Some would say that the field of power electronics started with magnetic amplifiers. Others, focusing on the word *electronic*, would say that power electronics started with mercury arc rectifiers. Still others would claim that the beginning of real power electronics was with the invention of the silicon-controlled rectifier in 1957. No matter what you call the start of power electronics, I think we would all agree that the major drive to move power electronics from the laboratory to widespread use was the space program. The need for small, light, and highly reliable power conversion for both unmanned and manned space missions drove the aerospace industry to develop switch-mode power during the 1960s. By the 1970s, switch-mode power technology had made its way into telephone systems and computers. By the early 1980s, switch-mode power supplies were the dominant power conversion technology in all electronic systems.

In those early exploratory days of power electronics, how did those pioneering engineers learn the art and science of power electronics? Of course, there were the IEEE papers, but those generally weren’t available to those working in industry. The first trade publications in power electronics, *Solid-State Power Conversion* magazine, did not appear until March 1975. Other trade magazines followed, and today they continue to be an important source of information, whether in print or online.

The other way early power electronics engineers learned about the latest in power electronics was through conferences. As best I can tell, the first power electronics-specific conference, the Power Conditioning Specialist Conference, was held in 1970. Given that the development of switch-mode power conversion was being driven by the needs of the aerospace industry, this conference was sponsored by the IEEE Aerospace Society and held at the NASA Goddard Space Flight Center in Greenbelt, Maryland. This conference evolved into the Power Electronics Specialists Conference, held annually until 2008, when it evolved into the Energy Conversion Congress and Exposition (ECCE).

This first power electronics conference sponsored by a commercial entity was the Solid-State Power Electronics Conference (POWERCON), held in March 1975. This conference was held at a little more posh location than the first IEEE Power Electronics Specialists Conference (PESC)—the Beverly Hills Hilton in Beverly Hills, California. This location is not as strange as it might first appear because Southern California was, and is, a hotbed of aerospace companies and research (think, for example, of the Jet Propulsion Laboratory in Pasadena, California).

POWERCON was a very successful conference that continued until 1984. That year it was held at the Lowes Anatole Hotel with a reported attendance of 1,100. This would make the 1984 POWERCON the largest power electronics conference until the Applied Power Electronics Conference and Exposition (APEC) surpassed those numbers in just the past couple of years. One of the key attributes of POWERCON was that it very much catered to the working engineer. The papers tended to be practical, with engineers sharing their hard-learned lessons. This made POWERCON a clear contrast to PESC, which, although it was highly regarded, has the reputation as a very theoretical and academic conference. POWERCON could probably have continued for many years had the main organizer, Ron Birdsall, not decided that he wanted to move his life in different direction. One real shame is that copies of the POWERCON proceedings are very rare and not generally available.

Another commercial conference that started about 1980 was Power Conversion International (PCI), which became Power Conversion and Intelligent Motion, which later simplified to

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just PCIM. Along the way, PCIM developed a focus on serving the European community. Today, PCIM has become the largest power electronics event in the world with more than 10,000 participants. I use the word event, rather than conference, to highlight that PCIM has evolved into a huge trade show with more than 500 exhibitors. The technical presentations and tutorials at PCIM are a tiny side show to the main event.

After POWERCON was discontinued, two conferences appeared to take its place, APEC and the commercial High-Frequency Power Conversion conference (HFPC). HFPC was a very good conference with lots of relevant and practical information. It was first held in April 1987 and appears to have continued until about 2002. Especially in the early 1990s, a lot of important work was published at this conference, and like POWERCON, it is a shame that archival copies of its proceedings are not available.

APEC has continued to grow until today; it is the largest power electronics conference in the world. APEC 2019, held this past March in Anaheim, California, had a paid attendance of approximately 1,700 and total attendance of about 6,200 (this includes all the people working the booths, journalists, and the free exhibits-only admissions). More about APEC in a moment.

In Europe, the European Power Electronics and Drives Association started the European Power Electronics Conference (EPE) in 1985. It has been held every other year since and recently joined forces with the ECCE conference to form EPE-ECCE. The association has also organized more than 20 additional power electronics-focused conferences in the past 20 years.

It has been said that we are living in a golden age of power electronics. I agree, and that also means we are living in a golden age of power electronics conferences. As I write this in June 2019, the IEEE PELS webpage lists 29 power electronics conferences and workshops between now and March 2020. The IEEE Industrial Electronics Society (IES) is also very active in power electronics, with at least eight power electronics-focused conferences scheduled in the same time frame. Between the various IEEE power electronics conferences and workshops, conferences and workshops sponsored by other organizations like the Power Sources Manufacturers Association, the China Power Supply Society, and other national organizations it appears that one could spend every week attending a power electronics event somewhere in the world.

I believe this abundance of power electronics conferences, workshops, and events has both upsides and downsides. One upside is that no matter your specialty within power electronics—wide bandgap devices and applications, motor drives, packaging, microgrids, electric vehicles, and systems and converters for renewable energy—there will be at least one conference or workshop focused on that specialty every year. This means that you can dive deeply into your area of interest with other power electronics engineers who share your interests. These deep discussions can provide paths to solving the most difficult of problems.

Another upside is that, with conferences and workshops all over the world, there is going to be one geographically close to you each year. No longer must you travel halfway around the world to attend a power electronics conference. Being able to attend a conference or workshop in your own neighborhood, so to speak, saves time and money. It also means that your fellow conference participants are likely to be from your own region, enhancing communication through common cultural norms and viewpoints.

One of my favorite sayings is “One’s greatest strength is often your greatest weakness.” And, so it is with power electronics conferences. While it is great that there are so many specialized conferences, it also means that we miss out on interacting with others from different areas of specialization. Opportunities for cross-discipline conversations are lost and with them opportunities to learn from different points of view. Also lost are conversations that lead to new cross-discipline collaborations that so often yield important advancements in any field. And, while it is great to attend a conference at which the attendees are your fellow countrymen, we again lose the opportunity to have conversations and interactions that broaden our viewpoint and open us to new possibilities for collaboration and problem solving.

The popularity of power electronics conferences events, propelling APEC and PCIM into mega-events, also has its pluses and minuses. APEC is still my favorite conference. I have been involved with it since its earliest days, chaired the conference twice, and served many years on its steering committee. The positive note is that no matter what your interest or specialization is in, you will find it at APEC. Also, you will have numerous opportunities to explore many different interests just by dropping in on another seminar or session. APEC attendees come from all over world and from both industry and academia. With a little initiative you can make connections that help you either deepen or broaden your expertise and perspective.

Still, I will say that I do miss the old days when APEC fit comfortably into one hotel and its ballrooms. Today, with APEC taking up whole convention centers including 20 sessions in parallel, a huge exhibit hall, and wall-to-wall crowds, getting around feels more like making one’s way through a crowded airport than attending a technical conference. I understand the
need for the APEC Program Committee to accept all the good papers submitted, but that comes at the cost of so many sessions in parallel and speakers limited to 15 minutes to present their work. There is so much hustle and bustle, scrambling from one session to another, that I leave the conference exhausted rather than refreshed. Even so, I am already making my plans to attend APEC 2020.

As I am self-employed, I do have some freedom to attend more than one conference or workshop a year. So when project schedules and circumstances permit, I do try to get to a smaller conference or workshop. In recent years, I have been attending the Wide Bandgap Power Devices and Applications (WIPDA) workshop as that aligns with some of my professional and research interests. It is refreshing to go to an event where one can take the time to meet new people and have extended and deep conversations. I will say, though, that as WIPDA has now grown to approximately 250 attendees with up to three sessions in parallel it has become more of a small conference than a workshop.

There is also the question of the future of conferences. The questions that are now often asked are “Why not just broadcast conferences over the web? Why do we even need to meet in person?” There are requests for conferences like APEC and ECCE to broadcast all of their sessions over the web so that people don’t have to travel and can attend the conference virtually. I do think that broadcasting the APEC plenary session is a good idea. I don’t think broadcasting the entire conference would be. I’m not opposed to webcasts; I find them useful, informative, educational, and I watch them as much as anyone else. But when it comes to a conference, there is nothing that can substitute for the face-to-face meetings and conversations with your colleagues and friends. When I go to APEC, I get as much out of all the various conversations I have as I do from all the technical sessions together. If the conference were strictly virtual, and I was just sitting in my office watching over the web, I would really miss out on the biggest and most important part of the conference. I hope that real, in-person, face-to-face conferences continue to be an important part of our professional experience for a long, long time.

Today, let us enjoy our good fortune to be in this golden age of power electronics and power electronics conferences. There is so much being offered that we can each choose the conference or workshop that best fits our interests, needs, and schedules. We can either go to a highly focused workshop like WIPDA, or we can attend a mega conference like APEC or ECCE or a mega tradeshow like PCIM. And we can do this practically in our own neighborhoods without having to travel around the world. So, let us enjoy this good fortune and take advantage while we can.

About the Author
Robert V. White (bob.white@ieee.org) has more than 30 years of industry experience as a power electronics engineer. He has worked in product design, systems and applications engineering, and technology development. He has been an active volunteer with the IEEE Power Electronics Society, serving several years on the Administrative Committee, two terms as technical vice president, and as a Chapter chair. He earned a B.S.E.E. degree from the Massachusetts Institute of Technology and an M.S.E.E. degree from Worcester Polytechnic Institute. He is currently pursuing a Ph.D. degree in power electronics at the University of Colorado, Boulder. Presently, he is the chief engineer of Embedded Power Labs, a power electronics consulting company. He is a Fellow of the IEEE.

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