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## CURRENT ACTIVITIES IN VR STANDARDS AT IEEE

*Standards Editor: Mary Lou Padgett*

The Institute of Electrical and Electronic Engineers (IEEE) plays a major role in the formation and publication of standards, cooperating fully with various national and international standards organizations such as ANSI (American National Standards Institute) and ISO (International Standards Organization) in the process.

There is probably nothing more important to the successful development and marketing of commercial products in virtual reality than the establishment of standards that can be followed by hardware and software developers. Only when various components from different producers can be integrated together into full operational systems will there be a robust market.

Working in the area of standards involves a lot of trying to predict and direct the future. The actual formation of the standards often proceeds at a glacial pace in order to fully involve all interested parties and deal with all the issues. This does not mean that benefit is not derived before the actual publication of the standard. The process itself may be just as important as the final result. In the process, future issues are discussed and publicized, and all interested parties can see and have a role in the general direction that developments are heading.

The IEEE procedures for VR standards development are briefly as follows. First, there may or may not be the formulation of a *Study Group*, which needs no formal recognition or approval, and which may exist for literally years before the process becomes more formalized. Typically a study group will have 25-100 active participants, though it may be many times that.

The process becomes formalized with the formation of a *Working Group*. To form such a group, a "PAR" (project authorization request) is filed with the Standards Board of the IEEE. Each working group will have a chair, a vice chair, and a recorder. The IEEE has found that a membership of 50 to 100 members is a reasonable compromise between the broad representation that is needed and proper coordination of the individual inputs. Typically the only requirement for being a member of a working group is the willingness to actively participate, but the group must include technical expertise in all pertinent areas.

The working group proposes the literal wording of the proposed standards. It carries no authority to make the

standards, however. To do that, another group, the *Balloting Group*, is formed. At this stage everything becomes very formal and legalistic, for the Standards Board must guarantee that the Balloting Group collectively has the expertise and the objectivity to pass on the proposed standards.

After the Balloting Group and Standards Board have approved a particular standard, the IEEE can publish the standard. The IEEE supports the standards activities through the sale of official publications containing those standards, and those publications are copyrighted. Thus in the formulation of the standards, starting from the working group, the IEEE maintains strict rules to ensure the legality of its copyrights. Among other things, this means that proposed standards are not "published" (in the legal sense of the word) during the process, and the copyrights of other sources are honored.

The IEEE standards activities in VR are coordinated by Richard Blade (University of Colorado - Colorado Springs), though Mary Lou Padgett (Auburn University) currently coordinates a study group (soon to become a working group) on Computational Intelligence, that includes VR as well as neural networks, fuzzy logic, and evolutionary computing. The only official working group so far in VR is one focusing on producing an official glossary, defining various technical terms. Richard Blade recently became chair of that group, while Carol Manetta (Ford Motor Company) serves as vice chair, with Margaret Loper (Institute of Simulation and Training) as recorder and Mary Lou Padgett as liaison to the IEEE Standards Board. The Working Group can call upon the VR Technical Resource Group and the VR Standards Resource Group to provide expertise in specific areas of VR and related standards as needed. Coordination with all related standards and interested groups is a major goal.

Additional working groups are anticipated in the areas of specifications for head mounted displays, specifications for position trackers, and interaction with graphical databases. All these areas have been specifically requested, mostly by persons working in the industry needing the standards. In addition, there have been numerous requests that VR standards ensure access by disabled persons.

The NNC standards activities in VR began about 18 months ago. Since that time most of the effort has gone into recruiting members for study and working groups. Currently the IEEE headquarters is setting up a list server and an ftp site to support the activities. The list server permits a member of a study, working, or balloting group to send an email message to the entire group through a single address, thereby enabling members to have private discussions. The ftp site contains a public directory, which contains reports and information for anyone wanting to see the progress of the committee, and a private directory, which contains material only for viewing by the group members. (Once again, the reason behind the private directory is not secrecy, but copyright protection.)

Persons interested in becoming involved in VR standards activities should contact Richard Blade at [r.blade@ieee.org](mailto:r.blade@ieee.org) or Mary Lou Padgett at [m.padgett@ieee.org](mailto:m.padgett@ieee.org).

## CALENDAR OF EVENTS

J. Fred Henderson

**April 3-5, 1995:** *Computer Vision, VR, and Robotics in Medicine*, Nice, France. Contact monique.simonetti@sophia.inria.fr, FAX: +33 936579 55.

**April 9-12, 1995:** *Symposium on Interactive 3D Graphics*, Monterey, CA. Contact zyda@trouble.cs.nps.navy.mil, FAX: 408-656-2814.

**April 11-12, 1995:** *Mediacomm*, Southampton, England. Contact phillipe.geril@rug.ac.be, FAX: +32 9 223 49 41.

**April 11-15, 1995:** *International Simulation Multi-Conference*, Phoenix, AZ. Contact scs@sdsc.edu, FAX: 619-277-3930.

**April 25-27, 1995:** *ITEC*, The Hague, Netherlands. Contact FAX: +44(0)985 846.

**May 9-11, 1995:** *Space Applications of Artificial Intelligence and Emerging Information Technology*, NASA Goddard Space Flight Center, Greenbelt, MD. Contact truszkowski@kong.gsfc.nasa.gov, FAX: 301-286-1768.

**June 5-7, 1995:** *European Simulation Multi-Conference*, Prague, Czech Rep. Contact Phillipe.geril@rug.ac.be, FAX: +32 9 223 49 41.

**June 5-8, 1995:** *A/E/C Systems*, Atlanta, GA. Contact FAX: 203-666-4782.

**July 19-20, 1995:** *VR in Science and Engineering*, London, UK. Contact swhalley@btsys.bt.co.uk, FAX: +44 473 649 791.

**July 24-26, 1995:** *Summer Simulation Conference*, Ottawa, ON, Canada. Contact scs@sdsc.edu, FAX: 619-277-3930.

**July 26-28, 1995:** *Modeling and Simulation Conference*, Calgary, AL, Canada. Contact iasted@istd.cuug.ab.ca, FAX: 403-247-6851.

**August 6-11, 1995:** *SIGGRAPH*, Los Angeles, CA. Contact siggraph95@siggraph.org, FAX: 312-321-6876.

**August 21-24, 1995:** *Pacific Graphics*, Seoul, Korea. Contact syshin@cs.kaist.ac.kr, FAX: +82 42 869 3520.

**September 22-24, 1995:** *Medical Robotics and Computer Assisted Surgery*, Pittsburgh, PA. Contact joan@ortho.ssh.cor.edu, FAX: 412-623-4333.

Send your notices including the dates, name of the event, sponsoring organization, location, contact email address and fax number to Fred Henderson, ijvr@net.usa, or FAX: 719-486-3652. In the future we shall accept a short paragraph description, including an invitation for papers and submission deadlines.

## STATEMENT OF PURPOSE

The *International Journal of Virtual Reality* is a multimedia publication dedicated to the cooperative development and application of diverse technologies associated with virtual reality. It is designed to disseminate relevant new information to professionals in all aspects of the

field using the latest in publishing technology. Each issue will consist of a printed paper edition and accompanying CD-ROM edition, the latter to be accessed via Microsoft Windows 3.1 only. (Future plans call for other platforms as well.)

The CD-ROM will not only contain a complete electronic edition of the printed portion with hypertext and string search, but will also contain graphics, animations, color photographs, sound and movie clips, and useful computer software that authors submit to enhance their articles. Plans are underway to expand the capabilities to wide viewing angle and stereographic photos, graphics, and movies on inexpensive display hardware.

## AUTHORS' GUIDE

(Revised 2-15-95)

### CONTENT

The IJVR solicits original manuscripts with possible multimedia enhancements and software for publication, including articles on original research and applications in all areas of virtual reality, including scientific discoveries, technical developments, innovative applications, proposed or newly adopted standards, social issues, reports, book reviews, reviews of new hardware and software, and artwork using the VR medium. The appropriateness to publish a submission shall be based on what professionals in the virtual reality field want to see in such a journal, as judged by the content editor in charge of the manuscript, following the guidelines of the Editorial Board.

### REFEREEING

All materials submitted for publication, including invited papers, are refereed to ensure adherence to originality and quality standards as well as ensure a broad enough interest among readers of the Journal. While the IJVR is published with an emphasis on multimedia, the printed portion must be self contained in the sense that it provides all the important points and results. The printed edition will be the primary focus of the refereeing.

### CONTENT EDITOR

Each article will be submitted to a content editor, either by the Editor-in-Chief, or directly by the author(s). That editor, enlisting the help of various referees, will be in charge of determining the appropriateness of the subject matter, the originality, and the quality of the proposed article. The content editor is also encouraged to invite papers that have particular significance. In the case of international submissions, attempts will be made to use a content editor in the country of the primary author.

In recognition of the significant role that the content editor plays, his or her name will appear below the name(s) of the author(s) in the article, clearly identified as the editor.

## ORIGINALITY

All manuscripts submitted must be original. The IJVR does not accept articles published, either completely, or in significant part, in other magazines or periodicals. However, the IJVR will consider reports described in conference proceedings if they deserve repeated coverage to a wider audience and if the author revises them to include current results. It is the author's responsibility to secure all necessary clearances, including reprint rights, for any materials reproduced from other papers or articles. All copyrights on figures, etc. must be clearly identified. References must be made to the original source of quoted material.

## ARTICLE LENGTH

In both the printed and multimedia version of the IJVR articles will be typeset in 10 point New Times Roman font with two columns. This page illustrates. Submitted articles typically run 80 to 300 column inches (4-15 pages in the printed edition of the journal). Multimedia enhancements are not counted in the length. Pure text runs about 54 words per column inch. Equations, tables, graphs, and line drawings for the printed edition should be included when estimating the length.

## TITLE AND AUTHOR NAMES

In both the printed and CD-ROM editions of the IJVR all the material, including the title and authors' names, are contained in a single column. The title must be limited to three one-column-wide lines. The name of each author will occupy a separate line. Titles, affiliations, etc. will only appear in the biographies.

## ABSTRACT AND KEYWORDS

An abstract of 100-200 words must be included in each article, along with a list of keywords to be used by various services that provide abstracts in electronic form. The abstract and keywords must be capable of being expressed in computer text files. Equations, special characters, or even italics, boldface, subscripts or superscripts are not allowed in the abstract.

## AUTHOR BIOGRAPHIES AND PHOTOS

Each author should submit a biography of 100-200 words that tells the reader about the author's interest and background relative to the subject of the article. Included should be the current position and technical interests. Additional optional information can include education, professional honors, and professional affiliations. Each author should include a current mailing address, voice phone number, fax number, and email address. The IJVR reserves the right to cut portions of the biography in the printed edition, the CD-ROM edition, or both.

In addition, each author should submit a color photograph of himself or herself with dimensions ranging from 3 to 10 inches on a side. Author photographs will only appear in the CD-ROM edition.

## LINE DRAWINGS AND GRAPHS

As stated above, each article must be adequately complete and self contained in the printed form to convey the important results without reference to the multimedia enhancements. This means that tables, graphs, equations, and line drawings may be needed in the printed edition. However, the IJVR will only accept photographs and half-tone/color graphics for inclusion in the CD-ROM. Line drawings and graphs must be photo-ready, submitted on paper no smaller than 3 by 3 inches with identifications such as figure numbers on the rear. Alternately, line drawings can be submitted in standard file format such as .EPS and .TIF. (Contact the IJVR office to discuss possible formats.) The IJVR will digitally scan the line drawings and graphs submitted on paper, and will resize them as needed. Screened pictures such as photographs printed in publications do not scan well and should be avoided when possible.

## TABLES AND EQUATIONS

The IJVR will typeset all the submitted tables and equations. Thus authors may submit them in neatly handwritten form. The IJVR reserves the right to change the typestyle or particular symbols. No mathematical expression or table in the printed edition can exceed the single column width, though expressions occupying multiple lines are permitted.

## FORMAT OF BIBLIOGRAPHIC REFERENCES

Citations of published literature must contain author names, article or book title, publication name (periodical or proceedings), publisher's name and city, volume and number (if appropriate), publication date (year and month if appropriate), and pages, sections, and/or chapters cited. Well-established abbreviations are acceptable. Here are two examples of the proper format:

[1] C. Stanfill and D. Waltz, "Toward Memory-Based Reasoning", *CACM*, ACM, New York, Vol. 29, No. 12, Dec. 1986, pp. 1213-1228.

[2] D. C. Montgomery, *Design and Analysis of Experiments*, Wiley, New York, 1984, Chapters 2,3.

## MULTIMEDIA ENHANCEMENTS

The IJVR encourages authors to submit color photographs, computer graphic files, videotape clips, sound clips, demonstration programs, and sourcecode files to enhance their presentations. Keep in mind that a number of short (5-30 second) clips are better than a small number of longer clips. The IJVR will digitize photographs, audio and video clips, the latter sent on formats like VHS, VHS-C, 8 mm, Hi-8. (Higher resolution formats digitize better.) Both PAL and NTSC formats are accepted. Authors can also send materials on computer files in most standard formats (e.g. .EPS, .GIF, .TIF, .PCX, .AVI, .WAV). Currently the standard of graphics viewing in the IJVR is the 640 by 480 VGA screen with 256 colors. The IJVR uses .AVI files as the starting point for video with sound. Stereographic pairs can

be published for use with currently available low cost viewing equipment (e.g. \$200 flicker free shutter glasses with SVGA interface board.)

### JUMP BUTTONS

The text of the article must refer to all "jumps" by enclosing appropriate identifications in double braces. In the CD-ROM edition of the journal the areas enclosed by double braces will become "jump buttons". That is, double clicking on one of those areas will take the reader to the labeled object, whether it be an additional screen of text or a multimedia enhancement like a color photo, videotape, audiotape, or some kind of computer graphic. Even a Windows and MS-DOS program can be run from a jump button. In the manuscript the double braces must enclose an adequate description of the jump destination, whether it be a footnote, bibliographic reference, or multimedia extension. Examples are {{footnote 1}}, {{ref [23]}}, {{videotape start=4:36, end=5:05}}, {{computer file egg.gif}}. In final editing the IJVR will change the descriptions inside the double braces to conform with its own system. "Entry screens", which are text screens with additional jump buttons leading into multimedia enhancements, are permitted in the CD-ROM edition. All buttons in the body of the article will appear in both editions, even though the multimedia enhancements are accessible only in the CD-ROM edition.

### SUBMISSION PROCEDURES

The initial submission may be to Richard A. Blade, Editor-in-Chief, IPI Press, 2608 N. Cascade, Colorado Springs, CO 80907, or directly to a content editor with a copy of the cover letter to the Editor-in-Chief. It should contain three (3) copies of the article to be printed organized in the following order: Title, authors, abstract, body of article, footnotes, bibliographic references, biographies, and list of keywords. In addition, a single copy of each of the video and audiotapes, computer files, and other materials to be published only on the CD-ROM is desirable but not absolutely required. At this stage the purpose of the submission is only to get a review, so photos, etc, need not be originals. It should not be assumed that materials will be returned, though the IJVR will attempt to do so if requested in the cover letter. The cover letter should contain the name of the single designated author to serve as contact along with address, phone, fax, and email address; date of submission; and a list of all enclosed materials. Email correspondence between the author(s), content editors, and IJVR staff is encouraged whenever possible, but the IJVR does not accept initial submissions by FAX or email (including ftp).

After the content editor has informed the designated author of the acceptance of the article, and has notified the IJVR, the staff at the IJVR will contact the author with instructions on the final submission.

## HOW TO USE THE ENCLOSED CD-ROM

The CD-ROM enclosed with this journal is designed to be used in *Windows 3.1* with a 386 or better computer with a minimum of 4M RAM, 256-color VGA (640x480 pixel) video, sound board, and CD-ROM drive. Depending on what else is loaded in the memory, even that configuration might not be adequate. We recommend a 486-33 or better computer with at least 8M RAM to run the CD-ROM.

Before the movies on this CD-ROM are played, software is loaded on your hard disk from the CD-ROM. Within the program manager, go to "RUN: " on the file menu and type "d:setup", where d: identifies the CD-ROM drive. Then follow the directions provided. After the software is loaded you can double click on the IJVR icon to access the CD-ROM.

## SPONSORS

The IJVR does not solicit nor does it accept donations to help subsidize operations. However, we accept grants for special projects and we sell multimedia advertising on the CD-ROM accessible through short paragraphs placed in this section. Contact Fred Henderson for additional information.

**Evans and Sutherland**, 600 Komas Drive, P.O. Box 59700, Salt Lake City, Utah 84108. Voice: (801) 582-5847 FAX: (801) 582-5848.

See the results of our compact, special-purpose image generator designed to produce imagery for VR applications {{movie 1}}. The generator produces photo-realistic 3D images using texturing, anti-aliasing, and smooth-shading techniques.

**ENGINEERING ANIMATION, INC.**, Headquarters: ISU Research Park, 2625 North Loop Drive, Ames, IA 50010, 800-324-6777.

One of the nation's leading computer visualization companies, Engineering Animation, Inc. provides three-dimensional computer animation products {{sample animations}} and markets its commercial software *VisLab*™, {{details}} to the engineering, biomedical, litigation, and entertainment communities. EAI's success stems from its expertise in litigation, engineering, and biomedical visualization, as well as a strong dedication to scientific accuracy. {{awards}} {{history}} With funding awarded from the U.S. Department of Commerce Advanced Technology Program, EAI is developing a 3D database of the human musculoskeletal system to create products for use in education and training, and to provide visualization services for the medical community.

## THE IJVR TEAM

### Host Institution:

University of Colorado - Colorado Springs, Linda  
Bunnell Shade, Chancellor

### Management:

Richard A. Blade, Physics, University of Colorado at  
Colorado Springs, *Editor-in-Chief*. **{{photo 1}}**  
J. Fred Henderson, IJVR Business Offices, *Managing Editor*.

### Advisory Committee:

Thomas Caudell, Electrical and Computer Engineering,  
University of New Mexico. **{{photo 2}}**  
Walter Karplus, Computer Science, University of California at  
Los Angeles.

### Multimedia Production:

Gordon Fuller, S3D Corporation, *Director of Multimedia  
Development*.  
Mark Hallahan, University of Colorado at Colorado Springs,  
*Director of Multimedia Production*. **{{photo 3}}**

### Content Editors:

Mary Lou Padgett, Auburn University, *Standards*  
William Martens, Spatial Media Corp, *Spatial Audio*.  
Hans Sieburg, Univ. of Calif - San Diego, *Biosciences*.  
Hal Thwaites, Concordia University, *3D Vision*. (Canada)  
Marilyn Panayi, City University of London, *Medical  
Applications*. (UK)

## INVITATIONS TO PARTICIPATE

**Content Editors for the IJVR:** The IJVR solicits nominations, including self-nominations, for individuals interested in becoming content editors for the IJVR. We are particularly interested in educational applications, social sciences, humanities, fine arts, and individuals outside the United States. Nominees should be motivated by the desire to play a role in the development of VR in general, and to insure high quality articles in the IJVR. The duties are to receive manuscripts, recruit referees to review the manuscripts, and communicate the recommendations to the authors. Content editors are listed along with the author(s) in articles published in the IJVR. Apply to Richard A. Blade, Editor-in-Chief, IJVR, 2608 N. Cascade, Colorado Springs, CO 80907, FAX: 719-630-1427, email: rblade@serf.uccs.edu.

**Computer Artists:** Aardvark Advertising is recruiting computer artists to work with advertising clients in preparing multimedia advertising for the IJVR and elsewhere. Apply to

Fred Henderson, Managing Editor, IJVR, PO Box 925,  
Leadville, CO 80461, Phone: 800-474-4587, FAX: 719-486-  
3652, email: ijvr@usa.net.

**Call for Papers:** Richard Blade is serving as guest editor for a VR issue of the European journal titled *ROBOTICS AND AUTONOMOUS SYSTEMS*, Elsevier Publishers, and is soliciting papers related to VR and robotics and/or autonomous systems. Papers must be submitted in preliminary form by June 1, 1995 to provide enough time for refereeing and making recommended modifications. Contact Richard Blade for further information and an author's guide at IPI Press, 2608 N. Cascade, Colorado Springs, CO 80907, FAX: 719-630-1427, email: rblade@serf.uccs.edu.

Currently there is no charge for placing announcements in the Invitations to Participate section of the IJVR, but the IJVR reserves the right to reject those that, in our opinion, are inappropriate. Send your announcement to Richard Blade, Editor-in-Chief, IJVR.

## ART GALLERY

This issue the IJVR features four pieces of computer art by Julia Hoerner, University of Colorado at Colorado Springs. **{{picture 1}}**, **{{picture 2}}**, **{{picture 3}}**, **{{picture 4}}**