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JOINT SERVICES ELECTRONICS PROGRAM

OVERVIEW

This final report on the Joint Services Electronics Program, Contract F49620-91-C-0028, covers the three year period 4/1/91 through 3/31/94.

During this period thirteen research projects were supported under this program in the areas of Solid State Electronics, Quantum Electronics, and Information Electronics. During this period, Prof. S. R. Forrest left the program and was replaced by Prof. R. Nottenburg The three year period has been a very productive one from the scientific results achieved and the transfer of the results to industry and government laboratories. The results are documented in the 93 scientific publications that have resulted from this research. Perhaps the best mode of technology transfer is through students who graduate and carry the technology with them to other laboratories and industry. Thirty one students who were supported by JSEP received degrees during this period.

JOINT SERVICES ELECTRONICS PROGRAM

RESEARCH UNITS

Solid State Electronics

SS1-1 Cross-Talk In Optical Receiver Arrays, *R. Nottenburg*

SS1-2 InGaAs /InP Strained Layer Materials and Devices, *P. D. Dapkus*

SS1-3 Kinetics of Growth of Highly Strained Pseudomorphic Structures on Pre-patterned Substrates and Applications to FETS and RTD"s, *A. Madhukar*

Optical and Infrared Electronics

OE1-1 Beam Shaping by Nonlinear Optical Mixing, *J. Feinberg*

OE1-2 Nonlinear Optics and Carrier Transport, *E. Garmire*

OE1-3 Quantum Well Waveguides Studies, *W. H. Steier*

OE1-4 Advanced Spatial Light Modulation Concepts for Optical Information Processing and Computing Applications *A. R. Tanguay, Jr.*

OE1-5 Plasma Based High Power Microwave and Millimeter Wave Sources, *M. Gundersen*

OE1-6 Smart Pixel Optoelectronic Devices for Optical Computing, *A. A. Sawchuk*

Information Electronics

IE1-1 Adaptive Channel/Code Matching, *R. A. Scholtz*

IE1-2 Blind Equalization Techniques, *C. L. Weber*

IE1-3 Research in Fiber-Optic Networks, *V. O. K. Li*

IE1-4 Inference on Wideband Random Communication Signals: Detection/Classification/Parameter Estimation, *A. Polydoros*

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JOINT SERVICES ELECTRONIC PROGRAM

PUBLICATIONS LIST

1. "A wavelength-convertible optical network," Lee, K. C. and Li, V. O. K., IEEE/OSA Journal of Lightwave Technology, Volume 11, No. 5, May 1993, pp. 962--970.

2. "Distributed database systems in high speed wide-area networks," Banerjee, S., Li, V. O. K., and Wang, C P., IEEE Journal on Selected Areas in Comm., Volume 11, No. 4, May 1993, pp. 617 - 630.

3. "Performance Analysis of the Send-on-Demand: A Distributed Database Concurrency Control Protocol for High Speed Networks," Banerjee, S., Li, V. O. K., and Wang, C P. , accepted for publication in Computer Communications.

4. "An approximate analysis of the performance of deflection routing in regular networks," Khan, I. and Li, V. O. K., accepted for publication in IEEE Journal on Selected Areas in Comm.

5. "One-shot semi-join execution strategies for processing distributed queries," Wang, C P., Li, V. O. K. and Chen, A. L. P., accepted for publication in Computer Systems Science and Engineering.

6. "A quorum-based termination protocol for distributed database systems," Huang, C. L. and Li, V. O. K., accepted for publication in Computer Systems Science and Engineering.

8. "Minimum-weight vertex cover problem for two-class resource connection graphs," Chen, J. S. J. and Li, V. O. K., accepted for publication in Information Sciences.

9. "A traffic control mechanism for ATM networks," Khan, I. and Li, V. O. K., Proc. IEEE GLOBECOM, Houston, Texas, Nov. 1993.

10. "Traffic shaping in ATM local area networks," Khan, I. and Li, V. O. K., Proc. IEEE Computer Communications Workshop, Del Mar, California, Oct. 1993.

11. "Performance analysis of fiber-optic PPM CDMA packet networks," Hsu, C S. and Li, V. O. K., Proc. ISCA International Conference on Computer Communications and Networks, San Diego, California, June 1993.

12. "Performance analysis at an ATM statistical multiplexer serving a superposition of bursty traffic sources," Khan, I. and Li, V. O. K., Proc. ISCA International Conference on Computer Communications and Networks, San Diego, California, June 1993.

13. "Wavelength-convertible optical networks," Lee, K. C. and Li, V. O. K., Proc. IEEE INFOCOM, San Francisco, California, April 1993.

14. "Multilevel Priority Scheme for Fiber-Optic Code-Division Multiple Access (CDMA) Packet Networks," Hsu, C S. and Li, V. O. K., Proc. IEEE INFOCOM, San Francisco, California, April 1993.

15. "Realization of high performance doped channel MISFETs in highly strained AlGaAs/InGaAs/AlGaAs base quantum well", K. Kaviani, K. Hu, Q. Xie, A. Madhukar, Jour. of Crystal Growth, 127, 68(1993).

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19. "Optimization of the Lens-Based Perfect Shuffle," A. S. Miller and A. A. Sawchuk, accpted for publication in Applied Optics.

20. "Input to Output Relations in the Lens-Based Optical Shuffle," A. S. Miller and A. A. Sawchuk, accepted for publication in Applied Optics.

21. "Smart Pixel Optical Computing Architectures," A. A. Sawchuk, L. Cheng, S. R. Forrest and P. R. Prucnal, in Optical Computing Technical Digest 1993, Optical Society of America, Washington, DC, 1993, vol. 7, pp. 214-217, (invited paper).

22. "Adaptive Channel/Code Matching," Narciso L. Tan, Ph.D. Dissertation, University of Southern California, October 1993.

23. "A forward-only procedure for estimating hidden Markov models," N. L. Tan, R. A. Scholtz, and L. R. Welch, submitted to the IEEE Trans. on Signal Processing.

24. "Correcting a specified set of likely error patterns," N. L. Tan, R. A. Scholtz, and L. R. Welch, accepted for publication in the IEEE Trans. on Information Theory.

25. "Correcting a specified set of likely error patterns," N. L. Tan, R. A. Scholtz, and L. R. Welch, submitted to the 1994 International Symposium on Information Theory, Trondheim, Norway, June 27-July 1, 1994.

26. "Gain saturation properties of a semiconductor gain medium with tensile and compressive strain quantum wells", S. Dubovitsky, W. H. Steier, A. Mathur, P. D. Dapkus, accepted for publication in J. Quant. Electr.

27. "AlGaAs waveguide optically controlled directional coupler latch", R. T. Sahara, W. H. Steier, S. G. Hummel, P. D. Dapkus, J. Lightwave Tech., 11, October, 1993.

28. "Gain saturation properties of a polarization insensitive semiconductor amplifier implemented with tensile and compressive strain quantum wells", S. Dubovitsky, A. Mathur, W. H. Steier, P. D. Dapkus, accepted for publication in Photonic Technology Letters.

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83. "An Optimal Approach to Blind Channel Characterization and Data Detection,"M. Ghosh and C. Weber, IEEE Transactions on Communications.

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DEGREES AWARDED TO STUDENTS SUPPORTED BY JSEP

KianKavian	PhD	1993
Li Chen	PhD	1993
Wei Chen	PhD	1994
Ravindra Kapre	PhD	1991
Vince Dominic	PhD	1993
Roger Chudney	PhD	1993
David Bacher	PhD	1993
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