



Member Success Case Study

Cambridge Mobile Telematics

The journey from research to commercialization isn't always straightforward: After shifting gears, avoiding potholes, and running into roadblocks, you may find yourself taking a few unexpected turns. But sometimes it pays to take the road less traveled — or go off-road to forge new paths altogether.

The creators of CarTel, a distributed mobile sensor computing system developed in MIT CSAIL, embarked on such an adventure by turning their lauded sensing technology into a viable product and building their startup, [Cambridge Mobile Telematics](#), from scratch.

About the Company

The mission of Cambridge Mobile Telematics is to make roads and drivers safer. They achieve this by combining mobile sensing, artificial intelligence, behavioral science, and the Internet of Things into a platform that measures driving quality and encourages drivers to reduce their risky driving behavior. Since helping to establish smartphone-based telematics in 2012, CMT has grown to support over 30 million drivers in 25 countries around the world as of mid 2023.

Journey's Start: CarTel

Before the iPhone and the Android, Professor Hari Balakrishnan and Professor Sam Madden of CSAIL had an idea: What if mobile devices were equipped with sensors? In 2004, they conceived the CarTel project to experiment with mobile sensing technology. They equipped mobile devices and moving objects with sensors to understand their mobility and environmental conditions around the mobile objects for real-world applications. For example, as part of the CarTel project, they pioneered the idea of using sensors on phones to understand traffic conditions.

“Nowadays, this is completely commonplace, but we’re talking about a time before iPhones, before Android,” says Balakrishnan. “So we developed some embedded mobile devices of our own and worked with old Nokia-type phones. Since then, this transportation idea for traffic conditions has been commercialized by companies like Waze and Google, but at the time we were working on it, no one was doing this type of thing.”

The CarTel project ran from 2004 to 2010. During that time, we saw the emergence of smartphones, which Balakrishnan and Madden predicted would come equipped with sensors.

“We worked on a few different application areas, but the fundamental technology we developed was around taking noisy data from phones and other mobile sensors, cleaning that up, and developing various algorithms to be able to draw accurate inferences about what that mobile device was doing,” says Balakrishnan.

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Journey's Start: CarTel (continued)

In 2007, they developed the “[Pothole Patrol](#)” system, placing devices with high-quality accelerometers and positions sensors in vehicles run by local taxi companies to measure road conditions. This application showed how mobile sensing — where they collected acceleration data, GPS velocity, and GPS position data — could be combined with machine learning.

“People hadn’t really been using machine learning in mobile sensing,” says Balakrishnan. “This sort of revolution with machine learning came about a few years later with advances in deep learning, but in 2007 we were able to show how to apply machine learning to sensor data to detect road hazards and understand road conditions.”

This “Pothole Patrol” work launched CarTel into the national spotlight, garnering attention from numerous press outlets and government reports considering how this technology could be used to help the U.S. Postal Service understand road surface conditions. After the project also achieved a number of academic successes including various best paper and best demonstration awards (and since then, “test of time” awards), the researchers started thinking about commercialization opportunities.

A Changing Terrain

Around the time they started looking into forming a company based on the CarTel technology, the economic recession hit.

The original idea the CarTel team had was to commercialize mobile sensing as the technology and come up with an application area. Traffic seemed a natural application area that could turn out a consumer-oriented product, such as building an app and driving up users.

At first, they spent a lot of time trying to create a business model for traffic, where they would sell the technology services to other consumer-oriented companies to get the data out there. However, they found that the technologies they developed at MIT were actually too sophisticated for models that were simply scaled to just get the good, simple-to-process data, for which Google was far more equipped to collect this data at scale. Instead, the researchers took a different route.

“Because of the success of road quality monitoring, in 2009, I got interested in safety and looked into who cares about safety. I started reading about insurance companies in Europe, especially in Italy, and then one or two insurance companies in the U.S. that started equipping vehicles with devices that were either attached to the vehicle’s diagnostics system or in expensive black boxes that were professionally installed. The more I started reading about it, the more I realized that a bunch of things align in the area of insurance,” says Prof. Balakrishnan. “I didn’t know the word ‘telematics’ at the time, but telematics is a combination of the mobile sensing area that we pioneered together with statistics and now artificial intelligence on that data.”

That’s when the idea for a company clicked: It was a win-win for the customer and for the insurance companies who could measure how people drive and use it to price insurance. It’s also a big win for society, because the number of car crashes is significantly reduced.

New Territory

“It turns out that a recession is actually a very good time to start a company, because most people are not starting companies at that time,” says Balakrishnan. “Funding is tight, people want to hold onto their jobs, the economy is tanking...but as it turns out, these are circumstances in which you can do something patiently.”

Balakrishnan had the time and space to form their safety ideas, as well as look into raising money to start a company. While they pitched their ideas to investors, venture capitalists weren’t yet willing to commit to funding them — the

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New Territory (continued)

Balakrishnan says that the market wasn't quite there yet; it was still a few years away. "In retrospect, it was a blessing in disguise, because we could pace the market. We could go and directly get customers and do the hard work. We didn't have an imaginary product in mind where we had convinced some investors to put money into the product and then go figure out what the market was and build it...so we did the company the old-fashioned way."

In 2009, Balakrishnan met Bill Powers, who joined him and Madden as a co-founder of Cambridge Mobile Telematics. They began trying to drum up business, ultimately forming the company in 2010. A few insurance companies came on board as early customers. As an academic who is used to writing proposals, Balakrishnan also tried his hand at applying for a National Science Foundation small business grant, assuming he wouldn't get it on the first try.

"I wrote this proposal in June 2009," he says, "and by October or so, I got a call from the program manager saying they had selected our proposal." The NSF grant was enough to get them through those early stages. In late 2011, they secured a contract with the largest insurer in the U.S., State Farm, and in 2012 produced a pilot version of a mobile system to measure driving behavior for State Farm. Fast-forward to 2015, when CMT had secured a handful of customers and were running the business on customer contracts, as well as entering into strategic investments with insurance companies. By 2018, their strategic partners started looking into how to scale their programs with promising early results, and now more companies wanted to join the programs and more investors were interested.

Since then, CMT has been growing exponentially, looking toward the future of safe mobility in the mobile telematics market. Their goal is to get to 1 billion vehicles. About eight years into the company, they took their first venture capital money.

"It's an unusual story, because we've been profitable and we're still profitable, even though we've grown and tripled the size of the company in the past year-and-a-half, and we're using the money to look at various options for growth into the future," says Balakrishnan.

What's Next?

Today, CMT is focusing on a product called DriveWell to make people better drivers. They are also using telematics data to detect crashes and send roadside assistance to the scene. They have also launched Claims Studio, a second product that provides both roadside assistance data and AI-based claims processing. They have also recently started working on video solutions, which would incorporate video into the telematics landscape in a way that is different from dash cams, combining telematics and video in new ways.

"In the future, the solutions will be about autonomy," adds Prof. Balakrishnan. "As we embark on this road to autonomy, we aspire for CMT to be at the forefront of insuring autonomous or semi-autonomous vehicles, in that all autonomous vehicles will be on telematics — rating the quality of the sensors, reinforcement algorithms, and the self-driver."

Startup Connect with CSAIL Alliances

As a company with research based in CSAIL, CMT is a Startup Connect member with CSAIL Alliances.

"We are a fairly recent member, so we are looking forward to increasing the engagement, sending people to the events and so on," he says. "What we have done is run some info sessions for recruiting and for hiring people for CMT."

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Startup Connect with CSAIL Alliances (continued)

Both Balakrishnan and Madden have students and colleagues who have started companies of their own over the last few years, and the faculty are excited about helping them. “I think one of the things that would be very useful for CSAIL to have and what we’d like to do is to create an ecosystem where we could have a free exchange of ideas, a forum for some shared learning between these companies,” he says.

As for advice to those just starting out on their own journey? Balakrishnan says, “If you start a company when you’re coming out of academia, most people in academia believe that what matters is your technology. It turns out that the tech is a necessary but not sufficient condition. Then when you start the company, people will tell you it’s all about the products. But ultimately, what customers want is not just a product built on some technology — what the customers want is a solution, something that will solve their problems in an economical way.”

It was this mindset shift that helped CMT have a clearer idea of how to build their company from an exciting technology to customer-driven solutions, and has contributed to their success and continuous growth from lab research to commercialization.

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