



Athletes' gadget aids businesses

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Article Synopsis

The article discusses the innovative use of technology in sports training and other industries. The Computerized Biomechanical Analysis Company (CBA) has developed a system that uses a combination of a Mega Tech graphics system and a Data General computer to analyze body movements. The system uses formulas developed by NASA and can calculate the force, velocity, and acceleration of different body parts during movement. The system has been updated to include a "vector generator" that can display these movements in three dimensions. The system is used by the US Olympics Committee, professional sports teams, sports equipment designers, and insurance companies. The system can also help determine liability in accidents by simulating movements. The system was developed by Ann Penny, a PhD who studied computer science and exercise science. The company plans to continue improving the system, with a goal of recording body movements without the need for diodes.

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Below find a reprint of the 1 relevant pages of the article "Athletes' gadget aids businesses" in "The Christian Science Monitor":

Consolidated Report of Operations of American Bank & Trust Company of Boston Inc. For the Quarter Ended December 31, 1980	
BALANCE SHEET	
At December 31, 1980	
Assets	
Cash and cash equivalents	\$ 1,122,000
U.S. Government securities	7,170,000
Other securities	1,000,000
Loans	1,000,000
Other assets	1,000,000
Liabilities	
Deposits	\$ 1,000,000
Other liabilities	1,000,000
Equity	1,000,000
Total	\$ 11,392,000

Athletes' gadget aids businesses

By Marjorie Coeyman
Special to The Christian Science Monitor

Picture this: It's spring training, and the coach is working with his star pitcher. As the pitcher winds up and goes through his motions, the coach is watching intently. After some observation, he's got suggestions to make: Release the ball a little sooner; really put your shoulder into it; change your foot angle a bit.

That sounds like coaching as it's been since the days of Babe Ruth. But add these ingredients to the picture. This is not taking place at a baseball camp in Florida, but in a laboratory in California. The pitcher's arms and legs are strapped with diodes, and instead of standing on a pitcher's mound he is positioned in front of a computer which is holding him in a field of infrared light rays. After each pitch, the computer rapidly calculates the force exerted by the pitcher's arm and the velocity and acceleration of different parts of the pitcher's body when he makes the throw.

Then, when the coach offers his suggestions, these are not drawn simply from his innate sense of what makes a pitch work. Rather, they are derived from equations based on the laws of physics and body mechanics. Could this be the training scenario of the future?

Actually, it's taking place already. Five years ago, a group known as the Computerized Biomechanical Analysis Company (CBA) created a Mega Tech graphics system with a Data General computer and produced a system capable of analyzing body movements. It borrowed formulas of body parameters worked out by the National Aeronautics and Space Administration, which uses a \$25 million Cray computer to analyze body movements in zero-gravity situations. CBA's \$1.2 million system is much less sophisticated than the complex hardware at NASA, but it is able to perform functions that make it



A tennis player's motions are studied

Three months ago, CBA's system was updated in a fashion that made it even more valuable to its users. Due to a Mega Tech innovation known as a "vector generator," CBA's computer now can not only record and calculate the acceleration and velocity of the movement of various parts of the body, but it can also display the performance on a screen in three dimensions. The picture on the screen can be related to provide a view from above, beneath, and all sides.

The Olympics Committee finds this system so useful that it has had one installed at headquarters in Colorado Springs, Colo. Any other would-be users must make the trek either to Amherst, Mass., where the system was first created, or to Coto Research Center in Coto de Casa, Calif. In these locations are housed what Gideon Arnel, cofounder of CBA, believes to be the only three such systems in the world.

The US Olympics Committee is employing the setup to improve US performances in 14 sports. The system has also been used by professional athletes, including the Dallas Cowboys and the Kansas City Royals. In addition, designers of athletic equipment such as gymnastic mats, golf clubs, and various kinds of footwear have made use of the computer's calculations.

But the system has its applications in other fields as well. According to Mr. Arnel, insurance companies find it very helpful in calculating disability compensation and liability insurance rates. For example, if a gymnast had an accident and Maimed it on the quality of the gymnastics mat, CBA's computer can help determine, through simulations of the gymnast's movements, in what extent the mat was actually responsible.

According to Mr. Arnel, Coto Research now has about 25 corporations using its computer. "We don't advertise," he says, "but we do complete all our goals for this system."

attracted to a number of users, including the US Olympics Committee, professional sports teams, designers of sports equipment, and various insurance companies.

We have more business now than we can handle. We could expand if we wanted to, we don't really need it. Seven people work at Coto Research Center at present, Mr. Arnel says. "It's like it this way: I, maybe 10 people at the most."

He says the "mastermind" behind the system is Ann Penney, a PhD who studied both computer science and the little-known discipline of exercise science at the University of Massachusetts. She wrote most of the software for the system. She began working on programs analyzing body movement in 1965 when she and Mr. Arnel founded CBA at Dartmouth College.

CBA updates its programs for the three computers in Coto de Casa, Colorado Springs, and Amherst almost monthly. The next technological breakthrough Mr. Arnel hopes to achieve will be a method of recording the movements of a body without first strapping that body with diodes.

"That right now," he laughs, "we have so many goals, it would take about 250 years to complete all our goals for this system."