

ROS automatic floor cleaner

A system that controls a bunch of robots that is able to clean a predefined area autonomously.

This has to be made with the ROS2 framework using behavior trees and the Turtlebot3 robot.

The original problem is that stables need to be cleaned. doing this by hand is a lot of work. It is realistic to expect to solve this problem using this technology.

The robot should be able to do this task.

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Context of use: Education

Level of education: Bachelor

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Impact on society

What impact is expected from your technology?

This category is not applicable for this technology.

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Hateful and criminal actors

What can bad actors do with your technology?

In which way can the technology be used to break the law or avoid the consequences of breaking the law?

The robots constantly know their surroundings. If needed it could be made to recognize humans. if somebody has access to the system hoe could be able to tell if somebody is there. This could be useful for when trying to break into the building where the robot is operating.

Can fakers, thieves or scammers abuse the technology?

Thieves could hack into the system to get to know all about the area. This technology requires all info there is about the area it operates in. This could give them the advantage.

Can the technology be used against certain (ethnic) groups or (social) classes?

Maybe against the poor whose only job they can obtain is one cleaning. This technology may threaten their job.

In which way can bad actors use this technology to pit certain groups against each other? These groups can be, but are not constrained to, ethnic, social, political or religious groups.

No.

How could bad actors use this technology to subvert or attack the truth?

They could claim this technology is hurting everybody by taking their jobs whilst in reality when this happens more and better jobs get created.

Now that you have thought hard about how bad actors can impact this technology, what improvements would you like to make? List them below.

We could give more clarity about how it works and what it is. Show everybody it could coexist with them and help do better.

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Privacy

Are you considering the privacy & personal data of the users of your technology?

Does the technology register personal data? If yes, what personal data?

No

Do you think the technology invades the privacy of the stakeholders? If yes, in what way?

Not yet. It could be possible for example for when implementing a new navigation feature, the robots navigate using a camera with object recognition or such. People could get recorded or even recognized.

Is the technology is compliant with prevailing privacy and data protection law? Can you indicate why?

at the moment it is but when implementing things like a camera with AI, things could become very complicated.

Does the technology mitigate privacy and data protection risks/ concerns (privacy by design)? Please indicate how.

As we make this proof of concept it is not designed to collect user data. However this technology could easily be changed to navigate areas to spy on people.

In which way can you imagine a future impact of the collection of personal data?

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Now that you have thought hard about privacy and data protection, what improvements would you like to make? List them below.

Make it difficult to implement such software such as object detection?

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Human values

How does the technology affect your human values?

How is the identity of the (intended) users affected by the technology?

The technology is not made for personal use. there are two kinds of spaces this platform could work. in stables or in an public environment. The cleaners of a public environment could feel threatened. The robots current goal is to clean floors. This is partially the cleaners part. This could be the beginning of a complete job takeover. This could frustrate them and they could lash out. for in the stables it is possible the animals could get frustrated.

How does the technology influence the users' autonomy?

The tech makes its own decisions. It does not make decisions for humans. Humans simply do not have to use this technology directly and work together. This technology removes having to think about a certain sector.

What is the effect of the technology on the health and/or well-being of users?

This alleviates the tough work of cleaning stables. This in the long term could help humans. Instead of being worn out in their late 40s they could focus their work on less intensive work.

Now that you have thought hard about the impact of your technology on human values, what improvements would you like to make to the technology? List them below.

None

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Stakeholders

Have you considered all stakeholders?

This category is only partial filled.

Who are the main users/targetgroups/stakeholders for this technology? Think about the intended context by answering these questions.

Name of the stakeholder

The area to be cleaned

How is this stakeholder affected?

Not clear. as said in another question how to improve this i stated we need to make more of a effort in stakeholder research. we do not know how the animals in the affected area will respond to the technology.

Did you consult the stakeholder?

Yes

Are you going to take this stakeholder into account?

Yes

Name of the stakeholder

Lely Farming Innovators

How is this stakeholder affected?

They are interested how we developed the technology using behavior trees and ros2.

Did you consult the stakeholder?

Yes

Are you going to take this stakeholder into account?

Yes

Name of the stakeholder

Fontys

How is this stakeholder affected?

They also are interested how we create this technology.

Did you consult the stakeholder?

Yes

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Are you going to take this stakeholder into account?

Yes

Did you consider all stakeholders, even the ones that might not be a user or target group, but still might be of interest?

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Now that you have thought hard about all stakeholders, what improvements would you like to make? List them below.

Do more research about the stables.

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Data

Is data in your technology properly used?

This category is only partial filled.

Are you familiar with the fundamental shortcomings and pitfalls of data and do you take this sufficiently into account in the technology?

The robot could gather data about things like what goals it had, its locations and found obstacles. These things could be useful but the system should not be too dependent of it.

How does the technology organize continuous improvement when it comes to the use of data?

This question has not been answered yet.

How will the technology keep the insights that it identifies with data sustainable over time?

This question has not been answered yet.

In what way do you consider the fact that data is collected from the users?

This question has not been answered yet.

Now that you have thought hard about the impact of data on this technology, what improvements would you like to make? List them below.

This question has not been answered yet.

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Inclusivity

Is your technology fair for everyone?

Will everyone have access to the technology?

Access to this technology will be very limited. It will be kept fairly secret as the companies who use it to build their machines want to be the only company capable of doing so. This means only big farms with a lot of capital will be able to use this tech. That being said I do not think having this technology will make a company a dominant force.

Does this technology have a built-in bias?

Yes, the fleet manager decides what robot gets what job. It generates a cost map per robot and looks for the best suited bot. This gives it a bias towards the "better" robots. That being said it is not like it discriminates like humans. I don't think this is an ethical problem.

Does this technology make automatic decisions and how do you account for them?

The technology uses some AI. It generates the best route for a given robot. This however is not human related. It does not care if the operator has a certain background or such.

Is everyone benefitting from the technology or only a small group?

Do you see this as a problem? Why/why not?

Only the companies that create this product and the few that use them are benefiting but its not like they will rule the world with it. At least not in the short term. It could be that in the future everything will be automated like this. If a small group could have all trivial tasks done automatically it could focus on other things. this gives them a great advantage over others.

Does the team that creates the technology represent the diversity of our society?

No. 4 white blokes with fairly the same background. We do not feel that what we are creating has some racial implementations. However. This product is meant for cows and alike. we are not farmers and thus do not know what these robots would be like in their environment.

Now that you have thought hard about the inclusivity of the technology, what improvements would you like to make? List them below.

We could spend some more time investing how this technology would impact

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the targeted group: stables. How will the animals react to this. Will they ignore it? will it frighten them? we do not know.

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Transparency

Are you transparent about how your technology works?

This category is not applicable for this technology.

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Sustainability

Is your technology environmentally sustainable?

In what way is the direct and indirect energy use of this technology taken into account?

Currently we do not think about energy use. This project is proof of concept and is scaled down. When it would be implemented at full scale the energy use could be big. The systems need big batteries that constantly need to be charged.

Do you think alternative materials could have been considered in the technology?

We could have looked into things like wired connections instead of wireless. Often the bot follows a certain road. Since this is not complicated like in a magazine this should be a possibility.

Do you think the lifespan of the technology is realistic?

Not really. I am not a big fan of batteries. They degrade fast over time and are very environment unfriendly. This is why I come back to the wired solution.

What is the hidden impact of the technology in the whole chain?

A lot of computer hardware and battery solutions come to place. Raw materials have to be mined and melted. These need to be shipped to different hardware makers. Then these are shipped from all over the world to make a few robots.

Now that you have thought hard about the sustainability of this technology, what improvements would you like to make? List them below.

More power efficiency. Instead of taking the robot that is the fastest, take the one that is most efficient.

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Future

Did you consider future impact?

This category is not applicable for this technology.