

Meet the DustBot— A New Spin on Waste Management

In the Disney/Pixar film *Wall-E*, audiences spent time with an endearing robot that collected trash and various knickknacks as it attempted to clean up Earth. Since 2006, the Sixth Framework Programme for Research, Technological Development and Demonstration (FP6), a segment of the European Commission's community research program, has been hard at work creating a robotic system with the capabilities to sweep and collect garbage in urban environments. This real-world *Wall-E* is known as the DustBot, aimed at designing, developing, testing and demonstrating a system for improving the management of urban hygiene.

"The DustBot project was conceived to address a real need for improving curbside collection of separated urban waste and cleaning and sweeping of streets in pedestrian areas," says Pericle Salvini, a project team member from Italy's Scuola Superiore Sant'Anna. "Since the writing of the project proposal, it has been characterized by a strict collaboration with end users, namely urban hygiene companies and citizens."

Two kinds of robots have been developed under the project: the DustClean, a robot equipped with cleaning materials to remove dirt and dust from city streets and the DustCart, a waste-collecting robotic device that interacts

with its user. Both systems include ozone and carbon monoxide sensors to monitor atmospheric pollutants—think R2D2 with an environmental agenda.

The first public demonstration of the DustBot system took place in Osaka, Japan at the Universal City Walk in January 2009; it was a collaboration between Scuola Superiore Sant'Anna and the Advanced Telecommunications Research Institute International of Kyoto. Since then, the robots have appeared in Italy, Sweden and Spain for further demonstrations.

From a technological standpoint, the DustBot system is almost complete. Armed with wireless systems for navigation, the robots have been successfully tested in real scenarios in Italy and other countries. Improvements need to be made on the robot localization system, including its GPS capabilities, but overall, the researchers are pleased with the results.

"Next, we will carry out further demonstrations and evaluate the numerous proposals concerning the project's future exploitation," Salvini adds.

Once the research and prototype phase ends, the next step will be taking measures to get the robots out into the streets. With the amount of navigation and communication features, it's not far-fetched to believe these robotic

systems could be applied to industries outside of waste management, including transportation, tourism and retail.

From a sociological standpoint, most people have accepted the robots and welcome the capabilities they can provide. "This is most likely due to the robot aesthetic design and to the useful functions they carry out," Salvini says.

Currently, the project team is working with law professionals to investigate the legal requirements that will allow the DustBots to work in urban environments.

"There is a legal gap concerning autonomous robots," Salvini says. "Issues such as safety, insurance, accountability and privacy need to be solved before these kinds of robots can freely move among people."

The researchers, however, see a real opportunity to provide these robots to communities in the future once the legislation is examined.

"While the DustBot is still a prototype developed in the framework of a research project, the safety and performance results have been very promising," Salvini says.

Demonstrations for the DustBot project will occur in South Korea in October, Japan in November and Germany in December. For more information, visit www.dustbot.org.



The DustBot project contains two robotic units, the DustClean and the DustCart, for street cleaning and waste removal projects (courtesy of Evelina Dario).



Robots might eventually replace humans in industries like waste management, tourism, retail and transportation (courtesy of Evelina Dario).