SpeedMax White Paper

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1 OVERVIEW

Established in 1998, Dynastream Innovations Inc. has world-leading expertise in the research and development of proprioceptive, or “smart” devices using inertial technology. Recent technological advances in miniaturized low-power processors and inertial sensors enabled the development of Dynastream’s patented SpeedMax technology for accurate tracking of human motion in real-time.

2 TECHNOLOGY DISCUSSION

SpeedMax technology utilizes accelerometers housed inside a foot pod, to measure the acceleration of the pod more than 1000 times per second. Making use of kinematics, the SpeedMax technology accurately determines the position of the pod in space based on the measured acceleration.

The foundation of the SpeedMax technology is that the foot continually accelerates and decelerates with each stride. With the pod attached to the foot, the major phases of gait can be extracted from the sensor signals using advanced DSP (digital signal processing) techniques (as shown in Figure 1). SpeedMax measures the accelerations throughout each stride, computes foot angles, and then determines the resultant acceleration in the direction of travel. These data are integrated for each and every stride to provide the running speed and distance in real time to the user.

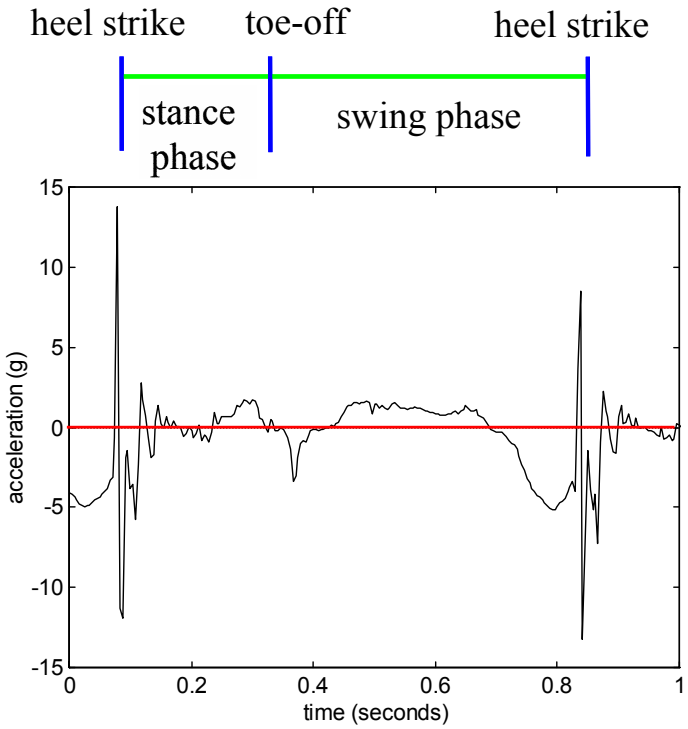

Figure 1 - Gait Events in Accelerometer Signal

3 ACCURACY

What makes SpeedMax technology particularly unique is its user independence, accuracy and ease of use. Right out of the box, the accuracy of the distance computation using the SpeedMax algorithm during running is typically 97%.

As mentioned, one of the inherent advantages of SpeedMax technology is it actually tracks and recreates the motion of the foot through its stride. By recreating each and every stride, it identifies the length of each stride to determine the distance a runner travels in the forward direction.

SpeedMax technology measures accelerations in the forward and vertical directions. In general, the foot pod will never be perfectly aligned to the direction of the running motion. As a result, lateral rolling motions of the foot during running may result in small and repeatable measurement inaccuracies for some users. Each runner has a different stride. If a user pronates or supinates significantly, or wears orthotics, he may want to calibrate the foot pod in order to get the best possible distance data. SpeedMax accuracy after calibration is approximately 99%.

4 TESTING SPEEDMAX ACCURACY

The challenge in developing this system was to find a way to accurately measure truth outside of a lab environment. This system is unlike any other technology used outside a tightly controlled laboratory. There was literally no traditional way to accurately measure and compare actual running data because SpeedMax is the first of its kind.

Therefore, it was crucial the developers of the technology invent a way to track the runner and compare SpeedMax data against truth. A baby jogger was set up with two bike sensors and data was collected concurrently from the SpeedMax unit and the baby stroller as shown in Figure 2, below.

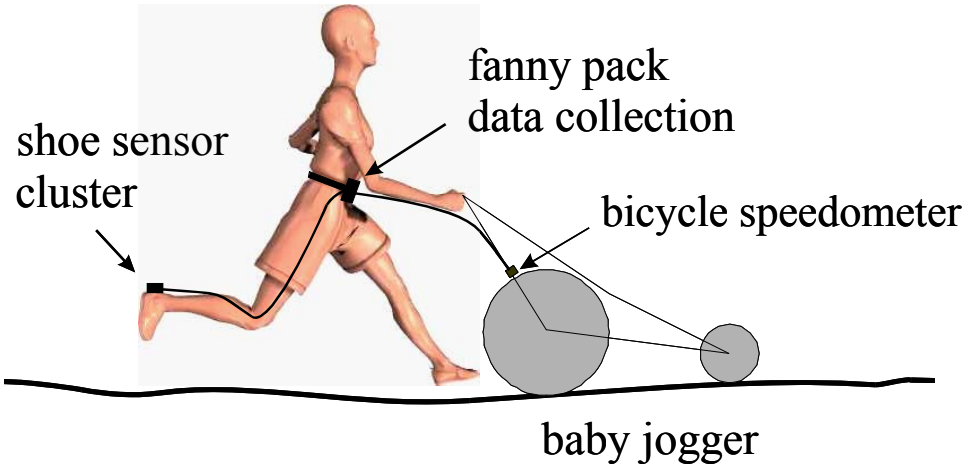

Figure 2 - Instrumented Baby Jogger to Compare Outdoor Running with SpeedMax Technology

Figure 3 shows a comparison of how closely a runner's speed, computed with SpeedMax technology, compares with that given by baby jogger wheel sensors. The ability to track even the smallest changes in the runner's velocity (and hence stride length) is an inherent trademark of SpeedMax technology.

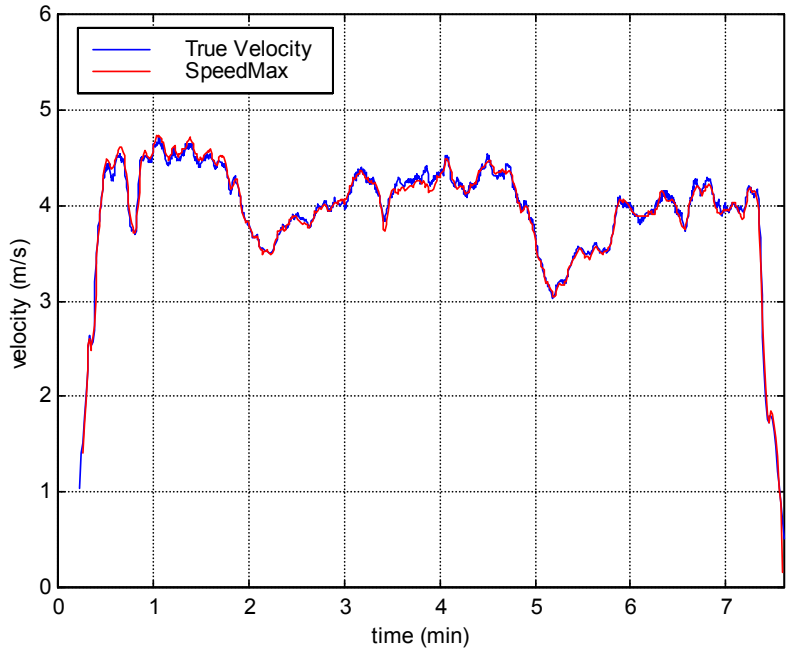

Figure 3 - Comparison of Velocities Between Baby Jogger and SpeedMax

The following is a diagram developed from the data collected with the SpeedMax technology. It shows the path of the foot measured during a walk, jog, run and sprint. Notice the difference in stride length for the four different types of gait.

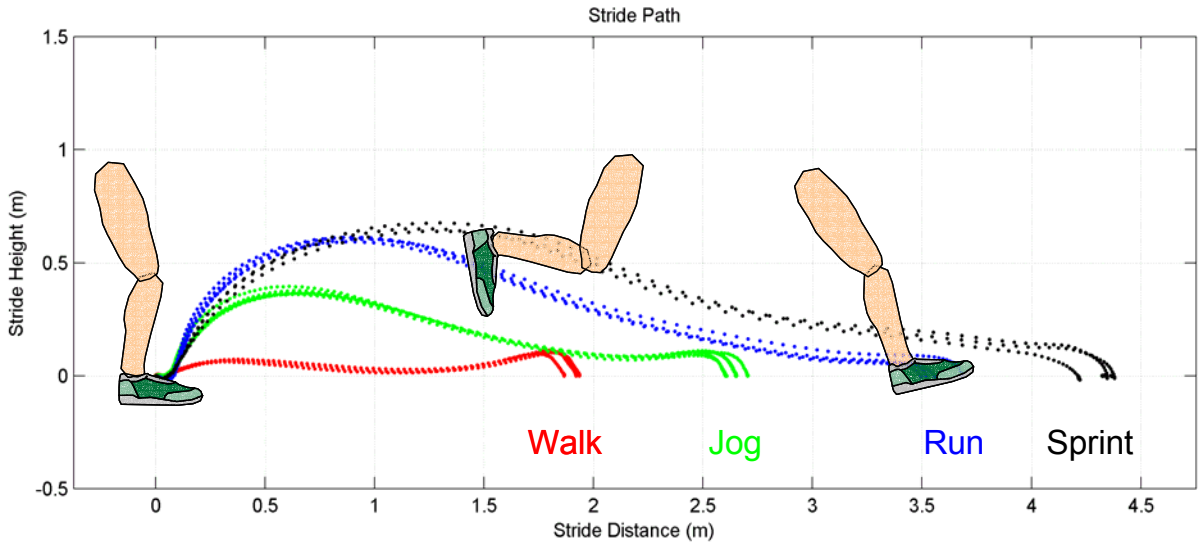

Figure 4 - Stride Paths for a Walk, Jog, Run and Sprint

As demonstrated, patented SpeedMax technology is capable of providing many things such as stride length, foot height, foot path, cadence, in addition to very accurate speed and distance. There is currently no other technology on the market that can make similar claims.

5 COMMUNICATING THE DATA

Once the stride data has been determined in the foot pod, a variety of mechanisms are available to display and store it. Most configurations use some means of RF or EM to transmit the information to a display such as a sports watch. Special design considerations must be taken into account because of the relatively large distance between the foot pod and the watch and to prevent pod messages from getting mixed up with other nearby pods. Individual users select how much information is transmitted and how that information gets displayed/stored.

In order to deal with the various custom low-power, wireless strategies, Dynastream has developed its own proprietary RF communication standard, called *Picotan*.

6 MARKET CONFUSION, MARKETING INTEGRITY

6.1 Pedometer Confusion

It is important that above described SpeedMax technology NOT be confused with pedometer products. Neither runners nor walkers perceive pedometers as an accurate source of information. Pedometers simply count steps. To measure distance or speed, an average stride length is required. Whether the stride length is manually entered or some sort of calibration process takes place, the result is the same; a constant stride length is used. As was earlier described, because a person's speed and stride length are continually changing during a walk or run, the constant stride length assumption is inherently erroneous.

6.2 Emerging Speed Distance Technologies

The major competing technology to SpeedMax is speed and distance data based on GPS technology. GPS requires a line-of-sight access to positioning satellites, which is not available indoors and not always available in treed areas and around buildings. During these satellite signal outages, estimates of distance traveled and speed have to be determined. Perhaps the biggest drawback of the GPS technology however, is that it is not possible to determine stride information at all, including stride length, cadence and step count.