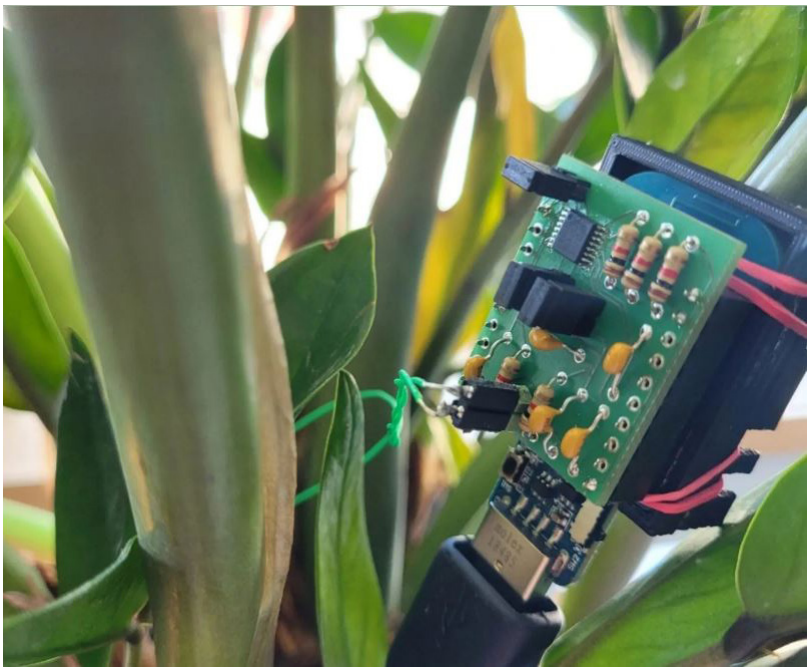
Editorial

Sensors with Plants Comprehend City Climate

Researchers at the University of Lübeck want to equip the plants with a network communicating sensors in order to strengthen the discriminating environment loads.

Heiko Hamann does not have special interest for plants. However in his laboratory there is a plant with spotted leaves, not for decoration for



Through the electronic device with the sensor knots there appear bio-hybrid organisms out of plants

as an experimental object. The plant is brought in a darkened laboratory in a 50 cm high glass case dipped in magnetic coloured light. It is in blue and red, which is mix in pink colour. At one of its stalks of multicoloured nettle a sensor hangs (swings) – small platinum piece which functions like a minicomputer, two needles lead into the plant.

Hamann is Professor for service robotic at the Institute for Technical Informatics of the University Lübec. Already on a preceding project he has engaged himself with plant experiments. In Flora robotica it went all about that in 2019, the plants to form with the help of light impulses. The signals for minirobots for that sent the signals which were set up with the plants. His uptodate project is named Watch Plant.

Plants used as sensors indicated in the technical world as phytosensing. That sounds simple. With the current sensors as at every standard weather station as for example soil, moisture, air, humidity and temperature are measured. It becomes exciting with the measurement of ozone sulphur, fine particulate matter and photosynthetic activities. Hamann and his colleagues of Lübeck work on that, to determine such complex measurable things with the help of plants. When the plant is exposed to the air around ozone, it has a physiological reaction which we can measure – reports Hamann. From that it is measured how much ozone was there in the air.

But how should that go. "We use electrophysiology. He sets needle like electrodes in the plant in order to measure with that the electrical potential. We receive abundant signal which plant scientist also can interpret with difficulty" he says. But what is to be observed a plant quickly changes exposed in the sun and cloud, one sees a change in signal. If one touches a plant it shows likewise a change which in signal it discourages.

On the contrary to determine exactly on what the plant reacts is however the art. Hamann and his team use artificial intelligence in order

to decode the signals. With that it works well; the AI must be trained. The medium supervised learning is trained. Hamann describes that "so we have a data amount which we can exactly organize a factor change and train with that a neuronal network". It is not necessary to understand that in details.

Why one comprehends the 'watch plant' this idea generates. We would like cities to be permanently assessed in this regard. It goes around all environmental influences, the air load, the temperature, ozone, explains Hamann. Certainty clearly cost-effective than what is possible with big stations in cities. We come from that it is always important to know this answer about up-to-date loads in environment" he finds. With the collated data one can in the event of emergency warn the citizens, fire brigade and the government.

With numerous small sensor knots the measurement not only become cheaper possibly the acceptance with city dwellers rises higher, when the plants take on huge measuring containers stand in the streets assumes Hamann. In ideal case one can hang sensors in a tree which then broadcast the information further at the delivery place. We hope that we can make it in a bigger way with the existing plants. The collected data give them modeling further from that a built-up a city with picture. The objective is to insure that most probably much of the evaluation match already with that at control place.

Source: VDI nachrichten, 26 August 2022, Nr. 17, Technik & Wirtschaft, Seite 9 Sensoren an Pflanzen erfassen Stadtklima, Von Kathleen Spilok.

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