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Assignment 10

**How Georgia Tech is Using GPS Technology to Improve Performance**

It has been a few years that technology has merged into sports including soccer and volleyball. Technology has helped these sports in many ways such as helping the referees to have a better judgment in debatable situations. It also has been helping players and coaches; it has been helping them to keep track of players’ movements during the game, so later they can analyze it in more details.

Soccer and volleyball are not the only sports that are taking advantage of the technology. College football teams are catching up as well. Recently, Georgia Tech University is implementing “GPS devices that can measure how fast a player is running, how often and quickly he is changing direction, accelerating, decelerating and a multitude of other actions” for its football team. This may sound trivial and not beneficial; however, implementing such a technology can help coaches to find out weaknesses of their players so that players can work on them. “If you take one of those guys and you go and you look at the numbers, (and) he’s doing 20 high-speed change of directions to the left but he’s only doing two high-speed change of directions to the right, that leg isn’t strong enough yet to be able to plan and accelerate, or he doesn’t have confidence in it.” It also can help coaches to make individual plans for each player. On top of that, players can see their own performances so they can see how they are doing compare to their teammates.

The question is what is the technology that has made Georgia Tech to implement in its football team. The GPS tracking device is called Catapult, an Australian company. Catapult believes that they exist to build and improve the performance of athletes and teams at all levels of sport. At the most fundamental level, a GPS receiver calculates position by timing the signals emitted by GPS satellites orbiting the Earth. “Each satellite continually transmits messages that include the time of transmission and the satellite’s position at that time, information that the receiver uses to compute the distance to each satellite using the speed of light. These distances and satellite locations are used to compute the location of the receiver at a specific point in time using a process known as trilateration.” This device can make a plot of movements of the players by regular repetition as they change their positions. As timestamps are simultaneously transmitted, distance covered can be represented relative to time as speed profiles. This would help coaches to analyze players’ movements during the training and matches. Important to note that Catapult does not just measure velocity and directional information. Catapult also has a number of sensors that enables coaches and players to conduct more detailed monitoring.

These sensors comprise an accelerometer (to measure accelerations and force), a gyroscope (to measure rotation), and a magnetometer (to measure body orientation). All three sensors collect data in three axes, or directions, allowing sensitive ‘maps’ of athlete movements and actions to be created. Catapult technology can also be integrated with heart rate data to provide a means of quantifying internal load.

Accelerometers are particularly useful for identifying many athletic movements, jump or tackle. “Catapult devices use tri-axial accelerometers (up/down, forwards/backwards and sideways) that are just a few millimeters in size, measure acceleration at 10,000 Hz and record at 100 Hz (100 times per second).”

Gyroscopes measure rotation around three axes (the coronal plane, the frontal plane and the sagittal plane). The combination of gyroscope and accelerometer data allows Catapult to create more precise pictures of dynamic athlete movements than would be possible with one sensor alone.

Catapult units contain tri-axial gyroscopes (the three axes being yaw, pitch and roll) that collect data at 100 Hz. This is particularly useful for detecting speed of rotation, something that can be employed to monitor how fast an arm moves during a football passing.

Magnetometers are an electronic compass that help to understand orientation in relation to magnetic north. In terms of athlete monitoring, magnetometers provide information regarding direction and orientation, helping practitioners to understand the volume of key movements such as changes of direction. In Catapult devices there are magnetometers in three axes measuring at 100 Hz to add an extra layer of to our performance data.

Using such a technology helps practitioners to quantify sport-specific demands and the exertions their athletes are being exposed to. GPS is one of the most important tools available to coaches and sports scientists when it comes to mitigating injury risk and preparing their team for competition. That is the reason why Georgia Tech has invested in such a technology.

Works Cited

“Catapult Fundamentals: Why Use GPS Tracking Technology?” *Catapult Sports*, 17 May 2018, www.catapultsports.com/blog/catapult-fundamentals-gps-tracking-technology.

Sugiura, Ken. “How Georgia Tech Is Using GPS Technology to Improve Performance.” *Ajc*, The Atlanta Journal-Constitution, 5 Mar. 2019, www.ajc.com/sports/college/how-georgia-tech-using-gps-technology-improve-performance/fGG7xiCxrLwKzyatt26dgM/.