Foreword
Special Issue on Digital Control in Power Electronics

MY FIRST exposure to the notion of digital control of power electronics, and to digital control in general, coincided with my first exposures to the IEEE Power Electronics Society at the 1988 Workshop on Computers in Power Electronics and the 1989 Power Electronics Specialists Conference. By this time, microprocessor control might be said to have achieved significant acceptance and application in relatively low bandwidth applications, for example as outer loop controllers in motor drives and as supervisory or sequencing controllers in high-end computer systems with complicated power distribution architectures. Relatively high-bandwidth digital control of power supplies still seemed economically and technically challenging. I recall, for example, a particularly spirited rap session at the 1989 PESC that went on long past the scheduled close. It included several vigorously argued, polar opinions about the design merits and economic cost of a microprocessor-controlled power supply with a relatively expensive analog-to-digital converter with a 1 megaHertz sampling rate.

At the risk of making a trite observation, the last 10 to 15 years of improvements in microprocessors have opened up fabulously exciting possibilities for enhancing the performance, applicability, and economy of power electronic supplies and drives. Adaptive controllers, parameter estimation, and sophisticated control algorithms, while not new concepts in principle, have become much more economically reasonable to implement. Power supplies and drives do not have to serve simply as power transformers; it has become much easier to use the power supply controller to affect the overall performance and dynamics of servomechanical loads, discharge illumination, high-end central processing units, and other loads with high commercial and industrial relevance. This is a very exciting time to be designing power electronics.

I believe this excitement is reflected in the content of this special issue. I will let the content of the issue speak for itself. My editorial team reviewed 97 submissions to select the 23 papers that you hold in your hand. This was a difficult process, and many outstanding papers that we could not fit in the special issue will appear in the regular Transactions over the next few issues. It was a privilege and a heavy responsibility to select from our colleagues' submissions. I hope that you find the papers in this issue as exciting and interesting as we have.

I would like to acknowledge the Herculean efforts of my Associate Editors for the special issue (Professors Yasuaki Kuroe, Werner Leonhard, Antonello Monti, Romeo Ortega, Alex Stankovic, and Miguel Velez-Reyes), as well as our *ad hoc* Associate Editors (Professors Phil Krein and Jason Lai) for their timely assistance at critical times. Let me also thank our many reviewers for their skilled and good-natured help. I am very grateful to Professor V. Rajagopalan for his mentorship and the thoroughly professional example he created in the May 1997 Special Issue. Dr. Arthur Kelley will never be adequately thanked, I suspect, for his amazing efforts in automating and overseeing the operations of our TRANSACTIONS—thank you! Finally, let me acknowledge the astonishing organizational talent of my office assistant, Ms. Vivian Mizuno, for her essential help in making this special issue possible.

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Dr. Leeb is a member of the IEEE Power Electronics, Control Systems, Power Engineering, and Signal Processing Societies. He is a Fellow of M.I.T.'s Leader's for Manufacturing Program and a member of Tau Beta Pi and Eta Kappa Nu.