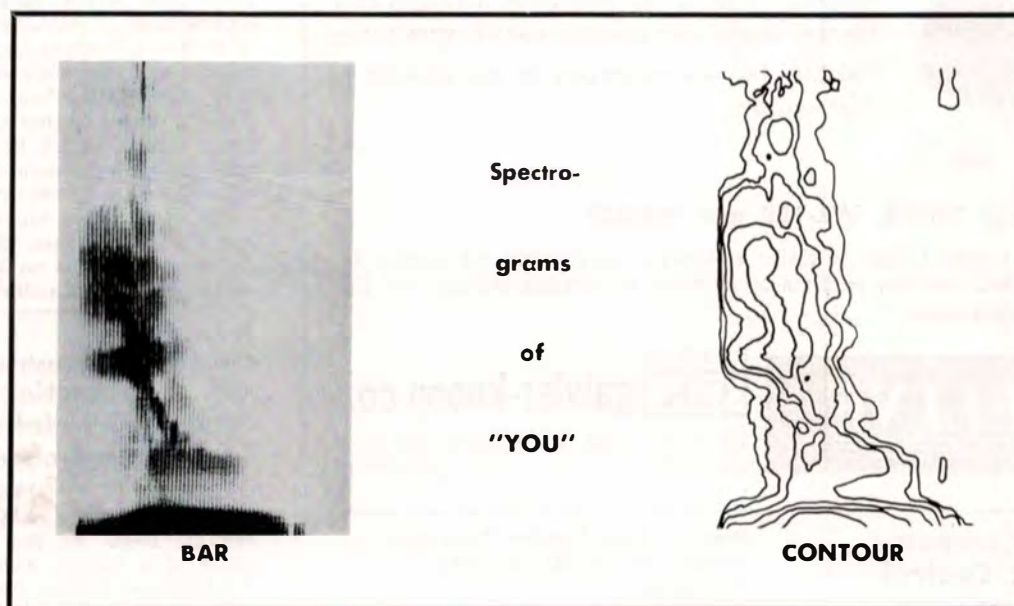


NORTH JERSEY SECTION AND COMTECH GROUP

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Voiceprint Identification



Lawrence Kersta

President, Voiceprint Laboratories, Inc.



The IEEE

Newsletter

The Magazine of the North Jersey Section

8:15 P.M., November 28 at Arnold Auditorium

**Bell Telephone Labs.
Murray Hill, N. J.**

Also, premeeting dinner
(See Page 4)

Volume 14 / Number 3 NOVEMBER, 1967

NEW

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North Jersey Computer and Automatic Control Digital Filtering

Presented by:

J. F. Kaiser (Part 1) and
H. D. Helms (Part 2)
Bell Telephone Laboratories, Inc.
Murray Hill, New Jersey 07971
and Whippany, New Jersey 07981

Date and Time:

Thursday, November 16, 1967
8:00 P.M.

Place:

Arnold Auditorium
Bell Telephone Laboratories
Murray Hill, New Jersey

Pre-Meeting Dinner:

Wally's Tavern on the Hill
(6:00 P.M.) Watchung, New Jersey

Part 1: The Digital Filter:

Why, How, When

Abstract:

The filtering of signals and simulation of linear continuous filter networks on a digital computer require the use of sampled-data filters or their difference equation equivalents. The extensive literature on continuous filters and network theory provides a broad base from which digital filter designs may be begun. Several methods for designing such digital filters from frequency domain specifications are developed. Both recursive and nonrecursive digital filter types are considered. Factors affecting the choice of a filter design procedure are discussed.

Part 2: Fast Fourier Transform as Applied to Digital Filtering

Abstract:

The Fast Fourier Transform (FFT) will be defined and derived. The application of the FFT to calculating convolutions will be established. Parameters will be chosen to minimize the number of computations required for calculating convolutions with the aid of the FFT. Methods of filtering signals by using a digital computer to implement this technique will be discussed. An example of the time savings occurring in processing a sample of speech through chirp filters will be presented.

Biographical Notes:

James F. Kaiser received the EE degree from the University of Cincinnati in 1952 and the SM and ScD degrees in electrical engineering from M.I.T. in 1954 and 1959, respectively. At M.I.T. he was associated with the Electronic Systems Laboratory and later became an Assistant Professor in Electrical Engineering.

He joined Bell Telephone Laboratories in 1959 and first engaged in speed processing studies. Recently he has been concerned with problems of data processing, system simulation, digital filters, and computer graphics as a member of technical staff in the Communication Principles Research Laboratory.

Dr. Kaiser is a member of the Committee on Computer Sciences in Electrical Engineering of the Commission on Engineering Education and co-author of two books in control systems and applications of digital computers. He is a member

of the Association for Computing Machinery, the Society for Industrial and Applied Mathematics, the American Mathematical Society, and the Simulations Council. He is also a member of Sigma Xi, Tau Beta Pi, and Eta Kappa Nu.

Howard D. Helms received the B.S. degree in electrical engineering and physics and the Ph.D. degree in electrical engineering from Princeton in 1956 and 1961, respectively.

From 1959 through 1960 he worked on sampling expansions in the Acoustics and Visual Research Center, Bell Telephone Laboratories, Inc., Murray Hill, New Jersey. After transferring to Whippany, New Jersey, in 1961, he served as a consultant in statistics and participated in studies of computer-controlled ballistic missile and telephone switching systems. Since 1965, he has been Supervisor of the Nike-X Data Gathering Analysis Program Group, which has been concerned with designing tracking equations and simulating radar receivers.

Dr. Helms is a member of Sigma Xi and Phi Beta Kappa. He is Chairman of Subcommittee 30.4 on Measurement Concepts of G-AE Standards Committee 30.

New York

Power and Industrial Division

Inspection Trip

South Philadelphia Works

Westinghouse Electric
Corporation

This trip will be on Thursday, November 16, 1967. At the Steam Divisions, parts of a million kilowatt turbine for Consolidated Edison Co., parts of a 620 MW double reheat turbine for Public Service Electric & Gas Co., and parts of other large tandem turbines and various processes of manufacturing will be seen. Also, gas turbines either on the test pit or in the process of assembly, will be seen. In the Heat Transfer Department, a nuclear steam generator will be seen. The trip will start from Pennsylvania R.R. Station, N. Y. at 8:30 A.M. Those who find it convenient may board train (Number 207) at Newark, N. J. Return to New York will be at 6:30 P.M.

Arrangements are being made for a refreshment car. Luncheon as guests of the Westinghouse Electric Corp. Cost of ticket will be \$6.00. Application for tickets must be in the mail by November 10, 1967. Trip limited to 50 people.

S. J. DOLEGA

Consolidated Edison Co.
Hell Gate Station
East 134th Street & Locust Avenue
New York, N. Y. 10454

Enclosed please find my check or money order in the amount of \$6.00 for ticket for the Westinghouse Electric Corporation trip.

Name _____

Address _____

Company _____

Make checks payable to: "Power and Industrial Group, N. Y. Section, IEEE.

Please Include Self-Addressed
Stamped Envelope

Published monthly except July & August by the North Jersey Section of the Institute of Electrical & Electronics Engineers, Inc. Office of Publication: 9 Little John Road, Morris Plains, N. J.

Volume 14 November, 1967 No. 3

Deadline for all material is the 25th of the second month preceding the month of publication.

All communications concerning The Newsletter, including editorial matter, advertising, and mailing, should be addressed to:

THE NEWSLETTER
c/o Staff Associates
P.O. Box 275 — Morris Plains, N. J.
Telephone: 398-5524

Subscription: 75¢ per year through dues for members; \$1.50 per year for non-members. Second Class Postage Paid at Morris Plains, N. J.

ABOUT ADDRESS CHANGES

REPORT ALL ADDRESS CHANGES TO:
INSTITUTE OF ELECTRICAL AND ELECTRONICS
ENGINEERS INC., 345 EAST 47th STREET
NEW YORK, N. Y. 10017

It is not necessary to inform the North Jersey Section when you change your mailing address. The NEWSLETTER and other section mailings use a list provided by IEEE's national headquarters in New York. This means the Section has no need to maintain a mailing list or addressing plates. Section membership records are changed when Headquarters notifies us.

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Executive Committee Meetings
at Verona Public Library
First Wednesday of Month
7:30 P.M.

1967	
November 1	December 6
1968	
January 3	February 7
March 6	April 3
May 1	June 5

All IEEE Members Welcome

Princeton Magnetics Advantages and Economics of Plated Wire Memories

Mr. George Fedde
Mr. James McCallister
Data Processing Division Research
Univac
Blue Bell, Pennsylvania
Wednesday, November 29, 1967
8:00 P.M.
Murray Hall — Room 120
Rutgers University
New Brunswick, New Jersey
Reservations:
Mrs. Helen Yefko
Department of Electrical Engineering
Rutgers University
247-1766, Extension 6325

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VIBRATION ANALYSIS

CALENDAR

	Page
Thursday, November 2	
STUDENT BRANCH — FAIRLEIGH DICKINSON	6
IBM Film — Small Miracle.	
Thursday-Friday, November 2-3	
NORTH JERSEY — RELIABILITY	5
1967 Fall Product Assurance Conference and Technical Exhibit, Waldorf-Astoria Hotel, New York City.	
Tuesday, November 14	
NORTH JERSEY — POWER	4
7:30 P.M. — "Power System Stability" by C. C. Young of General Electric Co., Schenectady, at Jersey Power & Light Company, Punchbowl Road, Morristown.	
NEW YORK — POWER AND INDUSTRIAL DIVISION	5
6:30 P.M. — Discussion on Industrial and Commercial Power Systems at Consolidated Edison Building, Four Irving Place, N. Y. C.	
STUDENT BRANCH — FAIRLEIGH DICKINSON	6
Field Trip — Fort Monmouth, New Jersey.	
STUDENT BRANCH — NCE DAY	6
Speaker — Sales and Marketing in Power Semiconductor Industry.	
Thursday, November 16	
NORTH JERSEY — COMPUTER	2
NORTH JERSEY — AUTOMATIC CONTROL	
8:00 P.M. — "Digital Filtering" by J. F. Kaiser and H. D. Helms, Bell Telephone Laboratories, at Arnold Auditorium, Murray Hill.	
JOINT METROPOLITAN — ELECTRON DEVICES	7
8:00 P.M. — "Large Scale Integration Using MOS Technology" by Dr. Frank Wanlass of General Instrument Corp. at International Telephone and Telegraph Laboratories, Nutley.	
NEW YORK — P. and I. DIVISION	2
8:30 A.M. — Inspection Trip to South Philadelphia Works of Westinghouse Electric Corp.	
Tuesday, November 21	
NEW YORK — COMPUTER	4
7:30 P.M. — "New Programming Techniques for Engineers" by Prof. Melvin Klerer, of New York University, at Wienerwald restaurant, 884 Third Ave., New York City.	
NEW YORK — P. and I. DIVISION	5
6:30 P.M. — Discussion on Insulated Conductors at Union Carbide Building, 270 Park Ave., New York City.	
Tuesday, November 28	
NORTH JERSEY SECTION AND COMTECH	4
8:15 P.M. — "Voiceprint Identification" by Lawrence G. Kersta, of Voiceprint Laboratories, at Arnold Auditorium, Bell Telephone Laboratories, Murray Hill.	
STUDENT BRANCH — NCE DAY	6
Speaker — Computer Electronics in Space Flight.	
Wednesday, November 29	
NEW YORK — P. and I. DIVISION	5
6:30 P.M. — Discussion on Transmission and Distribution at Union Carbide Building, 270 Park Ave., New York City.	
PRINCETON — MAGNETICS	3
8:00 P.M. — "Plated Wire Memories"	
Tuesday, December 5	
NEW YORK — P. and I. DIVISION	5
6:30 P.M. — Discussion on Power Generation at Consolidated Edison Building, Four Irving Place, New York City.	

North Jersey Section and ComTech Voiceprint Identification

Date:
Tuesday, November 28, 1967

Time:
6:30 P.M. — Dinner
Wally's, Watchung, New Jersey
8:15 P.M. — Meeting

Place:
Arnold Auditorium
Bell Telephone Laboratories, Inc.
Murray Hill, New Jersey

Speaker:
Mr. L. G. Kersta, President
Voiceprint Laboratories, Inc.
Somerville, New Jersey

A systematic method will be described by which people can be identified from a spectrographic examination of their spoken words. Voiceprint Identification is achieved by visually matching the spectrogram patterns for selected words from an unknown speaker's utterance, with a filed population of reference prints for which identification has been previously established. In the qualifying experiment conducted with a controlled population, the identification success for trained panelists exceeded 99%.

Various applications in the medical field will also be discussed.

An experimental study of automated classification means which resulted in the design of a novel binary coded system will also be described.

Lawrence G. Kersta, a retired member of the Acoustics and speech Research Department of Bell Telephone Laboratories, Incorporated, is now President of Voiceprint Laboratories, Incorporated, Somerville, New Jersey.

Mr. Kersta joined Bell Telephone Laboratories in 1926 after receiving his electrical engineering and physics degrees at Columbia University.



Lawrence G. Kersta, President
Voiceprint Laboratories, Inc.

His early research included carrier and coaxial cable telephone systems. During World War II, he developed radar transmitters for use in anti-aircraft systems. In this field, he holds basic patents and was awarded a Naval Commendation.

Since the war, he has specialized in speech research, culminating in the development of the Voiceprint Identification system, which is analogous in operation to fingerprinting identification. Presently, Voiceprint Identification is being widely applied by law enforcement agencies in both this country and Europe. Other applications of the technique apply to the solution of aircraft disaster, diagnostic aid in heart disease and vocal tract-connected diseases, and the analysis of industrial sounds.

He is a member of the Institute of Electrical and Electronic Engineers, the Acoustical Society of America, the New York Academy of Science, and the American Society for the Advancement of Science.

North Jersey — Power Power System Stability

Date:
Tuesday, November 14, 1967

Time:
7:30 P.M.

Place:
Punchbowl Room
New Jersey—Jersey Central
Power & Light Company
Madison Avenue (Highway 24)
at Punchbowl Road
Morristown, New Jersey

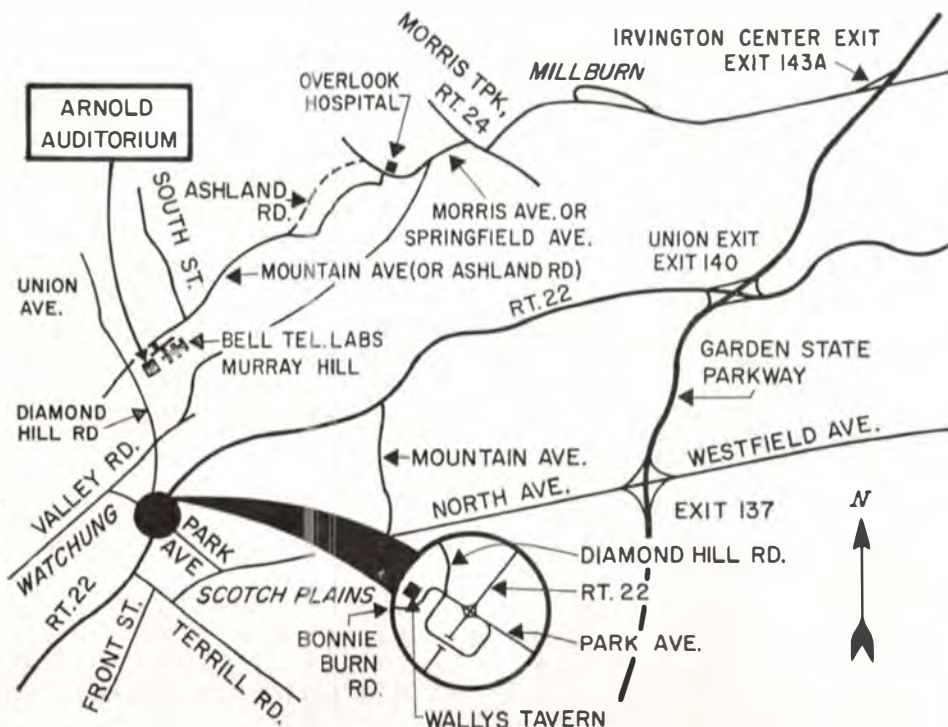
Speaker:
C. C. Young
Senior Application Engineer
Power Generation
Engineering Section
Electric Utility
Engineering Operation
General Electric Company
Schenectady, N. Y.

Mr. Young has been involved in Power System Stability Studies since 1950. In addition, he has been active in the development of digital computer programs for the study of system stability since 1960. He is an instructor in the General Electric Power Systems Engineering Course where he teaches synchronous machine theory and power system stability.

Mr. Young will discuss the nature of Power System Stability problems, the dominant influences, and the methods of analysis. Particular emphasis will be given to the manner in which changes in power system size and design have influenced both system performance and analysis.

Refreshments will be served following the program.

ATTENDANCE AT THESE MEETINGS IS NOT LIMITED TO POWER GROUP MEMBERS, BUT IS OPEN TO ALL INTERESTED PARTIES.



New York — Computer New Programming Techniques Help Engineers Use Computers

"Recent Advances in Two-Dimensional Programming and Other User-Oriented Systems," will be the subject of a dinner meeting of the N. Y. Chapter of the IEEE Computer Group, to be held jointly with the Association for Computing Machinery on Nov. 21.

Prof. Melvin Klerer, of NYU, an authority on the use of computers and a National Lecturer of the ACM, will be the speaker.

Prof. Klerer's talk, which will begin at 7:30 P.M., will be preceded by a cocktail hour beginning at 5:30 and dinner at 6:30 P.M. The meeting will be held at the Wienerwald restaurant, 884 Third Ave. (53rd St.)

For reservations phone or write Arthur Hutt, Bowery Savings Bank, 110 E. 42nd St., N. Y. C. 10017. Phone: 697-1414, Ext. 512. Computer Group and ACM-Chapter members \$5, others \$7.

North Jersey — Reliability

In lieu of a November meeting, the North Jersey Reliability Section is urging its members to attend and support the RELIABILITY PROGRAM FOR THE 1967 FALL PRODUCT ASSURANCE CONFERENCE AND TECHNICAL EXHIBIT, Waldorf-Astoria Hotel, New York City, New York, on November 2 and 3, 1967.

SESSION I — Thursday, 11/2/67

10:35 A.M. — The Program and Life Cycle Cost Benefits of a Board Screening Program: H. Niewood

11:25 A.M. — Reliability of Integrated Circuits in High Performance Aircraft: F. Mendez and G. Walker

SESSION II — Thursday, 11/2/67

1:15 P.M. — Growth of a Reliability Organization — Reliability Branch RADC: D. T. Bamber and A. Coppola

3:10 P.M. — Failure Causes, Modes and Mechanisms of MOS Devices: J. L. Farley

4:00 P.M. — Proposed Military Standard — Test Methods and Procedures for Microelectronics: J. Brauer

SESSION III — Friday, 11/3/67

9:00 A.M. — Reliability Education: Prof. M. I. Schooman

9:45 A.M. — Reliability and Maintainability in Space Systems Engineering: G. Sandler

10:35 A.M. — Comparison of Predicted and Demonstrated R & M Figures: A. Coppola and J. Daveau

SESSION IV — Friday, 11/3/67

1:15 P.M. — PANEL on The Pro & Con of Reliability Prediction. Moderator: S. A. Rosenthal

4:00 P.M. — High Reliability Interconnections Using Parallel Gap Welding: R. Halken

New York

Power and Industrial Division

Calendar for 1967-1968 Technical Discussion Groups

Members, Prospective Members, and other Engineers are invited to attend and participate in any of the Technical Discussion Groups.

Transmission & Distribution and Insulated Conductors Groups meet in the third floor meeting room, Union Carbide Building, 270 Park Avenue, N. Y. C. All other Groups meet in room 503, Consolidated Edison Company Building, Four Irving Place, N. Y. C. All meetings 6:30 to 8:30 P.M. unless otherwise noted in meeting notice.

Industrial and Commercial Power Systems

Tuesdays, Nov. 14; March 5; April 30

Transmission and Distribution

Wednesdays, Nov. 29; March 6; May 1

Power Generation

Tuesdays, Dec. 5; April 2

Insulated Conductors

Tuesday, Nov. 21

Thursdays, March 14; April 25

System Engineering

Thursdays, Feb. 29; April 18

Substations

Wednesdays, Dec. 6; March 20; April 24

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Student Affairs

Student Chapter of the Month Stevens Institute of Technology



From left to right, the Stevens Institute of Technology Student Branch officers are: Paul G. Greenfield, Secretary-Treasurer; Joseph A. Tana, Chairman; and Edward A. Radek, Vice Chairman.

In conjunction with Branch Chairman Tana's goal "to make the students aware of IEEE early in the (school) year so they will join, and then keep their interest up by means of an incentive program where those that participate will benefit most," the Stevens Branch has proposed a series of activities which should greatly increase Stevens' contribution to IEEE membership.

This proposed program includes "saturation" notices to all students for IEEE activities; participation in all Freshman orientation activities; Branch attendance at IEEE conventions and meetings, with refund of admission fees to all students who do attend; Branch trips, such as the forthcoming trip to the Indian Point Atomic Power Plant (see calendar below); Branch purchase of technical electronics books for use by members; association with the Stevens Computer Facility; lectures by EE Faculty and engineers from local electronics and power companies; and group attendance at EE department films.

Calendar

Fairleigh Dickinson University

November 2 — A film sponsored by the IBM Corp. entitled Small Miracle will be shown to the membership. An informal discussion will follow, the subject being the impact of the computer on the individual in today's modern society.

November 14 — A Field Trip to the Department of The Army Electronics Command, at Fort Monmouth, New Jersey has been scheduled by the F.D.U. Branch. The extensive tour will include a question and answer period and will

Executive Committee Column

Student Activities

Student Branches of the IEEE are organized and run by student members. They provide windows in the ivy-halls so that students may see what lies beyond graduation. An active branch brings in speakers representing many types of electronic and electrical activities. Sometimes there are movies and often field trips. Subjects such as lasers, holography, microelectronics, and biomedical engineering have been fields of special interest.

There are fourteen IEEE Student Branches in the Metropolitan Area. Four of these are in North Jersey — Fairleigh Dickinson, Stevens Institute of Technology, and the Day and Evening Branches of Newark College of Engineering. During November, there will be a membership drive during which the Branch officers will make a special effort to attract new members.

November is a particularly good time to join any of the North Jersey Branches, since it immediately precedes the annual Student Night Program of December 8, 1967. The program is organized by the four Branches jointly, but the expense is paid by the North Jersey Section of the IEEE. The theme of this year's meeting will be — "How did I get from graduation to where I am?" Alumni of the three colleges in the North Jersey Section, will, through a panel discussion, outline their personal experiences since graduating from college. These experiences have covered a broad field, varying from small company contacts to those with large manufacturers and again varying from production to research. Industrial companies — R.C.A., Hewlett-Packard, General Electric Co., I.T.&T. and others have generously donated many excellent door prizes for this occasion.

The post-meeting refreshment period will afford an opportunity for the students to question the speakers in further detail.

Broad interest functions are arranged through the Metropolitan Council, which consists of delegates from each of the fourteen student branches. An annual February event, sponsored by this council has afforded opportunities to enjoy a New York Philharmonic orchestra concert in Lincoln Center together with a social hour for refreshment and dancing in one of the New York College Centers last year and in 1965.

The Metropolitan council also conducts a Student Prize Paper Contest each year. Last year a paper presented by Steven Funk and Alex Gernert of Cooper Union took first prize. Fred Kelewski of Newark College of Engineering won the second prize and Ernest L. Ohlhoff of Fairleigh Dickinson University shared the third prize with Charles Bieber and Harold Shelley of Pratt Institute. The Long Island, New York and North Jersey Sections underwrote the entire expense of the contest and contributed toward the cost of the social evening at which prizes were awarded.

The North Jersey colleges maintain a placement service. The undergraduates are already asking about jobs for next summer. They would prefer jobs that would provide experience along electrical lines. Anyone that has suggestions, or can place a student, may route ideas or offers through the Placement Officer in each of these colleges:

Nwk. College of Engineering	Prof. J. Luben	123 High St., Newark
Fairleigh Dickinson Univ.	Dr. Lee Moss	1000 River St., Teaneck
Stevens Inst. of Technology	Mr. Apalant	Castle Point, Hoboken

These notes would not be complete without mention of the Branch Counselors — Dr. Ernest Wantuch at Fairleigh Dickinson, Prof. Harry Phair at Stevens Institute and Mr. James Earle at Newark College of Engineering. These men provide liaison between the Student Branches and the Engineering Society. They do everything they can to see that the students are given opportunity to profit from the experience of the men who are actively practicing the profession.

James Earle
Chairman
Student Activities

enable the student body to familiarize themselves with this military installation.

Newark College of Engineering— Day Branch

November 14 — Mr. John Cooke of Cutler-Hammer will speak on the Sales and Marketing aspects of the power semiconductor industry.

November 28 — Mr. J. P. Jarvis of North American Aviation will discuss the scope and contribution of computer electronics in space flight.

Stevens Institute of Technology

The Stevens Branch will welcome their new Freshman members with a trip in late November to the Indian Point Atomic Energy Power Plant of the Consolidated Edison Company. A comparison

between this plant and the Oyster Creek Facility will be made.

September Meeting on Holography

The NCE Day Branch of the IEEE sponsored a speaker demonstration program at the college on Sept. 26 at 9 A.M. Dr. Arthur Larsen of Bell Telephone Laboratories showed slides and used demonstrations in his talk on holography. The program was attended by over 175 students and faculty of NCE. Dr. Larsen, who received his B.S.E.E., M.S.E.E., and Ph.D. from Case Institute of Technology, has been with Bell Labs for 2 years and is a member of IEEE, Eta Kappa Nu, Tau Beta Pi, and Sigma Xi.

**Joint Metropolitan —
Electron Devices**

**Large Scale Integration
Utilizing MOS Technology**

Presented by:

Dr. Frank Wanlass
General Instrument Corporation
Salt Lake City, Utah

Date and Time:

Thursday, November 16, 1967
at 8:00 P.M.

Place:

International Telephone and
Telegraph Laboratories
Nutley, New Jersey

Pre-Meeting

Dinner:

Copperhood Restaurant (6:00 P.M.)
South of Route 3 at Park Ave. Exit

Abstract:

Even before techniques for making stable MOS structures were known there was excitement over the possibilities for extremely dense MOS logic. Stability problems have been solved, processes have been even further improved, and new multi-phase circuit designs have been invented; so the original excitement is more than justified. It is now possible to make chips with 100 gate functional complexity with good yield, (10%), and internal propagation delays of less than 10 nsec. Unique MOS features that make this packing density and speed possible will be described. Some of the future developments which can be achieved utilizing this approach will be discussed.

Biography:

Dr. Wanlass received his Ph.D. in Physics in 1962 from the University of Utah. Since that time he has been associated with the development of LSI MOS circuits at Philco and Fairchild. In December 1964 he became Director of R & D at General Instrument. He is currently responsible for the Advanced Development Group for General Instrument at Salt Lake City, Utah.

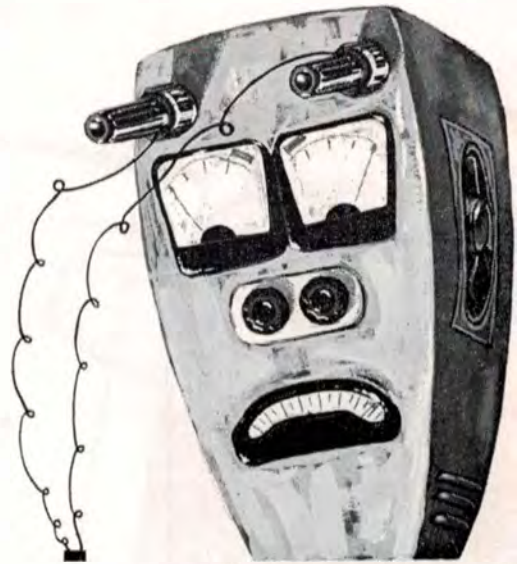
**Conference on Applications of
Simulation Using The
General Purpose Simulation
System (GPSS)**

This two-day conference co-sponsored by SHARE, the Joint Users Group of the Association for Computing Machinery and the Computer Group and Systems Science and Cybernetics Group of The Institute of Electrical and Electronic Engineers, will be held November 13-14, 1967 in the New York Hilton Hotel.

The conference will offer a number of simultaneous application sessions to provide conferees an opportunity to discuss application areas with speakers. These sessions include: Computer Systems, Transportation, Corporate Models, Gaming, System Performance Prediction, Queuing, Job Shop Scheduling, Human Factors and GPSS interactions with other programs.

Copies of the conference program may be obtained from the IEEE by writing to E. D. Mac Donald, 345 East 47th Street, New York, New York 10017.

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Professor James Earle (2nd from right) Students Affairs Chairman, and Carl Torell (far right) Member-at-Large stand with the Owner and Driver of Bonne Fille, winner of the "IEEE PACE," the fifth race at Freehold Raceway September 23rd. This was the day that about 80 members and guests of the North Jersey Section enjoyed a field trip to the Freehold Raceway at Freehold, New Jersey. Preceding the start of the races, the group heard talks by Mr. Joseph V. McLoone, Press and Public Relations Director and Mr. Champe F. Barton, Mutuels Manager covering the "technical aspects" of race track operations. For many it was their first visit to a Harness Racing track and from comments heard, a good time was had.



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PROJECT ENGINEER

...to work project from start to finish. Requires 5-7 years' experience in circuit or logic design and packaging of digital devices, design experience in business machine, digital control or computer peripheral equipment, as well as a BS in EE or engineering physics.

DEVELOPMENT ENGINEER

...to change research breadboards and feasibility devices into developed products, with activity both in the laboratory and with vendors. Requires minimum 5 years in applications engineering or development work on semiconductor devices, electro-optical devices or memories, a familiarity with the state-of-the-art in information processing technology and a BS in EE, physics, metallurgy, engineering physics, ceramic engineering or related fields.

LOGICIAN

...to participate in overall design of basic system hardware, up to design of special geometries for microelectronic logic devices. Requires 4 years' experience and capability of logic partitioning and minimization, as well as familiarity with general electronics hardware, and a BS in EE, math or physics.

*Salaries are commensurate with your professional achievements, and are supplemented by our full range of company benefits, including participation in Litton's Employee Stock Purchase Plan, pension plan and educational assistance.
For immediate interview, send your resume in confidence to
Mr. L. H. Ryan, 550 Central Avenue, Orange, New Jersey.*

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