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Meet The Tiny Sensors Hidden In Every NFL Game
28/09/17

The NFL, in the United States, now has RFID tracking in every player's shoulder pads and in the balls used at every match. Delivered by Zebra Technologies, the solution brings data and analysis to players, coaches and fans. The sensor, which is small, light and lasts a year is at the core of the solution.

The core of the technology are sensors that emit unique RF frequency signals 25 times each second. The data is captured by receivers installed around the stadium. Although the RF band is part of the public spectrum, the NFL controls how RF is used within the stadiums. The

data is collected and presented in real-time, as well as being available for post game analysis by teams and broadcasters.

Part of Zebra's heritage is in the use of RF for asset management. This is useful as players often have multiple sets of equipment and change during a game. Zebras system maintains a register of each player's equipment so the system keeps collecting data during when a player changes equipment.

The sensor is quite simple. It compromises of a board, a battery and an antenna. Each device lasts about a year and is so simple it doesn't even have an on/off switch. It's designed to make life easy so logistical issues are minimised.

Most players wear two sensors - they weigh almost nothing - although some wear three depending on their on-field role. By having a sensor in each shoulder pad, it's possible to not only know where a player is and how fast and far they move, but also what direction they're facing.

This is quite different from GPS-based solutions. Zebra says their solution is more accurate, measured within 15 centimetres, whereas GPS is within metres. Also, the Zebra solution is designed for indoor use whereas GPS is less effective as it requires line of sight to the satellite network.

The data generated has added significant insights. In the past, carries with the ball were counted based on how far the ball moved - the gains made by the team. But the new system lets teams know how far a player has actually moved. And objects on the fields, such as

pylons, as well as officials are also tracked. The number of sensors that can be tracked on the field at one time is so large as to not be practically limited.

The data coming from the sensors is meaningless without all the mapping and other other etadata which is held in the NFL's and Zebras's systems. So, even if the sensor data was intercepted, there's no way of knowing what data belongs to which player or device. With each player having up to three sensors, and 90 players involved in each game, some with multiple sets of playing equipment, as well as balls, officials and other objects, it would be very difficult for a hacker to make meaning of the data.

Backend systems are built for redundancy. During a game, the data is securely transmitted and processed at a central data centre with onsite redundancy in case connectivity is compromised. This was a condition of the deal with the NFL.

The data goes to a command centre that control every sensor and monitor everything from collection from devices through to delivery of the data to the data centre.

In the NFL's case, the data is owned by the league and then distributed to teams, with each team only receiving their own data. Game data is only available to teams he next day at noon so it can't yet be used by coaches to inform in-game tactics.

So, while commentators have access to data to support their coverage, the amount of data is balanced to give fans insight without influencing team tactics.

Teams can also work directly with Zebra in order to use the system at practice and training.

One of the applications of the system is the ability to track how often particular plays are run, so teams can adjust their tactics during games. The challenge, said Zebra, is to provide actionable insights. The NFL is still early in their journey, and it's clear listening to Zebra that the NFL is still some way from taking advantage of all the potential applications of the data.

Zebra is primarily a location services business. That limits what data is collected and what insights can be gained. And while that can be very useful in tracking things such as player movements agains the time they spend on the field and how those movements change, but less useful for capturing biometric data.

For example, changes in running cadence and stride length can be a replicator of some sorts of injuries. This data is not something that comes from the Zebra solution.

Teams are issued with 800 offical balls by the NFL each season. Hand made, the Wilson balls are now instrumented with a tag that is impossible for a player to detect. While the ball tag contains the same components as the player sensor, it needed to be lighter. It also has accelerometers so velocity, rotations and impacts can be measured and received in realtime.
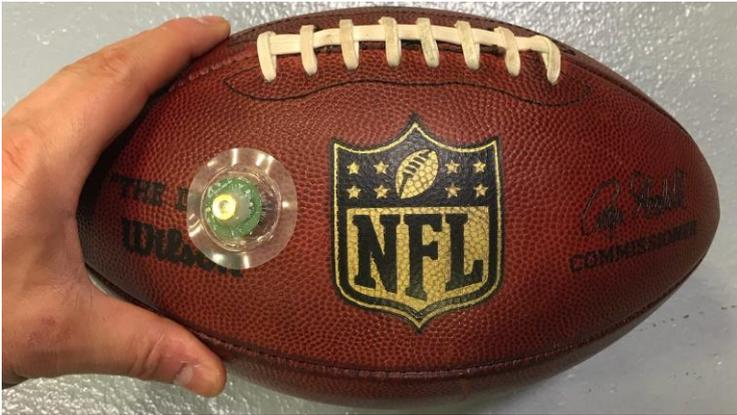
When it comes to other sports, Zebra said there are many applications with the company looking at basketball, Australian football, soccer and others. But one of the challenges is that leagues limit the use of the technology. For example, FIFA prohibits the use of wearables on the soccer pitch. But Zebra says they are working with leagues all over the world, across a number of sporting codes, to find applications of their technology.