

Gen 2 Tags Track Runner, Motorcycle Speeds

Two new systems allow runners and motorcycle racers to track their finish times with passive EPC Gen 2 RFID tags

By Claire Swedberg

May 1, 2008—[SAI Timing and Tracking](#) is offering a racer's bib with a disposable Gen 2 passive RFID tag to track a runner's time during a race. Developed by [ChronoTrack](#), a sports timing and tracking company based in Evansville, In., the system replaces a more expensive and labor-intensive transponder system requiring racers to use battery-powered transponders, then return them after a race to be reused at other races.

Meanwhile, [Hardcard Systems](#) and [Alien Technology](#) are testing a Gen 2 RFID tag to track racing times for motorcycles.

Designed and developed by ChronoTrack, the new SAI Timing system has been employed at marathons in Las Vegas and Los Angeles with a 99.84 percent read rate, according to SAI Timing's cofounder, David Simms.

Marathon participants typically employ an active transponder that they attach to their ankle, shoe or shoelace to track their times as they complete sections of a race and then cross the finish line. The problem is the cost of the transponders—usually about \$35—and the need for runners to return them when the race ends, causing a congestion of participants waiting in line to do so. The former system was also labor-intensive since each printed bib had to be matched to a transponder by marathon employees who input the runner's ID number for each transponder to link them in a database.

SAI's solution produces racer bibs with ChronoTrack D-Tags—adhesive labels with embedded passive EPC Gen 2 RFID tags. To encode and print the D-Tag and bib, SAI uses a [Lexmark T640rn](#) monochrome RFID laser printer-encoder (see [New Office Laser Printer Encodes Tags](#)), says Rick Kallup, Lexmark's senior industry consultant and RFID business development manager. When runners register for a race, they are assigned an ID number and a corresponding bib printed and encoded with that number. When they pick up their bib on the day of that event, they pull the RFID label from the bib and attach it to their shoe.

The system employs [Impinj](#) Speedway RFID readers and antennas installed under checkpoints along the racecourse and at the finish line. In that way, they can capture the tag's unique ID number as the racer passes. Impinj middleware running on the interrogator translates the data, and the reader transmits it to SAI's back-end server via an 802.11 Wi-Fi or GSM connection. SAI then makes that data available by posting the scores online, as well as text-messaging each racer—for them to read either during race (assuming they are carrying a cell phone) or afterward—or to their friends and family as they pass each milestone.

The system was developed in the fall of 2007, and was first used in the Las Vegas marathon in November of that year. Since then, it has been utilized in at least three other races. The system's accuracy has been tested by track-and-field timing company [Lynx System Developers](#), Simms says, and has proven to be just as accurate as the former active transponder system.

EPC Gen 2 passive UHF tags typically have a read range of 30 feet, but SAI Timing's system can pinpoint the exact time a runner reaches a checkpoint or the finish line. Simms declines to specify how the Impinj RFID readers accomplish this, calling it a proprietary technology, but notes that the company has found the tags work best on runners' shoes. Still, Impinj continues to work on other options as well, such as putting tags on the runners' chest. "Our best results have been on the shoes," he states. Simms says he expects between 500,000 and 750,000 runners will have used the system by the end of 2008, with that number jumping to several million in 2009.

In a similar application that tracks motorcycles rather than runners, Alien Technology has partnered with motor-sports management company Hardcard Systems to provide another system that employs passive EPC Gen 2 UHF RFID tags to time participants in sports competitions—in this case, motorcycle races. The two companies are currently field testing for motor-sports timing and scoring. The system, using Alien tags attached to motorcycles, allows for the tracking of the time each motorcyclist reaches the finish line within a tenth of a second.

Hardcard and Alien have been testing the system at California's Buttonwillow Raceway since December 2007, says Andrew Leisner, a managing partner at Hardcard, with eight motorcycles traveling at about 140 mph. The partners also began testing the system this week at Mazda Raceway Laguna Seca, located in Monterey, Ca.

The battery-powered transponders generally used for motorcycle racing can cost between \$700 and \$800 apiece, according to Leisner. The transponders—which weigh about a half a kilogram each and are the size of a pack of cards—transmit a signal to copper wire loops embedded in the track surface. In order for the tags to operate properly, their batteries must be recharged according to a specific charging schedule.

"I always thought there must be an easier way to do this," Leisner says. "My question was, could we replace these heavy transponders with RFID tags?" He began working with Alien Technology in 2007 and says, "It takes the per-user cost from \$600 to \$800 dollars to a few dollars."

The existing transponder system is extremely accurate, Leisner says, albeit bulky. It can measure a racer's time to within one-thousandth of a second. Despite such a high level of accuracy, Leisner says, race officials tend to rely on finish-line cameras and their own visual review of a finish line to determine who won a race.

With the new RFID system, Hardcard is employing Alien ALR-9900 interrogators to capture tags as they pass specific locations on Buttonwillow's and Laguna Seca's racetracks. Although the partners have only conducted simulated races to date, Leisner says he plans to begin testing the system in actual motorcycle races this summer. The readers can capture tags from a distance of up to 50 feet, ensuring they can read all the way across a track, which typically measures 30 to 40 feet wide. Each motorcycle has two adhesive, plastic-encased Alien M-Tags attached to it. In addition, the research team is also testing Alien Squiggle tags, attaching them to a variety of locations on the motorcycle.

RELATED_ARTICLES Hardcard has tested the placement of antennas overhead, as well as on the side of the track, and has placed tags on helmets and on different sections of the motorcycle. The Alien interrogator can transmit its data to a back-end system via a Wi-Fi or cabled connection, and Hardcard software enables users to view and compare the results of numerous racers. All such information is stored on the Hardcard server, Leisner says, and the reader interprets the exact instant the racer crosses the finish line.

Thus far, Leisner states, when it came to read rates in simulated races, "Alien hardware nailed it." Comparing the Alien tags with the active transponders typically used for motorcycle races, he adds, "They are drastically smaller, they don't need to be charged, they weigh less and [they] are disposable." According to Leisner,

Hardcard expects to make the system commercially available in the first quarter 2009.

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