IEEE

OCEANIC ENGINEERING SOCIETY

Newsletter

OES

VOLUME XXXIII

NUMBER 4

EDITOR: FREDERICK H. MALTZ WINTER 1998 (USPS 420-910) ISSN 0746-7834

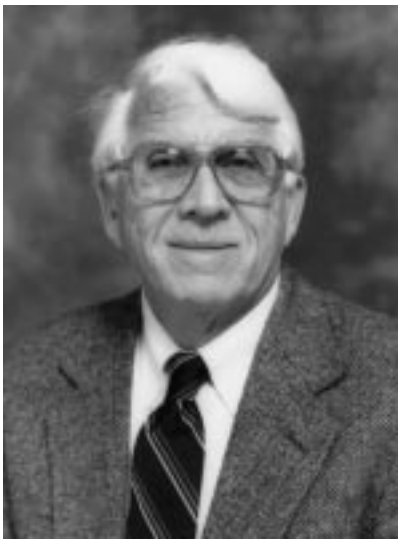
IEEE OCEANIC ENGINEERING SOCIETY

CHAPTER CHAIRMEN

IEEE Oceanic Engineering Society Newsletter is published quarterly by the Oceanic Engineering Society of the Institute of Electrical and Electronics Engineers, Inc. Headquarters: 345 East 47th Street, NY 10017. $1.00 per member per year (included in Society fee) for each member of the Oceanic Engineering Society. Printed in U.S.A. Periodicals postage paid at New York, NY and at additional mailing offices. Postmaster: Send address changes to IEEE OCEANIC ENGINEERING SOCIETY NEWSLETTER, IEEE, 445 Hoes Lane, Piscataway, NJ 08854

Outgoing President's Message

The Year In Review: 1998



Claude P. Brancart

Truly, 1998 has been a busy year for the Oceanic Engineering Society (OES).

In the conference area, we had three successful conferences. We started with Underwater Technology '98 (UT '98) in Tokyo. I was invited to be a plenary speaker. Both attendance and interest was high, so much so, that we have decided to have UT 2000. AUV '98 was conducted as a workshop on Autonomous Underwater Vehicle Navigation. The attendance was focused (80 people) to maintain a true workshop environment. I considered AUV '98 to be so successful that AUV '2000 will probably be conducted in the same format. Any suggestions on a technology topic? OCEANS '98 was our second excursion into foreign territory: Nice, France. Under the guidance and tutelage of Pierre Sabathé, we overcame all obstacles from language to culture to currency and regulations and ended up with a very well attended, high technical quality, and excellent exhibit displays conference.

OCEANS '99 will be in Seattle with the theme "Pacific-Rim of Future Ocean Science and Technology." OCEANS 2000 (O2K) will be in Providence, Rhode Island. OCEANS '01 will have a Hawaiian venue. For OCEANS '02, we are considering the Gulf Coast, Biloxi. Europe will be the location for OCEANS '03: Germany, Norway, and England are presently being considered.

Our Newsletter under the guidance and control of Fred Maltz, is now both a mail-out and on the OES web site. We are still requesting comments on a preferred format.

The Journal of Oceanic Engineering (JOE) will continue to maintain its high technical quality and earn the respect by all members of the ocean community under the new Journal Editor, James Lynch of Woods Hole. Dr. William Carey has been the JOE Editor for 6 years. I and all the membership, convey to him our gratitude and respect for the professional and successful job he has done. Bill, we all thank you, and remember, you cannot hide, we still want your involvement.

Our membership has increased, thanks to the aggressive work of our chairman, Dr. Jim Collins. Chapter growth is still slow, but Jim Glynn is working hard to change that.

In 1998, I could not have had a better Executive Committee. Joe Vadus as VP Technical, pursued conferences and conference support contractors, with emphasis on UT '98, and now UT '2000. Norm Miller, VP Professional, continues to excel with the Student Program. Norm is also deeply involved in OCEANS '99. Pierre Sabathé is taking a well earned rest after the success of OCEANS '98. He has asked for "early retirement" and we are looking for candidates to replace him as VP International. Our finances continue to be understandable thanks to our most diligent and eloquent treasurer, Dr. Thomas Freud Wiener. And our past presidents, Joe Czika and Glen Williams have continued to support, directed when needed, and "strongly recommended" when necessary. Their past and continued involvement has been invaluable. Personally, I could not have undertaken the job of President without Ms. Cindy McKee, OES Secretary. She truly made my responsibility, and ExCom's, easier to execute. Cindy, we all thank you.

Your new President for 1999 and 2000 is Dr. Glen N. Williams. IEEE societies are entering into a new phase of their existence relative to IEEE. We, and all other societies, will have to have strong leadership to interact at the IEEE board level to maintain identity. Glen is the right man to do that. We should give him all the support we can.

I will now be the OES Jr. Past President, and will fulfil the associated responsibility of that position I will continue to be the Chairman of Autonomous Underwater Vehicles Technology Committee, which will include the AUV 'XX conferences/workshops. For OCEANS 2000, I have accepted the position of Technology Chairman and OES Liaison.

At the IEEE level, I have been asked by the Technical Activity Board (TAB) to chair their Ad Hoc committee on Streamlining Decision Making at IEEE. I have also been asked by the 1998 and 1999 Presidents of IEEE, Joseph Bordogna and Kenneth R. Laker, to be a member of the IEEE Board Ad Hoc Committee on Streamlining. I continue by involvement at the RAB/TAB Transnational Committee on Globalization.

To all members of the Oceanic Engineering Society, I thank you for your support during my two years as President. It was a position I wanted and needed, and you made it possible.

Claude P. Brancart

Incoming President's Message

A Belated Happy New Year to All OES Members!

Glen Williams

As many of you know, this is my second stint as President of the IEEE Oceanic Engineering Society. I served as the OES President from 1990-1993, after serving in most other Administrative Committee (AdCom) capacities from 1976 until the present.

I would also like to take this opportunity to extend our collective and sincere Thank Yous to Mr. Claude Brancart, our immediate Past President, who served with distinction and dedication. Claude guided the Society through both some trying and exhilarating times, and I think he had some fun along the way.

I have several ideas for my next two year term which I would like to either bring to completion or at least get a long way down the road. One idea, which has already been brought to your attention, is our goal to take this Newsletter totally electronic. I think this action makes a lot of sense, both from an economic impact perspective on the Society, but also to publish in the media of today, the World Wide Web. The hardcopy production of the Newsletter costs the Society about $15,000 per year, which, if the hardcopy could be totally suspended, could be spent on other Member services. (The Newsletter is already on the OES Web Site at http://auv.tamu.edu/oes/ for those of you who wish to see the electronic version.) Fred Maltz, the Newsletter Editor, has a short survey in this issue, which specifically asks for responses from those OES members who feel that they must have the Newsletter hardcopy. If the responses are few to none, the OES Newsletter will go all electronic within 1999 and we will make other arrangements for our hardcopy-only Members.

We are also investigating publishing the OES Journal electronically. Currently IEEE has an Electronic Library which is available by subscription. There are also other IEEE electronic publishing product experiments that the OES may join to assess the impact on our Members and other readers.

Speaking of electronics, another project I have in mind is the production of a CDROM, which contains all of the OES Journal issues from the first issue through 1998. I would also like to produce a CDROM, which contains the papers in the OCEANS Conferences, say from OCEANS90 through OCEANS98. Both of these projects are in the planning stages, so specifics are not yet available; but, in any event, please let me know your thoughts on all of these endeavors.

Just a word (or two) about past and upcoming OES conferences. We just finished, in September 1998 actually, a very successful OCEANS98 Conference in Nice, France. The French Chapter of the OES, along with the other conference volunteers, did an awesome job of hosting an outstanding technical meeting, and in a not-too-shabby environment. The Acropolis conference facility in Nice is a world class venue for both technical interchange and exhibits, and the attendees also took a few minutes off to enjoy the French hospitality in the form of croissants or ... I would like to thank all of the conference volunteers, attendees and exhibitors who made this meeting the second offshore success for the OES.

OCEANS99 MTS/IEEE is coming up September 13-16, 1999 in Seattle, WA. This conference is a 10th year reunion for us, as OCEANS89 was also hosted in Seattle and sponsored by the OES and MTS. Both OCEANS89 and OCEANS99 was/is under the General Chairmanship of Bob Spindel, the Director of the Applied Physics Laboratory at the University of Washington. Bob has done yeoman service on behalf of both societies and his efforts are sincerely appreciated. The Technical Program is Co-Chaired by both Al Beam and Jack Jaeger and, knowing both of these men, will be outstanding. See you in Seattle...

As always, I invite feedback from the OES Members concerning society governance, conferences, or whatever. I'm here to serve you, so please let me know how we can make the OES better together. The best way to contact me is via email at williams@cs.tamu.edu.

Also, we are in continuous need of good people who want to be a part of the OES governance team. In particular, I am looking for some good young engineers/physicists who would like to be involved with the AdCom. The AdCom normally seats 20-25 individuals per year, with 6-8 or so elected each year. The OES Members drive the Society through the AdCom, so please take the time and get involved.

Glen Williams

IEEE Fellow Award

Oceanic Engineering Society

Daniel L. Alspach, Ph.D.

Daniel Alspach, Ph.D.

Dr. Alspach, a company founder in 1973, served as Vice President/Technical Director till 1980 and has been President of ORINCON Corporation since 1980. Using his 30 years of technical and management experience, he has guided ORINCON in its mission of bringing quality systems analysis and software development skills to bear on real-world technical problems.

Dr. Alspach oversees all corporate activities while maintaining a strong interest in ORINCON's technical work. Under contracts to DARPA, the U.S. Navy, and other Government customers, he has led many company efforts, particularly interarray processing and multiple coherence for ocean surveillance, designed and led the implementation effort for the SOSUS tracker, and the company's first mutlitarget/multisensor tracking system. He led an DARPA-sponsored technology assessment of key issues in development of antiballistic missile concepts for the Strategic Defense Initiative.

Dr. Alspach is a Fellow Member of the IEEE and past President of the IEEE Ocean Engineering Society, of which he is currently a member of the Executive Board. He has held faculty positions at the University of California at San Diego and at Colorado State University. Prior to founding ORINCON, he investigated spinoff concepts for the ORION nuclear-powered space vehicle at the General Atomic Division of General Dynamics and performed navigation and control studies of manned spacecraft at Honeywell, Inc., in the Advanced Space Flight Systems Division.

HARDCOPY NEWSLETTER SURVEY

l. Have you accessed the web version of the OES Newsletter? _____

2. Do you access the PDF version _____ HTML _____ both _____

3. Do you want to keep the printed version? _____

4. Suggestions and/or comments on producing the newsletter in electronic form only.

_____

_____

_____

_____

You can send your response to me at the address below: Fred Maltz
l760 Larkellen Lane
Los Altos, CA 94024
Fax: (650) 969-9390
e-mail: f.maltz@ieee.org

Distinguished Technical Achievement Award

Oceanic Engineering Society

OCEANS '98

Burton G. Hurdle

The IEEE Oceanic Engineering Society Distinguished Technical Achievement Award is presented to Dr. Burton G. Hurdle for his outstanding contribution to understanding the oceanography and acoustics of the Nordic Seas.

Dr. Hurdle received his B.S. in Physics from Virginia Polytechnic Institute and State University in 1943 and his Ph.D. in Engineering Mechanics from the Open University, United Kingdom in 1999.

Dr. Hurdle is currently a Senior Scientist and Consultant to the Naval Research Laboratory Acoustics Division. He has been quite active in the formulation of the Division's scientific program by developing new concepts, and his recent research has focused on the use of complex ocean interference fields to enhance knowledge of the acoustics of the oceans and the effects of geophysics and gas hydrates on low frequency propagation.

Dr. Hurdle was the Chief Scientist and Editor for a two volume reference book on The Nordic Seas (1986) and the Acoustics of the Nordic Seas (1991) which represent a major contribution to die U.S. Navy and the ocean engineering community. Between 1969 aid 1975 the Naval Research Labor", in conjunction with the Naval Undersea Center, the Naval Oceanographic Office, the Norwegian Defence Research Laboratory and additional Norwegian, US and UK researchers, conducted a comprehensive research program to study the Nordic Seas. An extensive body of experimental results on acoustics and the interaction with the environment was obtained, and Dr. Hurdle, as Chief Scientist and Editor, documented these results into a high quality reference on the Nordic Seas. The result speaks for itself and is a useful and thorough reference, a direct consequence of Dr. Hurdle's perseverance, diplomatic and technical skills.

Dr. Hurdle has been a research physicist with the Naval Research Laboratory's Acoustics Division since 1943. He served as the Head of the Scattering Branch (14 years), the Head of the Propagation Branch (6 years), Assistant Superintendent (19 years), Associate Superintendent (4 years) and as a senior Scientist and Consultant (4 yews). During this extensive career Dr. Hurdle has worked diligently with younger scientists to ensure they had meaningful research projects, high quality results and good carom. Indeed, Dr. Hurdle has made an outstanding contribution to our community.

Dr. Hurdle is a Fellow of the Acoustical Society of America, a member of Sigma)a and a Fellow of the Washington Academy of Science.

Oceanic Engineering Society

Distinguished Technical Achievement Award

1975	**Robert Frosch**
1976	**Wemer Kroebel**
1977	**Howard A. Wilcox**
1978	**Richard K. Moore**
1979	**David W. Hyde**
1980	**Neil Brown**
1981	**No Award**
1982	**Ira Dyer**
1983	**Alan Berman**
1984	**John B. Hersey**
1985	**William N. Nierenberg**
1986	**Robert J. Urick**
1987	**James R. McFarlane**
1988	**Chester M. McKinney**
1989	**Victor C. Anderson**
1990	**Robert C. Spindel**
1991	**Henry Cox**
1992	**Arthur B. Baggeroer**
1993	**William J. Plant**
1994	**Edmund J. Sullivan**
1995	**Mack O'Brien**
1996	**Frederick H. Fisher**
1997	**Newell Booth**
1998	**Burton G. Hurdle**

Oceanic Engineering Society

Distinguished Technical Achievement Award

1975	Arthur S. Westneat
1976	Frank Snodgrass
1977	Calvin T. Swift
1978	Edward W. Early
1979	Richard M. Emberson
1980	Donald M. Bolle
1981	Loyd Z. Maudlin
1982	Arthur S. Westaeat
1983	Elmer P. Wheaton
1984	John C. Redmond
1985	Joseph R. Vadus
1986	Stanley G. Chamberlain
1987	Stanley L. Ehrlich
1988	Harold A. Sabbagh
1989	Eric Herz
1990	Anthony 1. Eller
1991	Frederick H. Fisher
1992	Gordon Raisbeck
1993	Edward W. Early
1994	Daniel Alspach
1995	David Weissman
1996	Glen Williams
1997	Ferial. EI-Hawary
1998	Norman D. Miller

Distinguished Service Award

Oceanic Engineering Society

OCEANS '98

Norman D. Miller

The IEEE Oceanic Engineering Society Distinguished Service Award is presented to Mr. Norman D. Miller for his dedicated service in support of the Society.

Norm was elected a member of the OES AdCom in 1997. He was elected Vice President West in 1989 and while in this office developed a more efficient organizational structure for the Society. In 1993 he was elected to serve as Vice President, Professional Activities. He was active in the formation of the Seattle Chapter of OES and has served on OCEANS 73, 80 and 89 and is currently serving as the IEEE/OES Liaison for OCEANS 99. He initiated and fully developed the OCEANS Conference Student Poster series and organized this program for OCEANS 89, 91, 93, 94, 95 and 96. This program has been very successful and several former student poster participants have become active in the OES as a result. Norm continues to serve OES as the Student Activities Coordinator.

Mr. Miller is a private consultant in ocean engineering and project management. He began his career with Texas Instruments and was a project engineer on helicopter dipping sonar. He also directed an IR&D Program with the Destroyer Development Group 2 in Newport, Rhode Island. He joined Honeywell's Seattle Development Laboratory and became be-ad of the acoustic transducer and ocean engineering section. He was involved in the development of the CAPTOR mine and later lead the development of the long baseline acoustic positioning system for the Hughes Glomar Explorer deep ocean mining ship. He joined West Sound Associates as a consultant to the David Taylor Research Center's Puget Detachment in the design, installation, and testing of the Southeast Alaska Acoustics Range Facility for the measurement of submarine signatures in Behm Canal, Alaska.

Mr. Miller is active with the IEEE Professional Activities Committee for Engineers and is currently saving as the division IX PACE Coordinator. He is a member of MTS, ASA and NSPE. He served as Chairman of the Puget Sound Section of MTS. He is a registered Professional Engineer in Tem.

Oceans '98

Nice, France

Claude Brancart - President

Pierre Sabathe
VP International Activities and
Conference Co-Chair

OCEANS '98 CLEARLY A SUCCESS

OCEANS'98 in Nice was hosted in the huge and attractive Acropolis Convention Center. The celebration of the second venue of the Conference in Europe was clearly a success and OCEANS'98 is definitely a conference to be remembered. The organization ran smoothly and handled the 370 presentations (oral and poster) with efficiency. Clearly the setting of the session rooms and the choice of the Poster area (nearby the coffee break tables) allowed the attendees to stay in touch longer and to pursue the exchange of ideas well after the end of the sessions.

Thirty countries were represented with a mere 20% from Northern America, while 2/3 of the attendees came from the European Union. A very few no-show were noted (less than 4%) during the conference making probably OCEANS'98 the most successful conference (in term of presented papers) since OCEANS'94 in Brest. It is worthwhile noting that the number of presented papers is increased by more than 25% when OCEANS is located in Europe. The conference registered 700 full attendees and more than a thousand people visited the Exhibit. "Engineering for Sustainable Use of the Oceans", the theme of the conference, was at the heart of the presentations as well as in the booths of the Exhibition were about a hundred companies gathered their products. The fact that the Exhibit space was on the way to the session rooms and located at the same level as the Author's breakfast and partly the coffee breaks made possible closer contacts with the session attendees.

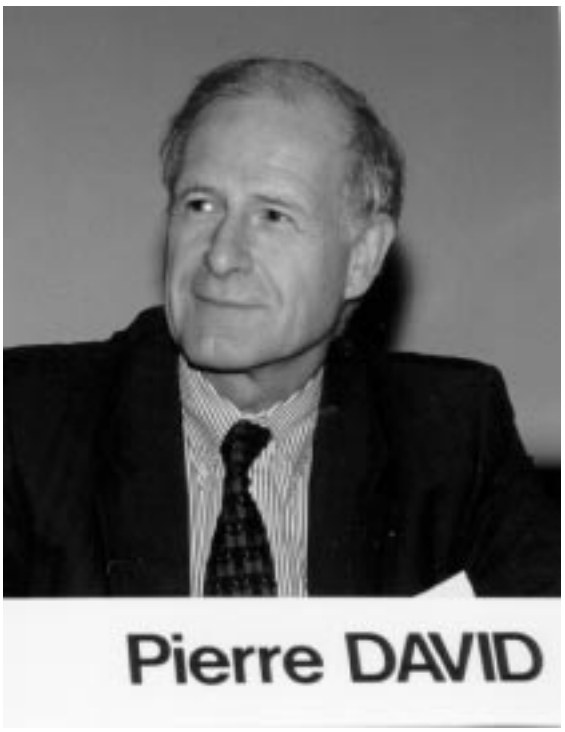
The three days of the conference were opened by a plenary session where the different speakers presented a very large overview of the actual knowledge in the Oceanic Engineering domain, some of the break-through and the possible trails for the future. This session presented in the very comfortable Athena auditorium was attended by a very large audience and was a remarkable start-up of the conference. Some of the attendees (60) had already participated the previous day at one of the eight proposed Tutorials on state-of-the-art subjects. A very high level of interaction was obtained due to this large participation.

Other, maybe less scientific, great moments were also reached during the OES Awards luncheon, recognizing this year the involvement and achievement of Burton G. Hurdle, Norman D. Miller and Dan Alspach. The Gala Cocktail was also another great time of informal and friendly encounters. Organizing a conference in Europe on the theme of Oceanic Engineering is definitely a key to a large audience and the potentiality of a great success with an over increasing exchange of ideas.

René Garello
Technical Committee Co-chair
President of the IEEE/OES French Chapter

Plenary Session


Maurice PAPO


Pierre DAVID

Engineering for Sustainable Use of the Ocean

Awards Luncheon

Norman D. Miller
Distinguished Service Awards

Daniel L. Alspach
IEEE Fellow Awards

Awards Luncheon

Left to Right: Ferial El-Hawary, Joseph Czika, Vandelyn Czika, Stan Chamberlain, John Illgen, Michelle Sabathe, Glen Williams

Burton G. Hurdle
Distinguished Technical Achievement Award

Claude Brancart, Fred Maltz, Lucy Maltz, Dan Alspach

Receptions

Vandelyn Czika, Claude Brancart, Jim Collins, Michele Sabathe, Joe Czika, Pierre Sabathe, Glen Williams, Georges & Mrs. Bienvenu

Left to Right: Glen Williams, Claude Brancart, Stan Chamberlain, Ferial El-Hawary, Sally Chamberlain, Joe Czika

Chateau des Ollieres

Beau Rivage

Left to Right: Jim Collins, Tom Wiener, Louise Wiener

Scenes from Nice, France

Glen Williams & Claude Brancart

Mr. & Mrs. Pierre Sabathe

Mr. & Mrs. Ed Early

OCEANS 98 Student Poster Program

Once again we had a very successful Student Poster Program at OCEANS 98. Thanks to the World Wide Web we received abstracts from Australia, India as well as Eastern Europe and schools in Western Europe, England, the United States and Canada. We received 35 abstracts and were able to invite 15 students to present their posters. The posters were well displayed in the lobby where the sessions were held and received a lot of attention. The task of judging the posters was a challenging one as all of the posters were well done and told the story the author intended without further explanation. Three posters were selected as prize winners and two were selected for Honorable Mention. A Student Poster Awards Ceremony was held at the Wednesday evening reception and buffet. The student winners received appropriate accolades as their names were announced. The winners of the awards were:

First Place - Georgina Hackett - University of Victoria, Canada - "A Portable simulation facility for the design of autonomous underwater vehicles. "

Second Place - G.J. Crossingham, University of South hampton, UK - "A digital laser sloperneter for small scale sea surface roughness measurements."

Third Place - Amy Howser, University of North Carolina, USA - "Combining wave energy and artificial reef technology for sustainable coastal resource development."

Honorable Mention - Jason Gobat, Woods Hole Oceanographic Institution, USA "WHOI Cable: Time domain numerical modeling of moored and towed oceanographic systems."

Honorable Mention - Irene M. Williams, University of Melbourne, Australia -"Threedimensional measurement of the shelf environment using Along Track Video."

The other posters on display included:

Oceanic surface features in the central and south-western Kara Sea - Brice Anselme, Ecole des Mines de Paris, Sophia-Antipolis, France

Temperature changes of the delectability of sea background slight-contrast anomalous radar formations in sea surface radar sensing - Arsen Arakelyan, Remote Observation Center, Yerevan, Armenia

Laboratory measurements of artificial rain impinging on a water surface - Nicole Braun, University of Hamburg, Germany

Shallow water predictions and BF radar measurements of waves in coastal areas - Sofia Caires, Sheffield Centre of Earth Observation, UK

A Fourier-based motion estimation approach for wide band synthetic aperture sonar David Chevillon, CREATIS/CNRS, INSERM, Lyon, France

Drag characterization in the autonomous benthic explorer - James C. Kinsey, State University of New York, USA

A miniaturised Fourier-transform infrared spectrometer for seawater monitoring - Martin Kraft, Vienna University of Technology, Austria

Optimum array signal processing in the presence of imperfect spatial coherence of wavefronts - Guiseppe Montalbana, Institut Eurecom, Sophia-Antipolis, France

Sea temperature and cloudiness obtained with NOAA-14 AVBRR Imagery - Enrico Piazza, University of Florence, Italy

The measurement and subsequent removal of surface current variation from OSCR radar backscatter - Stephen Traylen, University of Sheffield, UK

Student Poster Program Participants

One of the added benefits of the Student Poster Program is the return of the Student Poster Alumni to the OCEAN Conferences. There a number of former student participants from OCEANS 93 in Victoria, Canada, OCEANS 94 in Brest, and OCEANS 96 in Fort Lauderdale in attendance at the Conference and stopped by to view and comment on the posters. Several of the former student poster participants presented papers at the Conference.

A Portable Simulation Facility for the Design of Autonomous Underwater Vehicles

G. Hackett and M. Nahon
Space and Subsea Robotics Laboratory
Department of Mechanical Engineering
University of Victoria, Victoria, B.C.
Canada, V8W 3P6
ghackett@me.uvic.ca, mnahon@me.uvic.ca

Abstract:

The development process of an Autonomous Undersea Vehicle (A UV) typically requires evaluation of the stability and controllability of a large number of candidate vehicle configurations in order to arrive at some 'optimal' design. The three-dimensional animated simulation presented in this paper provides a computer-based toot with which initial screenings of candidate vehicle configurations can be performed. The three dimensional animation presented in this paper features an animated A UV and an instrumentation panel. The graphics application is written with Open Inventor, a C++ graphics library developed by Silicon Graphics and based on OpenGL. The entire package was initially developed on a Silicon Graphics Indy workstation and then ported to a PC running Windows NT and equipped with a OpenGL- compatible graphics card. The paper discusses the frame rates obtained with each system.

I- Introduction

Autonomous Underwater Vehicles (AUVs) are designed to complete any number of tasks intelligently and independently. Potential exists for AUVs to carry out oceanographic surveys, be equipped to monitor various environmental concerns such as oil spills, toxic waste levels, and fish stocks, or become underwater workhorses for the oil industry. The military has a continued interest in AUV technology for mine countermeasures and surveillance.

Currently, AUV design relies on past experience, tow tank experiments, and hardware testing, all of which are taxing on a designer's available resources. The development process of an AUV typically requires many iterations in order to arrive at some 'optimal' design. During this process-, the stability and controllability of a large number of candidate vehicle configurations must be evaluated in typical missions. Field testing is risky as communication with the vehicle is limited to a low bandwidth acoustic link. It is difficult to know where the vehicle is, communicate with it, and recover it if control is lost. An intuitive understanding of its behavior in its own environment is hampered by the designers' inability to watch the vehicle in operation. A three- dimensional animated simulation can provide an efficient means to perform an initial screening of candidate vehicle configurations, and allow a better use of resources to discard grossly inadequate designs. Simulation can be effectively used as a filter to reduce the experimental effort that still must be performed for the detailed design of the AUV.

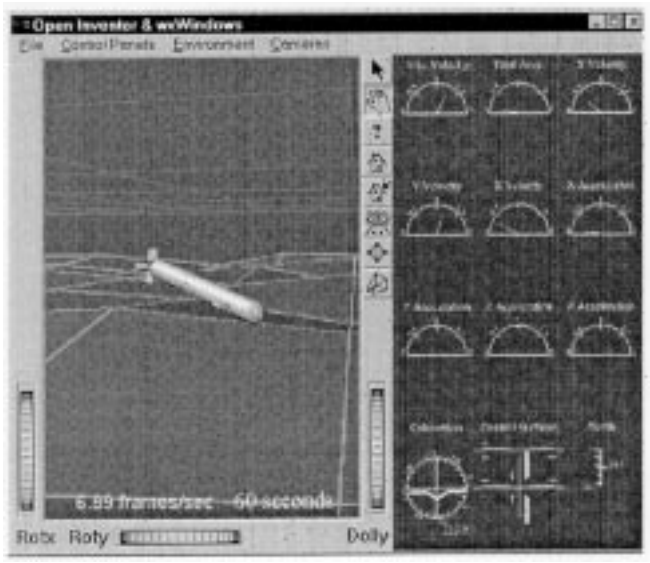


Fig. 1. 3D Viewer - PC Version

Research into the development of virtual worlds for simulation of AUVs is ongoing at a number of institutions. The largest body of work involving 3D visualization and simulation of AUVs is from the Naval Postgraduate School (NPS) in Monterey, California. A 3D visualization system developed for mission planning and control is presented in [9]. Since that time NPS has developed an integrated simulation and virtual world for the development of AUVs [1]. The system is intended for use during any phase of research involving the development, testing, and post mission analysis of the NPS AUV Phoenix [1]. A more recent simulation and 3D visualization system presented is under development at Florida Atlantic University (FAU). The software is being developed jointly with the Naval Postgraduate School specifically for FAU's AUV Ocean Explorer. It is intended for motion visualization, in-lab debugging and testing mission specific strategies [2]. Work at the MIT Department of Ocean Engineering Design Laboratory includes the NavViewer which is used as visualization tool for a map based Autonomous Underwater Vehicle (AUV) Navigation algorithm, [7]. In Japan, Kuroda, Aramaki, and Ura, [3], propose integrated testing of AUV hardware and software by developing a "synthetic world" for a real-life AUV. The AUV hardware systems are integrated with the virtual world allowing it to interact with a virtual world while operating in a test pool.

The 3D AUV Viewer discussed in this paper is targeted at the designer of undersea vehicles, rather than for mission planning. The features of the viewer and its instrument panel will be presented. The flexibility provided by a standard user interface will be outlined. The system is fully portable between UNIX and PC platforms. The various software and hardware requirements to operate the system will be discussed as will the performance achieved on each platform.

II- Goals

The 3D AUV Viewer developed in the present work will provide a window into the remote and inaccessible environment that an AUV operates in. Intended as an initial evaluation tool, it does not require sonar models, collision avoidance capability, or hardware in the loop extensions. These tools are left to detailed design phases and more complex simulation tools such as those presented in [1], [21, [3]. A familiar Graphical User Interface will be used for interaction. An instrument panel will provide the designer with information about the vehicle motion. The designer will be able to display as much or as little information as desired in the panel.

An important feature of the facility is that it be based on software which is widely available and that appears likely to become a standard for animation. Another prime factor in this decision is that the hardware and software be available at a reasonable cost. In order to reach a wide range of users, the software must be implementable on a PC, but also be compatible with other common operating platforms.

III- 3D Viewer Features

The 3D Viewer, Figure 1, is divided into a window for rendering the AUV and its surrounding environment and a window which renders the instrument panel. The AUV is created using geometry stored in an easily understood and altered ASCII file. The AUV is represented by standard 3D shapes (e.g. cones and cylinders) and the dimensions in the geometry file reflect these approximations. Currently the viewer supports two basic hull shapes: cylindrical and rectangular. The data file also contains all the information necessary to construct the animated control surfaces for the vehicle.

The virtual environment includes a gently contoured ocean floor which can be represented by a shaded surface, a grid, or set of dots. A grid can be rendered slightly above the shaded floor to assist with interpreting environment depth and dimension. The ocean surface is represented by a blue grid with the same dimensions and grid spacing as the floor below it. The depth of the virtual environment is initially set at 30 m, but can be changed though the user interface. A heads up display in this window provides the current frame rate and the elapsed time since the animation was started.

The 3D AUV Viewer has several predefined viewpoints which can be selected from a pulldown menu. Options axe also available to create a customized viewpoint. Two schemes for following the vehicle axe available. With the first, the camera's coordinates (x, Y, z, expressed in the inertial frame) remain fixed relative to the center of mass of the vehicle. The camera is oriented such that it always looks at the center of mass of the vehicle. With this scheme, the camera effectively tracks the vehicle but remains unaffected by its changes of orientation. With the second scheme, the camera position is fixed to a user-specified position in the x-y (horizontal) plane of symmetry to the vehicle. Again, the camera is always directed toward the center of mass of the vehicle. Since the camera position changes with changes of orientation of the vehicle (due to movements of the plane of symmetry), this scheme tracks the vehicle and rotates with it.

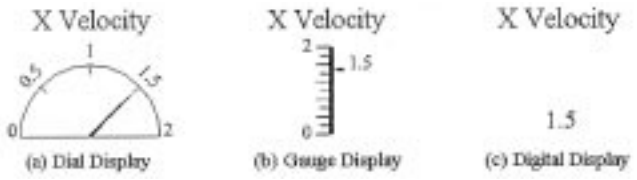


Fig. 2. The three display styles available.

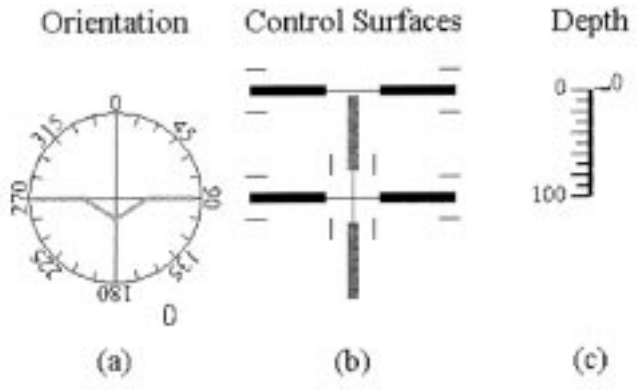


Fig. 3. Special Purpose Instrumentation

The 3D AUV Viewer instrumentation is provided to help the designer understand the behavior observed in the viewing window. To this end nine general purpose and three special purpose instruments are rendered in the instrument panel window. The information presented on the panel is only limited by what is output from the simulation. A sample of the information available to display in the general purpose instruments includes inertial velocity and acceleration, body frame velocity and acceleration, total inertial velocity, and total inertial acceleration. The information can be viewed in the three formats shown in Figures 2a, 2b, and 2c. The styles axe interchangeable.

A set of special purpose instruments provide a concise representation of all the information relative to understanding the current status of the AUV. The orientation indicator in Figure 3a reduces the amount of information to be synthesized by combining the roll, pitch, and yaw motion into one instrument. Modeled on the artificial horizon indicator of an aircraft, the center object rotates as the vehicle rolls, and translates vertically to indicate pitch. The outside ring rotates to indicate changes in heading, or yaw. Included under the ring is a text read out of the heading. A stationary cross behind the instrument marks the zero point for the indicators.

The Control Surfaces indicator in Figure 3b represents the control surfaces diagrammatically with a cross marking the neutral positions of each. As a control surface is deflected, the corresponding indicator surface moves. Markings also indicate the maximum deflection of each control surface.

A depth gauge completes the information provided by the special purpose instrumentation. The gauge provides a visual representation of the total depth of the virtual ocean environment and an account of the location of the AUV in the water column. The depth is also reported digitally beside the moving indicator.

The panel is organized to provide complete flexibility to the designer to choose what information is displayed, where it is displayed, amount of information shown (number of active slots), and how it is represented (instrument style). This flexibility promotes customization for both designer preference, and current usage.

The Viewer is currently run from a simulation data file which is generated off line with the dynamics simulation program described in [4]. The model is applicable to streamlined undersea vehicles. It determines the forces and moments acting on a vehicle by summing the effects of its constituent components, including the hull, foreplanes, and tailplanes. The simulation currently models the behavior of the ARCS AUV built by International Submarine Engineering, Vancouver, B.C. The Viewer is animated real time through a series of Open Inventor nodes that interpolate between the two entries in the simulation data file which most closely match the elapsed time since the animation was started.

IV- Graphics Software

The 3D Viewer was developed with Open Inventor [8], a C++ graphics toolkit based on OpenGL [5]. Both libraries were originally developed by Silicon Graphics for the UNIX environment. Template Graphics Inc. now develops and distributes Open Inventor for multiple platforms including PCs. The Open Inventor toolkit provides a set of building blocks which packages the individual functions of OpenGL into objects which can be used to create 3D scenes and interactive applications. The intent of Open Inventor is to focus on what is to be rendered, rather than how it will be rendered. The core graphics components of Open Inventor are system independent providing the ability to port the graphics portion of the application to any platform which supports OpenGL.

Open Inventor can be purchased and downloaded from the TGS website. It consists of a 20 MB download, and is 60 MB once expanded. Currently, some options in VC++ 5.0 must be set manually; however, complete instructions are included in the installation guide.

The Open Inventor distribution for the PC includes all of the sample programs in the Inventor Mentor, and the Inventor Tool maker. The application wizards, and sample programs axe distributed for VC++ only. Because the graphics components of Open Inventor are system independent, with only a few lines of code to indicate if it is a windows application, the graphics source code is completely transferable between SGI and PC.

The 3D AUV Viewer executable and two inventor ASCII files can be distributed as a zipped file. It can be installed and run on any computer with an Open Inventor runtime licence.

V- Graphical User Interface

The intent of the user interface is to facilitate interaction between the application and the user. In choosing a toolkit to develop the GUI for the 3D viewer the following criteria were used: (a) low cost to both the developer and the end user, (b) cross platform compatibility, (c) ease of implementation, and (d) compatibility with Open Inventor or support for compatibility.

A freeware library called wxWindows met all four of the criteria established for the 3D AUV Viewer user interface and Was used to develop the cross-platform compatible application. wxWindows is a unique cross platform toolbox in that it does not emulate behavior; it simply calls the relevant Motif, XView, or Windows API [6]. By using the native system APIs, the application does not require additional runtime libraries, and has the appropriate appearance for each platform. Once compiled, the application will operate on any similarly configured system. wxWindows supports Linux, Sun, SGI, Windows 3.x, 95, NT, OS/2 and Macintosh. It has been tested with widely available C++ compilers for UNIX, and commercially available Windows C++ compilers.

wxWindows is public domain software and is currently maintained volunteers world wide. It is freely available through anonymous file transfer protocol from the wxWindows web site, and several mirror sites. It provides all tools commonly found in a commercial application and supports functions such as audio output, printing, graphics, and interprocess communication.

wxWindows does not directly support Open Inventor. However, at the University Paderborn, Kai Benndorf has developed a wrapper class which maps the system dependent window calls of Open Inventor to the appropriate wxWindows classes. The wxWindows application treats these calls as it would any other and uses the appropriate API to create them on each platform.

All user interaction with the 3D Viewer is initiated through the menu bar. Both the AUV geometry file and the dynamics simulation data file are selected though standard file selection menus found under *File* in the menu bar. The environment surrounding the AUV can be customized using the *Environment* pulldown menu, shown in Figure 4. A text box is opened when the *Set Depth* option is selected. Any depth can be entered into the box, and the ocean depth is altered accordingly. The surface grid can be toggled on and off, as can the floor grid. The rendering style of the ocean floor is switched with options available on the menu. The default camera follow points axe easily chosen through the *Camera* pulldown menu. Customized follow points are defined with text boxes which are also activated through the menu. The animation controls and the tools to customize the instrument panel are provided on menu panels which are found in the *Animation Controls* menu. One panel provides a set of play, pause and reset buttons to control the animation. A second panel provides nine choice lists and sets of radio buttons. With the choice lists the user is able to choose the information to be displayed (e.g., a velocity) in each of the nine instrument locations. The radio buttons toggle the desired display style for the information in each location.

VI- Hardware

The 3D viewer was developed on an SGI Indy equipped with the R4600 SC 134 MHZ CPU, and the 'XZ' 24 bit HW accelerated Z buffer. The source code was later transferred to a Pentium 233 MHZ with 32 MB RAM running Windows NT 4.0. A Leadtek WinFast 3D L2300 3D accelerator card was also installed on the PC. This graphics card is based on the 3D

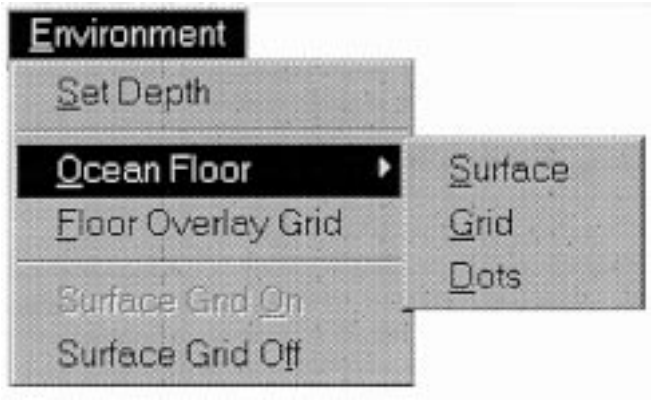


Fig. 4. Environment Pulldown Menu

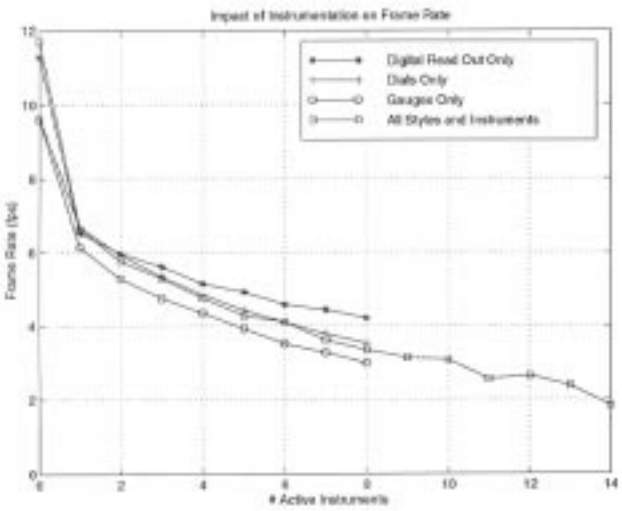


Fig. 5. Impact of Instrumentation on Frame Rate on an SGI Indy.

Labs Permedia 2 chipset, and is the only specialized component added to the PC to operate the animation. The card has 8MB SGRAM, supports OpenGL rendering in hardware, and costs approximately $150.

VII- Performance

The viewer, running from a data file, reached frame rates of 1.6 to 1.8 fps on the SGI. The animation is choppy and disjointed at this frame rate, and is only moderately acceptable for use as a design tool. Once ported to the PC the 3D Viewer averaged rates of 6.8 fps. At this speed the animation is smooth, and acceptable for a computer based design tool. Since advances in graphics cards for PCs are occurring at a tremendous rate, we fully expect that this frame rate can be doubled on a yearly basis for the foreseeable future. Graphics cards based on the 3D Labs GMX 2000 chipset can already be purchased, and are about three times faster than the Permedia 2 boards (albeit at 10-20 times the price).

To gain an understanding of the effect of the number of active instruments in the panel and the impact of the individual instrument styles the following series of cases were tested on the SGI: (a) progressively removing each position and its corresponding instruments, (b) progressively removing the dial instruments, (c) progressively removing the gauge instruments, and (d) progressively removing the digital instruments. In the final three cases the two instrument styles not being tested were not included in the compiled code.

As shown in Figure 5, the frame rate drops from a high frame rate, when no instrumentation displayed, to a rate of approximately 6 fps when one instrument is displayed. In the case where all styles and instruments axe included the three instrument styles are available, but only dials are rendered. The final four instruments in this case are the depth gauge, the time indicator, the orientation instrument and the control surfaces indicator.

The digital readout instrumentation is the simplest style of all three instruments and results in the highest set of frame rates when rendered alone. The dials have one moving part and consequently have a slightly lower frame rate than the digital instrumentation. The gauges have moving text and an animated indicator making them the most complicated instrument style. This is reflected in the lowest set of frame rates.

VIII- Conclusions and Future Work

The three-dimensional graphical simulation will enhance the AUV designer's ability to evaluate the stability and controllability of a large number of vehicle configurations. It is a tool that uses resources effectively. It will provide efficient means to rapidly evaluate ALTV designs and arrive at an optimal design with minimal experimental effort.

It is possible to develop 3D graphics applications on a PC and achieve acceptable performance rates. A PC based graphics application reduces the hardware cost generally associated with 3D graphics capable computers.

Considering the leap in performance from the SGI to the PC, further development of our animation will proceed on the PC. The low cost of the hardware required to operate the PC version of the animation also supports PC based development.

Future work includes linking the dynamics simulation of the ISE ARCS vehicle to the 3D animation to operate both components simultaneously. There is also potential to implement the viewer as a field trial tool, and extend it to include multiple vehicles and towed vehicles.

IX-Acknowledgments

With thanks to Vince den Hertog of International Submarine Engineering for evaluating the animation, and the Natural Sciences and Engineering Research Council for financial support.

X- References

1. Brutzman, D., "Virtual World Visualization for an Autonomous Underwater Vehicle", Proceedings of Oceans '95, San Diego, pp. 3-10, 1995.

2. Chen, X., Marco, D. Smith, S., An, E., Ganesan, K., and Healey, T., "6 DOF Nonlinear AUV Simulation Toolbox," Proceedings of Oceans '97, Halifax, October 6-9, 1997.

3. Kuroda, Y., Aramaki, K. and Ura, T., "AUV Testing using Real/Virtual Synthetic World", Proceedings of the IEEE

Symposium on Autonomous Underwater Vehicles (AUV) 1996, pp. 365-371, Monterey, June 1996.

4. Nahon, M., "A Simplified Dynamics Model for Autonomous Underwater Vehicles", Proceedings of the 1996 IEEE Symposium on Autonomous Undersea Vehicles, pp. 373-379, Monterey, June 1996.

5. Neider, J., Davis, T., and Woo, M., OpenGL Programming Guide - The Official Guide to Learning OpenGL, Release 1. Addison-Wesley Publishing Company, 1993.

6. Reichard, K. and Johnson, E.F., "A Free, Portable GUI Toolkit," Unix Review, Vol. 13, pp. 87-90, November 1995.

7. Tuohy, S.T., Bruening, D., and Patrikalakis, N.M., "Visualization for AUV Non-Traditional Navigation Algorithm Development," Proceedings of the IEEE Symposium on Autonomous Underwater Vehicles (AUV) 96, pp. 380-387, Monterey, June 1996.

8. Wernecke, J., The Inventor Mentor. Addison Wesley Publishing Company, 1994.

9. Zyda, M.J., McGhee, R.B., Kwak, S., Nordman, D.B., Rogers, R.C., and Marco, D., "Three dimensional Visualization of Mission Planning and Control for the NPS Autonomous Underwater Vehicle," IEEE Journal of Oceanic Engineering, Vol. 15, pp. 217-221, July 1990.

Georgina Hackett is currently a research engineer at the University of Victoria (UVIC), British Columbia. She completed her Master of Applied Science degree in Mechanical Engineering at UVIC in November 1998. She received a B.A.Sc. in Mechanical Engineering (Naval Architecture option) from the University of British Columbia (UBC), Vancouver, B.C., in 1995. Georgina was awarded the Robert Allen Memorial Scholarship in Naval Architecture (1994), and received an academic scholarship from the Victoria branch of the IEEE Oceanic Engineering Society in 1996.

Georgina's thesis research involved developing a 3D animation of an undersea vehicle for use as a design tool. Her current projects involve extending the undersea vehicle animation and developing a 3D cable animation. She has a continued interest in high-speed ship technology. Georgina is currently serving on the executive of the UVIC Women in Science and Engineering Association, and has served terms on the UVIC IEEE Student Branch executive and the B.C. Advanced Systems Institute Graduate Student Advisory Committee.

Through the University's *Let's Talk Science* program, Georgina assists local elementary school teachers with computer literacy, science materials, hands on projects, and career presentations. She is a High School math and science tutor, and an avid sailor.

A GOLD Weekend

How was your Labor Day Weekend? For my final summer weekend I attended the 1998 IEEE Professional Activities Conference in Phoenix, AZ. This is an annual Conference and Workshop sponsored by the Professional Activities Committee for Engineers (PACE). I, along with 20 other young engineers, was asked to attend the conference as a Graduate of the-Last Decade (GOLD) participant. We, the GOLD representatives, 300 hundred IEEE members to learn about and discuss today's electrical engineering careers.

If you are like me, I was curious to know besides making a project deadline, what else should an engineer possibly be concerned about? This was clearly answered by the Conference. We realized that engineers must be concerned about many issues that effect their career, their company, and even their government. Specifically the Conference was divided into six tracks of sessions. Individual tracks were focussed on careers, career skills, personal skills, professional activities, and two GOLD tracks with a little different tilt for people at a younger career stage. The Career and Career Skills tracks described techniques to maintain your competitive edge in a changing work place. Your edge being those skills, approaches, and attitudes required in building positive working relationships and communicating them properly. There were many sessions on Communication skills for engineers since this is an area open for vast improvements. The Personal Skills Workshops dealt with issues around the work place. Issues discussed were diversity, behavior, stress management, and other less interesting, but necessary items. The Professional Activities track covered the engineer's critical role in our society. In the political arena filled with lawyers, the workshop stressed the need for engineering representation in the local and state governments. Included was how to be involved in lobbying, writing letters to congressmen, and the basics on how to run for political office.

The two GOLD tracks were focused on the less experienced engineer. The first track covered Careers. This emphasized the need to market yourself while knowing what to look for in a new company. High salaries are not the only bait that lures people into jobs these days. Some engineers are asking for personal mentors, hefty stock options, or assignments of their choice. The other workshops covered skills required in a changing industry. The sessions included networking techniques and personally marketing yourself in a field where companies have little to no loyalty to their employees anymore.

I was greatly surprised at the large number of young professionals who were invited to participate in the GOLD events and were eager to get more involved at all levels of IEEE. This made the conference great for networking with people with similar interests, but not of the same technical focus. Addi-

tionally, the more seasoned engineers provided some rare and priceless insight on their career strategies. My company does not offer career development training, public speaking courses, or have a mentoring program; in fact before the Conference I hardly knew such programs existed. Coming out of the weekend I felt confident about my future and where I was going in my engineering career. The learning provided me with many insights that my employer could not provide.

Overall the weekend was invaluable to any young engineer. I am looking forward to the 1999 Labor Day weekend Conference already. If you would like to join me as a GOLD member attendee in 1999 contact your Section or Region PACE chair or your Society PACE Coordinator to learn more about the program. The GOLD program will cover most of your expenses for the Conference.

Michael J. Ingram
IEEE/OES GOLD Participant

Michael J. Ingram received his B.S. degree in Electrical Engineering from Worcester Polytechnic Institute, Worcester, MA in 1993 and his M.S. degree in Ocean Engineering from the University of Rhode Island (URI) in 1996. He is presently working for Seatex Inc. in Seattle, Washington involved in development work for Seatex navigation and inertial sensing products. He is currently the project leader for Seatex in a project to evaluate the accuracy and usability of the European Geosynchronous Non-Earth Orbit Satellite (EGNOS) correction and GPS ranging signals in a maritime application. This is a European Union (EU) funded research project called Magnet A/B. At URI, Mr. Ingram was a research assistant in the Ocean Mapping Development group and involved in the local New England OES chapter. Mr Ingram presented a Student Poster at OCEANS 96 MTS/IEEE in Fort Lauderdale. He has been a member of IEEE since 1991 and OES since 1992. He will serve as the OES PACE Coordinator in 1999.

UPCOMING CONFERENCES

The 1999 Large Engineering Systems Conference on Electrical & Computer Engineering "LESCOECE '99"

The Halifax World Trade Convention Center
Halifax, Nova Scotia, Canada

June 20-22, l999

Dr. Ferial El-Hawary, P. Eng., F.EIC, F.MTS
BH Engineering Systems Limited
P.O. Box 25041,
Halifax, NS, B3M 4H4, Canada
Tel: 902-443-2400
Fax 902-445-5110
Email "FERIAL" *elhawary@dal.ca*

Ultrasonics International '99
joint with **Technical University of Denmark**

Copenhagen, Denmark

June 29 - July 1, 1999

1999 IEEE Pacific Rim Conference on Communications, Computers and Signal Processing (PACRIM '99)

August 23-25, l999

Victoria, B.C., Canada

Second International Conference

Shallow Water Fisheries Sonar
Seattle, Washington

September 7-9, l999

OCEANS '99 MTS/IEEE Conference & Exhibition

September 13-16, l999

Seattle, Washington

Underwater Technology 2000 UT '00

The New Sanno Hotel Tokyo, Japan

May 23-26, 2000

5TH European Conference on Underwater Acoustics ESCPE

Lyon, France

July 10-13, 2000

OCEANS 2000 MTS/IEEE Conference & Exhibition

Providence, Rhode Island
September 11-14, 2000

Oceanology International 99 Pacific Rim Exhibition & Conference

World Trade Centre, Singapore

27-29 April 1999

Contact: Versha Carter - Spearhead Exhibitions Ltd,
Ocean House, 50 Kingston Road, New Malden,
Surrey KT3 3LZ, UK
Telephone: +44 (0) 181 949 9222
Facsimile: +44 (0) 181 949 8186/8193
E-mail: oi99@spearhead.co.uk
WWW: http://www.spearhead.co.uk

OES Activities in Japan and Hawaii

A meeting of principals planning the Oceans 2001 MTS/IEEE Conference in Hawaii at the Hilton Hawaiian Village. L to R. Epooni Perkins, Hilton Director of Sales; Liz Corbin State of Hawaii; Mike Cruikshank, MTS VP, Technical Activities; Joe Vadus, OES VP Technical Activities; Kiman Wong, past chair of the OES Hawaii Chapter and Chair for Oceans '91; and Craig MacDonald, State of Hawaii. MacDonald and Corbin are presently leading the planning effort.

J. Vadus, OES VP, Technical Activities at the OES booth at Techno Ocean '98 in Kobe, Japan. Booth was set up for Professor Tamaki Ura, University of Tokyo, Chairman of the OES Japan Chapter, J. Vadus was invited to give the keynote address.

Who's Who in the OES

JOHN ILLGEN is President/CEO and the founder of Illgen Simulation Technologies, Inc. (ISTI), a certified small business established in 1988 that provides modeling and simulation information systems services to both the government and non-government sectors. Mr. Illgen is responsible for the overall operation of the company including technical operations, administrative, marketing, and strategic planning. Mr. Illgen is recognized both nationally and internationally for his pioneering work in communications and navigation. Mr. Illgen's contributions focus on the simulation of communication (satellite and terrestrial) and navigation/position location systems, sensors (IR/laser, acousto-optics), MMW, radar as these pertain to the C3I process including EW (ECM, ECCM, and ESM). Mr. Illgen is currently leading the implementation of a major ISTI strategic initiative to upgrade ISTI's simulation environment by incorporating JAVA, CORBA, object oriented methods, and advanced graphics and animation. Mr. Illgen has been a pioneer in the areas of independent system evaluations using simulation to assess design, augment testing, support systems engineering, analysis, system employment, operations, and production decisions as these impact the DoD's system acquisition process.

John Illgen

1998 IEEE-USA Professional Activities Conference Emphasized Career Development

by Norman Miller,
Division IX PACE Coordinator

The 23rd annual IEEE-USA Professional Activities Conference, held during Labor Day weekend at The Pointe Hilton Resort at Squaw Peak in Phoenix, was the largest one yet, with more 300 registered attendees, including 95 GOLD (Graduates of the Last Decade) participants. The conference format this year differed from previous years: the emphasis was on professional and career development rather than on training PACE leaders.

Following optional tutorials and workshops, the conference officially began with a reception and dinner on Friday, September 4. John Reinert, IEEE-USA President, spoke on the progress that IEEE-USA made this first year of its autonomous status within IEEE and its plans for the future. Following the dinner, separate meetings were held for each of the six U.S. Regions and one for the 37 Technical Societies on how to facilitate the promotion of professional association within their respective Regions and Societies.

Saturday morning started with an opening plenary session addressed by Paul Kostek, IEEE-USA President-Elect, who led off with a multi-media presentation on "Launch Pad 2000: What Will Our Future Hold?" The morning plenary was followed by workshop sessions: six parallel tracks, two of which were primarily devoted to the GOLD participants. The noon luncheon speaker was Joseph Tidwell, Division Education and Training Coordinator, Engineering, of the Boeing Company, who spoke on job definitions, a huge undertaking to define the multitude of disciplines required within the company. The presentation was very interesting and well received.

One of the last sessions on Saturday afternoon was a panel discussion on professional activities that can be done at technical conferences. If you are interested in such activities and PACE programs, contact the PACE representative in your Society or Section for more information.

The luncheon speaker on Sunday was the 1998 IEEE-USA Student Professional Paper Competition winner, Kelley Roark, of Texas Tech University. She presented a very interesting paper on the "Perception of Professionalism" and emphasized what qualities students should attain to mark themselves as professionals: ability to speak in public, proper usage of grammar, accountability, integrity, dress, and credibility. It was well received by the audience, and she presented the paper in a very professional manner.

The Sunday afternoon Plenary comprised Candidates Forums for IEEE President-Elect and IEEE-USA President-Elect. All of the candidates were eminently qualified. A reception, awards ceremony, and awards banquet concluded the day.

A second Division/Society meeting was held prior to the awards reception and ceremony. This meeting included reports from each Division Coordinator on Society activities. It was interesting to learn what the various Societies are doing to promote professionalism and provide information to the Society members on what IEEE is doing to promote professional development and services to the membership. The question always arises regarding whether technical societies, being multi-national, should be promoting professional activities that apply most directly to U.S. members. Interestingly enough we had conference participants from Regions 7 (Canada) and 8 (Europe); they were very interested in the publications and programs that IEEE-USA had to offer. It was the consensus that members outside of regions 1-6 are interested in learning what IEEE-USA is doing and what products it has to offer. It was emphasized to the Society Coordinators that there are plenty of professional programs that IEEE has to offer that do not involve governmental policy issues. These are things that can be promoted to all Society members.

The Conference ended on a very positive note. Once again it was good to see younger members participating in an IEEE Conference. The GOLD program is a valuable tool to get the younger professionals involved in IEEE; all the Societies and Sections should have a GOLD representative in attendance at the 1999 conference in Dallas.

TODAY'S ENGINEER Fall Issue Preview: What Engineers Can Learn From Venture Capitalists

WASHINGTON, Nov. 17, 1998 — "History is strewn with sad tales of brilliant technologies that never made a cent; what you want to do is marry a terrific technology with a terrific business plan." So goes the argument in "Why Should a Venture Capitalist Give You a Dime?," the lead article in the Fall 1998 edition of TODAY'S ENGINEER magazine.

Have you ever wondered how engineers can make their everyday jobs more closely incorporate the very best aspects of an entrepreneurial venture, complete with the discipline, innovation and

gusto normally associated with such projects? Authors Trudy E. Bell, Arthur P. Cimento and Jeffrey C. Sinclair attempt to answer this important question by presenting new ideas to help product development teams work together toward more productive and cohesive goals.

The main point of the argument is simple: An engineer on an interdisciplinary product development team — no matter what the size of the company — should approach the project as if he of she were developing a product for an entrepreneurial start-up about to apply for venture financing. And just how does seeking venture financing relate to the engineering profession anyway? Stated simply, venture capitalist firms want to know first and foremost how a startup company plans to make money off an idea. They are more interested in management teams and complete marketing plans than they are in specific technological concepts. As an engineer, you can greatly benefit by thinking like a an entrepreneur seeking venture capital — concentrating specifically on sound business issues, as opposed to just the technical features of your product.

The article goes on to describe the various players that can — and should — comprise a sound interdisciplinary product team. Most importantly, it presents a picture of how these players can interact in the most effective ways possible to realize the over-riding goal of the project, utilizing the best resources and talents of all the members simultaneously.

Pick up "Why Should A Venture Capitalist Give You a Dime?" in the Fall 1998 issue of TODAY'S ENGINEER, the magazine dedicated to illuminating the minds of engineers with new ideas and trends in the ever-changing world of work. The IEEE-USA publication aims at helping technical professionals transcend traditional boundaries, think strategically, and develop an overall business perspective. Be on the lookout for future articles and issues that will change the way you work and think.

Engineers Week

The 1999 U.S. National Engineers Week will be 21-27 February. To order planning kits and other materials, call 412.741.1393 or order from the on-line product catalog at:

http://www.eweek.org

For planning kits, send an email to:

eweekorders@abdint1.com.

Welcome The Fellows!

What is a Fellow? As described in the IEEE Bylaws "The grade of Fellow recognizes unusual distinction in the profession and shall be conferred only by invitation of the [IEEE] Board of Directors upon a person of outstanding and extraordinary qualifications and experience in IEEE designated fields, and who has met important individual contributions to one or more of these fields."

The slate of newly elected IEEE Fellows for 1999 is listed alphabetically by last name on the Fellow Program link on the Awards/Fellow Activities Web site. Check out this site at http://www.ieee.org/awards/fellows.htm to see if any of these newly elected Fellows are residing in your Section. You can reach out to these Fellows to congratulate them and perhaps put an item in your Section newsletter. For additional information, contact IEEE Awards/Fellow Activities.

IEL Online

The IEEE/IEE Electronics Library (IEL) is now available to institutional customers via the Internet. With a subscription to IEL Online, customers worldwide can access full-page PDF images of IEEE journals, conference proceedings, and standards directly over the Internet. Users will be able to search through a bibliographic database, based on the INSPEC database, and link to corresponding PDF images of the selected records. IEL Online is updated monthly, and is available as an annual subscription covering the range of IEEE and IEE publications from 1988 forward. Access to the subscription is based on IP (Internet Protocol) address and the number of simultaneous users. The National Aeronautics and Space Administration (NASA) became one of the first subscribers to IEL Online when it subscribed even before the product was released. A total of 13 different NASA organizations joined together to purchase IEL, making this the biggest network sale in IEEE history. This subscription serves over 3,000 engineers across the United States, from such sites as NASA Headquarters in Virginia, Kennedy Space Center in Florida, Goddard Flight Center in Maryland, and The Jet Propulsion Laboratory in California. For more information, contact Scott MacFarland, IEEE Publications.

Y2K The Countdown Continues

Are your databases Y2K compliant? A number of Sections and Chapters maintain special databases, which are used for mailings and promotions. If you have such a database, and in particular if it is something for which you developed the application program, you should consider testing for Y2K compliance. All IEEE entities should request written documentation from their vendors or programmers stating that the systems being used to manage their databases are Y2K compliant (i.e., programmed to recognize a 4-digit year). If you have questions, contact Vera Sharoff, IEEE Regional Activities.

ELECTED ADMINISTRATIVE COMMITTEE

JAMES BARBERA
(see Chapter Chair)

HISAAKI MAEDA
Institute of Industrial Science,
University of Tokyo
7-22-1 Roppongi, Minatoku,
Tokyo 106, Japan
+81-3-3402-6231 ext. 2255
+81-3-3402-5349 (Fax)

PAULA LAU
15222 162nd Avenue SE
Renton, WA 98058
(206) 235-3413 (Phone);
(206) 847-9284 (Fax)

JOSEPH CZIKA, JR.,
(see Jr. Past President)

DANIEL L. ALSPACH
ORINCON Corp.
9363 Towne Center Drive
San Diego, CA 92121
(619) 455-5530; (619) 452-4258 (Fax)
alspach@snap.org

GLEN N. WILLIAMS
(see Senior Past President)

LLOYD R. BRESLAU
Environmental Solutions Inc.,
108 Rue Acadian
Slidell, LA 74061
(504) 847-9720 (Phone & FAX)

JAMES S. COLLINS
Dept. of Elec. &
Comp. Engineering
University of Victoria
P.O. Box 3055
Victoria, B.C.
CANADA V8W 3P6
(604) 721-8610; (604) 721-6052 (FAX)
j.s.collins@ieee.org

ROGER DWYER
43 South Cobblers Ct.
Niantic, CT 06357
(860) 440-4511
r.dwyer@ieee.org

EDWARD W. EARLY
4919 N E 93rd Street
Seattle, WA 98115-3931
(206) 525-2578

FERIAL EL-HAWARY
(see Chapter Chair)

JAMES GLYNN
Klein Associates
11 Klein Drive
Salem, NH 03079
(603) 893-6131

FREDERICK H. MALTZ
(see Newsletter Editor)

NORMAN D. MILLER
(see Vice President)

CHRISTIAN DE MOUSTIER
Masrine Physical Lab.
Scripps Instit. of Ocean.
La Jolla, CA 92093
(619) 534-6322

E.L. NELSON
Computer Science Dept.
Texas A&M University
College Station, TX 77843
(409) 845-0085

PIERRE SABATHE
(see Vice President)

JOSEPH R. VADUS
Director, International Programs
Center for Ocean Resource
Technology
University of Hawaii
8500 Timber Hill
Potomac, Maryland 20854 USA
(301) 299-5477; (301) 983-4825 (FAX)
j.vadus@erols.com

THOMAS F. WIENER
ARPA/STO
3701 North Fairfax Drive
Arlington, VA 22203
(703) 516-7405; (703) 522-6108 (FAX)
twiener@arpa.mil

DAVID E. WEISSMAN
Hofstra University
Dept. of Engineering
Hempstead, N.Y. 11550
(516) 560-5546

ROBERT C. SPINDEL
(see Associate Editors)

ROBERT W. FARWELL
(see Associate Editors)

ANTHONY J. HEALEY
Dept. of Mechanical Engineering
Naval Postgraduate School
Monterey, CA 93943
(408) 656-3462; (408) 656-2238 (FAX)
healey@me.nps.navy.mil

STANLEY G. CHAMBERLAIN
Raytheon Electronic Systems
MS T3TN46, 50 Apple Hill Dr.
Tewksbury, MA 01876
(508) 858-5012; (508) 585-1955 (FAX)
s.chamberlain@ieee.org

FRANK M. CAIMI
Harbor Branch Oceanographic Inst.
5600 Old Dixie Highway
Fort Pierce, FL 34946
(407) 465-2400 ext. 256;
(407) 464-9094 (FAX)
caimi@hboi.edu

EX-OFFICIO

Jr. Past President
CLAUDE P. BRANCART
Draper Laboratory
555 Technology Square
MS 55
Cambridge, MA 02139
(617) 258-3097
c.brancart@ieee.org
(617) 258-2942 (FAX)

Sr. Past President
JOSEPH CZIKA, JR.
T.A.S.C., Inc.
12100 Sunset Hills Road
Reston, VA 22090-3221
(703) 834-5000 ext 7122
(703) 318-7900 (FAX)
j.czika@ieee.org

Membership Development
JAMES S. COLLINS

Nominations
CLAUDE P. BRANCART

Chapters
JAMES GLYNN

Publicity

Journal Editor
JAMES F. LYNCH

Standards

Awards and Fellows
DAVID WEISSMAN

Publications Review Board
GLEN N. WILLIAMS

Newsletter Editor
FREDERICK H. MALTZ

Neural Networks Council
JAMES M. GLYNN

Pace
NORMAN D. MILLER

TAB Engineering Research and Development Policy Committee
JOSEPH R. VADUS

ASSOCIATE EDITORS

ARTHUR B. BAGGEROER
Dept. Ocean Eng. — Rm. 5-204
Mass. Inst. Technology
Cambridge, MA 02139
(617) 253-4336
abb@arctic.mit.edu

D. RICHARD BLIDBERG
Autonomous Undersea Systems Institute
86 Old Concord Turnpike
Lee, NH 03824
(603) 868-3221
Fax: (603) 868-3283
blidberg@ausi.org

PETER H. DAHL
Applied Physics Lab.
Univ. of Washington
1013 N.E. 40th Street
Seattle, WA 98105
(206) 543-2667
dahl@apl.washington.edu

CHRISTIAN DE MOUSTIER
Marine Physical Lab.
Scripps Inst. of Oceanography
La Jolla, CA 92093
(619) 534-6322
cpm@mpl.ucsd.edu

ROGER F. DWYER
43 South Cobblers Cove
Niantic, CT 06357-1322
(860) 739-0237
r.dwyer@ieee.org

GEOFF EDELSON
Sanders
Advanced Systems Directorate
MAN6-2000
P.O. Box 868
Nashua, NH 03061-0868
(603) 645-5735
Fax: (603) 645-5731
edelson@sanders.com

JOHN E. EHRENBERG
Boeing Defense and Space Group
P.O. Box 3999
MS 84-41
Seattle, WA 98124-2499
(206) 773-1442
ehrejexoo@ccmail.boeing.com

DAVID M. FARMER
Institute of Ocean Sciences
PO Box 6000
9860 W. Saanich Road
Sidney BC V8L4B2 Canada
(250) 363-6591
Fax: (250) 363-6798
dmf@ios.bc.ca

ROBERT W. FARWELL
Code 243
Naval Research Lab.
Stennis Space Center, MS 39529
(601) 688-4875

RENE GARELLO
Telecom Bretagne
Dpt. ITI BP 832
29285 Brest Cedex France
(33) 2 98 00 13 71
Fax: (33) 2 98 00 10 98
rene.garello@east-bretagne.fr

MALCOLM L. HERON
Physics Dept.
James Cook University
Townsville, Queensland 4811
Australia
61 77 81 4127

DAVID P. KNOBLES
EVG
Applied Research Labs
Univ. of Texas at Austin
P.O. Box 8029
Austin, TX 78713-8029
(512) 835-3687
knobles@ arlut.ulcxan.edu

JOHN J. LEONARD
Ocean Engineering Department
Room 5-422
Mass. Inst. Technol.
77 Massachusetts Ave.
Cambridge, MA 02139
(617) 253-5305
Fax: (617) 253-8125
jleonard@mit.edu

JAMES F. LYNCH
Ocean Physics and Engineering
203 Bigelow Building
Woods Hole Oceanographic Institution
Woods Hole, MA 02543
(508) 457-2000 ext. 2230
jlynch@whoi.edu

HISAAKI MAEDA
Institute of Industrial Science,
University of Tokyo
7-22-1 Roppongi, Minatoku,
Tokyo 106, Japan
+81-3-3402-6231 ext. 2255
Fax: +81-3-3402-5349
maedah@iis.u-tokyo.ac.jp

ARYE NEHORAL
Dept. Elect. Eng. And Computer Sci.
Univ. of Illinois at Chicago
851 S. Morgan St., Rm. 1120 SEO
Chicago, IL 60607-7053
(312) 413-0024
nehorai@eecs.uic.edu

JOHN D. PENROSE
Centre for Marine Science & Tech.
Curtin University
Kent St., Bentley, W. Australia 6102
Australia
61 9 351 7380
tpenrosej@cc.currin.edu.au

ROBERT C. SPINDEL
Applied Physics Laboratory
University of Washington
1013 N.E. 40th Street
Seattle, WA 98105
(206) 543-1310
spindel@apl.washington.edu

STERGIOS STERGIOPOULOS
DND/DCIEM
1133 Sheppard Ave. West
North York, ON M3M 3B9
Canada
stergios@dciem.dnd.ca

RICHARD STERN
Applied Research Lab.
Penn State Univ.
P.O. Box 30
State College, PA 16804
(814) 865-6344
rs@arlvax.arl.psu.edu

EDMUND J. SULLIVAN
Code 103, Naval Undersea Warfare Ctr.
Newport, RI 02841
(401) 841-2011

IEEE OCEANIC ENGINEERING SOCIETY TECHNOLOGY COMMITTEE CHAIRPERSONS

Underwater Acoustics, ROBERT FARWELL
Severe Environments Instrumentation, PAULA A. LAU
Autonomous Unmanned Underwater Vehicles, CLAUDE P. BRANCART
Current Measurements, A. J. WILLIAMS
Marine Communication & Navigation, JOHN ILLGEN
Modeling, Simulation & Data Bases, E. GOUGH
Oceanographic Instrumentation, OREST DIACHEK
Remote Sensing, DAVID E. WEISSMAN
Sonar Signal Processing, ROGER DWYER
Non-Acoustic Image Processing, FRANK M. CAIMI
Neural Networks for Oceanic Engineering, WILLIAM PORTO
Technical Committees Coordinator, STANLEY G. CHAMBERLAIN