maxim integrated™

HD Medical

Visually documenting heart waveforms for better patient screening with MAX32620

HD Medical's HD Steth enables real-time collaboration among medical providers.

During a physical training session as a child, Arvind Thiagarajan was rushed to the hospital, where doctors detected a heart murmur. Until he turned 21, he had to undergo bi-annual check-ups to determine whether he would need surgery. While anxiety around his health inspired an interest in medicine, Thiagarajan ended up at a prestigious engineering school, where a mentor told him that being a "doctor's doctor" would enable him to reach millions of patients.

Challenge

- Needed ICs with high performance, very low power, small footprint

Solution

- MAX32620
- MAX14690
- MAX1703
- Battery monitors

Benefits

- Superior performance, power, and size vs. competitive ICs
- Long battery life
- Fast design cycle

Years later, with a team of 20 researchers in India, Thiagarajan set out to create a device that doctors could use to screen for heart valve and structural defects, particularly in children. Eventually, Thiagarajan moved to the U.S. and founded HD Medical, where he and his team developed the ViScope family of electronic stethoscopes that augment sound with real-time visual displays of heart waveforms. Later versions integrate murmur detection and EKG leads. ViScope stethoscopes allow doctors to conduct more accurate initial patient screenings, enabling early detection and reducing costs of unnecessary tests.

 "Our stethoscope technology gives doctors great power in their own hands," said Thiagarajan, chief inventor and CEO of HD Medical, headquartered in Sunnyvale, California. "You not only hear the sounds almost 30 times better, but you can actually see the sounds on the screen in real time. We have added intelligent algorithms that can detect the problems and present them in a different color."

"The name of the game is miniaturization and low power, and Maxim has the best solution for both."

- Arvind Thiagarajan, CEO, Founder, Chief Inventor, HD Medical

Soon, doctors began asking to see heart waveforms on a smartphone. This feedback led HD Medical to create HD Steth, a smart electronic stethoscope with integrated EKG functionality that transmits data collected via Bluetooth to a smartphone. In beta mode, HD Steth detects structural, electrical, and mechanical heart defects. The company has also developed cloud-based predictive algorithms providing further analysis of data collected by its stethoscopes. "This can be life-saving for patients and it can provide a better clinical workflow," said Thiagarajan.

Heart waveforms can be viewed on a smartphone using HD Medical's technologies.

Challenges and Solution

High performance, very low power, and small footprint were key requirements as HD Medical evaluated ICs for its electronic stethoscopes. Maxim Ventures, which provides funding for the young business, directed the team to a Maxim chipset, including:

- MAX32620 ultra-low-power ARM® Cortex®-M4F FPU-based microcontroller
- MAX14690 battery-charge management IC for wearables
- MAX1703 high-efficiency, low-noise step-up DC-DC converter
- Battery monitors

"The name of the game is miniaturization and low power, and Maxim has the best solution for both," noted Thiagarajan. "The MAX32620 microcontroller is highly efficient, so we won't even need a DSP in our future versions."

Benefits and Summary

Earlier versions of the ViScope use competitive ICs, which have turned out to consume a lot of power. Because of this, said Thiagarajan, the company has already replaced some of these competitive components with Maxim chips in newer iterations of the product. A future home version of the electronic stethoscope will use all Maxim parts. The engineers are also evaluating Maxim's ICs for pulse-oximetry sensing and EKG.

"In terms of performance, size, and power, we found the MAX32620 to be much superior to the competitive solution. Power/performance and battery life of our stethoscope has improved drastically," said Thiagarajan. "Also, the design cycle was really fast because we received wonderful support from the Maxim team."

Learn more at www.maximintegrated.com