CASE STUDY

Helping athletes get connected with a smart basketball.

Summary

This sports innovation company leveraged Beacon EmbeddedWorks' software and systems engineering services to develop the infrastructure for their connected basketball. By collaborating closely with the customer, our team provided a firmware and power management solution that helped deliver a more reliable product to market.

Challenge

Connected technology is changing the way we live and work by providing us with more insight about the world around us than ever before. These changes are helping us to streamline processes and improve operational efficiency, from connecting doctors to patient vital signs before they reach the hospital, to providing soldiers in the field with real-time enemy troop movement updates.

The customer, InfoMotion Sports Technologies, sought to leverage connected technology to help athletes improve their game by providing them with better performance metrics. To realize this goal, InfoMotion chose Beacon for our expertise in communication protocols and ability to provide a stable infrastructure.

Customer Profile

InfoMotion Sports Technologies is a leader in innovative sports equipment and products. They specialize in using technology to quantify and digitize athletic skills and for managing online communities for customers to share and compare results.

More Information

Why choose a Beacon EmbeddedWorks SOM?
See what differentiates our SOMs from the rest.
beaconembedded.com/system-on-modules/

About Beacon EmbeddedWorks
Beacon EmbeddedWorks is a full-service provider of innovative System on Modules (SOMs). Backed by a suite of customization, security, and support services, our dependable, pre-certified, and feature-dense embedded solutions serve the most strenuous applications.

Solution

Our software and systems engineers were asked to design the firmware for communication and upgrades, as well as a solution for power management. Systems engineers were required for the communication framework that would leverage the core of the basketball. The team recommended the TMS320C5515 ultra-low-power fixed-point DSP from Texas Instruments for its form factor and functionality. This hardware provides the Bluetooth capabilities required to send new versions of firmware to the basketball without a wired connection. However, the potential for failed updates was still a big issue. If a firmware update were to fail in progress, the microcontroller would shut down, creating a non-functioning basketball.

To solve this issue, software engineers maintained two copies of the program in the ball. One copy would run consistently to help track performance metrics. The second copy would serve as a back-up, and would also be the target for any available upgrades. If the update is successful, the basketball switches the roles of the two program copies. If the upgrade were to fail, the basketball is still able to run on the first copy of the program. In the case of upgrade failure the ball never makes the switch, allowing it to continue functioning at pre-upgrade capacity. This built-in fail safe ensures that users consistently have a working basketball, despite any possible interruptions in communication.

Power management would prove to be another challenge for software engineers. The customer requested that the ball be fully charged when purchased by the customer. Because the ball activates itself in response to motion, engineers were worried that battery power would be diminished during the shipping process. Beacon engineers created a beginning state for each ball in which the ball would lock itself down. This low-power state would not respond to any jarring during the shipping process. To put the basketball back in a normal state, the user simply has to place the ball on the charger. The charger cuts the power between the battery and the board, essentially rebooting the processor. This reboot puts the ball back into normal data collection mode. In the normal data collection state, the ball begins recording and sending data via Bluetooth when the ball is dribbled.

Results

The first of its kind basketball, the 94Fifty, helped players everywhere improve their game through advanced metrics and reporting. To support new products and development, we were able to provide InfoMotion with the same infrastructure to use in future applications. InfoMotion has been featured in numerous publications for their product and was honored as an Edison Awards Bronze winner, a Consumer Electronics Show Innovation Award Honoree, a finalist in the Bluetooth Breakthrough Awards, and was a Best of Consumer Electronics Show 2014 winner in iPhone Life Magazine.

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