List of articles proposed for study and citation analysis 2019.02.19

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1. Allison et al., Proc. Of IEEE VR 2001
2. Ardouin et al. ACM VRST 2012
3. Bowman et al., CACM 2012
4. Brooks, IEEE CGA 1999
5. Brown et al, The Visual Computer, 2004
6. Burns et al, Presence 2006
7. Chaminade et al, Soc Cogn Affect Neurosci. 2007
8. Cruz-Neira et al, Communications of the ACM, 1992
9. Glaeser et al, The Visual Computer, 1999
10. Ho, Basdogan et al, Presence 1999
11. Hodgins J. et al, ACM TAP 2010
12. Hoffman et al, Pain 2004
13. Interrante et al. IEEE 3DUI 2007
14. Johansson, Perception and Psychophysics 1973
15. Krueger et al, SIGCHI 1985
16. Lecuyer, Coquillart et al, IEEE VR Conf 2000
17. Lecuyer, Lotte et al, IEEE Computer 2008
18. Meehan et al, SIGGRAPH 2002
19. Murray et al, Disability & Rehabilitation 2007
20. Pertaub et al, Presence 2002
21. Poupyrev et al., ACM VRST 1997
22. Raij et al, IEEE TVCG 2007
23. Rizzo et al, Medecine meets VR, 2009
24. Sanchez-Vives & Slater, Nature reviews Neuroscience 2005
25. Scharples et al, Displays 2008
26. Schultheis et al., Presence 2001
27. Stoakley et al., CHI 1995
28. Thomson et al., Presence 2004
29. Tolani et al, Graphical Models, 2000
30. Ustinova et al., Journal of Neuroengineering and rehabilitation 2011
31. Yee et al, Communication Research 2009

- R. S. Allison, L. R. Harris, M. Jenkin, U. Jasiobedzka, and J. E. Zacher. Tolerance of temporal delay in virtual environments. In *Proceedings of the Virtual Reality 2001 Conference (VR'01)*, VR '01, pp. 247–. IEEE Computer Society, Washington, DC, USA, 2001.
    - To enhance presence, facilitate sensory motor performance, and avoid disorientation or nausea, virtual-reality applications require the percept of a stable environment. End-end tracking latency (display lag) degrades this illusion of stability and has been identified as a major fault of existing virtual-environment systems. Oscillopsia refers to the perception that the visual world appears to swim about or oscillate in space and is a manifestation of this loss of perceptual stability of the environment. In this paper, the effects of end-end latency and head velocity on perceptual stability in a virtual environment were investigated psychophysically. Subjects became significantly more likely to report oscillopsia during head movements when end-end latency or head velocity were increased. It is concluded that perceptual instability of the world arises with increased head motion and increased display lag. Oscillopsia is expected to be more apparent in tasks requiring real locomotion or rapid head movement.

- Jérôme Ardouin, Anatole Lécuyer, Maud Marchal, Clément Riant, and Eric Marchand. 2012. FlyVIZ: a novel display device to provide humans with 360° vision by coupling catadioptric camera with hmd. In *Proceedings of the 18th ACM symposium on Virtual reality software and technology* (VRST '12). ACM, New York, NY, USA, 41-44. DOI=http://dx.doi.org/10.1145/2407336.2407344
    - Have you ever dreamed of having eyes in the back of your head? In this paper we present a novel display device called FlyVIZ which enables humans to experience a real-time 360° vision of their surroundings for the first time. To do so, we combine a panoramic image acquisition system (positioned on top of the user's head) with a Head-Mounted Display (HMD). The omnidirectional images are transformed to fit the characteristics of HMD screens.

- Doug A. Bowman, Ryan P. McMahan, and Eric D. Ragan. 2012. Questioning naturalism in 3D user interfaces. *Commun. ACM* 55, 9 (September 2012), 78-88. DOI=10.1145/2330667.2330687 http://doi.acm.org/10.1145/2330667.2330687
    - 3D UIs are uniquely able to achieve superior interaction fidelity, and this naturalism can be a huge advantage.

- Frederick P. Brooks. 1999. What's Real About Virtual Reality?. *IEEE Comput. Graph. Appl.* 19, 6 (November 1999), 16-27. DOI=10.1109/38.799723 http://dx.doi.org/10.1109/38.799723
    - As is usual with infant technologies, the realization of the early dreams for VR and harnessing it to real work has taken longer than the wild hype predicted, but it is now happening. I assess the current state of the art, addressing the perennial questions of technology and applications. By 1994, one could honestly say that VR "almost works." Many workers at many centers could doe quite exciting demos.Nevertheless, the enabling technologies had limitations that seriously impeded building VR systems for any real work except entertainment and vehicle simulators. Some of the worst problems were end-to-end system latencies, low-resolution head-mounted displays, limited tracker range and accuracy, and costs. The technologies have made great strides. Today one can get satisfying VR experiences

with commercial off-the-shelf equipment. Moreover, technical advances have been accompanied by dropping costs, so it is both technically and economically feasible to do significant application. VR really works.

- Joel Brown, Jean-Claude Latombe, and Kevin Montgomery. 2004. Real-time knot-tying simulation. Vis. Comput. 20, 2 (May 2004), 165-179
    - The real-time simulation of rope, and knot tying in particular, raises difficult issues in contact detection and management. Some practical knots can only be achieved by complicated crossings of the rope, yielding multiple simultaneous contacts, especially when the rope is pulled tight. This paper describes a graphical simulator that allows a user to grasp and smoothly manipulate a virtual rope and to tie arbitrary knots, including knots around other objects, in real time. A first component of the simulator computes the global configuration of the rope based on user interactions. Another component of the simulator precisely detects self-collisions in the rope as well as collisions with other objects. Finally, a third component manages collisions to prevent penetration, while making the rope slide with some friction along itself and other objects, so that knots can be pulled tight in a realistic manner. An additional module uses recent results from knot theory to identify, also in real time, which topological knots have been tied. This work was motivated by surgical suturing, but simulation in other domains, such as sailing and rock climbing, could also benefit from it.

- Eric Burns, Sharif Razzaque, Abigail T. Panter, Mary C. Whitton, Matthew R. McCallus, and Frederick P. Brooks, Jr.. 2006. The hand is more easily fooled than the eye: users are more sensitive to visual interpenetration than to visual-proprioceptive discrepancy. Presence: Teleoper. Virtual Environ. 15, 1 (February 2006), 1-15.
    - A virtual environment (VE) user's avatar may penetrate virtual objects. Some VE designers prevent visual interpenetration, assuming that prevention improves user experience. However, preventing visual avatar interpenetration causes a discrepancy between visual and proprioceptive cues. We investigated users' detection thresholds for visual interpenetration and visual-proprioceptive discrepancy and found that users are much less sensitive to visual-proprioceptive discrepancy than to visual interpenetration. We propose using this result to better deal with user penetration of virtual objects.

- Thierry Chaminade, Jessica Hodgins and Mitsuo Kawato, Anthropomorphism influences perception of computer-animated characters' actions, Soc Cogn Affect Neurosci. 2007 September; 2(3): 206–216. Prepublished online 2007 May 21. doi: 10.1093/scan/nsm017.
    - Computer-animated characters are common in popular culture and have begun to be used as experimental tools in social cognitive neurosciences. Here we investigated how appearance of these characters' influences perception of their actions. Subjects were presented with different characters animated either with motion data captured from human actors or by interpolating between poses (keyframes) designed by an animator, and were asked to categorize the motion as biological or artificial. The response bias towards 'biological', derived from the Signal Detection Theory, decreases with characters' anthropomorphism, while sensitivity is only affected by

the simplest rendering style, point-light displays. fMRI showed that the response bias correlates positively with activity in the mentalizing network including left temporoparietal junction and anterior cingulate cortex, and negatively with regions sustaining motor resonance. The absence of significant effect of the characters on the brain activity suggests individual differences in the neural responses to unfamiliar artificial agents. While computer-animated characters are invaluable tools to investigate the neural bases of social cognition, further research is required to better understand how factors such as anthropomorphism affect their perception, in order to optimize their appearance for entertainment, research or therapeutic purpose.

- C. Cruz-Neira, D.J. Sandin, T.A. DeFanti, R.V. Kenyon, and J.C. Hart. The cave. audio visual experience automatic virtual environment. Communications of the ACM, 35(6):64-72, June 1992
    - the CAVE Is a new virtual reality Interface. In its abstract design, It consists of a room whose walls, ceiling and floor surround a viewer wlth projected Images. Its design overcomes many of the problems encountered by other virtual reality systems and can be constructed from currently available technology. Suspension of disbelief and viewer-centered Perspective, are often used to describe such systems.

- GLAESER, G., AND GRöLLER, E. 1999. Fast generation of curved perspectives for ultra-wide-angle lenses in vr applications. The Visual Computer 15, 7-8, 365–376
    - Classic ultra-wide-angle perspectives are not realistic and often misleading, nevertheless, they have to be used in many applications where the viewer needs a survey of the scene. Current hardware, however, only supports classic perspectives. We present a fast polygon-oriented algorithm that allows the use of curved perspectives in order to overcome several drawbacks, but at the cost of non-linearity. Space is projected onto a sphere rather than onto an image plane. The spherical coordinates are then interpreted two-dimensionally. We discuss the advantages and drawbacks of several approaches to curved perspectives.

- C. Ho, Cagatay Basdogan and Mandayam A. Srinivasan, Efficient Point-Based Rendering Techniques for Haptic Display of Virtual Objects, Presence: Teleoperators and Virtual Environments 1999 8:5, 477-491
    - Computer haptics, an emerging field of research that is analogous to computer graphics, is concerned with the generation and rendering of haptic virtual objects. In this paper, we propose an efficient haptic rendering method for displaying the feel of 3-D polyhedral objects in virtual environments (VEs). Using this method and a haptic interface device, the users can manually explore and feel the shape and surface details of virtual objects. The main component of our rendering method is the “neighborhood watch” algorithm that takes advantage of precomputed connectivity information for detecting collisions between the end effector of a force-reflecting robot and polyhedral objects in VEs. We use a hierarchical database, multithreading techniques, and efficient search procedures to reduce the computational time such that the haptic servo rate after the first contact is essentially independent of the number of polygons that represent the object. We also propose efficient methods for displaying surface properties of objects such as haptic texture and friction. Our haptic-texturing techniques and friction model can add surface details onto convex or concave 3-D polygonal surfaces. These haptic-rendering techniques can be extended to display dynamics of rigid and deformable objects.

- Jessica Hodgins, Sophie Jörg, Carol O'Sullivan, Sang Il Park, and Moshe Mahler. 2010. The saliency of anomalies in animated human characters. ACM Trans. Appl. Percept. 7, 4, Article 22 (July 2010),
    - Virtual characters are much in demand for animated movies, games, and other applications. Rapid advances in performance capture and advanced rendering techniques have allowed the movie industry in particular to create characters that appear very human-like. However, with these new capabilities has come the realization that such characters are yet not quite “right.”

- H. G. Hoffman, Sam R. Sharard, Barbara Codad, John J. Everetta,b,Marcia Ciolb, Todd Richardsc, David R. Patterson, Manipulating presence influences the magnitude of virtual reality analgesia, Pain 111 (2004) 162–168.
    - Excessive pain during medical procedures performed in unanesthetized patients is frequently reported, but can be reduced with virtual reality (VR) distraction. Increasing the person’s illusion of going into the virtual world may increase how effectively VR distracts pain. Healthy volunteers aged 18–20 years participated in a double-blind between-groups design. Each subject received a brief baseline thermal pain stimulus, and the same stimulus again minutes later with either a Low Tech or a High Tech VR distraction. Each subject provided subjective 0–10 ratings of cognitive, sensory and affective components of pain, and rated their illusion of going inside the virtual world. Subjects in the High Tech VR group reported a stronger illusion of going into the virtual world (VR presence) than subjects in the Low Tech VR group, (4.2 vs. 2.5, respectively, P ¼ 0:009) and more pain reduction (reduction of worst pain is 3.1 for High Tech VR vs. 0.7 for Low Tech VR, P , 0:001). Across groups, the amount of pain reduction was positively and significantly correlated with VR presence levels reported by subjects (r ¼ 0:48 for ‘worst pain’, P , 0:005).

- Interrante, V.; Ries, B.; Anderson, L., "Seven League Boots: A New Metaphor for Augmented Locomotion through Moderately Large Scale Immersive Virtual Environments," *3D User Interfaces, 2007. 3DUI '07. IEEE Symposium on* , vol., no., pp.,, 10-11 March 2007
doi: 10.1109/3DUI.2007.340791

    - When an immersive virtual environment represents a space that is larger than the available space within which a user can travel by directly walking, it becomes necessary to consider alternative methods for traveling through that space. The traditional solution is to require the user to travel 'indirectly', using a device that changes his viewpoint in the environment without actually requiring him to move - for example, a joystick. However, other solutions involving variations on direct walking are also possible. In this paper, we present a new metaphor for natural, augmented direct locomotion through moderately large-scale immersive virtual environments (IVEs) presented via head mounted display systems, which we call seven league boots.

- Johansson, G. (1973). Visual perception of biological motion and a model for its analysis. Perception And Psychophysics, 14(2), 201-211.

http://www.scopus.com/scopus/inward/record.url?eid=2-s2.00015721589&partnerID=40&rel=R6.5.0

- This paper reports the first phase of a research program on visual perception of motion patterns characteristic of living organisms in locomotion. Such motion patterns in animals and men are termed as biological motion. They are characterized by a far higher degree of complexity than the patterns of simple mechanical motions usually studied in laboratories. In everyday perceptions, the visual information from biological motion and from the corresponding figurative contour patterns (the shape of the body) are intermingled. A method for studying information from the motion pattern per se without interference with the form aspect was devised. In short, the motion of the living body was represented by a few bright spots describing the motions of the main joints. It is found that 10-12 such elements in adequate motion combinations in proximal stimulus evoke a compelling impression of human walking, running, dancing, etc. The kinetic geometric model for visual vector analysis originally developed in the study of perception of motion combinations of the mechanical type was applied to these biological motion patterns. The validity of this model in the present context was experimentally tested and the results turned out to be highly positive.

- Myron W. Krueger, Thomas Gionfriddo, and Katrin Hinrichsen. 1985. VIDEOPLACE\—an artificial reality. In Proceedings of the SIGCHI conference on Human factors in computing systems (CHI '85). ACM, New York, NY, USA, 35-40. DOI=10.1145/317456.317463 http://doi.acm.org/10.1145/317456.317463
  - The human-machine interface is generalized beyond traditional control devices to permit physical participation with graphic images. The VIDEOPLACE System combines a participant's live video image with a computer graphic world. It also coordinates the behavior of graphic objects and creatures so that they appear to react to the movements of the participant's image in real-time. A prototype system has been implemented and a number of experiments with aesthetic and practical implications have been conducted.

- Lecuyer, Anatole, Coquillart, Sabine, Kheddar, Abderrahmane, Richard, Paul, and Coiffet, Philippe: Pseudo-Haptic Feedback: Can Isometric Input Devices Simulate Force Feedback?, Proceedings of the IEEE Virtual Reality 2000 Conference, IEEE Computer Society, 83–, 2000.
  - This paper considers whether a passive isometric input device, such as a Spaceball, used together with visual feedback, could provide the operator with a pseudo-haptic feedback.For this aim, two psychophysical experiments have been conducted. The first experiment consisted of compliance discrimination, between two virtual springs hand-operated by means of the Spaceball. In this experiment, the stiffness (or compliance) JND turned out to be 6%. The second experiment assessed stiffness discrimination between a virtual spring and the equivalent spring in reality. In this case, the stiffness (or compliance) JND was found to be 13.4%.These results are consistent with previous outcomes on manual discrimination of compliance. Consequently, this consistency reveals that the passive apparatus that was used can, to some extent, simulate haptic information.In addition, a final test indicated that the proprioceptive sense of the subjects was blurred by visual feedback. This gave them the illusion of using a non-isometric device.

- Lecuyer, A.; Lotte, F.; Reilly, R.B.; Leeb, R.; Hirose, M.; Slater, M.; , "Brain-Computer Interfaces, Virtual Reality, and Videogames," Computer , vol.41, no.10, pp.66-72, Oct. 2008 http://ieeexplore.ieee.org/stamp/stamp.jsp?tp=&arnumber=4640665&isnumber=4640644

- Far beyond science-fiction clichés and the image of a person connected to cyberspace via direct cerebral implants as in The Matrix, brain-computer interfaces (BCIs) can offer a new means of playing videogames or interacting with 3D virtual environments (VEs). Only in recent years have research groups been attempting to connect BCIs and virtual worlds. However, several impressive prototypes already exist that enable users to navigate in virtual scenes or manipulate virtual objects solely by means of their cerebral activity, recorded on the scalp via electroencephalography (EEG) electrodes. Meanwhile, virtual reality (VR) technologies provide motivating, safe, and controlled conditions that enable improvement of BCI learning as well as the investigation of the brain responses and neural processes involved.

- Michael Meehan, Brent Insko, Mary Whitton, and Frederick P. Brooks, Jr.. 2002. Physiological measures of presence in stressful virtual environments. In Proceedings of the 29th annual conference on Computer graphics and interactive techniques (SIGGRAPH '02). ACM, New York, NY, USA, 645-652. DOI=10.1145/566570.566630 http://doi.acm.org/10.1145/566570.566630
  - A common measure of the quality or effectiveness of a virtual environment (VE) is the amount of presence it evokes in users. Presence is often defined as the sense of being there in a VE. There has been much debate about the best way to measure presence, and presence researchers need, and have sought, a measure that is reliable, valid, sensitive, and objective. We hypothesized that to the degree that a VE seems real, it would evoke physiological responses similar to those evoked by the corresponding real environment, and that greater presence would evoke a greater response. To examine this,...

- Murray, C.D., Pettifer, S., Howard, T., Patchick, E., Caillette, F., Kulkarni, J. amd Bamford, C. (2007) The treatment of phantom limb pain using immersive virtual reality: three case studies. Disability & Rehabilitation, 29(18), 1465-1469,
  - Purpose: This paper describes the design and implementation of a case-study based investigation using immersive virtual reality as a treatment for phantom limb pain.
  - Method: Three participants who experienced phantom limb pain (two with an upper-limb amputation, and one with a lower-limb amputation) took part in between 2-5 Immersive Virtual Reality (IVR) sessions over a three week period. The movements of participants' anatomical limbs were transposed into the movements of a virtual limb, presented in the phenomenal space of their phantom limb.

- Pertaub, D.P., Slater, M., and Barker, C.: An experiment on public speaking anxiety in response to three different types of virtual audience, Presence, Teleoperators and Virtual Environments 11(1), volume 11, 68–78, 2002.
  - This paper describes an experiment to assess the anxiety responses of people giving 5 min. presentations to virtual audiences consisting of eight male avatars. There were three different types of audience behavior: an emotionally neutral audience that remained static throughout the talk, a positive audience that exhibited friendly and appreciative behavior towards the speaker, and a negative audience that exhibited hostile and bored expressions throughout the talk A second factor was immersion: half of the forty subjects experienced the virtual seminar room through a head-tracked, head-mounted display and the remainder on a desktop system. [...] The negative audience clearly provoked an anxiety response irrespective of the normal level of public speaking confidence of the subject. The somatic response also showed a higher level of anxiety for the negative audience than for the other two, but self-rating was generally higher only for the static audience, each of these results taking into account prior PRCS.

- Ivan Poupyrev, Suzanne Weghorst, Mark Billinghurst, and Tadao Ichikawa. 1997. A framework and testbed for studying manipulation techniques for immersive VR. In *Proceedings of the ACM symposium on Virtual reality software and technology* (VRST '97). ACM, New York, NY, USA, 21-28. DOI=10.1145/261135.261141 http://doi.acm.org/10.1145/261135.261141
    - Developing virtual reality (VR) applications which enable actual work over a period of time requires optimization of the most basic interactions, such as object manipulation, so that the immersed participant can concentrate on higher-level tasks rather than on low-level motor activities.

- Andrew B. Raij, Kyle Johnsen, Robert F. Dickerson, Benjamin C. Lok, Marc S. Cohen, Margaret Duerson, Rebecca Rainer Pauly, Amy O. Stevens, Peggy Wagner, and D. Scott Lind. 2007. Comparing Interpersonal Interactions with a Virtual Human to Those with a Real Human. IEEE Transactions on Visualization and Computer Graphics 13, 3 (May 2007), 443-457.
    - This paper provides key insights into the construction and evaluation of interpersonal simulators—systems that enable interpersonal interaction with virtual humans. Using an interpersonal simulator, two studies were conducted that compare interactions with a virtual human to interactions with a similar real human. The specific interpersonal scenario employed was that of a medical interview.

- Rizzo A., Difede J., Rothbaum B., Johnston S., McLay R., Reger G., Gahm G., Parsons T., Graap K., Pair J. VR PTSD Exposure Therapy Results with Active Duty OIF/OEF Combatants, *Medicine Meets Virtual Reality 17* (January 2009)
    - Post Traumatic Stress Disorder (PTSD) is reported to be caused by traumatic events that are outside the range of usual human experience including military combat, violent personal assault, being kidnapped or taken hostage and terrorist attacks. Reports indicate that at least 1 out of 6 Iraq War veterans are exhibiting symptoms of depression, anxiety and PTSD. Virtual Reality exposure therapy has been previously used for PTSD with reports of positive outcomes. This paper will present a brief description of the USC/ICT Virtual Iraq/Afghanistan PTSD therapy application and present clinical outcome data from active duty patients treated at the Naval Medical Center-San Diego (NMCSD) as of October 2009. Initial outcomes from the first twenty patients to complete treatment indicate that 16 no longer meet diagnostic criteria for PTSD at post treatment. Research and clinical tests using the Virtual Iraq/Afghanistan software are also currently underway at Weill Cornell Medical College, Emory University, Fort Lewis and WRAMC along with 20 other test sites.
      VR PTSD Exposure Therapy Results with Active Duty OIF/OEF Combatants
      http://ict.usc.edu/publications/vr_ptsd_exposure_therapy_results_with_active_duty_oif_oef_combatants/

- M. V. Sanchez-Vives1 & Mel Slater, From presence to consciousness through virtual reality, Nature Reviews Neuroscience 6, 332-339 (April 2005) | doi:10.1038/nrn1651
    - Immersive virtual environments can break the deep, everyday connection between where our senses tell us we are and where we are actually located and whom we are with. The concept of 'presence' refers to the phenomenon of behaving and feeling as if we are in the virtual world created by computer displays. In this article, we argue that presence is worthy of study by neuroscientists, and that it might aid the study of perception and consciousness.

- Sarah Sharples, Sue Cobb,Amanda Moody, John R.Wilson, Virtual reality induced symptoms and effects (VRISE): Comparison of head mounted display (HMD), desktop and projection display systems, Elsevier, Displays, Volume 29, Issue 2, March 2008, Pages 58-69, https://doi.org/10.1016/j.displa.2007.09.005
    - Virtual reality (VR) systems are used in a variety of applications within industry, education, public and domestic settings. Research assessing reported symptoms and side effects of using VR systems indicates that these factors combine to influence user experiences of virtual reality induced symptoms and effects (VRISE). Three experiments were conducted to assess prevalence and severity of sickness symptoms experienced in each of four VR display conditions; head mounted display (HMD), desktop, projection screen and reality theatre, with controlled examination of two additional aspects of viewing (active vs. passive viewing and light vs. dark conditions). Results indicate 60–70% participants experience an increase in symptoms pre–post exposure for HMD, projection screen and reality theatre viewing and found higher reported symptoms in HMD compared with desktop viewing (nausea symptoms) and in HMD compared with reality theatre viewing (nausea, oculomotor and disorientation symptoms). No effect of lighting condition was found. Higher levels of symptoms were reported in passive viewing compared to active control over movement in the VE. However, the most notable finding was that of high inter- and intra-participant variability. As this supports other findings of individual susceptibility to VRISE, recommendations are offered concerning design and use of VR systems in order to minimise VRISE.

- M. T. Schultheis, Ronald R. Mourant, Virtual Reality and Driving: The Road to Better Assessment for Cognitively Impaired Populations, Presence, August 2001, Vol. 10, No. 4, Pages 431-439, doi:10.1162/1054746011470271, MIT Press
    - Individuals with cognitive impairments can be faced with difficulties that may challenge their ability to drive an automobile, and this impairment is often very disruptive to vocational, social, and domestic activities. Rehabilitation specialists are often given the task of determining capacity to drive. However, traditional assessment methods are fraught with various limitations, including dependence on subjective interpretation of behaviors, non standardized procedures, and few ecologically valid measures. A virtual reality-based driving-assessment system (VR-DAS) offers the opportunity to overcome many of the limitations of current methodologies.

- Richard Stoakley, Matthew J. Conway, and Randy Pausch. 1995. Virtual reality on a WIM: interactive worlds in miniature. In *Proceedings of the SIGCHI Conference on Human Factors in Computing Systems* (CHI '95), Irvin R. Katz, Robert Mack, Linn Marks, Mary Beth Rosson, and Jakob Nielsen (Eds.). ACM Press/Addison-Wesley Publishing Co., New York, NY, USA, 265-272. DOI=10.1145/223904.223938 http://dx.doi.org/10.1145/223904.223938
    - This paper explores a user interface technique which augments an immersive head tracked display with a hand-held miniature copy of the virtual environment.

- W. B. Thompson, Peter Willemsen, Amy A. Gooch, Sarah H. Creem-Regehr, Jack M. Loomis, Andrew C. Beall, Does the Quality of the Computer Graphics Matter when Judging Distances in

Visually Immersive Environments? Presence, October 2004, Vol. 13, No. 5, Pages 560-571, MIT Press

- In the real world, people are quite accurate in judging distances to locations in the environment, at least for targets resting on the ground plane and distances out to about 20 m. Distance judgments in visually immersive environments are much less accurate. Several studies have now shown that in visually immersive environments, the world appears significantly smaller than intended. This study investigates whether or not the compression in apparent distances is the result of the low-quality computer graphics utilized in previous investigations. Visually directed triangulated walking was used to assess distance judgments in the real world and in three virtual environments with graphical renderings of varying quality.

- Deepak Tolani, Ambarish Goswami, Norman I. Badler, Real-Time Inverse Kinematics Techniques for Anthropomorphic Limbs, Graphical Models, Volume 62, Issue 5, September 2000, Pages 353-388, ISSN 1524-0703
    - In this paper we develop a set of inverse kinematics algorithms suitable for an anthropomorphic arm or leg. We use a combination of analytical and numerical methods to solve generalized inverse kinematics problems including position, orientation, and aiming constraints. Our combination of analytical and numerical methods results in faster and more reliable algorithms than conventional inverse Jacobian and optimization-based techniques. Additionally, unlike conventional numerical algorithms, our methods allow the user to interactively explore all possible solutions using an intuitive set of parameters that define the redundancy of the system.

- Ksenia I Ustinova, Wesley A Leonard, Nicholas D Cassavaugh and Christopher D Ingersoll, Development of a 3D immersive videogame to improve arm-postural coordination in patients with TBI, Journal of NeuroEngineering and Rehabilitation 2011,8:61.
  http://www.biomedcentral.com/content/pdf/1743-0003-8-61.pdf

    - Traumatic brain injury (TBI) disrupts the central and executive mechanisms of arm(s) and postural (trunk and legs) coordination. To address these issues, we developed a 3D immersive videogame Octopus. The game was developed using the basic principles of videogame design and previous experience of using videogames for rehabilitation of patients with acquired brain injuries. Unlike many other custom-designed virtual environments, Octopus included an actual gaming component with a system of multiple rewards, making the game challenging, competitive, motivating and fun. Effect of a short-term practice with the Octopus game on arm-postural coordination in patients with TBI was tested...

- Nick Yee,Jeremy N. Bailenson, The Proteus Effect: Implications of Transformed Digital Self-Representation on Online and Offline Behavior, Communication Research, Volume 36 Number 2 April 2009 285-312
    - Virtual environments allow individuals to dramatically alter their self-representation. More important, studies have shown that people infer their expected behaviors and attitudes from observing their avatar’s appearance, a phenomenon known as the Proteus effect. For example, users given taller avatars negotiated more aggressively than users given shorter avatars. Two studies are reported here that extend our understanding of this effect.