



Kinetis® MCUs—The Brain Behind a Remarkably Smart Fan

The Haiku® with SenseMe® ceiling fan detects changes in a room's temperature, humidity and occupancy and automatically adjusts speed to meet them.

EASY BREEZY

The Haiku® with SenseMe® ceiling fan does everything but turn itself off and on – oh, wait. Actually, turning off and on automatically is just one of many capabilities that make Haiku with SenseMe the smartest ceiling fan around. It knows when someone is in the room, and turns on in response. Then, based on your preferences, it will automatically speed up as the room heats up, slow down if the temperature drops and turn off completely when the room is empty. You can also set the fan to adjust automatically overnight as you sleep, and run at different speeds during different times of the day.

You control the Haiku fan with SenseMe using a smartphone app that includes a number of preset modes to cater to your comfort and maximize energy efficiency. You can use the smartphone app to customize the fan settings if you'd like – but you probably won't have to, since it's also designed to learn your preferences over time, anticipating your needs and responding accordingly.

Available with Moso bamboo or matrix composite airfoils, Haiku with SenseMe is as beautiful as it is functional.

Note to Consumer: Freescale® Semiconductor created this case study to illustrate the effectiveness and quality of its products. Any and all research, findings, opinions and claims contained herein are the work and expressions of Freescale Semiconductor, a wholly-owned subsidiary of NXP Semiconductors.

The national and international design industry has honored the fan with many prestigious awards and recognitions, including:

- ▶ CES Innovation Award
- ▶ Popular Science Best of What's New
- ▶ Interior Design Best of Year
- ▶ ENERGY STAR® Most Efficient

CHALLENGE

Add a new level of intelligence to a ceiling fan that allows it to sense environmental changes and respond to them based on individual preferences.

SOLUTION

The Haiku with SenseMe ceiling fan incorporates advanced sensors, connectivity and machine-learning technologies to dynamically adapt to the environment and the people in it.



BENEFIT

Highly energy-efficient and beautifully designed, the Haiku with SenseMe fan delivers precisely the comfort experience the user desires.

CONNECTED TO THE INTERNET OF THINGS

The technology behind Haiku with SenseMe effortless operation is anything but simple. It combines infrared motion detection with ambient temperature and humidity sensors to help maintain the user's ideal effective temperature. Built-in Wi-Fi® allows you to link the fan in the cloud to data points from the Nest Learning Thermostat®, establishing Internet-of-Things connectivity that enables additional features, such as automatically switching into winter mode when the Nest thermostat triggers heating mode.

Winter mode—which automatically pushes warm air down from the ceiling to reduce heating bills in colder months—is one of several Haiku with SenseMe features aimed at maximizing energy efficiency and sustainability. Additionally, Haiku with SenseMe helps users cut back on air conditioning use to save on summer energy bills. The fan has received top ENERGY STAR rankings, as well as a variety of awards from the U.S. Green Building Council, the Perspective Awards panel of leading architects and designers, and numerous publications promoting energy efficiency and sustainability.

BIG ASS FANS MAKES IT POSSIBLE. WE MAKE IT WORK.

The brain behind Haiku with SenseMe smart operations is the Kinetis K10 MCU. Based on an ARM® Cortex®-M4 core, the K10 MCU collects and analyzes sensor data and adjusts the fan's internal algorithms as data changes, enabling it to "learn" from experience.

Big Ass Fans chose the Kinetis MCU based on the device's processing power and low energy consumption, as well as on the company's previous experience of designing an earlier generation Haiku fan using our technology.

"When it came time to introduce the SenseMe component to our original Haiku fan, continuing with Freescale was the logical path to provide the increased processing power and additional capabilities needed for the new smart-sensor capabilities," said Big Ass Fans' Motor and Control Manager David Banks.

Ease of customization was also an important factor in selecting the Kinetis K10 MCU. Big Ass Fans used our Processor Expert® software to get the part configured and up and running quickly.

"Having Processor Expert was a huge consideration," said Marshall White, Senior Embedded Engineer for Big Ass Fans.



"The configuration process was incredibly easy, allowing us to focus on the core functionality."

Additionally, the device's I/O complement represented the right combination for what Big Ass Fans wanted to achieve functionally, further enabling the company to get the product to market fast.

INNOVATION FOR CONSUMER APPLICATIONS

We deliver system solutions, including reference designs, to help develop cutting-edge consumer applications. Our technology includes a complete range of microcontrollers and application processors built on ARM technology with broad operating system support. Among these are Kinetis microcontrollers, which support a range of real-time operating systems (RTOS) such as our proprietary MQX™ RTOS, and i.MX application processors for Android™ and Linux® operating systems. Add to that our sensing solutions designed with the right combination of high-performance sensing capability, processing capacity and customizable software. With a comprehensive ecosystem of tools, software, technology and services, we help facilitate innovation and shorten your design cycle.

BIG ASS FANS: QUIET, ENERGY-EFFICIENT SOLUTIONS FOR INDUSTRIAL, COMMERCIAL AND RESIDENTIAL SPACES

As the name suggests, Big Ass Fans isn't your traditional business. While the quirky name understandably garners a lot of attention, it's the serious work behind the scenes that drives the company's continued success. Whether it's a 24-foot fan engineered for industrial applications, a 60-inch fan for the living room or anything in between, each Big Ass Fan is individually inspected and tested for quality and performance. A testament to that approach is the company's research and development lab, the world's only such facility constructed specifically for testing large-diameter fans. Big Ass Fans' ISO-certified manufacturing operations are based in Lexington, Kentucky, where the company is headquartered. For more information, visit www.bigassfans.com.

www.nxp.com

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