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UnaliWear

Helping People Stay Independent with Maxim ModelGauge Fuel Gauges

With its battery system in the band, UnaliWear's Kanega watch doesn't have to be taken off the wrist to be charged.

UnaliWear is dedicated to extending independence with dignity via its Kanega watch. Self-contained and voice-controlled, the Kanega watch provides emergency assistance, medication reminders, fall detection, directions, and "guide me home" assistance. The waterproof watch is currently in beta testing.

"After my previous startups were sold, I started UnaliWear because my mom isn't willing to wear today's emergency alert products," said Jean Anne Booth, CEO and founder of UnaliWear. "She thinks they're ugly, they are limited outside the home unless they are tethered to a smartphone (which she doesn't have), and she finds those big help buttons socially stigmatizing."

Challenges

The Kanega watch doesn't require a connection to a home-based system or a smartphone. It features a battery system in its band, and is integrated with cellular, Bluetooth, Wi-Fi, and GPS connectivity. For the Austin, Texas-based company's engineering team, meeting stringent power management requirements proved to be the toughest design challenge.

Challenge

- Needed ultra-small, highly accurate fuel gauges to assess battery SOC
- Had to meet stringent power management requirements

Solution

- MAX77818
- MAX17201
- MAX44009
- MAX2693
- MAX8969
- MAX16125 dual pushbutton controllers
- MAX8841 LDO voltage regulators
- MAX14634 bidirectional battery switches

Benefits

- Met key design challenges
- Faster design cycle due to Maxim's battery characterization support
- Useful product and business feedback from Maxim Ventures

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"The Kanega watch is a lifeline to emergency assistance. Running out of power is unacceptable," noted Jon Guy, UnaliWear's VP of engineering. "In earlier generations, we used a microcontroller to make power measurements. But it became apparent that we needed high accuracy over a wide range of operating conditions and power modes—a 5% error in state-of-charge is unacceptable."

Most lithium batteries need to be replaced after about 500 cycles, when capacity is about 70% of what it originally was. UnaliWear, however, uses very small batteries that need to be replaced when they're at 90% of capacity. The company remotely monitors the battery state-of-charge (SOC) of all of the watches in its network, sending out replacement batteries when needed. So, it was critical for UnaliWear to find highly accurate battery fuel gauge technology with low quiescent current to enable it to properly assess the power profiles of its watches.

The Kanega watch's voice-activated assistance connects the user with an operator who arranges emergency help.

Solution

UnaliWear is funded in part by Maxim Ventures, which recommended various ICs to the engineering team for its watch's small, high-density boards. After evaluating options on the market, the company chose several Maxim components for their performance (accuracy), low quiescent current, and small package sizes:

- MAX77818 dual-input switch-mode battery charger with ModelGauge™ m5 fuel gauge technology
- MAX17201 stand-alone ModelGauge m5 fuel gauge with SHA-256 authentication
- MAX44009 ambient light sensor
- MAX2693 GPS/GNSS low-noise amplifier
- MAX8969 step-up converter for handheld applications
- MAX16125 dual pushbutton controllers
- MAX8841 LDO voltage regulators
- MAX14634 bidirectional battery switches

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The watch features an OLED display to provide the high contrast needed by users. The company relies on the MAX44009 ambient light sensor to adjust the display's brightness. Since the watch includes four different radios, the company needs the MAX2693 GPS/GNSS low-noise amplifier to filter out cellphone signals from the front-end of the watch's GPS receiver. The watch not only features a battery on its band but also one inside the watch itself for backup, so the MAX77818 fuel gauges are integrated inside the watch and on its band. A battery pod that recharges the internal battery has a lower voltage than the internal battery, so the company uses the MAX8969 step-up converter to boost the voltage of the internal pod battery. The charger base station for the watch utilizes the MAX77818 fuel gauge/battery charger, along with the MAX8841 LDO voltage regulator and MAX44009 ambient light sensor.

Benefits

When UnaliWear sought beta testers for the Kanega watch, interest was so great that the company actually had to turn away some potential testers. The feedback collected is helping the engineers adjust the design for even better usability. Working with Maxim was helpful as UnaliWear evaluated ICs. Once in the design phase, the company benefited from Maxim's efforts in characterizing their custom batteries.

UnaliWear expects to begin shipping to its channel partners at the end of the year, with mass production anticipated in 2018, according to Delena Spencer, the company's VP of finance and operations. "Maxim Ventures has been a great partner," noted Spencer. "They've been really actively engaged with UnaliWear, providing good business and product feedback."

Learn more at www.maximintegrated.com