An intelligent network for better water management

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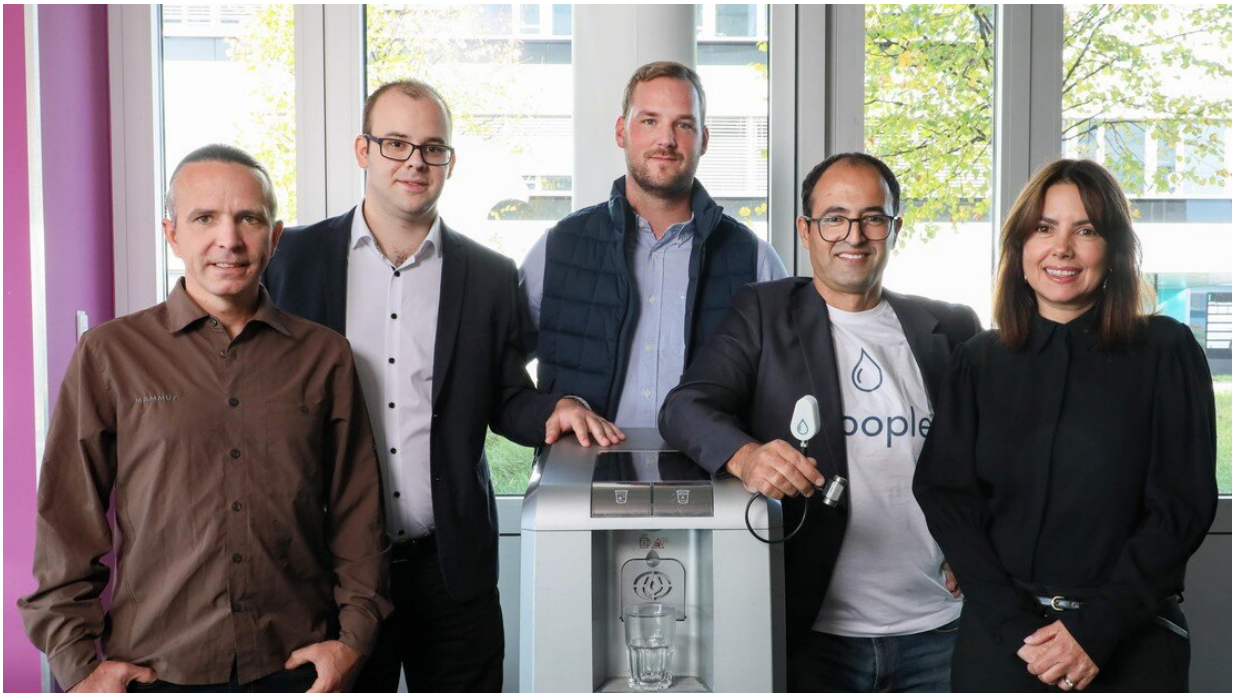

Credit: Ecole Polytechnique Federale de Lausanne

EPFL-based startup Droople has developed a smart flow meter that can measure buildings' water consumption and identify potential savings in energy. The Montreux Jazz Café at EPFL has already tested the device and found a way to cut its energy bill.

Droople's smart meters record not just water flow rates and

temperatures, but also peak usage times and total consumption—valuable data for facilities managers seeking to cut costs. The system consists of a series of smart flow meters installed at the point of use that collect data and send them through a low-power wide-area network (LoRaWAN) to a cloud-based software program. "Our program runs the data through a series of algorithms to extract the useful information," says Ramzi Bouzerda, Droople's founder and CEO. He set up the company in April 2018 at EPFL's Innovation Park.

Recovering energy from hot water

The Montreux Jazz Café on the EPFL campus recently tried out the device. "I wanted to know if it was worth installing a heat recovery system on the refrigeration compressors in the ArtLab building," says David Gremaud, who is in charge of the Energy project on EPFL's facilities management team. Refrigerators and freezers operate through an exothermic (i.e., heat-releasing) process. The excess heat is absorbed by water running through the compressors, creating a stream of hot water. At EPFL, this hot water is generally sent to an evacuation system, but Gremaud is now looking at ways to recover the heat and reuse the energy. This spring he worked with Droople to install smart meters on the Montreux Jazz Café's refrigeration compressors. After collecting data for two weeks, he saw that the outlet temperature and flow rate were high enough to warrant installing a heat recovery system.

"It's not always worth making this kind of investment, but in this case, we saw it could save EPFL money. The restaurant could recover around 4,800 kWh a year in energy, which is roughly how much it uses to heat water for its kitchen—4,000 kWh a year—and corresponds to 720 francs worth of electricity," says Bouzerda. And since a heat recovery system costs between 1,500 and 1,800 francs, the investment would pay for itself in around two and a half years. Gremaud therefore decided to install a heat recovery system. "Our decision is also consistent with

EPFL's energy efficiency policy and the high standard we want to set in terms of sustainability. We are now collecting data at the Esplanade restaurant in the CO building, and other restaurants will surely follow," says Gremaud.

Droople's smart meters collect water flow data at the point of use and send them to a cloud-based program that extracts the useful information. Credit: EPFL/Alain Herzog

Low-power data transmission network

According to Gremaud, "there is currently no turnkey system out there for monitoring buildings' water consumption." Droople's technology

could be useful not only to facilities managers, but also to the operators of heating and sanitary systems. And it can reduce maintenance costs. "For instance, under current health and safety regulations, buildings are required to change the filters on their water fountains and coffee machines after a given volume of water has gone through. With our device, building operators can easily track how much water has passed through the filters and predict when they will need to be replaced. That means they can plan out the most efficient maintenance schedule and route for their technicians," says Bouzerda. The same principle holds true for the cleaning of restrooms at restaurants and airports, for example.

Another benefit to Droople's system is that it requires very little power, since the smart meters run on batteries, collect relatively little data and transmit the data they do collect through a LoRaWAN. All this means the meters can run for anywhere between three and five years without any maintenance.

Bouzerda got the idea for Droople one morning at 3:00 when he was trying to fill his baby son's bottle with exactly 300 mL of water. The son of a plumber, Bouzerda holds a Master's in computer science from EPFL and drew on his programming knowledge to come up with a novel way to measure water consumption. His initial concept continues to evolve. "We based our system on fog computing—that is, the smart meters themselves run the data analyses in real time. That means they can detect and respond immediately to micro leaks by closing a valve, for example," says Bouzerda. "And we've submitted a research proposal with Professor David Atienza's lab at EPFL."

Provided by Ecole Polytechnique Federale de Lausanne