



DigiEduHack Solution Turin - Improving the learning experience through Robotics Challenge: Turin - Improving the learning experience through Robotics Challenge 2020

RoBotany

Learn Robotic trough Botany!

Thanks to Robotany you can learn how to use a robot by taking care of a vertical garden!
Everything you need is a basic 3D printer and the desire to learn.

Team: RoboSquare

Team members

Roberto La Commare, Francesco Augello

Members roles and background

The team is composed by Francesco and Roberto, Automation and Control Engineers students of Politecnico di Milano with the same passion for robotics. Francesco has a bachelor degree in automation and informatic engineering with some experience with raspberry systems and OS, while Roberto has a bachelor degree in mechanical engineering with experience with arduino, 3D modelling, 3D printing and a passion for smart garden.

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Solution Details

Solution description

For many years the care of a small garden has become part of the educational offer of many Italian institutes. Garden-based learning can contribute to all aspects of basic education on varying levels depending on the student and the learning program. Aspects of basic education benefits include but are not limited to academic skills, personal development, social development, moral development, vocational and/or subsistence skills, and life skills. Our idea is to join this useful activity with the robotic experience.

This school project can last one or two semesters. Students will learn how to program e.DO using the Comau app by taking care of the vertical garden:

- programming the irrigation routine
- programming the routine of artificial lighting
- changing end-effector automatically
- teaching e.DO to change the position of the different ePots

The school will only need:

- e.DO robot and the controller tablet/pc
- cheap 3D printer, with a printing capacity of 20cm cube in order to print the modular ePots and end-effectors
- Some earth to fill the ePots and seeds.

Solution context

Teaching robotics in school is a very advanced and futuristic idea. But when you bring a robot into a classroom the teaching should not be limited to a simple show.

For this reason RoBotany can be an excellent alternative: it gives a meaningful, pragmatic goal to e.DO, plus teaching the importance of taking care of nature.

Solution target group

The robotic field, as well as the botanics one can become educational subjects in different school levels depending on how deep the experiences are studied. Our solution is very suitable for the majority of students, from primary to the secondary school, because it offers different experience levels in programming, modelling and gardening.

- The younger students can learn how to take care of the garden with e.DO, deciding the path of the robot to reach the different plants. This is particularly useful in building some important soft skills: spatial 3d thinking, scheduling and defining tasks.
- The older ones can learn basics in programming and robotics by writing new programmes for the robot to fulfill the different gardening tasks.

Solution impact

The success of this solution can be measured depending on how many plants the students are able to grow during the semester, or how much e.DO keeps the students engaged with respect to a standard solutions.

Solution tweet text

Learn robotics by taking care of a vertical garden! #solution

Solution innovativeness

- The use of an educational robot for vertical gardening.
- All the pieces can be 3Dprinted directly in school/home lowering the cost.
- The project is completely modular: every school can decide how many ePots use.

Solution transferability

The topic of automation gardening is gaining high interest: the global market for Autonomous Farm Equipment is projected to reach \$128.8 billion by 2025. If the students or professional improve the robot paths it can be directly used to grow fresh edible vegetables for the market. Furthermore e.DO can be equipped with smart cameras whose image recognition algorithms (increasingly powerful thanks to machine learning technologies) are able to detect ill or dehydrated plants so that it can automatically take care of them. In the same way the ePots can be equipped with embedded sensors to increase the information available.

Solution sustainability

This project does not need big investment neither for Comau nor for the consumers:

- From the Comau prospective it needs only to refine the 3D projects of the ePots and end-effector.
- From the schools prospective it need only a 3D printer and e.DO.

Solution team work

The development of the project continued effectively thanks to the successful interaction between the design of 3D models and development of the algorithms, everything accomplished while we are in different cities.

We enjoyed work as a team and we would love to continue to work on this project.