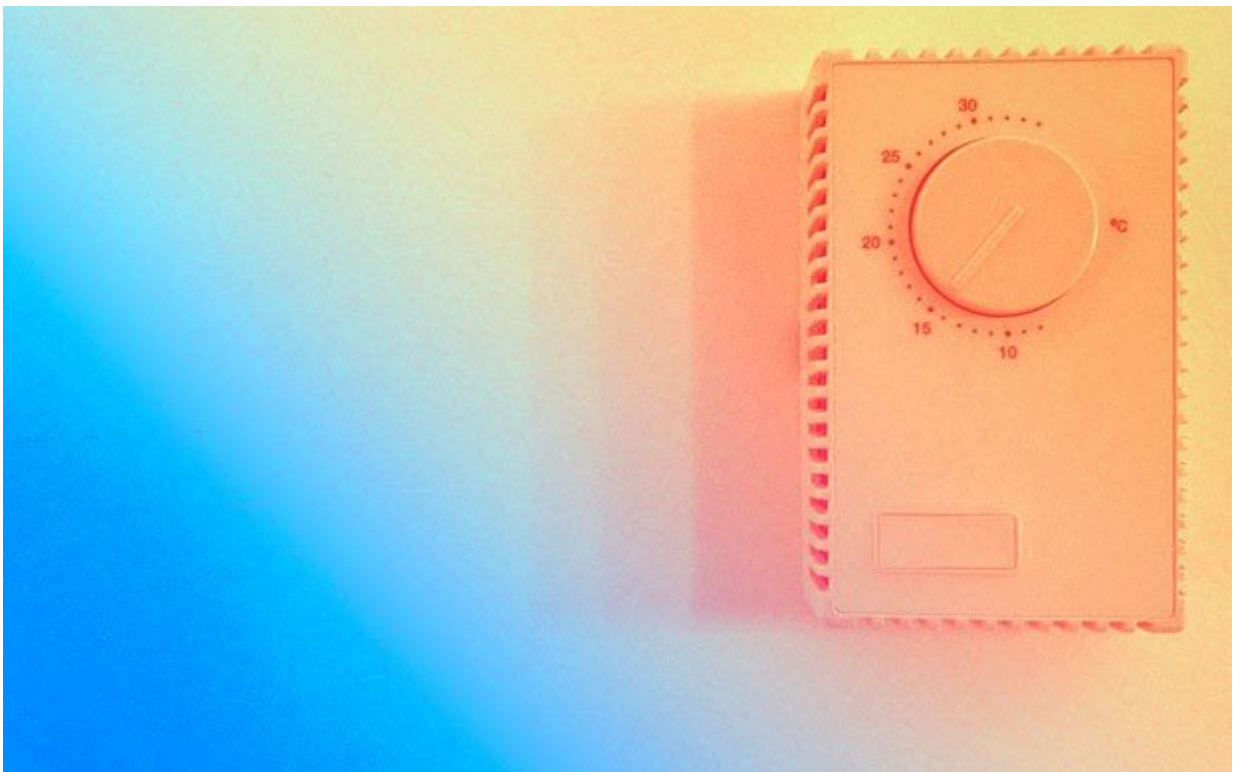


Researchers engineered a cloud-based system to improve comfort, productivity and energy efficiency

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Credit: Concordia University

No matter the season, thermostat wars rage in offices worldwide. Workers bicker over the temperature, alternately complaining that it's too hot or too cold. Thankfully, Concordia researchers may have

developed a solution.

A new study published in the *Journal of Energy and Buildings* proposes a method that simultaneously optimizes individual office workers' productivity and energy consumption costs by automating the control of indoor environmental conditions including [air quality](#), temperature and lighting.

"Improving the quality of the office-building environment impacts the comfort of employees, which in turn influences their productivity," says Hashem Akbari, professor in the Department of Building, Civil and Environmental Engineering.

He conducted the study with Farhad Mofidi (PhD 17), a recent graduate in building engineering.

How it works

The researchers simulated their method in an open-air Montreal office building with five zones and four occupants per zone. They tested different occupancy scenarios and outdoor weather conditions and took into consideration the employees' thermal tolerance.

Using data analysis techniques, they modelled the preferences of each office worker. As a result, they could simulate worker-preferred indoor temperatures, ventilation rates, natural illumination and artificial lighting based on sensors placed throughout the office.

"We considered several parameters, including energy exchange processes across the [building](#), sets of indoor and outdoor environmental parameters, energy prices, indoor air quality, occupants' activities and personalized thermal and visual preferences," Mofidi explains.

"The proposed method is able to act as the brain behind the decision-making system of a cloud-based energy management platform."

Potential for major savings

Their results? Reduced [energy](#) costs and an upsurge in occupants' overall productivity.

In fact, the proposed method is capable of improving the productivity of employees by up to \$1,000 per year per person (assuming a fixed productivity rate of \$20 per hour).

This aligns with a 2011 study which estimated that economic benefits of \$17 to 26 billion are achievable annually by improving indoor environmental quality of [office](#) buildings across the United States.

Buildings where comfort conditions are controlled at a group- or zone-level, on the other hand, risk neglecting occupants' individual temperature preferences which can cause [productivity](#) losses.

More information: Farhad Mofidi et al. Personalized energy costs and productivity optimization in offices, *Energy and Buildings* (2017). [DOI: 10.1016/j.enbuild.2017.03.018](https://doi.org/10.1016/j.enbuild.2017.03.018)

Provided by Concordia University

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