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FIRST OF TWO PARTS

Machine-made golfers

University of Toledo professor works on developing a way to build better players

By JENNI LAIDMAN
BLADE SCIENCE WRITER

Vijay Goel doesn't golf. Never even tried it. But if you want to improve your game, he may be your man.

The University of Toledo professor holds a plastic spine and shows how it twists and turns and compresses during movement. This is his expertise: the spine and its operations.

Alan Schultheis is a businessman and avid golfer. Twelve years ago, he lived in the golfers' paradise of Ponte Vedra Beach, Fla. Many of Mr. Schultheis' neighbors worked most of their lives to have their piece of land on the back nine. Now retired, they wanted to golf golf golf.

Their bodies, however, weren't cooperating.

"A lot of them were unable to hit the ball very far anymore. If they played, by the end of the round, their backs were sore. They couldn't play again for another four, five days," Mr. Schultheis said.

The memory stayed with Mr. Schultheis long after he moved back to Connecticut. He began envisioning a machine to strengthen the muscles from the mid-thigh to the mid-chest, the so-called core muscles that seemed weak in older golfers.

It wasn't exactly his niche. He's spent his career with MasterCard, American Express, and AT&T doing marketing and business development. Still, he tried to find experts to help him create a machine. East Coast universities and businesses gave him the brush-off or had their own ideas about what he ought to do.



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Finally, he turned to the American Society for Mechanical Engineers. They recommended one man: Vijay Goel.



Vijay Goel in the biomechanical lab at the University of Toledo.
(THE BLADE/JETTA FRASER)

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They hit it off instantly. After a phone conversation, Mr. Schultheis flew to Toledo and the process of developing a golf fitness machine began. The professor's lack of golf expertise proved no difficulty.

"I loved it," Mr. Goel said. "It tells me that it helps sometimes to come from one knowing too much. Then you really have some innovation. Our minds were like slates."

Although, he acknowledged, two of the team members, John Jaegly, laboratory director for the mechanical engineering department, and graduate student David Dick, most directly with the product's development, are both golfers.

Now, a company in Utah is manufacturing the fourth prototype of a patented machine. When those prototypes are complete at the end of September, they will be distributed to a number of centers, including the University of Toledo, for further testing. By November, Schultheis says, the new machine will be on the market.

The equipment enters a field crowded with golfer improvement programs.

ALSO

There are programs that analyze one's swing, and programs to improve strength. There are programs that diagnose movement patterns, and programs that work to strengthen specific weaknesses. Name the program, and you can who swear by it.

• See Jenni Laidman's

What you probably won't find is published scientific data.

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"In my opinion we've been behind the times," says Debbie Crews, an Arizona State University researcher who studies golf and

"If you look at some of the other sports - tennis for example has been way ahead in terms of putting together research and go she said. In fact, all the Olympic sports have funded programs for research, she said. Ms. Crews is organizing world congress science to take place in March.

But golf is no Olympic sport, with a committee designating research spending. Golfers are on their own when it comes to eval works best.

"It amazes me that they're willing to try anything when their livelihood depends on it," Ms. Crews said. "Then again, they don't left behind."

When an individual golfer tries to assess a program's efficacy, chances are she doesn't account for the fact that our desire for work can actually make it work.

"You have to remember, 27 percent of effect is placebo," Ms. Crews said.

And some would argue it's not easy to rate whether a program improves an individual's golf game.

Greg Rose is one of the founders of the elite Titleist Performance Institute, which works with golfers on everything from fitness: club choice using a database of golfer performance built over 12 years.

"I can give you more data than anyone in the world," he said, even on things as arcane as the average hip range-of-motion at classes of golfers. "But outcomes? That's the hardest thing in the world to measure."

The performance institute works with every Titleist-sponsored pro, and also offers \$7,500 fantasy camps - what they call "exp nonprofessionals. During "experiences" golfers may see immediate results from the program, he said.

"We'll notice changes that day. When somebody comes out for an experience, we may add 20 yards just by changing their dr So it may not be possible to tease out fitness results in that background.

But the UT program hopes to establish some objective research to support its invention. Thus far, the equipment has been th round of testing to assure it actually works the muscles it was designed for.

"Once we had a working prototype of the device, we needed to test its validity - is it recruiting the muscles that we want to rec Danny Pincivero, an expert on body mechanics. The UT associate professor is part of the team that developed the core-cond equipment.

To use the machine, a golfer assume the posture he would use to address the ball. Padded arms hold him at the hips and the The golfer twists as he would during a swing, with the machine providing a programmed amount of resistance - different resis different golfers.

Finally, the machine tells the golfer how hard he is working, and how well he is moving.

Initial studies on the Toledo machine showed that it does recruit the correct muscles. (Mr. Goel said this data will be publish larger study on the machine.)

But the question of whether the machine makes better golfers is far more difficult.

"We came to the conclusion, if you want to be a better golfer, go play golf and get somebody to teach you," Mr. Pincivero saic the machine is, develop the muscles, strengthen and condition the muscles used in the swing, and you'll have better enduran power so you can drive the ball farther. We're not addressing the technique."

Scott Lephart, is the man behind the Golf Fitness Laboratory at the University of Pittsburgh Medical Center.

The expert on biomechanics calls golf "the last frontier for sports medicine.

"There are very few scientifically reviewed materials out there," Mr. Lephart said. "Very little has gone through rigorous scienti

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His laboratory has produced a number of papers on golf. Some of the work suggests that the UT machine could have value.

"The physical parameters that decline over time are balance, flexibility, and strength. Our data support that. As we stratify our data at each decade across the life span, those three characteristics consistently go down," Mr. Lephart said.

The Pitt program was born in 2000 of an effort to reduce golf-related injuries. Researchers began by profiling hundreds of golfers to determine the relationship of a golfer's physical characteristics to the mechanics of the golf swing and then analyzing how they contribute to injury.

By discovering the vulnerabilities to injury, Dr. Lephart said his group created a guide to enhanced performance. He identified exercises that address players' vulnerabilities. Today, for \$850, golfers can enter a Golf Laboratory program and have a complete assessment of their strength, flexibility, range-of-motion, balance, and the biomechanics of their swing.

That data is compared to a database of 800 golfers. Golfers are then assigned specific exercises based on their deficiencies. Exercises are designed so they can be done anywhere, with little more equipment than rubber tubing.

In initial tests of 15 golfers using this system, research published in scientific literature shows driving distance improved an average of 4 percent, or approximately 18 yards, Mr. Lephart said.

Since then, some 800 golfers have been added to the database. Their improvements are on par with those in the initial trial, Mr. Lephart said. Some of this data has been published in abstract form.

Publishing research in scientific journals makes the Pitt program unique. More typical is the stance of the Bedford, N.H.-based Bentley Kinetics, makers of the K-Vest. The K-Vest is a \$3,500 vest that provides instant feedback for golfers who wear it while practicing their swing.

Tony Morgan, director of marketing for K-Vest, and a PGA golf professional, said the two-year-old company is still compiling information.

Like others with golf-improvement products, he is ready with testimonials.

"I work with golfers, I've seen handicaps, just recently in last 60 days, go from 22 to 12 with less than 60 minutes a week training product," he said.

A program called "functional movement screening" designed by Danville, Va., physical therapists Lee Burton and Gray Cook, around 10 years.

This method looks at seven movements and analyzes weakness, then works to rectify those vulnerable areas. The program was developed for golf, but first used in personal training, and then among high school athletes, where Mr. Burton said it had immediate results.

This anecdotal evidence is finally getting some scientific backup. Functional movement screening was tested on more than 400 firefighters, the profession with the highest injury rate on record, according to a study in the American Journal of Preventative Medicine.

A paper published this year in the Journal of Occupational Medicine and Toxicology showed that functional movement screening time off for injuries by 62 percent among firefighters. The number of injuries during the year of testing fell more than 40 percent.

Research is expected this fall showing functional movement screening results in professional football players.

Roger Knick, a PGA golf instructor in Connecticut, is a fan of the program.

"Once we know their weakness, we can eliminate their weakness. Once they eliminate weakness, and their strength gets better, movement gets better," improvements follow, said Mr. Knick, who also uses the K-Vest when he trains.

"We'll see an increase in club speed, distance, and more efficient movement," he said.

He's also playing a role in the development and evaluation of the new UT core-conditioning equipment.

"As a movement specialist, this is a good fit for me," Mr. Knick said.

The development of the machine is part of a growing trend in golf, he said.

"In the last 18 years, there's been a huge transformation," as people focus more on the athleticism of golfing.

"Golf is a way of financial gain, of getting into college. Parents are looking into it really early to start developing some kind of physical science helps them get better. The more research done on it, the better."

Contact Jenni Laidman at: jenni@theblade.com or 419-724-6507.