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JCR

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In This Issue

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EDITORIAL

Welcome to the second issue of the *Journal of CyberTherapy & Rehabilitation* (JCR). This peer-reviewed academic journal continues to explore the uses of advanced technologies for therapy, training, education, prevention, and rehabilitation. JCR is a quarterly published academic journal, which focuses on the rapidly expanding worldwide trend of moving toward technological applications in healthcare. Our main interests include, but are not limited to, psychiatry, psychology, physical medicine and rehabilitation, neurology, occupational therapy, physical therapy, cognitive rehabilitation, neurorehabilitation, oncology, obesity, eating disorders, and autism, among many others.

Advanced technologies such as virtual reality (VR), robotics, non-invasive physiological monitoring, E-health, and adaptive displays are being applied to several areas of healthcare. New areas of research regarding the use of advanced technologies in healthcare are transforming this ever-changing field revealing new discoveries, aiding patients with both mental and physical disorders.

Since the debut of our inaugural issue, JCR has received international attention from peers, international institutions, and international conferences. The JCR is the official journal of the International Association of CyberTherapy & Rehabilitation (IACR) and the official journal of the CyberTherapy Conference series, the fourteenth annual conference will be held in Verbania next June, which has gained interest from European high-level conferences on healthcare to Ministers of Health all over the European continent. The IACR has recently collaborated with Med-e-Tel 2009, an international annual telehealth conference that draws an enormous and diverse attendance, after Med-e-Tel's 2008 addition of telepsychiatry, to bring cybertherapy to another innovative field of healthcare. Both the Association and the Journal have been invited to European conferences on health and wellbeing, which has opened many doors for opportunities through our gained publicity. "Healthcare in Europe needs to change," remarked Zofija Mazej-Kukovic, Slovenian Minister of Health and currently holding the European Union Presidency, while interviewing for the JCR. "I look forward to working with as many possible partners and organizations in the future."

This issue of JCR features comprehensive articles by preeminent scholars in the field. This issue's reviews and studies include some of the most promising applications for technology in therapy and rehabilitation, surveying the concepts and studies that laid the groundwork for the field up to this point. In the previous issue, the focus of the articles were an introduction for those new to the field as well as an expansion of knowledge of those well-established in their careers with newer applications for technology in healthcare. This issue has many new and innovative expansions on cybertherapy and healthcare in more focused fields. It is exciting to see the JCR evolve into new aspects of the field, moving technology and scientific findings, as well as our journal, into the transforming field of cybertherapy.

In the first paper, Gamberini writes an article on the continual usage of computer games in healthcare. Gamberini et al. focuses their article on proposing a review of existing research on computer games, exploited for prevention, support, training, rehabilitation, and specifically reviewing the relationship between cognitive processes and gaming. The article shows the success and ability to foster motivatation and to enhance cognitive processes.

The second article, by Mülberger et al. focuses virtual reality therapy on treatment for phobias, specifically on patients who suffer from spider phobia. "A Virtual Reality Behavior Avoidance Test (VR-BAT) for the Assessment of Spider Phobia" use virtual environments and spider scenarios for a behavior avoidance test, monitoring subjective anxiety, symptoms, heart rate, skin conductance, and approach behavior in 34 female patients. Their research found a very effective result for physiological assessment of fear.

The next article by Villani and Riva which is entitled, "The Role of Media in Supporting a Stress Management Protocol: An Experimental Study," focuses on stress management and the sense of presence carried out through virtual environments. This article suggests the importance of the sense of presence as a mediating variable between the experience and the efficacy of the relaxation process, creating new advances in therapeutic approaches.

After that, Alcaniz et al. authored "Low-cost Virtual Motor Rehabilitation for Neurophysical Disability Improvements in Impaired Patients," which attempts to find a new way of using technology to improve motor rehabilitation to customize exercises for patients. The end result brings promising outcomes, citing increased motivation for patients in the rehabilitation process.

Later is an article using technology and therapy to treat obese patients with emotional eating. "New Technologies and Relaxation: An Explorative Study on Obese Patients with Emotional Eating," written by Manzoni et al. analyze stress and negative emotions as critical factors in inducing overeating in obese patients using virtual reality. The authors present several examples of the effectiveness of relaxation training using VR for emotional eating.

Hoffman et al., wrote the sixth article, "Pain Control During Wound Care for Combat-Related Burn Injuries Using Custom Articulated Arm Mounted Virtual Reality Goggles," for the use of pain control for soldiers suffering from various combat-related wounds. The VR goggle system proved to distract and even entertain many patients during wound care, dropping pain from "severe" to "mild." This article focuses mainly on burn victims using VR as an effective adjunctive nonpharmacologic analgesic for reducing cognitive pain, emotion pain, and sensory components.

Finally, the article "Applying the Technology Acceptance Model to VR with People who are Favorable to its Use," by Bertrand and Bouchard tests the Technology Acceptance Model as applied to the use of virtual reality in clinical settings. The results reveal that Intention to Use VR is predicted only by Perceived Usefulness, which then indicates how to better document the dissemination of virtual reality among clinicians.

The third issue of JCR will continue to explore the ways in which technology influences and enhances the healthcare of citizens in Europe and throughout the world. We are interested in receiving original research and ideas for future theme issues from our readership. Current topics being considered include non-manual displays, neurophysiology, VR and e-health for special populations including the elderly, pediatrics, and those with disabilities, among others. Please contact us with your interesting manuscripts and ideas for additional topics for the Journal, and thank you for your support of this promising new publication.

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A GAME A DAY KEEPS THE DOCTOR AWAY: A SHORT REVIEW OF COMPUTER GAMES IN MENTAL HEALTHCARE

Luciano Gamberini[1], Giacinto Barresi[1], Alice Majer[1], and Fabiola Scarpetta[1]

Computer games are currently a focal topic in different research areas. One of the emerging contexts for their use is represented by healthcare. Thanks to their potentialities, they have been successfully exploited in this domain to foster motivation and to enhance cognitive processes. This paper proposes a review of existing research on computer games, exploited for prevention, support, training, rehabilitation, and particularly stressing the relationship between cognitive processes and gaming.

1. Games and Videogames

1.1 The Double Soul of Game

Playing is an activity that everyone has encountered more than once during his/her lifetime. Trying to provide a definition of games, Caillois (1957) identified some distinctive traits characterizing this activity. First of all, games are based on a free participation, and their development is circumscribed in time and place. Games are structured according to specific rules and the activity's outcome is unpredictable. Finally, players are well aware of the existence of this different reality, where norms and behaviors usually enacted in our daily life are temporarily suspended.

Developmental scientists have underlined that playing affects cognitive processes. Piaget (1945), for instance, observed that different stages in the psychological development of children correspond to different stages in play development. The perceptual play, based on perceptual and motor pleasure characterizing the first months of life, is substituted by the symbolic play, individual and subjective, focused on imagination and fantasy. Later, even the symbolic play will be gradually replaced by games with rules, involving a group of participants with different and specific roles imitating the real world. According to Piaget, the passage from symbolic to ruled games would also mark the appropriation of moral values (Piaget, 1932).

This Piagetian distinction between imagination and rules in play has been further developed by another important psychologist, Vygotskij (1967). He claimed that the effects of culture are visible even in the phase of symbolic play, as every imaginary situation includes social rules of behavior. For example, children will play Mom, reproducing the practices of what can be called a "maternal behavior".

If Piaget and Vygotskij depict children as sponges absorbing social and physical inputs from the environment, a constructivist approach to game interprets this activity as a process for the construction of meanings (Farné, 2005).

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A VIRTUAL REALITY BEHAVIOR AVOIDANCE TEST (VR-BAT) FOR THE ASSESSMENT OF SPIDER PHOBIA

Andreas Mühlberger[1], Miriam Sperber[1], Mattias J. Wieser[1], and Paul Pauli[1]

Lang and colleagues postulated that fear responses must be described on three levels: subjective-cognitive, physiological, and behavioral. However, in-vivo assessments of fear in phobic situations are complex, difficult to control, and frequently associated with methodological problems. The present studies used a virtual reality spider scenario for a behavior avoidance test (VR-BAT). Subjective anxiety, symptoms, heart rate (HR), skin conductance (SCL), and approach behavior were measured in 34 female spider-phobic participants during two VR-BATs and during eight exposure trials in-between. The distance and fear ratings decreased from the first to the second VR-BAT and during the exposure trials. Interestingly, HR and SCL increased during the exposure trials and HR even between the first to the second VR-BAT. Physiological measures, fear ratings and approach were only partially associated, but approach and fear measures correlated with psychometric measures of spider phobia. The virtual reality scenario seems feasible for the behavioral and physiological assessment of fear.

Introduction

According to widely accepted criteria (e.g., Diagnostic and Statistical Manual, Version IV [DSM IV], American Psychiatric Association, 1994) the diagnosis of a specific phobia is based on reports of fear, on physiological arousal, and/or on behavioral avoidance triggered by phobic stimuli or situations. Similarly, Lang and colleagues postulated that fear must be described on three fairly independent response levels: subjective-cognitive, physiological, and behavioral. The simultaneous assessment of these three levels is necessary because fear reactions differ between levels as reflected in only low to moderate correlations (about $r = .30$, see Lang, 1978; Lang, 1994).

The discrepancy between the theoretical claim that a multi-level assessment of phobic responses is useful and necessary and the rare practical implementation may have two reasons: firstly, in-vivo assessments of fear in phobic situations are complex, difficult to realize and to control, and are frequently associated with methodological problems. Real-life situations cannot be presented in an experimentally controlled way. Furthermore, while in-vivo approaches might have a high potential to discriminate phobic from control participants, elaborate analyzes to reduce measurement artifacts are necessary (Wilhelm & Roth, 1998). Secondly, standardized laboratory experimental set-ups hardly elicit clinically relevant emotions (Loomis, Blascovich, & Beall, 1999) and their ecological validity remains questionable (e.g., Cohen, 1977).

High-fidelity Virtual Reality (VR) is a technical development that may allow a reliable and valid assessment of both clinically relevant verbal and physiological fear reactions. VR provides a person with a high level of sensory realism. Besides, it enables the experimenter to control the situation and most of the stimulus aspects. Both factors allow to simulate realistic phobic situations and to induce emotions in a controlled, standardized way (Hoffman, 1998; Loomis et al., 1999). Additionally, the measurement of verbal, motor, and physiological responses is possible whereas artifacts usually induced by uncontrollable factors in real environments are rare.

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We thank Mathias Müller for his assistance in the development and set-up of the virtual environments. Parts of the present data have been presented at the Laval Virtual International Conference and have been published in the VRIC Laval Virtual Proceedings 2007 (pp. 97-102).

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THE ROLE OF MEDIA IN SUPPORTING A STRESS MANAGEMENT PROTOCOL: AN EXPERIMENTAL STUDY

Daniela Villani[1] and Giuseppe Riva[1]

Stress management (SM) is a term widely used with a seemingly obvious meaning but it is not clear how many different forms of SM exist and how efficacious they are according to the target problem. Stress is a multidimensional condition and we believe that it requires a wide-spectrum approach. We consider that a combination of stress management techniques can produce more significant outcomes than did single-strategy programs. For this reason we propose an integration of three approaches to cope with stress and improve emotional management from different points of view: the Emotion Focused Therapy; the Behavioral Therapy, and in particular Relaxation; the Rational Emotive Therapy.
In particular, we decided to use two mediated experiences – audio and immersive 3D video - to support the Relaxation phase. The critical role in mediated experiences is played by the sense of presence that allows the experience to evoke the same perceptual reactions and emotions as a real one.
To verify the efficacy of the SM protocol we carried out a controlled trial, comparing an experimental Video group, an Audio group (that only listened to the relaxing narrative), and a control group without treatment.
Results showed the efficacy of integrating different approaches to cope with stress and suggested the importance of the sense of presence as a mediating variable between the experience and the efficacy of the relaxation process.

Introduction

Stress management (SM) is a term widely used with a seemingly obvious meaning, as recently noted by a review (Ong, Linden, & Young, 2004), but it is not clear how many different forms of SM exist and how efficacious they are according to the target problem. Analyzing more than hundred research articles, results showed that the most commonly employed components in a SM program involve multicomponent cognitive-behavioral therapy (CBT) or relaxation-oriented techniques.

Stress has been associated with a variety of chronic and acute illnesses (S. Cohen et al., 1998; S. Cohen, Miller, & Rabin, 2001), with increased health care costs and decreased productivity (Pelletier & Lutz, 1988). As a consequence, considerable research has been conducted with a variety of specific types of samples applying a variety of professional-to-participant interventions. A comprehensive review of work-site-based research (Murphy, 1996) identified that the most common single stress-management techniques applied were relaxation and cognitive reframing. Importantly, at the same time the review concluded that programs that apply a combination of stress management techniques produced more significant outcomes than did single-strategy programs.

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LOW-COST VIRTUAL MOTOR REHABILITATION FOR NEUROPHYSICAL DISABILITY IMPROVEMENTS IN IMPAIRED PATIENTS

Mariano Alcañiz[1], José A. Gil[1], Javier Chirivella[1], Enrique Noé[1],
Carolina Colomer[2], and Joan Ferri[1]

Motor rehabilitation needs, in most cases, specialists that indicate exercises to do, and, generally, the specialist must follow the patient most of the time. Moreover, there are not objective measures to evaluate in detail the correction of exercises and the exercises patient's evolution. To improve the motor rehabilitation process, we present a new low-cost system that allows in the first stage, the use of last generation tools for the development of customizable standing exercises. This new system is being validated in an important rehabilitation center with very promising results. The first validations that are taking place indicate that it contributes with important improvements, permitting a smallest dependence of the patient in relation to the specialist, providing objective measures of evolution of the patients in the realization of exercises, and increasing the motivation of the patients in the rehabilitation process.

Introduction

Patients with brain injury can suffer balance disorders caused by various and mixed factors, which include alterations in mechanical components, such as strength and tone, sensory organization or motor coordination systems.

Recovering the strategies that allow maintaining balance and postural control is of crucial importance to achieve autonomy in daily activities.

There are three main factors in motor recovery: early intervention, task-oriented training and repetition intensity ([1]). Motor rehabilitation programs are oriented to satisfy the two last factors. In order to obtain this, motor rehabilitation programs must include exercises set out to reinforce the appropriated balance strategies necessary in each individual case and clinical period. The precise repetition of the exercises, their complexity, speed, intensity and number of repetitions determine the further results. Therefore, a strict supervision and exhaustive data record is basic.

The use of virtual reality techniques and last-generation tools in the process of rehabilitation can suppose an important help in this process, as current references show up ([2], [3], [4]). However, the integration of virtual rehabilitation systems in clinic centres is not yet extended, partly due to the cost of some of the existing systems, which need very expensive components (high quality Head Mounted Displays, high-performance PC platforms, expensive gesture an posture recognition devices, etc.).

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NEW TECHNOLOGIES AND RELAXATION: AN EXPLORATIVE STUDY ON OBESE PATIENTS WITH EMOTIONAL EATING

Gian Mauro Manzoni, Psy.D.[1,2]; Alessandra Gorini, Ph.D.[3,4]; Alessandra Preziosa, Ph.D.[1]; Francesco Pagnini, M.S.[2]; Gianluca Castelnuovo, Ph.D., Psy.D.[5]; Enrico Molinari, Ph.D.[1,5]; and Giuseppe Riva, Ph.D.[3,5]

Since stress and negative emotions are critical factors in inducing overeating in obese patients, psychological and behavioural interventions for obesity should include stress management techniques. A three weeks relaxation protocol supported by the use of new technologies, including virtual reality (VR) and portable mp3 players, was developed in order to reduce stress and related emotional eating episodes in obese patients. Sixty female obese inpatients reporting emotional eating were included in the study and divided in three experimental groups (virtual reality-VR, imaginative-IM and waiting list). Psychometric and physiological variables were collected. Results show that relaxation training was effective in improving perceived self efficacy in eating control, as well as in decreasing depressive symptoms, anxiety and physiological arousal both in the VR and IM conditions.

This study suggests that relaxation training for obese patients with emotional eating is effective, even if the lack of differences between the two conditions suggests some important critical considerations.

Introduction

The interest in eating-related issues reflects worldwide statistics showing that approximately 1.6 billion adults (age 15+) are overweight and at least 400 million are obese. The World Health Organization (WHO) further projects that by 2015, approximately 2.3 billion adults will be overweight and more than 700 million will be obese (WHO, 2006). Given that overweight and obesity lead to serious health consequences, developing and implementing effective interventions for substantially reduce weight and the associated risks for health is compelling.

Beside some important and well established aetiological factors such as excessive food intake and lack of physical activity, that are the principal targets in the majority of traditional weight reduction programs based on diet and exercise training, an important variable that must be taken into account for the treatment of obesity regards the way in which food intake relates with bio-psychological stress (Gluck, 2006; Volkow & Wise, 2005). This relationship is well illustrated in the behavioural phenomenon of emotional eating, that is defined as eating in response to one's mood or emotion (Bekker, van de Meerendonk, & Mollerus, 2004), as opposed to eating in response to physiological cues of hunger, eating on a schedule, or eating socially.

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PAIN CONTROL DURING WOUND CARE FOR COMBAT-RELATED BURN INJURIES USING CUSTOM ARTICULATED ARM MOUNTED VIRTUAL REALITY GOGGLES

Christopher Maani, MD[1], Hunter G. Hoffman, Ph.D[2], Peter A. DeSocio, DO[1], Michelle Morrow[1], Chaya Galin[1], Jeff Magula[2], Alan Maiers[1], and Kathryn Gaylord[1]

We describe the first two cases where virtual reality was added to usual pain medications to reduce excessive pain during wound care of combat-related burn injuries. Patient 1 was a 22 year old male who suffered 3rd degree burns on 32% of his body, including his right hand, during a roadside bomb terrorist attack in Iraq. The nurse administered wound care to half of the right hand during VR and the other half of the same hand during no VR (treatment order randomized). This patient was the first to use a unique custom articulated robotic-like arm mounted VR goggle system. Three 0-10 graphic rating scale pain scores for each of the two treatment conditions served as the primary dependent variables. The patient reported less pain when distracted with VR. "Time spent thinking about pain" dropped from 100% during no VR to 15% during VR, “pain unpleasantness” ratings dropped from “moderate” (6/10) to “mild” (4/10). Wound care was "no fun at all" (0/10) during no VR but was "pretty fun" (8/10) during VR. However, Patient 1 reported no reduction in worst pain during VR. Patient 2 suffered 2nd and 3rd degree burns when his humvee was hit by a terrorist's rocket propelled grenade in Iraq. During his wound care debridement, "time spent thinking about pain" was 100% (all of the time) with no VR and 0 (none of the time) during VR, "pain unpleasantness" ratings dropped from "severe" (7/10) to "none". Worst pain dropped from "severe" (8/10) to mild pain (2/10). And fun increased from zero with no VR to 10 (extremely fun) during VR. Although preliminary, using a within-subjects experimental design, the present study provided evidence that immersive VR can be an effective adjunctive nonpharmacologic analgesic for reducing cognitive pain, emotional pain and the sensory component of pain of soldiers experiencing severe procedural pain during wound care of a combat-related burn injury.

Introduction.

U.S. soldiers injured in Iraq with significant burns are treated at the U.S. Army Institute of Surgical Research (USAISR) at Brooke Army Medical Center in San Antonio, TX. The mean length of inpatient stay for burn patients at this medical center is approx 25 days. (Kauvar et al.) Recovery often involves extensive outpatient physical therapy rehabilitation. Soldiers often move to San Antonio to continue their outpatient physical therapy for six months, a year or longer. Currently, wounded warfighter inpatients with severe burn wounds may have their bandages removed each day, so the wound can be inspected, cleaned and kept free of infection. Wounded warriors with severe burns remain conscious during daily wound care. Typically, they receive strong short-acting opioid analgesics and anxiolytics about twenty minutes prior to debridement (cleaning of dead skin from their healing burn wound). Despite early, aggressive

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APPLYING THE TECHNOLOGY ACCEPTANCE MODEL TO VR WITH PEOPLE WHO ARE FAVORABLE TO ITS USE

Manon Bertrand[1] and Stéphane Bouchard[1]

This study aims to test how the Technology Acceptance Model (TAM; Davis, 1989, 1993; Venkatesh, 2000) applies to the use of virtual reality in clinical settings. The sample is composed of 141 adults interested in using this technology. We adapted the standard items used to test the TAM and added a perceived cost factor as it was expected to play a role on Intention of Use. Structural equation modeling was used and, after removing several parameters, an adequate fit to the data was found. The final model revealed that Intention to Use VR is predicted only by Perceived Usefulness. These results pinpoint what should be better documented in order to foster the dissemination of virtual reality among clinicians.

Introduction

Virtual reality (VR) is a therapeutic tool that has proven effective in the field of training, health, and the treatment of mental health problems (Murphy, 2003). Its effectiveness has been demonstrated on many occasions (Bouchard, Côté, & Richard, 2006 ; Tate & Zabinski, 2004) and it seemed interesting, based on this observation, to attempt to identify in an empirical way the elements that play a role on the intention to use or not to use VR in clinical practice. In order to do so, we chose to adapt the Technology Acceptance Model (Davis, 1989; Davis & Venkatesh, 1996; Venkatesh, 2000) to VR.

Since the mid 70's, various researchers have been interested in factors that explain or predict the use of different technologies. The Technology Acceptance Model (TAM) represents one of the explanatory models having most influenced the theories of human behavior (Venkatesh, Morris, Davis, & Davis, 2003).

The TAM was specifically developed with the primary aim of identifying the determinants involved in computer acceptance in general; secondly, to examine a variety of information technology usage behaviors; and thirdly, to provide a parsimonious theoretical explanatory model (Davis, Bagozzi, & Warshaw, 1989). It is rooted in social psychology and draws on Fishbein's and Ajzen's reasoned action model (1975), which establishes that the intent to produce a behavior depends on two basic determinants: attitude toward behavior and subjective norms. Subjective norms refer to the reasons for producing a certain behavior or not and make the link between the latter and an expected result, whereas attitude toward behavior refers to the positive or negative value the individual associates to the fact of producing the behavior.

The TAM suggests that attitude would be a direct predictor of the intention to use technology, which in turn would predict the actual usage of the technology. Davis and Venkatesh (1996) however, suggest that attitude would not play a significant role but rather that perceived ease of use (expectation that a technology requires minimum effort) and perceived usefulness

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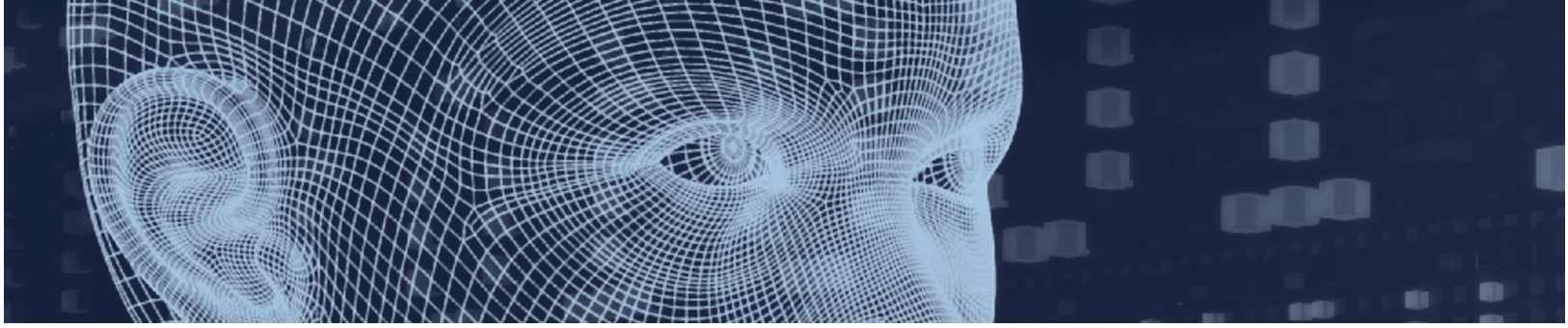

Join the International Association of CyberTherapy & Rehabilitation

The International Association of CyberTherapy & Rehabilitation (IACR) is a international association to promote Virtual Reality and other advanced technologies as adjuncts to more traditional forms of therapy, training, education, prevention, and rehabilitation. IACR will address the urgent need to develop a "roadmap" for the future of this rapidly growing field.

Key Issues

- Need for shared operating standards/platforms
- Need for improved access to healthcare for all citizens
- Need for advanced interactive training and education for healthcare professionals
- Need to enhance existing healthcare treatments through the addition of advanced technologies
- Need to move healthcare and health promotion/disease prevention to the individual level, providing all citizens the opportunity to become active participants in their own healthcare

Mission

Our mission is to bring together top researchers, policymakers, funders, decision makers and clinicians, pooling collective knowledge to improve the quality, affordability, and availability of existing healthcare.

Ultimately, through international collaboration with the most eminent experts in the field, we are working to overcome obstacles and increase access to top-quality healthcare for all citizens. By enhancing public awareness of the possibilities that technology offers, we move toward changing and improving healthcare as it currently exists.

IACR is the official voice and resource for the international community using advanced technologies in therapy, training, education, prevention, and rehabilitation.

Membership in IACR

As the only international association dedicated to CyberTherapy and Rehabilitation, IACR offers its members unique opportunities to:

- Network with other experts and industry leaders in CyberTherapy and Rehabilitation
- Be among the first to know about important events, funding opportunities and other news
- Share your knowledge with industry peers
- Learn industry best practices and standards
- Attend the CyberTherapy Conference and other special events at a member's-only rate
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