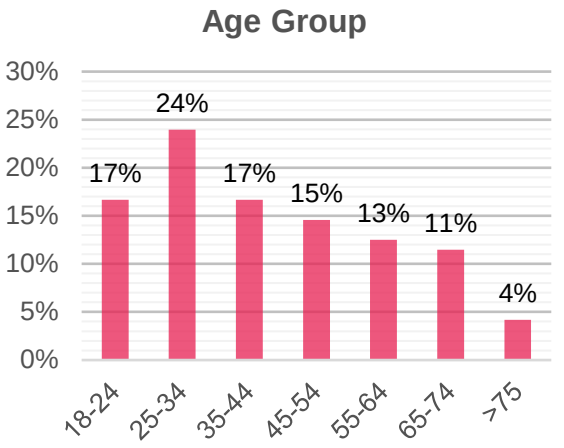
In total 97 respondents were engaged in answering questions about the robot Artaban by Panza Robotics.

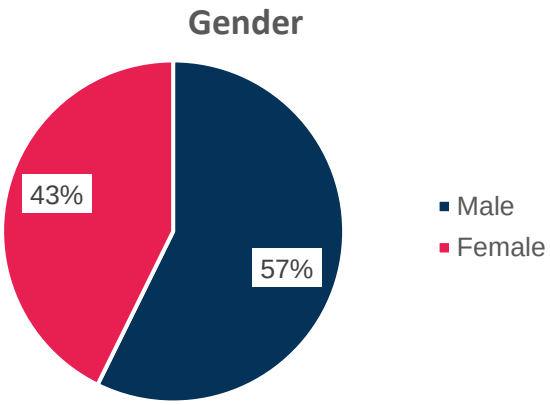
Respondents answering the survey were mostly citizens between the ages 25-34 and this demographic made up for 24% of the total answers to the survey. Following this, age groups 18-24 and 35-44 each made up 17% of the total answers. The rest of the age groups were evenly divided with 45-54 coming in at 15%, ages 55-64 at 13% and 65-74 at 11%. Finally, the least represented age group was 75 or older with 4%.

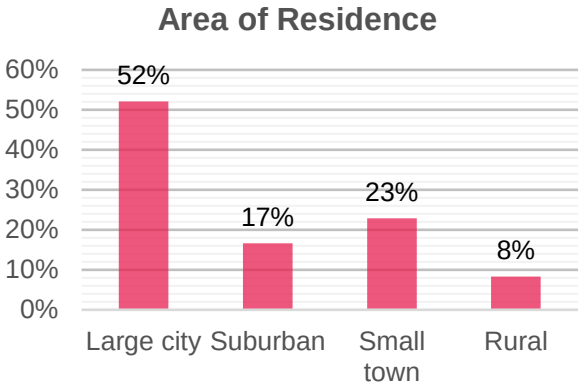
The gender distribution in this survey was shifted towards male respondents with them accounting for 57%, while female participants made up the remaining 42%.

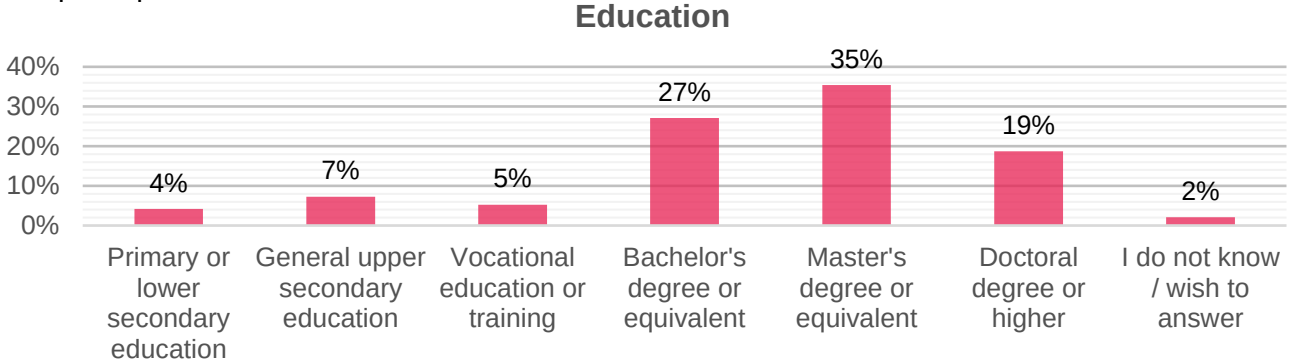
Looking at the areas of residence of the respondents, the distribution was more uneven. Over half came from large cities, with this category accounting for 52% of the total respondents. The second most chosen category was small town with 22% while suburban had 16%. Participants coming from rural areas made up only 8%.

The survey attracted citizens with a higher degree of educational background and 35% of the participants answered that they held a master's degree or equivalent. Following this segment, bachelor's degree or equivalent was the second most chosen answer accounting for 27% of the participants.









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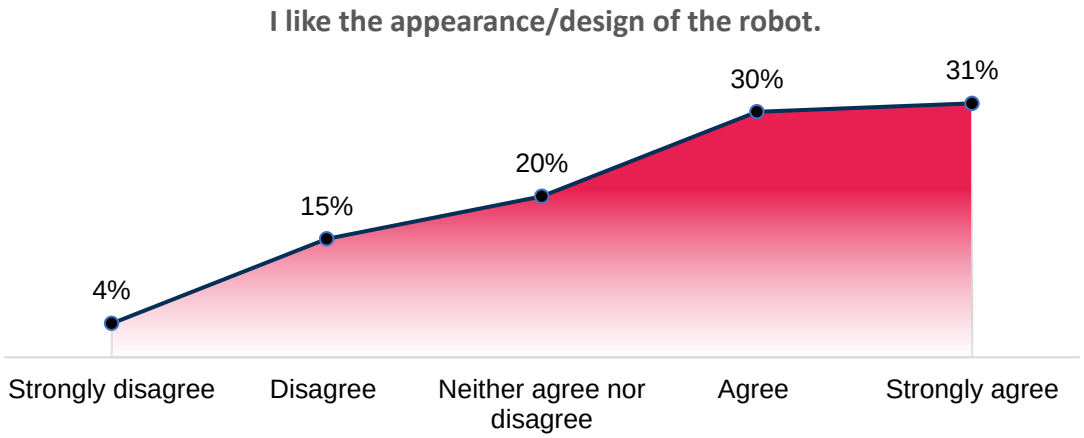
More than 15 different countries were represented in the survey, with France being the country with the most respondents accounting for 16.7% of the total answers. This was followed by Denmark with 13% and then Norway with 11%. 24% choose not to disclose their country of origin.

These specific demographics may influence the answers and tendencies described in the report. Therefore, when reading through the responses it is important to be aware that these results are not statistically representative, but indications of people's individual opinions which can be used as valuable input to the further work of the company's robot solution.

Survey Results

Question 1: I like the appearance/design of the robot

To get a first-hand impression of the opinions of the robot respondents were first asked to consider the design/appearance of the robot Artaban. Here, responses were mostly positive, and a combined 61% answered either 'agree' or' Strongly agree'. 14% choose 'disagree' and only 4% choose 'Strongly disagree'. 19% of respondents choose 'Neither agree nor disagree', showing that several respondents did not form an opinion about the robot, or did not think particularly about it. See the figure below:



There were several respondents that chose to elaborate on their answer. Many of these answers praised the design, commenting that the robot had a *"Good, friendly, non threatening, clean design"* and that it: *"Looks capable of any terrain traversal and is bright and can be easily detected."* Others mentioned that the robot looked *"cute"* and that the animal-like design was preferable to more humanoid designs.

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The fact that some respondents were very enthusiastic about the quadrupedal and animal-inspired design might hint at a tendency to be more accepting of robots that resembles something towards which there is a certain familiarity, and one respondent mention that:

"It's easy to recognise, and I think it looks cute. I would feel safe if I worked at a place where Artaban would be roaming around".

However, there were also comments on the design which were less positive, and some respondents mentioned how *"It looks a bit creepy"* and that the robot looks *"mean"* which indicated that some might be put off by its animal resemblance.

The results of the focus group among the participants of the Robotex International festival differed somewhat in the data collected by the survey. The reason may be the more positive attitude of the participants in the robotics event towards robots. "That I have this feeling, yes, that he is made more fiercely. He is fierce even if he is made a little scarier. I would like to have one like that in my home."

Question 1.2 If you have any recommendations for changes in the design, please comment them here

Respondents were asked if they wanted to further elaborate on the question concerning design and appearance by asserting their own recommendations for changes in the design. Here, some respondents show a minor dislike towards the angular design and point out that – because of this design choice – the robot looks somewhat more like a weapon than a collaborative tool and one respondent notes that:

> *"Even though it looks like a dog and therefore has a familiar appearance, it looks a little threatening. Maybe because of the colours or the shape, but it looks more like a weapon than a tool that could help us."*

In general, respondents seem to be either in favour of the dog-like/animal-like design or to be against it. Some also mentioned the angular shapes and how they contribute to making the robot look somewhat intimidating and that one way to make the robot seem more approachable and friendly could be by adding more rounded shapes. There were also a few comments regarding the functionality of the design and one respondent mentioned that the robot looks like it might trip and crash when encountering obstacles and another suggests that it could be more practical if the robot used wheels or crawlers, instead of legs.

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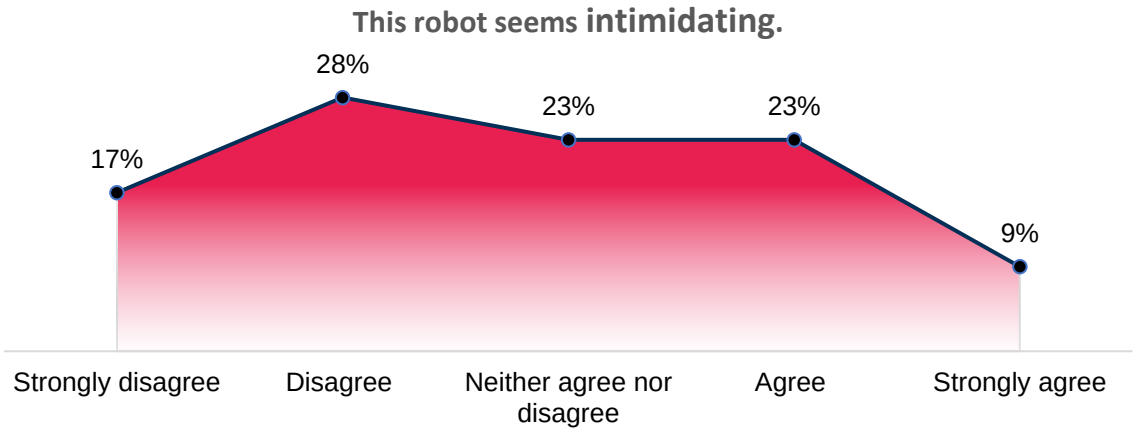
Question 2: This robot seems intimidating.

When asked whether the respondents found the robot intimidating the answers were distributed relatively broadly. The most chosen answer was 'Disagree' with 27%, indicating that many respondents were not too negative towards it. 17% choose 'Strongly disagree", meaning that a combined 44% of respondents considered the robot not to be intimidating. Many also did not seem to have an opinion on whether they found the robot to be intimidating as 22% answered 'Neither agree nor disagree" The remaining 32% chose either 'Agree' or 'Strongly agree'. See the figure below:



Many respondents elaborated on their choice and the written answers to this question echo some of the sentiments from the earlier question. Here, one respondent elaborates on the design in the following way:

> *"It is replicating a small pet-like animal (dog/cat), this is good. And if it walks around on a construction side (for example) I do not see where the problem should be. It will melt into the environment and people will get used to it."*

Furthermore, "*cuteness*" and animal-like appearance are again highlighted and one respondent notes: *"I love dogs, it looks like a dog, and its color scheme are crazy, it is perfect"* while another notes that: *"It has a very safe appearance".* So, while some respondents had comments and recommendations concerning the current design, most did not find the robot intimidating.

Question 3: By utilizing robots in hazardous areas, work can be made safer for humans. Are there any areas or situations in which you prefer not to use robots such as Artaban?

Ensuring a healthy and successful implementation of new robotic technologies is also about defining limitations. Here, respondents were asked to choose 3 areas where they did *not* want robots such as Artaban to work. Respondents were purposely only given the opportunity to choose 3 to make them reflect more critically about their answers.

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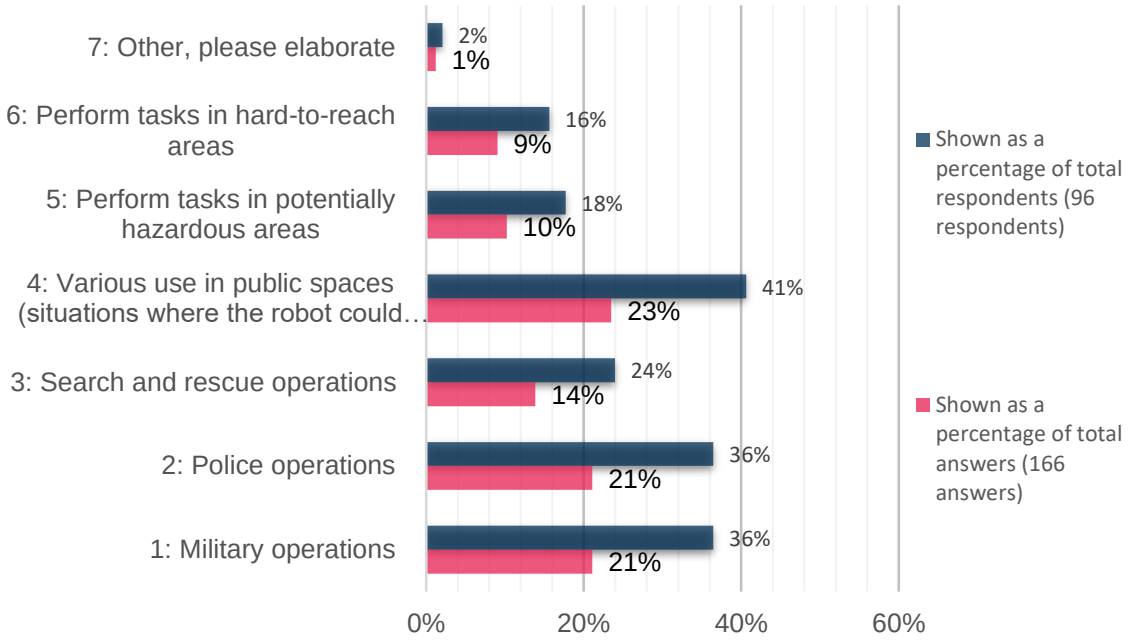
Here, the most chosen answer was 'Various use in public spaces (situations where the robot could potentially be in close contact with citizens)' with a total of 23% of the answers. Following this was use in 'Military operations' and 'Police operations' with 21% each. The rest of the votes were distributed between 'Search and rescue operations' with 13%, 'Perform tasks in potentially hazardous areas' with 10% and finally 'Perform tasks in hard-to-reach areas' with 9%. See the figure below:

By utilizing robots in hazardous areas, work can be made safer for humans. Are there any areas or situations in which you prefer not to use robots such as Artaban?



The distribution of the answers to this question might be an indication that respondents are sceptical towards the use of these robotic solutions in public spaces where people who are not familiar with the robot may potentially be present and in close contact with the robot. This may be because of a deeper grounded and general fear about new robotic technologies and what effect these might have on society – especially if used in public spaces. One respondent elaborated on a worry regarding having robots in public spaces: "*Robots should not be used in public spaces. I am not in favour of surveillance of citizens. It is an invasion of people's privacy, of their freedom."* As Panza Robotics are in the early stages of development they can use this feedback to identify business opportunities within areas that are more prone to accept the robot by looking at implementation in restricted/controlled areas or under circumstances where the people encountering the robot are acquainted to it or trained to be around it.

There was also a noticeable disdain towards using Artaban in situations involving military or police. There seems to be a general sentiment throughout, namely that respondents were critical towards the use of robotic technology for military purposes or in situations that might potentially cause harm.

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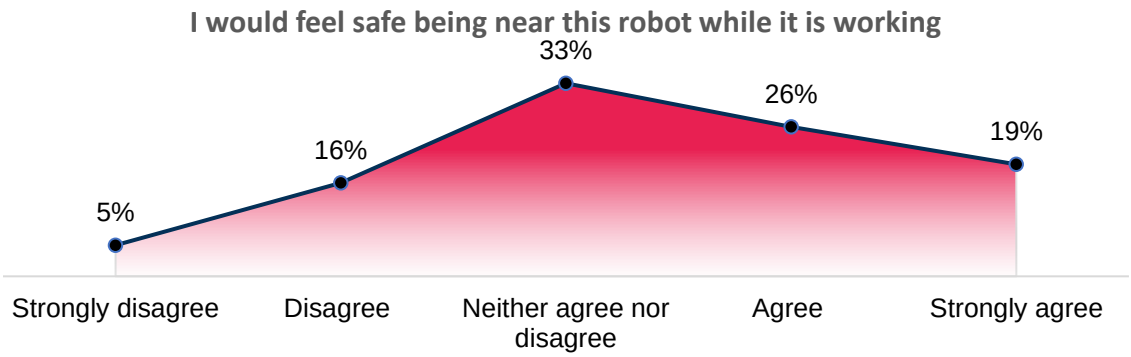
Question 4: I would feel safe being near this robot while it is working

To follow up on the previous question the respondents were asked about safety. When asked the rather broad question about whether respondents would feel safe being around the robot while it is working, many did not seem to have an opinion and the distribution of answers showed that 32% opted for 'Neither agree nor disagree'. However, while many found it difficult to form an opinion, respondents were generally positive towards being near Artaban in a work situation. Here, 25% choose 'Agree' while 19% opted for 'Strongly agree' for a combined 45% placing their answers in the high end of the scale. At the other end 16% 'Disagree' while only 5% 'Strongly disagree'. See the figure below:



One respondent noted that it might not be the case that someone will feel safe around this kind of robotic application from the beginning. However, it might very well be something that people will get used to in the same way that people get used to other new types of technology and tools over time - a quite common phenomenon.

Granted, one of the reasons that many of the respondents felt that they were unable to form an opinion, might be that the question itself was so broadly formulated. There are several factors that need to be specified more clearly, such as working conditions, types of interaction etc. This in turn might therefore make such a question rather difficult to answer at face value as it involves being asked whether one would feel safe around a new and perhaps previously unknown technology, which can be very difficult to answer. However, such a question might also evoke a more intuitive answer amongst the respondents.

A focus group interview conducted among participants at the Robotex International festival reveals that "He does work that we don't want to do. He is very necessary. It doesn't even matter if he is scary to us."

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Question 5: Artaban is a robot with multiple purposes, such as surveillance, healthcare, waste management and much more. Apart from what you have been shown, what other uses can you think of?

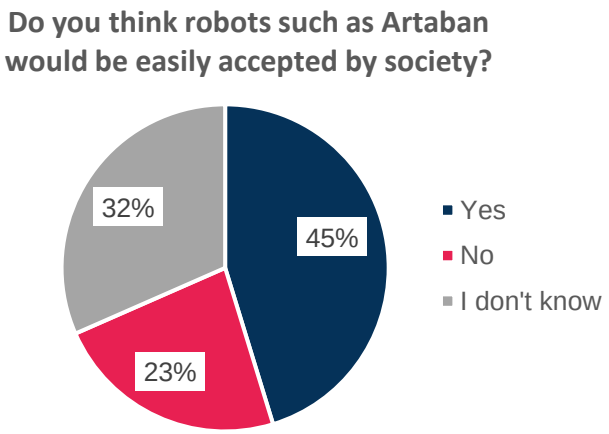
When asked to consider further uses for Artaban, respondents came up with some interesting takes on the usefulness of the robot. A lot of respondents mentioned or highlighted some of the functions that had already been presented. As respondents had already been introduced to quite a few application areas in which the robot can be utilised, many answered that they did not have any ideas for how to use the robot further.

However, here several respondents mentioned how they can see Artaban being used for multiple different entertainment purposes – for example as a pet or an artificial dog-toy. Some respondents also highlight using Artaban for Search and rescue operations, for example as: *"on demand scalable forest surveillance and/or search and rescue"* and for monitoring biodiversity, food, or in the fields.

There were also few who did not like the idea of using Artaban further and mentioned – perhaps somewhat sarcastically – that it could be used for *"scaring civilians"* or that it should be doing *"Something far away from people"*.

Question 6: Do you think robots such as Artaban would be easily accepted by society?

Finally, respondents were asked whether they thought that robotic solutions such as Artaban will easily be accepted into society and here 45% answered 'Yes' while 23% answered 'No' and 31% answered 'I don't know". See the figure below:



Here, some of the reasons presented by the respondents were answers such as: *"If people can be exposed to fewer dangerous situations it will surely win the foothold"* Another respondent answered that:

> *"I think Artaban would be a lot easier to accept in society. For one, it's cute. But, also, people won't have to work at a place where they risk breathing in toxic fumes from leaks."*

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Respondents also mentioned the design as a crucial factor when it comes to social acceptability. Here, focus is once again on the animal-like design which, for some, is mentioned as a feature that helps boost acceptability. The fact that the robot has an instantly recognizable design that resembles a canine can help people be more open towards accepting the robot into society. One respondent already assigned gender-like features to Artaban when they mention that: *"She is like a dog and people like dogs"*, appealing to the fondness many hold for dogs and their often social and likeable nature as pets and companions. For others, however, this familiarity might evoke different feelings and one respondent notes that: *"It seems intimidating"* while another respondent writes that: "*I think the robot is very frightening for the average person who does not come across robotics on a daily basis."* It is obvious that acceptability of this kind of robot is something that respondents did not easily agree upon and that when designing multi-purpose robotics, asking citizens can provide valuable input that can help to increase acceptability of the particular solution.

Conclusion

The majority of respondents had a positive impression of the design of the robot, Artaban. Respondents liked the design for being friendly, nonthreatening, and capable of traversing different terrains. However, some respondents had negative impressions of the design, commenting that it looked creepy or mean. The animal-like design of the robot may have contributed to this mixed reaction, with some feeling more accepting of the robot due to its familiar appearance, while others were put off by it. Respondents also provided recommendations for changes in the design of the robot, such as adding rounded shapes to make the robot look more approachable and friendly and improving functionality by using wheels or crawlers instead of legs. Additionally, the majority of respondents did not find the robot to be intimidating, citing the robot's animal-like appearance and "cuteness" as reasons for not finding it intimidating. However, some respondents had recommendations for changes in the design to make the robot less intimidating. When asked about areas or situations where they would prefer not to use robots such as Artaban, the most chosen answer was 'various use in public spaces' indicating a scepticism about the use of robots in public spaces. Lastly, when asked if they would feel safe being near the robot while it is working, the majority of respondents had a positive attitude towards it. Overall, it seems that the design of the robot plays a crucial role in how it is perceived by people, and that a more approachable and friendly design could help to reduce feelings of intimidation, increase social acceptability, and make it more user-friendly.

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