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FOREWORD

This IMA Volume in Mathematics and its Applications

DISCRETE EVENT SYSTEMS, MANUFACTURING SYSTEMS AND COMMUNICATION NETWORKS

is based on the proceedings of a workshop that was an integral part of the 1992–93 IMA program on "Control Theory." The study of discrete event dynamical systems (DEDS) has become rapidly popular among researchers in systems and control, in communication networks, in manufacturing, and in distributed computing. This development has created problems for researchers and potential "consumers" of the research. The first problem is the veritable Babel of languages, formalisms, and approaches, which makes it very difficult to determine the commonalities and distinctions among the competing schools of approaches. The second, related, problem arises from the different traditions, paradigms, values, and experience that scholars bring to their study of DEDS, depending on whether they come from control, communication, computer science, or mathematical logic. As a result, intellectual exchange among scholars becomes compromised by unexplicated assumptions.

The purpose of the Workshop was to promote exchange among scholars representing some of the major "schools" of thought in DEDS with the hope that (1) greater clarity will be achieved thereby, and (2) cross-fertilization will lead to more fruitful questions. We thank P.R. Kumar and P.P. Varaiya for organizing the workshop and editing the proceedings. We also take this opportunity to thank the National Science Foundation and the Army Research Office, whose financial support made the workshop possible.

Avner Friedman

Willard Miller, Jr.

PREFACE

This volume is the Proceedings of the Workshop on Discrete Event Systems, Manufacturing Systems, and Communication Networks held at IMA, May 10–14, 1993, as part of the year devoted to Control Theory and its Applications.

The areas of discrete event systems and queueing systems pose a number of challenging design, analysis and control problems. The Workshop covered topics in the following areas:

- Modeling, design and analysis of discrete event systems,
- Design of scheduling policies for manufacturing systems,
- Optimal designs for queueing systems,
- Analysis of queueing system models of manufacturing systems and communication networks.

The talks spanned the entire gamut from theory to practice. design of systems. The Workshop was notable for bringing together experts in fields that used to be quite separate, but which are now evolving closer together.

We would like to take this opportunity to extend our gratitude to the staff of IMA, Kathy Boyer, Paul Ewing, Joan Felton, Ceil Mcaree, John Pliam, Kathi Polley, Pam Rech, and Mary Saunders. We have fond memories of the extremely warm hospitality in a cool climate. We also thank Professors Avner Friedman and Willard Miller, Jr. for making the Year on Control Theory and its Applications possible, and this Workshop in particular. Their institute inspires all visitors. We thank Patricia V. Brick, Stephan J. Skogerboe, and Kaye Smith for the preparation of the manuscripts.

Finally, we gratefully acknowledge the support of the National Science Foundation and Army Research Office.

P.R. Kumar

P.P. Varaiya

CONTENTS