By Michael Nassberg

Ohad BarSimanTov, an Israeli who recently received a Ph.D. in electrical engineering from Binghamton University, is the founder of InfraSonic Monitoring, a company developing a non-invasive, mobile monitor for cardiac output, a technology with applications in the fields of medicine and athletics. Currently the company is seeking further investment to allow testing, including a clinical study for the FDA, in the hopes of bringing a product to market in the next few years.

As the product of heart rate and stroke volume, cardiac output is the volume of blood being pumped by the heart within a span of time. In certain medical cases, treating a patient can require tracking cardiac output, instead of just heart rate, which “doesn’t give the full spectrum of what the cardiac system is doing,” according to BarSimanTov. “The chamber is not fixed, it’s variable—it changes every contraction and depends on your breathing and other aspects.” However, the monitors typically used require implantation in the body to record the information accurately, and the expensive, invasive procedure can lead to complications, such as infections and blood flow issues. An external alternative could reduce hospitalization and other costs by allowing patients to monitor their cardiac output at home.

For professional athletes, measuring heart rate alone is not as useful cardiac output, which can provide more information about one’s fitness. Trainers, BarSimanTov noted, are “trying to grab any kind of information they can to give better advice to the athletes.” One of the challenges of developing their system was measuring heart contraction timing without interference from “confounding factors,” according to InfraSonic Monitoring’s website, including “breathing motions, speech noise and other impact spikes” that would be caused by movement.

InfraSonic Monitoring is based on BarSimanTov’s Ph.D. project, and was developed initially with the Gates Foundation in mind as a product that could aid third world nations. “The first couple months we started to work on the project, that’s what we see “Cardiac” on page 9
Cardiac

"talked about," said BarSimanTov, referencing his advisor, Kenneth McCleod, an entrepreneur and former Binghamton University professor in the Department of Bioengineering.

"I think working with him helped tremendously - he pushed more toward the idea of creating a company and trying to push to the market," said BarSimanTov. Through their research, they found that their work could benefit people by allowing cardiac output monitoring to occur outside the hospital. "We had a proof of concept, we were able to get the measurements that we want and we investigated what was out there - there's nothing in the consumer market developed."

Now that they have a proof of concept, BarSimanTov has worked to build the company by closing gaps in its skill set. "Mark Sodan joined the company two weeks ago as the CEO," noted BarSimanTov. "I'm focusing more on the technology part and he has a lot of business background... He's experienced - he started a different company, Fusion, a credit card processing company."

BarSimanTov has also recruited a software developer, who will join the company full-time in the future, as well as a professional cyclist, Rotem Ishay, who will help with their product testing. "We are planning a clinical study with him in January so we have set up a clinical study to measure the amount of oxygen you use," explained BarSimanTov. "That's a very common device that athletes use to measure their fitness level so we can market it to the athletic market."

That's how we do the correlation, that's how we're going to develop our product." He noted that Ishay can bring a marketing perspective as a professional athlete who would consider using such a product. BarSimanTov also indicated that InfraSonic Marketing is in talks with Guthrie, which may provide a fellow to work with them as they approach the clinical study.

"The healthcare market is definitely the bigger market... because of all the procedures that they have and the way you use the device," said BarSimanTov. "In athletics, you use it pretty much because you want more information, not because you have to. In healthcare, you pretty much have to. The advantage of monitoring cardiac output continually answers a lot of questions and concerns." He explained that one of the main concerns of hospitals is readmission. "If the patient is released and comes back within 30 days, the hospital gets fined because it means they didn't treat the patient correctly - so that's something it can help with, because you monitor people from home instead of in the hospital."

He noted that this is not just for the hospital to save money, but also to improve patient care, as continued monitoring will be possible without having to readmit the patient. "Many medications affect the cardiac system and you want to make sure the medication, e.g. for blood pressure, doesn't have a negative affect on the patient... if you have a negative reaction you can see it right away if you monitor," noted BarSimanTov. Furthermore, he added that sometimes a patient can experience a symptom that occurs infrequently or unpredictably - a constantly active monitor during a patient's normal daily activity can capture information to which physicians may not otherwise have access. "You have another set of eyes following the patient during the day without actually being there."

Of course, the potential of the healthcare market does not mean InfraSonic Monitoring will ignore the athletic side. "The advantage of working with the athletic market is they are really adaptive, they want the new gadgets, want to stay on top," said BarSimanTov. "It's a good market to start in. They give a lot of support. They really encourage people to actually push out new products because they want more and more things."

When asked about his background, BarSimanTov said that he came to the United States following his military service in Israel. He noted that the army helped his career by allowing him to further specialize in engineering. As a student in a technical high school, he pointed out that the army seeks to place each soldier in a position that will be best for both the army and the individual. "The army doesn't necessarily put you in the position you want, but if you have the right background and experience, the army will try to put you in the position that you want," he said. "Obviously, three years experience of doing that directed me to engineering."

Currently, InfraSonic Monitoring is participating in 43North, a business plan competition based out of Buffalo. After applying back in May with nearly 7,000 others, BarSimanTov's company was one of 113 - six from Israel - to move on to the second round. The winners from the second round will enter a competition to establish a final ranking, which determines the funding received by each group. "We hope we will get some funding because that will help a lot [and help] keep us in the Binghamton area," said BarSimanTov."