

**SENSOR
FLOW**

MAKING SMART BUILDINGS A REALITY

CORPORATE PROFILE





SENSORFLOW

SensorFlow Pte. Ltd. is a Singapore-based, proptech startup combining the use of smart wireless IoT solutions and AI to help building managers improve productivity, energy efficiency and sustainability.

Founded in 2016 by Saikrishnan Ranganathan and Max Pagel, SensorFlow's solutions offer real-time data insights on energy consumption, occupancy trends and guest behaviours, along with heating, ventilation and air conditioning (HVAC) management. These can be used to conduct predictive maintenance and enhance the overall guest experience at the room and create better management at the property and portfolio levels, helping building managers get prompt alerts on faulty equipment.

SensorFlow's retrofit solutions comprise sensors and proprietary networks that are quick and easy to install with no operational disruptions. Its pay-as-you-save model means there are no upfront costs. Hotels are expected to save up to 30 percent in total energy savings and up to 40 percent in maintenance costs.

For more information, please visit
www.sensorflow.com



TECHNOLOGY AND DESIGN OF SENSORFLOW

SensorFlow operates a wireless, cloud-based, full-stack IoT solution that involves installing a series of wireless sensors that can communicate and interact with each other via IoT technology. As the sensors work on our proprietary long range (LoRa) radio network, a single gateway is able to connect to over hundreds of sensors across multiple floors, and is able to continue room automation even if the Wi-Fi is down.

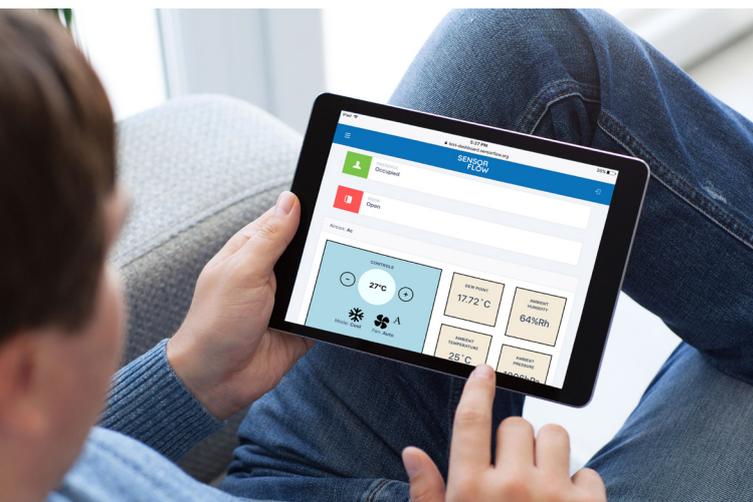
When guests leave the room empty with the HVAC running, occupancy sensors and smart thermostats communicate this data to our gateway. The gateway - which is the “brain” of our solution that runs our automation engine - then uses AI to react to the real-time occupancy data and automatically switches off the HVAC or adjusts it to a more energy efficient setting save energy, without needing any manual intervention from hotel staff. If guests leave the room with the HVAC running and the pool/balcony doors or windows are open, the HVAC is then automatically adjusted to ensure proper ventilation and prevent condensation issues while saving energy. When our sensors detect that guests have returned, our gateway then automatically resets the HVAC to the guests’ previous settings.

With IoT, our solution can also continuously collect data on how much energy is being used by every room via our wireless flowmeters and/or energy meters. All data is then sent to our online dashboard for our clients to see, providing them with high-level trends and insights to help them make better decisions to improve not only their energy efficiency but operational efficiency and guest satisfaction as well. For example, insights from occupancy data trends can help hotels optimise their housekeeping routes as well as better plan events and Food and Beverage (FnB) promotions for improved guest experience and maximum guest spend.

Energy costs contribute to one of the highest spending categories for hotels. In fact, energy is the second largest spending category for a hotel after employment, representing 3% to 6% of hotel operating costs and accounting for approximately 60% of its CO2 emissions. With SensorFlow’s retrofit solution, hotels can save up to 50% in Heat, Ventilation and Air-Conditioning (HVAC) costs and up to 30% in total energy costs.

With SensorFlow, hotels can go beyond Reactive Maintenance and save more with Preventative and Predictive Maintenance. Our solution provides alerts to safeguard against unforeseen equipment failures and costly repairs.

Additionally, with smart automation, hoteliers can better control and manage their room environments. This includes the ability to prevent and reduce issues such as condensation and mold formation, thus improving the lifespan and operational efficiency of their HVAC units. Subsequently, this helps to minimize guest complaints about their room environment, ultimately leading to improved guest satisfaction scores.



KEY SPOKESPERSON:

Saikrishnan Ranganathan

CEO, Sensorflow

Saikrishnan (Sai) is the CEO and co-founder of SensorFlow, a Singapore-based startup which offers hoteliers a smart solution to reduce their energy consumption, optimise their operational efficiency and achieve their sustainability goals.

Driven by the vision to mitigate global challenges, Sai has consistently worked towards engineering solutions that are practical, adaptable, and aligned with the immediate climate problems faced worldwide. SensorFlow is the result of that goal to reduce the massive energy consumption and environmental impact of buildings via smart and responsive HVAC automation. The keystone of Sai's leadership is his business acumen and high-level design thinking, that is reflected in SensorFlow's smart room automation, IoT and energy monitoring solutions.

Together with his co-founder, Max Pagel, they setup SensorFlow and envisioned that it would make smart buildings a reality by leveraging on data and AI to make buildings more energy-efficient, productive and sustainable. SensorFlow is thus a combination of Sai's clarity in approaching pressing needs with business rationale and Max's acumen for determining product viability through research-driven modeling that has made SensorFlow one of the leading technology startups in the region.

One of the youngest thought leaders in the region, Sai was part of the Entrepreneur First cohort, where he built the technical expertise to transform SensorFlow as a viable business model, scalable across different markets. Sai also has a background in energy management and smart home automation and has worked extensively on energy monitoring solutions for schools, data centres, homes, malls and factories. Being an industry expert in areas such as IoT, AI and digital transformation for buildings, Sai has been invited to speak at a number of international conferences, seminars, events and panels where he has shared his views and expertise on key topics.



MILESTONES

We have over
11K rooms
signed on to date.

We will have over
800K rooms
installed globally by 2024.

We have over
45K rooms
in our sales pipeline from top
hotel brands.

We have raised over
\$9M
to grow globally and planning to
raise \$15M in December 2022.

SENSORFLOW CLIENTS



ST GILES HOTELS



BANYAN TREE
proof of concept

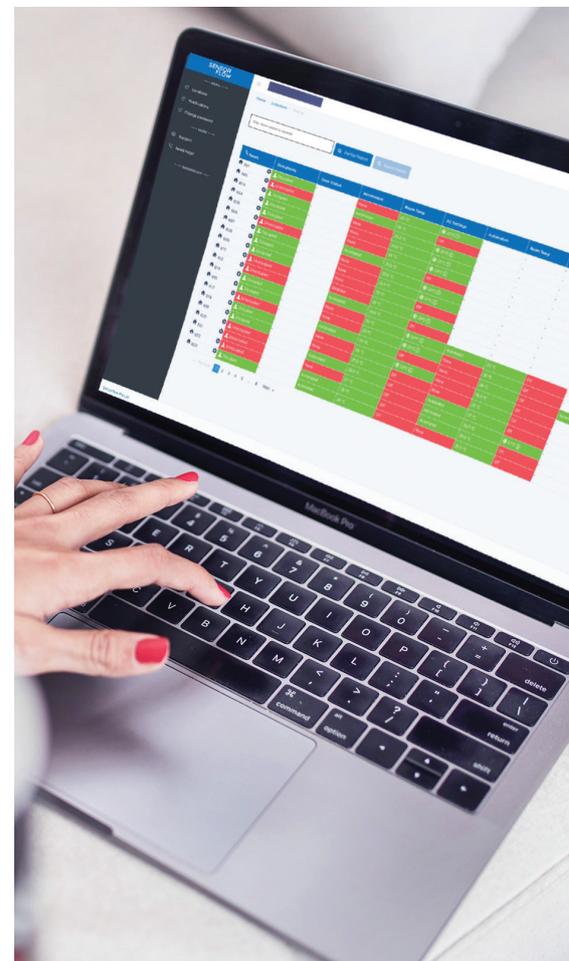


SALES IMPACT

Our clients have seen energy **savings of up to 30%** after implementing our advanced technology, and it turns out that the International Energy Agency (IEA) estimates most buildings have untapped energy savings potential of up to 30%.

Key Results:

- Our clients have seen savings up to immediately after installation, with the larger savings from hotels with higher occupancy rates.
- In terms of optimising maintenance costs, we have helped hotels to move towards predictive maintenance - for example, we assisted hotels to identify poorly performing HVACs for their engineering team to fix in a timely manner, as well as highlighted rooms with high humidity issues so their maintenance team can correct them and prevent mold/condensation related issues.



Key Findings & Customer-Centric Trends:

- Based on data across multiple properties installed across Asia, 22-23°C is the optimal temperature for most guests i.e. it is the most frequently used set point.
- Across multiple properties, about a third of guests had set the temperature below 21°C, with a sizable proportion (ranging from 12-33%) setting the A/C to temperatures below 19°C. However, there were many who set it to such low temperatures, mistakenly thinking it would cool the room faster, only to turn the temperature back up again when it gets too cold.
- We also found that the majority (>50%) of guests actually leave the A/C running - yes, even with a key card system in place - although they have left the room empty for most of the day. Preliminary results suggest that this percentage is especially high for hotel rooms with wall-thermostats (ranging from 67%-89%), compared to those with remote controls (54%-64%).
- We have also helped to identify rooms with high humidity issues (rooms with relative humidity levels consistently above 80% for more than a week) and found that these tend to occur in sun-facing rooms or if the HVAC piping/ducting has not been done correctly.



AWARDS & RECOGNITION



Singapore Business Review - awarded the Technology Excellence Award in 2020



APAC CIO Outlook - awarded the Top 10 Travel and Hospitality Solution Providers for 2020



CleanTech Group - awarded the Top 25 APAC25 Companies as a Leading Private Clean Technology Companies in Asia Pacific for 2020

Tracxn - awarded SensorFlow as one of the top energy efficiency tech startups of 2020

Singapore Tourism Board - (STB) selects SensorFlow as an awardee under the Hotel Innovation Challenge



OTHER ITEMS FOR DISCUSSION

SensorFlow's presence in the region

Headquartered in Singapore, SensorFlow has dedicated sales teams for different regions where they are currently engaged and plan to expand.

Growth/Expansion:

Our current priority markets include Singapore, Malaysia, Thailand, Vietnam, Indonesia, Cambodia and the Philippines. We aim to establish a strong presence across the SouthEast Asia region by the end of 2020. Thereafter, we have our eyes set on entering the European market by 2021, establishing a base in Luxembourg and then the American market in 2022. We aim to do so by building partnerships with regional companies, leveraging on the network effect of chain hotels we work with and partnering with local sustainability schemes across the region to further champion energy efficiency and make smart green hotels a standard practice in the industry.

Investors:

Series A: SGD\$3.8M / US\$2.7M

- Led by private investor Pierre Lorinet
- Includes Playfair Capital, Cocoon Capital, EF, 2be.lu Investments, Aurum Land, Insitu Asia Holdings

Series A+: SGD\$11M / US\$8.3M

- Includes OpenSpace and Gaw Capital





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