Goal

Amiko develops artificial intelligence (AI)-powered sensors as add-ons to standard inhalers to improve asthma treatment. These smart sensors must be low-powered, scalable, and cost-efficient to work with a patient-facing app on a connected platform.

Solution

At the core of Amiko's Respiro sensor module is the Arm Cortex-M processor, chosen for its low-power processing, machine learning capabilities, and cost efficiency.

Benefits

- Processing takes place securely on the device.
- No need to connect to the cloud.
- Low-powered Bluetooth connectivity to smartphone app.
- Processor efficiency helps extend battery life.

AI-Based Technology Added to Traditional Devices for Improved Respiratory Care

Asthma affects millions of people around the world, causing about 250,000 deaths each year, according to the World Health Organization. Treatment using traditional inhalers helps patients immensely, but no matter how easy inhalers are to use, it's almost impossible to tell for sure whether they're being used properly, or whether one prescription works better than another.

Amiko is developing innovative asthma management tools to help patients better manage the disease, and potentially save lives. Its flagship product, Respiro, is a system that uses artificial intelligence and machine learning (ML) in medical sensors connected to other health tools and technologies to track key respiratory data.

"Our mission is to transform respiratory care through advanced AI sensor technologies," says Duilio Macchi, Amiko CEO. "By monitoring medication use and patient health, and analyzing the data we collect, we can help millions of asthma sufferers effectively control their disease."

Optimal Power Consumption

Respiro uses smart add-on sensors in modules designed to fit standard inhalers. Since these modules use ML to track and report on inhalation technique, flow rate, volume and other parameters, Amiko needed a processor that would allow intelligence and connectivity in the sensor.

"We chose the Arm Cortex-M processor because of its low-power processing and machine learning capabilities," Macchi explains. "We needed a cost-efficient and scalable design that doesn't rely on a connection to the cloud. Plus, the low power consumption of the Cortex-M helps extend the sensor battery life. These are extremely important features in a real-world patient setting."

The Respiro uses ML to interpret vibration data from the inhaler. The sensor is trained to recognize the patient's breathing pattern and inhalation time, and can calculate important parameters such as lung capacity and inhalation technique.

"The processing power of the Arm Cortex-M processor allows us to run real-time machine learning algorithms that recognize behavior patterns and interpret data in the sensor module itself," Macchi says. "There's no need to

wait on backend infrastructure to process detailed sensor data. When the user presses the trigger, the breath data pattern is instantly recognized, and the module provides low-latency, private user feedback."

Flexibility to Scale

The Respiro sensor is bundled with an app that the patient installs on their smartphone. The sensor collects inhaler use data without disrupting the medication delivery pathway, and sends data and private user feedback to the app via Bluetooth Low Energy.

Where required, a professional dashboard offers clinicians a suite of applications, remote monitoring tools, artificial intelligence-enabled therapy suggestions, and data analytics. This information helps them coach patients and offer support, while direct care givers can see the actual dose and its efficacy.

With rapid access to all information related to the asthma and its treatment, healthcare professionals can make accurate, smart decisions and personalize regimens to the needs of their patients.

"These powerful machine learning algorithms, deployed on energy-efficient, low-cost, Arm microcontrollers, let us develop respiratory care technologies that allow doctors to effectively treat asthma and improve the quality of their patients' lives," Macchi says. "We also have the flexibility to add new features, and are already looking at ways to deliver even more innovative connected healthcare solutions."

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