

P&M Robotics Debate 2nd session - 18/09/2019

Will we have the technology for domestic robots in 2039?

Dynamics of the debate are as follows: a poll among the attendants is performed to know the a priori opinion. Each advocate has 2 minutes to present some of their points of view. Then, there is around 30 minutes of open debate, where the moderator will encourage particular questions of the public to the advocates. At the end, each advocate has 2 minutes for the closing remarks. Finally, a new poll will take place.

Advocates for NO	Joan Lobo and Júlia Borràs
Advocates for YES	Sergi Foix and Antonio Andriella
Moderator	Guillem Alenyà
Note taking	Marc Maceira

Initial voting

YES	8
NO	3

Opening remarks

Júlia opening remarks (for NO)

- What is a domestic robot? Not a roomba, a domestic robot needs manipulation.
- Manipulation is by far more difficult than AI.
- We need some simplification for robotic tasks, but they still should be useful.
- We need safe, ethics, and robust robots.

Sergi opening remarks (for YES)

- How the home of the future will be? It would be without humanoid robots. We will have many small robots and devices interconnected. Robots will work in specific tasks.
- We have some actual robots solving many tasks already.

Joan opening remarks (for NO)

- Domestic robot has to be defined as solving many tasks. Robots take a long time to solve simple tasks. We will need human supervision to deal with uncertainty.
- There will be a problem with acceptability.
- Science Fiction has raised too much the expectations of people.

Antonio opening remarks (for YES)

- Robot defined within the mind-body paradigm.
- Domestic robot can be classified between indoor/outdoor/entertainment/social.
- Technology needed: deep learning/ 3d sensors / IoT / multi-agent systems / ...

Debate

Reaction to Sergi/Antonio videos: Don't trust videos, they are made by people like us! Uncertainty in domestic tasks and physical interaction too complex for being ready in 20 years

Will we have just 1 complex robot at home or many robots solving each a specific task? Robots are too expensive now, but when the technology will be ready, companies would put money and the market will buy them. Complex

robots have no interest for companies: too expensive and not effective. Houses will be transformed, robots won't be human imitations. (*Complex robot VS specialized simpler robots*)

We will need physical interactions. Manipulation is a must. Dexterity is more difficult to solve than AI. Touch is a big issue.

We will reduce the uncertainty, boundaries would be put on tasks. We will reshape the tasks to make them easier. THEN we are not solving the problem, but reformulating the question. And probably, humans won't be in the loop (not human-robot interaction) as uncertainty increases. (*reshape the task*)

There are projects working on robots such as centaur/dog shapes. Would those more stable shapes be the base of domestic robots? It will depend on the environment. For example, in houses with stairs, wheels are not a good solution.

The technology from roomba was from 80's, until 20 years later haven't been mass-produced.

Currently, we are having a good quality of life at home, do we really need another layer of complexity? For example, we may not be able to flush the toilet due to lack of WiFi!

Some tasks cannot be simplified. People won't dress only with tunics in 20 years just to make it easier for the robots.

If dexterity is the bottleneck in domestic robots, then what is the bottleneck in dexterity for robots? Hardware is advancing, but it is not reliable. Nowadays, in prosthetics people prefer use hooks than more advanced solutions that may malfunction randomly. Robustness is a big issue.

In a controlled environment, we are ready to manipulate clothes. But not on the wild.

We are having a semantic debate. We already have roomba robots at home. Are roombas robots? With the definition of robot, roomba seems to be robot since it senses the environment. And what about air conditioning or washing machines, those machines can sense and adapt to the environment also! The definition of a robot changes along time, when a robot keeps doing stupid things we see them more as a tool (mindless) than a robot (intelligence). Just as the definition of human has evolved along time. What makes us humans?

Will we have AI and dexterity ready? 3D sensors have provided a lot of information of the environment, with GPUs help we are able to interpret this information. We can detect walls easily, more difficult on other materials as liquids. Things will continue to evolve. Integration of the parts will be an issue: reliability, robustness... (*parts VS whole*)

If a big company starts investing money on solving the dexterity problem, can they solve it? Some problems are solved in a controlled environment, but they don't let you touch the robot in fairs. Human communication it's a big issue for robot acceptancy.

Robots will change the interaction mechanism. People will have to adapt, as with Siri. Also, we need to change homes! People want to see the robot as a friend, not change everything at home to have some help! Human interaction is the biggest issue. Not only in the short time, but also long term human preferences / changes (people adaptation)

As long as we define clearly the task, the robot needs to interact with the human. Understanding their feelings (empathy). There are some solutions working on empathy in machines. There is a big challenge in task understanding and generalisation. Also, in empathy and emotions understanding.

If the robot has enough intelligence, don't you think that robots can reconfigure to better use limited hardware (As some people that lost arms and learn how to write with a foot)? Human body is a living thing, can learn and change a lot. Not easy to transfer this to robotics. We also need better hardware for robots and not just work on the brain. (*intelligence VS hardware*)

Closing remarks

Antonio

No matter the definition, we already have robots at home. Don't think that manipulation will be a big issue, as is only a subset of tasks. The technology will be ready and we will have robots solving specific tasks

Joan

We have domestic robots already. In the future, robots will be able to do more tasks in more uncertain conditions. There are concerns about cybersecurity and privacy. We need to communicate properly with robots to have human acceptance

Sergi

Dexterity will be very difficult but many tasks do not require high dexterity. We need to deal with ethical issues to make better AI. The technology will be able to add humans into the loop. Changing the environment can help.

Júlia

How much we need to simplify the tasks? We need to interact with the robot. AI and hardware is extremely hard, humans have millions of sensors and brain dedicated to solve manipulation tasks. We won't have domestic robots in 20 years

Final vote

YES	10
NO	4

Conclusions

A general robot able to perform multiple tasks is very hard. Specialised and simpler robots are more feasible. Physical interactions are hard (hardware and software), specially manipulation.

Trying to solve the unconstrained problem is too hard. We will re-shape the environment (and also people), put constraints, to simplify the problem. BUT then we are not really solving the original problem!

Having the technology in form of individual modules is only half of the problem: integration to have a reliable, safe, robust, trustworthy system is the big issue.