

DOSSIER: Dr. Ravi Rajamani, aerospace engineer and consultant

The subject of this month's Dossier is Dr. Ravi Rajamani, an expert in aerospace propulsion and energy systems with a specialty in model-based analytics for controls, diagnostics, and prognostics.

Three years ago, he founded his own company, drR2 consulting, and works frequently with other consultants, industry partners, and universities on various projects.

Ravi is an SAE Fellow, book author, technical paper author, and standards participant. At the recent AeroTech Americas 2019 conference, he presented a paper, "Data Interoperability for Aerospace Systems," which outlines a new proposed document, "AIR6904: Rationale, Considerations and Framework for Data Interoperability for Health Management within the Aerospace Ecosystem," being published by the HM-1 (IVHM) Committee.

He has a bachelor's degree in mechanical engineering from the Indian Institute of Technology, Delhi; a master's degree in automation from the Indian Institute of Science, Bangalore; and a Ph.D. in electrical engineering from the University of Minnesota, Minneapolis.

His first job was with GE, where he worked for 10 years, first at its R&D and Power Generation businesses, working mainly on gas turbines for energy applications. He then



Ravi is an expert in aerospace propulsion systems.

moved to United Technologies, spending three years at its Research Center, and then at its aero-engine division, Pratty & Whitney, where he spent eight years. His final move was to Meggitt, where he worked for five years on a number of aircraft subsystems before striking out on his own three years ago.

Over the course of his career, he has earned 26 patents, evenly split between GE and UTC, with a few more applications still being reviewed.

What is the most interesting activity you are engaged in at the moment?

We just finished a small-business initiative on



At WCX World Congress Experience 2018, Ravi was recognized as an SAE Fellow.

developing fiber-optic sensors for temperature and strain measurements in the hot section of gas turbines. If we can measure these temperatures reliably, we can do a better job of controlling the turbines. Phase 2 of that project was recently awarded, and this will include actual testing on real turbine rigs. It's quite exciting to be working independently as a consultant. Now I wish I could just get more projects, but I'm sure that will come as I establish myself.

What past activity, accomplishment, or memory gives you the most satisfaction?

When I worked at GE, we developed an amazing diagnostic system for an advanced combined cycle system. It was quite advanced in concept. We were able to accomplish something that even today is

not done very easily, which is transient diagnostics using a dynamic model. A lot of diagnostics systems today are based on steady-state models. This was transient because we had to react to a critical fault within seconds; we couldn't wait for the system to reach a steady state. That was a good technical accomplishment.

Also, writing a book for SAE International, [Electric Flight Technology: The Unfolding of a New Future](#), was a lot of fun. It was published in 2018.

Is SAE helpful to you in your job?

Absolutely. And personally, as well. I've made a lot of connections within industry, within the government and within the SAE community, which have all been very helpful. It has also given me a lot of recognition—for example, it has recognized



Dr. Ravi Rajamani presenting a technical paper at AeroTech Americas 2019.

me as an SAE Fellow, which is quite an honor. Other than that, just working on standards documents is fun and rewarding. You get to work with really good, really smart people who don't just take what you say for granted. The healthy back-and-forth helps educate you while making the end product that much better.

It was working on standards that first got me involved with SAE, back in 2003. A manager at Pratt & Whitney moved to a different position, and I took over the role. He was part of the E-32 Aerospace Propulsion Systems Health Management Committee and asked me to help him with that assignment as well. I've been with E-32 working on documents ever since. E32 encompasses gas turbines and transmissions, but the emphasis is on propulsion.

Also, I was one of the first members of the new HM-1 Integrated Vehicle Health Management (IVHM) technical committee, which was established in 2011, and served as its second Chair. I am currently the Vice Chair of the IVHM Steering Group.

Has any SAE Member been particularly helpful to you?

When I joined E-32, Richard Greaves (SAE Past President, 2015) was kind of a mentor to me. Another person who has been particularly helpful is Rhonda Walthall, who joined E-32 at about the same time as I did. It was because of both of their support that I was elected an SAE Fellow.

Any advice for SAE Members?

Get good exposure to both the theoretical and practical aspects of your field. When I started at GE, after my Ph.D., it was very much on the theoretical side—analysis and applied math. I did not have as much experience with the application side. It was an era when the discipline of control systems was heavily theoretical. That was great, and thanks to that, I have a good grounding in analytical methods. However, I wish I had had more experience with the practical. That changed in a hurry when I went to GE because I did get exposure to physical, real-world problems, which was really good. I'd advise kids who are so inclined to get as much exposure to the

practical as possible. Do internships and try to link up with professors who have collaborations with industry. Those will really help you. Once you get grounded, once you know what the real problems are, you'll ask better questions and your research also will be much better. And with that kind of balance, you will have the entire world open to you. You can go into teaching and you'll be a better teacher, or you can go into industry and you'll be better because you have the grounding in academics as well as industry.

Farewells

News of the death of the following SAE Members has reached SAE.

Takeyuki Kamimoto (SAE Fellow), 37 years of SAE Membership

Wayne G. Richter, 23 years of SAE Membership

What do you do for fun?

I run. I also get together with friends and cook. I travel to some extent. Wherever I travel, I try to go out for a run in the morning. This gives me an opportunity to do some sightseeing. I have seen many cities at 6 a.m. A bonus is that there aren't many people around early in the morning. In fact, many of the people I run into that early are also visitors like me, and often Americans! ■



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