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Re: Industry

An Interview with Yonghui Shu of Eravant

■ Jon Martens 

In this first installment of the “RE: Industry” column, we sat down with Yonghui Shu, founder and chief technology officer of Eravant, a microwave and millimeter-wave technology company, to gain insight on his experiences in starting and growing high-frequency technology companies. Also covered were his views on the Microwave Theory and Technology Society (MTT-S)–industry relationship, university collaborations, and technical questions on the horizon. This inaugural column is in a question-and-answer format, where editing has been done for length and clarity.

The Interview

Jon Martens: What led to starting these companies? An identified unmet need, a technology gap not being exploited, or something else?

Yonghui Shu: I started my first company, WiseWave Technologies, Inc., in 2001 by servicing a niche market, which was low-cost and high-performance Ka-band Doppler radar sensors



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for traffic control. I leveraged my prior academic and industrial knowledge of microwave and millimeter-wave technologies, and my experience in developing components and subassemblies, such as Gunn oscillators, mixers, antennas, and passive components,

Note From the Editor

One important aspect of the IEEE Microwave Theory and Technology Society is the participation of the industrial community in society activities, and it is relevant that the interests of and information about that community are propagated. To this end, we are starting a regular column in *IEEE Microwave Magazine* that has an industry focus to complement our current “MicroBusiness” column. Here, we will present a wide range of topics and articles, which may include the following:

- Interviews with high-frequency technology company executives and founders to get their perspectives and opinions about the status of our field, its future directions, and to learn about the journeys that those leaders have taken.
- Articles on important historical developments that have enabled our industry to advance.
- Articles related to manufacturing, including how to take technologies and prototype devices/circuits/systems to a product stage and the manufacturing processes that are required.
- Columns related to how industry and academia can successfully collaborate to achieve mutual benefit and how they have done so in the past.

Of course, this column is a work in progress, and we envisage that its scope may change once feedback is received. If you have some material that you think would be interesting to the community, please submit it to microwave.editor@ieee.org.

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for pioneering work in collision-avoidance radar, and in point-to-point and multipoint communication systems. Our customers were in industries where manufacturability, reliability and economies of scale heavily influence long-term design strategies. Our niche market was an attractive opportunity because the raw materials were readily available, and each sensor required a relatively small number of components. Our production staff could produce the sensors consistently and with high yields.

Over time, WiseWave focused on millimeter-wave sensing applications, with many opportunities to develop custom components and subassemblies for emerging millimeter-wave system applications. Eventually, WiseWave developed a wide range of millimeter-wave components, subassemblies, and frequency-extension heads. Our products included antennas, amplifiers, down-converters, oscillators, control devices, ferrite devices, and passive components to support the rapid growth of millimeter-wave commercial applications. With this rapid growth in demand, I decided to merge with a much larger company to grow the technology at a faster pace. After the acquisition, I discovered that the main business focus was to use our existing design libraries to support large production contracts. I supported that mission for several years but eventually moved on to follow my passion for supporting millimeter-wave technology forward at a faster pace. There was increasing demand for improved technologies and hardware, and for the design skills and personal attention that I could offer. Many of my previous customers and business partners encouraged me to start another company in this discipline.

With that vision, in 2011 my second company was founded, SAGE Millimeter, Inc., which was renamed as *Era-vant* in 2020. At that time, procuring millimeter-wave components for system development frequently involved cumbersome component-level speci-

cation development and negotiations, nonrecurring-engineering fees, custom designs, and other extra steps, because there were no industry standard millimeter-wave component portfolios for system developers and integrators to choose from. This often resulted in high costs and long lead times, presenting high barriers to entry for new applications. With that opportunity presented, we chose to invest heavily in developing our own portfolio of standard, full waveguide bandwidth millimeter-wave components, covering frequencies through the WR-10 band or 110 GHz.

The main challenges to these efforts were the component definitions, engineering, and cost-effective manufacturing processes required for thousands of component models. We utilized our decades of knowledge and experience, stayed focused on the best technologies and tools available to us, and invested in our own resources to overcome these challenges. We were also challenged by the limited supply of experienced engineers and skilled technicians required to support such a broad range of product offerings while production volumes rapidly increased. In response, we developed our five-step engineering and manufacturing process: electrical design, mechanical simulation, manufacturing quality control, assembly accuracy, and testing repeatability. This effort further increased our productivity and decreased our manufacturing costs. Today we have thousands of commercial-off-the-shelf components, building blocks essentially, up through the WR-03 waveguide band, 330 GHz, for system developers to choose from.

Have university collaborations played a role? Do you see those possibilities changing over time?

We have a few on-going collaborations with university professors. These relationships are mutually beneficial in that we help the professors and their students work with technology that

might otherwise be unreachable. On our end, we have a better understanding of the university environment and what the students are learning. We also receive help in ways that would otherwise be more difficult to access. Progress in this industry is often inhibited by institutional inertia, even as the current business climate is making faster technological progress more critical to survival. Students are great at challenging established preferences and practices. The microwave industry needs more of these collaborations. Larger companies can sponsor many graduate students at several universities as a feeder system for new employees. As a smaller business we can't provide that level of support at universities, but we do what we can by providing professors with materials and access to our knowledge base.

How do you see the industry-MTT-S relationship evolving in time?

MTT-S promotes the advancement of microwave theory and its applications, including RF, microwave, millimeter-wave and terahertz technologies. I can see that MTT-S publications and conferences are evolving from being mostly focused on theory and analysis to including more practical topics, such as devices, components, and subsystems. Many of the invited articles in *IEEE Microwave Magazine* have been focused on technology history and summaries. Such articles present the overall picture of many disciplines to help the readers capture a wide range of knowledge in a single setting. MTT-S is a bridge for research and product development and has been doing a great job of pushing technology forward. In the meantime, MTT-S could more actively promote industry and university partnerships, which may also help with its membership pull.

Thank you very much for your time in responding to our questions for our readers.

