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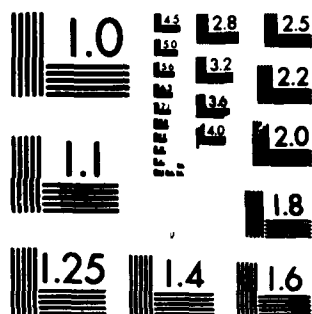
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Period of April 1, 1986 - March 31, 1987

**Coordinated Science Laboratory
University of Illinois at Urbana-Champaign
Urbana, Illinois 61801**

**Joint Services Electronics Program
(U.S. Army, U.S. Navy, and U.S. Air Force)
Contract N00014-84-C-0149**

**Principal Investigator: Dr. William Kenneth Jenkins
Program Director: Dr. Kenneth Davis**

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ABSTRACT

This document contains some of the reprints of articles, books, and book chapters which have been sponsored (at least in part) by the JSEP contract, N00014-84-C-0149, during the period April 1, 1986, through March 31, 1987.¹

Key Words and Phrases: None

This work was supported by the Joint Services Electronics Program, contract N00014-84-C-0149.

The views and conclusions contained in this document are those of the authors and should not be interpreted as representing the official policies either expressed or implied of the U. S. Government.

¹Some of the reprints are dated prior to April 1, 1986, since they were not received until after we submitted our last set of microfiche reprints. Therefore, they were not included in our booklet which reported reprints for the period April 1, 1985, through March 31, 1986.

INTRODUCTION

the Joint Services Electronics Program

This document includes some of the reprints of articles, books, and book chapters which have been sponsored (at least in part) by JSEP contract N00014-84-C-0149, for the time period April 1, 1986, through March 31, 1987. The reprints are organized by work units to be consistent with the most recent annual progress report and are listed by date, earliest to most recent.

(Note that there is no Unit 3 in the current contract.)

The reprints are:
(Signal processing electronics)
(Thermal electronics)
(Electromagnetics)
(Information systems)

LIST OF REPRINTS

The reprints in this document are organized by work units to be consistent with the most recent annual progress report. The list which follows identifies the reprints for the time period April 1, 1986, through March 31, 1987, under contract N00014-84-C-0149, University of Illinois at Urbana-Champaign. These reprints are reproduced on the microfiche included. An index to the proper microfiche follows the list of publications included in each unit.

SOLID-STATE ELECTRONICS

Unit 1 Crystal Growth from the Vapor Phase and Controlled Doping of Equilibrium and Metastable Semiconductor Alloys: Ion/Surface Interactions

Senior Faculty Investigator(s): J. E. Greene and S. I. Shah

- [1] S. A. Barnett, H. F. Winters, and J. E. Greene, "The interaction of Sb_4 molecular beams with Si(100) surfaces: Modulated-beam mass spectrometry and thermally stimulated desorption studies," *Surf. Sci.*, vol. 165, pp. 303-326, 1986. (JSEP/SRC)
- [2] J. Knall, J.-E. Sundgren, G. V. Hansson, and J. E. Greene, "In overlayers on clean Si(100)2x1: Surface structure, nucleation, and growth," *Surf. Sci.*, vol. 166, pp. 512-538, 1986. (JSEP/SRC)
- [3] A. Rockett, J. Knall, M. A. Hassan, J.-E. Sundgren, S. A. Barnett, and J. E. Greene, "Thermal and accelerated (≤ 200 eV) In doping of Si(100) layers during molecular beam epitaxy," *J. Vac. Sci. Technol. A*, vol. 4, pp. 900-901, 1986. (JSEP/SRC)
- [4] A. Rockett, J. Klem, S. A. Barnett, J. E. Greene, and H. Morkoc, "Si incorporation and segregation on $\text{Ga}_{1-x}\text{Al}_x\text{As}$ (100) films grown by molecular beam epitaxy," *J. Vac. Sci. Technol. B*, vol. 4, pp. 519-520, 1986. (JSEP)
- [5] A. Rockett, J. Klem, S. A. Barnett, J. E. Greene, and H. Morkoc, "Si incorporation probabilities and depth distributions in $\text{Ga}_{1-x}\text{Al}_x\text{As}$ films growth by molecular beam epitaxy," *J. Appl. Phys.*, vol. 59, pp. 2777-2783, Apr. 15, 1986. (JSEP)
- [6] T. C. McGlinn, T. N. Krabach, M. V. Klein, G. Bajor, J. E. Greene, B. Kramer, S. A. Barnett, A. Lastras, and S. Gorbatkin, "Raman scattering and optical-absorption studies of the metastable alloy system $\text{GaAs}_x\text{Sb}_{1-x}$," *Phys. Rev. B*, vol. 33, pp. 8396-8401, June 15, 1986. (JSEP)
- [7] J. E. Greene, T. Motooka, J.-E. Sundgren, A. Rockett, S. Gorbatkin, D. Lubben, and S. A. Barnett, "A review of the present understanding of the role of ion/surface interactions and photo-induced reactions during vapor phase crystal growth," *J. Cryst. Growth*, vol. 79, pp. 19-32, 1986. (JSEP/DOE/SRC)

- [8] S. A. Barnett, H. F. Winters, and J. E. Greene, "Influence of Ion bombardment on the interaction of Sb with the Si(100) surface," *Surf. Sci.*, vol. 181, pp. 596-603, Mar. 1987. (JSEP/SRC)

The preceding appear on microfiche #1, beginning on pages 1, 25, 52, 54, 56, 63, 69, and 83, respectively.

Unit 2 Studies of Transport Phenomena in Semiconductors

Senior Faculty Investigator(s): K. Hess and J. P. Leburton

- [1] S. L. Chuang and K. Hess, "Impact ionization across the conduction-band-edge discontinuity of quantum-well heterostructures," *J. Appl. Phys.*, vol. 59, no. 8, pp. 2885-2894, Apr. 15, 1986. (JSEP)
- [2] K. Hess, T. K. Higman, M. A. Emanuel, and J. J. Coleman, "New ultrafast switching mechanism in semiconductor heterostructures," *J. Appl. Phys.*, vol. 60, no. 10, pp. 3775-3777, Nov. 15, 1986. (JSEP/ONR/ARO)
- [3] J. Higman and K. Hess, "Comment on the use of the electron temperature concept for non-linear transport problems in semiconductor p - n junctions," *Solid-State Electronics*, vol. 29, no. 9, pp. 915-918, 1986. (JSEP)
- [4] I. C. Kizilyalli, K. Hess, G. J. Iafrate, and D. Smith, "Dynamics of electron transfer between two adjacent channels as calculated by an ensemble Monte Carlo method," *Proc. NUMOS Workshop*, Los Angeles, CA, Dec. 1986. (ARO/JSEP)
- [5] J. P. Leburton, "Anomalous current oscillations in semiconductor-insulator-semiconductor structures and related devices," *NATO Summer School*, Antwerp, Belgium, 1986. (JSEP)
- [6] J. P. Leburton, "Microscopic interpretation of the current oscillations in $\text{GaAs}^+ - \text{AlGaAs} - \text{GaAs}^-$ tunnel junctions," *Proc. 18th I.C.P.S.*, Stockholm, Sweden, 1986, pp. 1623-1626. (JSEP)
- [7] S. L. Chuang and K. Hess, "Tunneling-assisted impact ionization for a superlattice," *J. Appl. Phys.*, vol. 61, no. 4, pp. 1510-1515, Feb. 15, 1987. (NASA/JSEP)
- [8] J. P. Leburton, "Space charge generation by LO phonon ionization of neutral donors in $\text{GaAs} - \text{AlGaAs} - \text{GaAs}$ tunnel junctions," *Bull. Am. Phys. Soc.*, vol. 32, p. 886, Mar. 1987. (JSEP)
- [9] I. C. Kizilyalli, K. Hess, and G. J. Iafrate, "Electron transfer between adjacent channels simulated by ensemble Monte Carlo methods," *J. Appl. Phys.*, vol. 61, no. 6, pp. 2395-2398, Mar. 15, 1987. (ARO/JSEP)

Reprint [1] appears on microfiche #1, beginning on page 1. Reprints [2] - [9] appear on microfiche #2, beginning on pages 3, 6, 10, 16, 47, 51, 57, and 58, respectively.

Unit 4 Basic Studies of the Optical and Electronic Properties of Defects and Impurities in Compound Semiconductor Epitaxial Layers and Related Superlattices

Senior Faculty Investigator(s): G. E. Stillman

No JSEP-sponsored publications for this time period.

Unit 5 Heterostructure Electronic Devices by Metalorganic Chemical Vapor Deposition (MOCVD)

Senior Faculty Investigator(s): J. J. Coleman

- [1] T. K. Higman, M. A. Emanuel, J. J. Coleman, S. J. Jeng, and C. M. Wayman, "Structural analysis of Au-Ni-Ge and Au-Ag-Ge alloyed ohmic contacts on modulation-doped AlGaAs-GaAs heterostructures," *J. Appl. Phys.*, vol. 60, no. 2, pp. 677-680, July 15, 1986. (JSEP/NSF)
- [2] P. A. Martin, K. Hess, M. A. Emanuel, and J. J. Coleman, "Deep level transient spectroscopy studies of defects in GaAs AlGaAs superlattices," *J. Appl. Phys.*, vol. 60, no. 8, pp. 2882-2885, Oct. 15, 1986. (JSEP/ONR)
- [3] K. Hess, T. K. Higman, M. A. Emanuel, and J. J. Coleman, "New ultrafast switching mechanism in semiconductor heterostructures," *J. Appl. Phys.*, vol. 60, p. 3755, 1986. (JSEP/ONR/ARO) (See microfiche #2, page 3, for reprint.)

Reprints [1] and [2] appear on microfiche #2, beginning on pages 62 and 66, respectively. Reprint [3] appears on microfiche #2, beginning on page 3.

Unit 6 High-Speed and Other Optical Properties of MBE-Grown Structures

Senior Faculty Investigator(s): M. V. Klein and H. Morkoc

- [1] A. Rockett, J. Klem, S. A. Barnett, J. E. Greene, and H. Morkoc, "Si incorporation probabilities and depth distributions in $\text{Ga}_{1-x}\text{Al}_x\text{As}$ films grown by molecular-beam epitaxy," *J. Appl. Phys.*, vol. 59, pp. 2777-2783, Apr. 15, 1986. (JSEP) (See microfiche #1, page 56, for reprint.)
- [2] D. Y. Oberli, D. R. Wake, M. V. Klein, J. Klem, and H. Morkoc, "Transient Raman scattering in multiple quantum well structures," in *Ultrafast Phenomena V*, G. R. Fleming and A. E. Siegman, Eds. Berlin: Springer, 1986, pp. 207-209. (JSEP/AFOSR/NSF)
- [3] T. C. McGlinn, T. N. Krabach, M. V. Klein, G. Bajor, J. E. Greene, B. Kramer, S. A. Barnett, A. Lastras, and S. Gorbatskin, "Raman scattering and optical-absorption studies of the metastable alloy system $\text{GaAs}_x\text{Sb}_{1-x}$," *Phys. Rev. B*, vol. B33, pp. 8396-8401, 1986. (JSEP/NSF) (See microfiche #1, page 63, for reprint.)

- [4] P. J. Pearsall, J. Klem, T. Henderson, C. K. Peng, H. Morkoc, D. C. Reynolds, and C. W. Litton, "Optical reflectance in GaAs/AlGaAs quantum wells," *J. Appl. Phys.*, vol. 59, no. 11, pp. 3847-3850, June 1986. (JSEP)
- [5] I. Sela, R. Beserman, and H. Morkoc, "Defects created in ion-implanted $\text{Ga}_{1-x}\text{Al}_x\text{As}$ alloys," *J. Appl. Phys.*, vol. 60, no. 7, pp. 2316-2320, Oct. 1, 1986. (JSEP)
- [6] U. K. Reddy, G. Ji, R. Houdré, H. Unlu, D. Huang, and H. Morkoc, "Study of GaAs/AlGaAs and InGaAs/GaAs multiple quantum wells grown on non-polar substrates by photoreflectance," *Proc. of SPIE Conf.*, Mar. 1987, Florida, USA. (NASA/JSEP/AFOSR)
- [7] D. Huang, R. Houdré, Y. C. Chang, and H. Morkoc, "Excitonic absorption in modulation-doped GaAs quantum wells," Abstract, Meeting of the American Physical Society (APS), Mar. 1987, New York, NY. (JSEP/AFOSR)

Reprints [1] and [3] appear on microfiche #1, beginning on pages 56 and 63, respectively. Reprints [2], [4], [5], [6], and [7] appear on microfiche #2, beginning on pages 70, 74, 78, 83, and 88, respectively.

Unit 7 Computer-Aided Design of High-Performance Integrated Circuits with Ultra-Small Features

Senior Faculty Investigator(s): I. N. Hajj, S. M. Kang, and V. B. Rao

- [1] R. D. Freedman, S. M. Kang, C. G. Lin-Hendel, and M. L. Newby, "Automated Extraction of SPICE circuit models from symbolic gate matrix layout with pruning," in *ACM/IEEE Design Automation Conf. Proc.*, Las Vegas, NV, June 1986, pp. 418-424. (JSEP/AT&T)
- [2] K. R. Cioffi and T. N. Trick, "A DC circuit model for modulation doped FETs," in *IASTED Conf. Proc. Comput.-Aided Design & Applications*, June 6-7, 1986, 1986. (JSEP)
- [3] S. M. Kang and H. Y. Chen, "Modeling of propagation delay for a class of domino CMOS circuits," in *Proc. 29th Midwest Symp. on Circuits and Syst.*, Lincoln, NB, Aug. 1986, pp. 907-910. (JSEP/SRC)
- [4] S. M. Kang, "Accurate simulation of power dissipation in VLSI circuits," *IEEE J. on Solid-State Circuits*, vol. SC-21, no.5, pp. 889-891, Oct. 1986. (JSEP/SRC)
- [5] K. R. Cioffi, A. Yang, T. N. Trick, and S. M. Kang, "A charge-conserved circuit simulation model for MODFETs," *Workshop on Numerical Modeling of Processes and Devices of Integrated Circuits*, Palo Alto, CA, Nov. 1986. (JSEP)
- [6] S-L. Su, V. B. Rao, and T. N. Trick, "A simple and accurate node reduction technique for interconnect modeling in circuit extraction," *IEEE Int. Conf. Comput.-Aided Design*, Santa Clara, CA, Nov. 1986. (JSEP)
- [7] T. K. Yu, S. M. Kang, I. N. Hajj, and T. N. Trick, "Statistical modeling of VLSI circuit performances," *Digest of Technical Papers, IEEE Int. Conf. on Computer-Aided Design*, Santa Clara, CA, pp. 224-227, Nov. 1986. (JSEP/SRC)

- [8] V. B. Rao and T. N. Trick, "Network partitioning and ordering for MOS VLSI circuits." *IEEE Trans. Comput.-Aided Design of Integrated Circuits and Syst.*, vol. CAD-6, No. 1, Jan. 1987. (JSEP/IBM)

Reprints [1] and [2] appear on microfiche #2, beginning on pages 89 and 95, respectively. Reprints [3] - [8] appear on microfiche #3, beginning on pages 1, 5, 8, 11, 15, and 19, respectively.

QUANTUM ELECTRONICS

Unit 8 Collective Electronic Transport in Quasi One-Dimensional Systems

Senior Faculty Investigator(s): J. R. Tucker and J. W. Lyding

- [1] R. E. Thorne, J. R. Tucker, J. Bardeen, S. E. Brown, and G. Grüner, "Phase-locking in charge density wave transport." *Phys. Rev. B*, vol. B33, no. 10, pp. 7342-7345, May 15, 1986. (JSEP)
- [2] R. E. Thorne, W. G. Lyons, J. H. Miller, Jr., J. W. Lyding, and J. R. Tucker, "Current oscillations in charge density wave transport." *Phys. Rev. B*, vol. B34, no. 8, pp. 5988-5991, Oct. 15, 1986. (JSEP/NSF)
- [3] J. R. Tucker, "Dynamics of sliding charge density waves." *Physica*, vol. 143B, pp. 19-23, 1986. (JSEP/NSF)
- [4] J. R. Tucker, W. G. Lyons, J. H. Miller, Jr., R. E. Thorne, and J. W. Lyding, "Origin of the dielectric relaxation frequency in sliding charge density wave systems." *Phys. Rev.*, vol. B34, no. 12, pp. 9038-9041, Dec. 15, 1986. (JSEP/NSF)
- [5] R. E. Thorne, J. R. Tucker, and J. Bardeen, "Experiment versus the classical deformable model of charge density waves." *Phys. Rev. Lett.*, vol. 58, no. 8, pp. 828-831, Feb. 23, 1987. (JSEP/NSF)

The above appear on microfiche #3, beginning on pages 36, 40, 44, 49, and 53, respectively.

Unit 9 An Investigation of Plasma and Chemistry Processes in Cylindrical Magnetron Plasma Discharges

Senior Faculty Investigator(s): J. A. Thornton

- [1] A. S. Penfold, G. Y. Yeom, and J. A. Thornton, "A new method for generating uniform magnetic fields in form suitable for cylindrical magnetron sputtering sources." in preparation. (JSEP)
- [2] G. Y. Yeom and J. A. Thornton, "Current-voltage characteristics for DC and RF driven cylindrical magnetron discharge sources." in preparation. (JSEP)

- [3] J. A. Thornton and G. Y. Yeom, "An examination of the current-voltage behavior of magnetron and planar diode discharge sources used for materials processing," in preparation. (JSEP)
- [4] G. Y. Yeom and J. A. Thornton, "The formation of DC bias in RF driven cylindrical magnetron discharge sources," in preparation. (JSEP)
- [5] J. A. Thornton, "RF driven cylindrical magnetron discharge sources," Keynote Address to be presented at 1987 Annual Symposium of the upstate New York Chapter of the American Vacuum Society, Rochester, New York, June 17-19, 1987 (invited). (JSEP)
- [6] J. A. Thornton and G. Y. Yeom, "Voltage division versus area ratio considerations for RF driven plasma discharges," in preparation. (JSEP)

Unit 10 Excited State Chemistry in Gases

Senior Faculty Investigator(s): J. T. Verdeyen and J. G. Eden

- [1] J. G. Eden, K. K. King, E. A. P. Cheng, S. A. Piette, and D. B. Geohegan, "Laser photochemical vapor deposition," *Proc. SPIE*, vol. 710, pp. 43-45, Sept. 1986. (JSEP)
- [2] K. J. Nordheden and J. T. Verdeyen, "The effect of Oxygen on the etch rate of NF_3 discharges," *J. Electrochem. Soc.*, vol. 133, no. 10, pp. 2168-2171, Oct. 1986. (JSEP)
- [3] L. J. Overzet, J. T. Verdeyen, R. M. Roth, and F. F. Carasco, "The effects of modulation on an RF discharge in Silane and on the deposited $\alpha\text{-Si:H}$," *MRS Symposium K*, Anaheim, CA (to be published). (JSEP) (Preprint appears on microfiche.)

The above appear on microfiche #3, beginning on pages 57, 60, and 64, respectively.

ELECTROMAGNETICS

Unit 11 Monolithic Millimeter-Wave Integrated Circuits with Microstrip Antennas

Senior Faculty Investigator(s): S. L. Chuang and Y. T. Lo

- [1] S. L. Chuang and B. Do, "Electron states in two coupled quantum wells—A strong coupling of modes approach," submitted for publication to *J. Appl. Phys.* (JSEP/Air Force)
- [2] L. Tsang and S. L. Chuang, "Improved coupled-mode theory for reciprocal anisotropic waveguides," submitted for publication to *IEEE J. Lightwave Technol.* (JSEP/NASA/NSF)
- [3] L. Tsang and S. L. Chuang, "Strongly coupled-mode theory for reciprocal anisotropic multiwaveguide system," submitted for publication to *J. Lightwave Technol.* (JSEP)

Unit 12 Investigation of Radar Scattering Characteristics of Controlled Surface Shapes with Application to Low Observable Targets

Senior Faculty Investigator(s): R. Mittra

- [1] R. Mittra. "Some recent developments on iterative techniques for solving electromagnetic scattering problems." *Proc. 1986 URSI Inter. Symp. on Electromagnetic Theory*. pp. 370-373. Budapest, Hungary, Aug. 1986. (JSEP/ONR)
- [2] Z. Pantic and R. Mittra. "Quasi-TEM analysis of microwave transmission lines by the finite-element method." *IEEE Trans. Microwave Theory Tech.*, vol. MTT-34, no. 11, pp. 1096-1103. Nov. 1986. (JSEP/ARO/ONR)
- [3] A. F. Peterson and R. Mittra. "Convergence of the conjugate gradient method when applied to matrix equations representing electromagnetic scattering problems." *IEEE Trans. Antennas Propagat.*, vol. AP-34, no. 12, pp. 1447-1454, Dec. 1986. (JSEP/ONR)

The above appear on microfiche #3, beginning on pages 70, 74, and 82, respectively.

INFORMATION SYSTEMS

Unit 13 High-Performance Testable Electronic Systems

Senior Faculty Investigator(s): J. A. Abraham and J. H. Patel

- [1] P. Banerjee and J. A. Abraham. "Bounds on algorithm-based fault tolerance in multiple processor systems." *IEEE Trans. Comp.*, vol. C-35, no. 4, pp. 296-306, Apr. 1986. (JSEP)
- [2] J. A. Abraham and W. K. Fuchs. "Fault and error models for VLSI" (invited paper). *Proc. IEEE*, vol. 74, no. 5, pp. 639-654, May 1986. (SRC/JSEP)
- [3] T. C.-K. Chou and J. A. Abraham. "Distributed control of computer systems." *IEEE Trans. Comp.*, vol. C-35, no. 6, pp. 564-567, June 1986. (JSEP/VHSIC)
- [4] M. Malkawi and J. H. Patel. "Performance measurement of paging behavior in multiprogramming systems." *Proc. 13th Int. Symp. on Comp. Architecture*, Tokyo, Japan, June 1986, pp. 111-118. (JSEP)
- [5] P. Banerjee and J. A. Abraham. "Concurrent fault diagnosis in multiple processor systems." *Proc. 16th Int. Symp. on Fault-Tolerant Comp.*, Vienna, Austria, July 1986, pp. 298-303. (JSEP/SRC)
- [6] P. Banerjee and J. A. Abraham. "Graph-theoretic bounds on on-line checks in multiple processor systems." *Proc. National Comp. Conf.*, New Orleans, LA, Dec. 1986, pp. 283-296. (JSEP)

- [7] W. K. Fuchs, K.-L. Wu, and J. A. Abraham. "Comparison and diagnosis of large replicated files." *IEEE Trans. Software Eng.*, vol. SE-13, no. 1, pp. 15-22, Jan. 1987. (MCC/JSEP)

Reprint [1] appears on microfiche #3, beginning on page 90. Reprints [2] - [7] appear on microfiche #4, beginning on pages 3, 19, 23, 31, 37, and 50, respectively.

Unit 14 New Directions in Fault-Tolerant Computing

Senior Faculty Investigator(s): P. Banerjee, K. Fuchs, and R. Iyer

- [1] P. Banerjee and J. A. Abraham. "Bounds on algorithm-based fault tolerance in multiple processor systems." *IEEE Trans. Comput.*, vol. C-35, no. 4, Apr. 1986, pp. 296-306. (JSEP) (See microfiche #3, page 90, for reprint.)
- [2] P. Banerjee and J. A. Abraham. "Graph-theoretic bounds on on-line checks in multiple processor systems," *AFIPS Proc. National Comput. Conf.*, Las Vegas, Nevada, June 1986. (JSEP) (See microfiche #4, page 37, for reprint.)
- [3] R. K. Iyer and D. J. Rossetti. "A measurement-based model for workload dependence of CPU errors." *IEEE Trans. Comput.*, vol. C-35, no. 6, pp. 511-519, June 1986. (ARO/DoE/NSF/JSEP)
- [4] P. Banerjee and J. A. Abraham. "Concurrent fault diagnosis in multiple processor systems," *Proc. 16th Fault Tolerant Computing Symp.*, Vienna, Austria, July 1986. (JSEP/SRC) (See microfiche #4, page 31, for reprint.)
- [5] R. Chillarege and R. K. Iyer. "Fault latency in the memory—An experimental study on Vax 11/780," in *Proc. 16th Int. Symp. on Fault-Tolerant Comput. Syst.*, Vienna, Austria, July 1-4, 1986, pp. 258-263. (JSEP/NASA)
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Unit 15 Efficient Computation Techniques

Senior Faculty Investigator(s): F. P. Preparata, D. J. Brown, M. C. Loui, and V. L. Ramachandran

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Unit 16 High-Resolution Sensor Array Processing

Senior Faculty Investigator(s): T. S. Huang, W. K. Jenkins, and D. C. Munson

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Unit 17 Parallel VLSI Structures for Sensor Array Processing

Senior Faculty Investigator(s): K. S. Arun, W. K. Jenkins, and B. W. Wah

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Unit 18 Adaptive Algorithms for Identification, Filtering, Control, and Signal Processing

Senior Faculty Investigator(s): P. V. Kokotovic, P. R. Kumar, J. V. Medanic, and W. R. Perkins

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Unit 19 Distributed and Decentralized Systems

Senior Faculty Investigator(s): T. Basar, J. B. Cruz, Jr., and P. R. Kumar

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Unit 20 Robust Feedback Control of Nonlinear Systems

Senior Faculty Investigator(s): J. W. Grizzle, P. V. Kokotovic, and K. Poolla

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Unit 21 Multiple-Terminal Digital Communication Systems

Senior Faculty Investigator(s): E. Arıkan, B. Hajek, M. B. Pursley, and D. V. Sarwate

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Unit 22 Statistical Signal Processing in Communication Systems

Senior Faculty Investigator(s): H. V. Poor and A. R. Barron

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