

Talking plants... science fiction?

January 21 2014, by Thijs Westerbeek



Science is becoming closer emulating the fiction of the Avatar movie, by deciphering plants' electrical signals to devise new holistic environmental biosensors.

Plants, like almost all living organisms, have an internal communication system to respond to [external stimuli](#). Whether they are exposed to sunlight, pollutants, nutrients or pests, plants react with a tell-tale [electrical signal](#). Now, the EU-funded project PLEASED tries to understand these signals. If it succeeds, plants could be used as biosensors. Andrea Vitaletti, professor of computer engineering at W-LAB of the University of Rome, Italy, who is also the project

coordinator, talks to youris.com about using plants as pollution sensing devices.

We already have sensors for almost anything. Why should we focus on plants?

Well, because plants evolved over millions of years in a very specific environment. They can react to a lot of different stimuli. They must do so because they cannot run away. So if you use them as biosensors they can be multifunctional. If you have an artificial device, measuring some parameter like temperature or humidity, it will probably be more accurate than the plant. But the plant needs to measure a large number of parameters simultaneously, in order to survive. So if we could read the signals of the plant we would be able to measure many parameters at the same time.

How do you intend to do that?

What we try to do is to classify the different signals plants produce in order to determine what kind of stimulus has been applied. Imagine you know which electrical pattern is typically produced by a sunflower when it is suffering from drought. Then, you could keep looking for that pattern in sunflowers. The plant will so-to-speak tell you when it wants some water through specific electrical signals.

How to differentiate between different electrical signals, which might occur simultaneously?

That is still a challenge. We simply have to conduct many experiments to recognise the different stimuli. It is going to take lot of work before we can use the plants practically as biosensors.

Why not simply look at how a plant is doing?

This is more convenient. We will interface plants with electronic devices. The plant is turned into a kind of cyborg, or plant-borg if you like. In the vision of the project to develop very small devices, the size of paperclips or even smaller, that will be put in the plant. They can collect the signals generated by the plant in its natural environment, analyse them, combine them with the signals of other plants nearby, and thus produce a clear analysis of the environment of the plant. We know it works, we have proof of concept.

Are there other reasons why we should use plants as botanical sensors?

They are robust for the simple fact that they want to live. They can be extremely cost effective. And they are pervasive; that is to say, they are everywhere.

And what could be practical applications?

They could be used for monitoring pollution of the environment, for example, or acid rain. A very practical application we have in mind is to use plants as certification devices of organic farming. By observing the signals generated by the plants, it should be possible to determine whether or not the farmer has used adequate chemicals. If you want to find out the same thing with artificial devices, you would need quite a number of them.

Where do you hope the project will lead to?

The project finishes in May 2014. By then we will have created the beginning of an open source data set of species of plants, specific stimuli

and the corresponding electrical signals. What I hope is that the scientific community will continue to increase the size and the quality of this data set. Ultimately, it should be something like the Avatar movie: [plants](#) and people in close communication about the world they live in. Fantasy, science fiction, yes, but that's the popular version of our idea.

Provided by Youris.com

Citation: Talking plants... science fiction? (2014, January 21) retrieved 21 September 2024 from <https://phys.org/news/2014-01-science-fiction.html>

This document is subject to copyright. Apart from any fair dealing for the purpose of private study or research, no part may be reproduced without the written permission. The content is provided for information purposes only.