

QoMEX 2009

First International Workshop on Quality of Multimedia Experience



July 29–31, 2009
San Diego, California, U.S.A.

PROGRAM GUIDE

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WELCOME TO QoMEX 2009

The field of multimedia is maturing and one of the positive results of this fact is the increase in the quality of offered products and services. Nowadays, there is no longer only a question of which features are included in a multimedia product or service, but also how well such features are addressed, and even more importantly, which impact they have on end-users. The era of user-centric multimedia has already begun, where quality plays a center role. But what is meant by quality in multimedia services and products, how to measure it, and once measured, how to improve it?

The International Workshop on Quality of Multimedia Experience (QoMEX) has been created as a forum to address these important issues, and to bring together leading professionals and scientists active in disciplines relevant to multimedia quality and user experience.

The first edition of QoMEX takes place in San Diego, California, from July 29th to 31st, 2009. QoMEX 2009 is not only the first workshop built around the notion of Quality of Experience in Multimedia, but also features several first time organizational innovations, that hopefully will inspire other workshops and conferences in future.

A workshop dealing with quality cannot neglect the quality of its content, and dissemination. To secure the quality of accepted papers to QoMEX 2009, six to eight reviewers were assigned to each submitted contribution. This has resulted in nearly 45 accepted papers to QoMEX, which correspond to around 60% as acceptance rate. To guarantee the quality of dissemination, high visibility, and ease of access to its content, all accepted papers in QoMEX 2009 will be part of the IEEE Xplore digital library. Furthermore, among accepted papers in QoMEX 2009, 14 contributions have been identified as candidates for best paper, and best student paper awards (seven candidates in each category). The winners will be announced at the workshop venue, when our Awards Committee completes its work. Finally, it is our pleasure to inform you that the top candidates for best paper awards will be invited to submit a full

version of their submission as a journal paper to a special issue, which has been set up to further disseminate the highest quality contributions to QoMEX 2009.

A workshop/conference, as opposed to a journal, is not only a means to inform others of one's latest achievements in research and development, but also a forum to meet, and to interact, with other researchers and professionals sharing same interests. To further enhance this aspect of things, QoMEX 2009 has created a number of social networks accessible from its website at <http://www.qomex.com>, where everybody, including those who cannot attend the workshop, will be able to introduce themselves, present their interests, their ideas, results of their research in various multimedia forms, give their opinion and impressions, exchange all sorts of relevant information, ask questions, provide answers, and in short, become active members of the growing community of Quality of Multimedia Experience.

In addition to the above efforts aimed at building a community of interest in quality of multimedia experience, QoMEX 2009 features several oral and poster sessions, an exhibit session, a panel session, and four plenary speeches. Please refer to the program of the workshop to find out more about them, and make sure you will take full advantage of these sessions as they each bring a different and complementary information that will allow you to find out about what is going on today, what are the trends, what has been achieved in academia and industry, and what are the challenges ahead, in different disciplines relevant to quality of multimedia experience.

QoMEX 2009 could have not happened, if it was not thanks to a committed team of individuals. We would like to especially express our appreciations to QoMEX 2009 Technical Program Co-Chairs, Exhibitions and Demo Co-Chairs, Finance Co-Chairs, Publicity Co-Chairs, members of QoMEX 2009 Advisory Committee, members of our Technical Committee, Plenary Speakers, Panel Chair, Panelists, Awards Chair, members of Awards Committee, as well as our reviewers. A list of these individuals is available on the QoMEX 2009 website, mentioned earlier,

to acknowledge their appreciated efforts.

We are grateful to our Sponsors Dolby, DCA Inc., and NTNU, and our Gold Sponsors Qualcomm and EPFL, whose financial support allowed us to maintain the registration fee to QoMEX 2009 low enough, while providing a quality venue and infrastructure at the disposition of participants. Especial thanks also go to our Gold Sponsors Qualcomm and EPFL for supporting the best paper and best student paper awards. Our appreciations finally go to our Technical Sponsors, IEEE and Petamedia, whose various logistic help and other assistance were instrumental in the success of QoMEX 2009.

Last but not least, we acknowledge the efforts of all submitters, contributors, and participants to QoMEX 2009, without whom, this workshop could have not existed. We wish you all a great time in San Diego and a fruitful workshop, and hope that QoMEX 2009 will be remembered as the start of new series of workshops in a key area of multimedia, in the years to come.

QoMEX 2009 General Co-Chairs

Prof. Dr. Touradj Ebrahimi

Dr. Khaled El-Maleh

PLENARY SPEAKERS

Wednesday, July 29, 09:30 - 10:30

“Haptic Design Guidelines and Tools for the Next Generation of User Experience”

Dr. Christophe Ramstein, Chief Technology Officer, Immersion Corporation

Haptics (touch feedback) is emerging as a critical feature to improve usability and performance of touchscreens, and more generally to make the user experience for digital devices more engaging, more fun, and more personal. Since 1993 Immersion has been designing and developing technology for multimodal user interfaces with haptic feedback. In 2008, over 15% of the worldwide shipping touchscreen phones use Immersion’s haptic technology, a number expected to grow to 25% by the end of 2009. In his talk, Christophe Ramstein will present the state of haptics in the consumer electronics market, discuss the added value of haptics, demonstrate some products, and with TouchSense Studio(tm), introduce basic design guidelines and principles.

With over 15 years experience in haptics and multimodal technology, Mr. Ramstein leads Immersion’s global research and development with a focus on touch innovation and the future of user experience. Passionate about the limitless potential of user experience, Ramstein promotes touch as the cornerstone of the next generation of user interfaces for the medical and other industries. His tenure at Immersion includes senior positions in software development, engineering and research covering several key focal areas for user experience innovation including mobility, medical simulation and more. Before joining Immersion in 2000, Ramstein co-founded Haptic Technologies Inc, a leading-edge award-winning haptics company, as chief architect. Ramstein is both an author and co-author of numerous haptic patents. He holds a Master’s from the Institute Joseph Fourier as well as a PhD in Applied Mathematics for real-time physical modeling, simulation, gesture analysis, and composition for musical creation from the Polytechnic Institute in France.

Wednesday, July 29, 17:00 - 18:00

“Innovating the Multimedia Experience”

Mr. Dave Blakely, IDEO www.ideo.com

Innovation and creativity are learnable skills, not inborn talents. IDEO has applied its general methods of “design thinking” for innovation on a variety of multimedia programs. In this talk, Dave Blakely will present a set of principles for successful innovation in multimedia. The heart of any innovation agenda is a carefully-chosen interdisciplinary team, typically including members with backgrounds in technology, business, and human factors. Creative leaps can be inspired by empathetic human research, and insights are distilled in synthesis sessions. Techniques such as brainstorming can help teams to direct their creativity, and prototypes can be used to improve visualization and mitigate risk.

Dave Blakely is a Senior Director based in IDEO’s Palo Alto office. He leads Technology Strategy at IDEO, which explores links between emerging technologies, business opportunities and customer needs. Dave implements the methods and tools of Technology Strategy through his management of strategic business relationships with several of IDEO’s technology-focused clients such as Cisco. He also advises executives at a number of different technology companies, serves on advisory boards for business and academia, conducts innovation workshops, and speaks frequently to academic and business groups. Dave is proud to serve on the UC Berkeley Engineering Advisory Board, helping his alma mater to adjust the engineering curriculum to the needs of a rapidly changing global economy. He is also a faculty advisor to Singularity University, a new academic institution that understands and facilitates development of exponentially advancing technology to address broad challenges to humanity.

Much of Dave’s advisory work involves helping technology-focused companies to foster a culture of innovation, and to develop products and services to maintain market leadership. Dave helps global companies understand how attributes of Silicon Valley culture can transcend political borders and organizational charts. Recent clients for this advisory work on

innovation range from the French government (Dave is working with the French Secretary of State) to senior advisory councils at NASA. Of particular value for many of these clients is Dave’s knowledge of emerging technology developments from Silicon Valley startups.

Prior to his current position at IDEO, Dave built and led a successful business unit of IDEO called “Smart Products” which focused exclusively on electromechanical systems with embedded controls. Dave and his 35-person team provided the market with full-service design and development of embedded systems by assembling an interdisciplinary staff of human-factors experts, interaction designers, and electrical, mechanical and firmware engineers. Working with his team, Dave helped visualize the future of computing for Microsoft, created streaming media players for Philips, adapted new technologies into the workplace for Steelcase, designed a new surgical device for Gyrus ENT, and created a new category of appliance controls for Whirlpool. Dave holds six patents.

Top-notch program management is critical as development timelines shrink, teams disperse geographically, and competition increases. Dave was proud to lead the team that developed IDEO’s Program Management Training. This is a unique combination of soft and hard skills that prepare program managers for a broad range of challenges that emerge on IDEO’s innovation programs.

Before joining IDEO in 1988, Dave worked at Kevex corporation developing electron spectrometers for surface analysis. The robotic arms he developed for this system are still in use at numerous research labs.

He received a BS in engineering physics (Class of 1982) with honors and an MS in Mechanical Engineering with a controls specialization (Class of 1983) with honors, both from the University of California at Berkeley.

Thursday, July 30, 09:00 - 10:00

“Light is a Two-Way Street: The Next 50 Years of Video”

Dr. Bruce Flinchbaugh, Texas Instruments Fellow and Director of the Video & Image Processing Laboratory, TI, Dallas

When I was a child, circa 1960, I watched the blue TV screen light. I especially watched Saturday morning cartoons, sometimes until my mother shook me (literally) back to reality for lunch. The light that reaches our eyes from video displays has thus brought us many entertaining and captivating events, with content from movies, television shows, video games and now also wide-ranging video sources on the Internet. What will the next 50 years of video bring? I believe that video systems of the future will watch and involve us as much as we watch them. Let's consider the future of video in a new light, in which cameras complement the video displays that have entertained us so well so far. Many aspects of the required technologies are already understood and the transition has begun. As examples: The last fundamental obstacle to video phone popularity is almost gone. The long-anticipated potential of touch-less human-device interaction will be enabled by pervasive cameras. And the traditional definition of 'video' will be expanded as children play video camera games, video surveillance cameras analyze events, and video camera phones provide new kinds of tools for consumers.

Dr. Bruce Flinchbaugh is a Texas Instruments Fellow and director of the Video & Image Processing Laboratory at TI in Dallas. Since 1982 he has led R&D projects for diverse TI products, including the design of video, imaging and vision algorithms for embedded processors in video surveillance, digital video recorder, digital camera, media player and automotive vision applications. He was TI principal investigator for DARPA Image Understanding Research in the 1990s. He has served on program committees for numerous conferences and workshops, and currently serves on industry advisory boards for engineering departments at the University of Notre Dame and The Ohio State University. He has been honored with two Distinguished Alumnus awards: by The Ohio State University College of

Engineering in 2003 and by Otterbein College in 2007. He holds over twenty patents for TI methods and has published or presented in over 75 technical forums including journals, industry magazines, conferences and universities.

Friday, July 31, 09:30 - 10:30

“Comparison of Subjective Assessment Protocols for Digital Cinema Applications”

Prof. Christine Fernandez-Maloigne, Professor of Signal and Image Processing in Poitiers University, France

Quality assessment is becoming an important issue in the framework of image processing. This need is expressed by the fact that the quality threshold of end-users has been shifted up because of the large availability of high fidelity sensors at very affordable price. This observation has been made for different application domains such as printing, compression, transmission, and so on. Starting from this, it becomes very important to manufacturers and producers to provide products of high quality to attract the consumer. This high interest on quality means that tools to measure it have to be available. For this two types of measurements are possible: Subjective assessment that takes the end observer in the loop of assessment and objective assessment based on the use of mathematical tools that can use properties of the Human Visual System (HVS). The objective tools are separated in three categories: Full-reference metrics using the original image and its impaired version to compute the fidelity, Reduced-reference metrics that embed some characteristics of the original image in order to compare them with impaired ones and no-reference metrics based on the detection of artefacts such as bluriness, blockiness, flickering, ringing...

Objective tools are very interesting because they represent implementable tools that can be more or less complex and can be run when needed without any protocol or specific preparation.

However, some tasks or some artefacts cannot be handled by a mathematical tool because there is a subjectivity dimension that it cannot capture. For example, the cinematographic studios still need golden-eyes for the evaluation of the final

work to be projected. Moreover, images and their associated processing (compression, halftoning, ...) are produced for the enjoyment or education of human observers so their opinion of the quality is very important. Subjective measurements have always been, and will continue to be, used to evaluate system performance from the design lab to the operational environment. Even with all the excellent objective testing methods available today, it is important to have human observation of the pictures. There are impairments which are not easily measured yet but which are obvious to a human observer. This situation will certainly go worst with the addition of modern digital compression. Therefore, casual or informal subjective testing by a reasonably expert viewer remains an important part of system evaluation or monitoring. Formal subjective testing has been used for many years with a relatively stable set of standard methods until the advent of digital compression subjective testing described in the ITU recommendation and ISO standards. Moreover, several test-plans have been defined by the Video Expert Quality Group (VQEG) for television, multimedia, HDTV...

This work is dedicated to the comparison of subjective methodologies in the digital cinema framework. The main goal is to determine with a group of observers, which methodology is better for assessing digital cinema content and what is the annoyance level associated to each of them. Several configurations are tested side by side, Butterfly, one by one, Horizontal scroll, vertical scroll, Horizontal and vertical scroll.

Christine Fernandez-Maloigne is currently Professor of signal and image processing in Poitiers University, France. She manages a regional research federation which gathers 260 researchers in TIC in region Poitou-Charentes, in the area of imaging, data mining, and communication systems. PRIDES federation (Research Program in Images, Datas, SystEms) involves 5 laboratories in Poitiers, la Rochelle and Angoulême, in the west of France. She is director of one of these laboratories, XLIM-SIC (Signal Image and Communication, Joint Research Unit between CNRS and University of Poitiers

Christine Fernandez-Maloigne was graduated

at the University of Technology of Compiègne (UTC), France, as a computer engineer in 1986. She received her Ph.D. degree in Image Processing at this University in 1989. She was associated Professor in UTC between 1990 and 1996. She succeeded in enabling degree to manage researches at the University of Lille, France, in 1995. Then she moved to University of Poitiers, France, in 1996, to create a new research pole for image processing and analysis. In the same time, she organized first national research actions regarding colour imaging in the CNRS (National Centre of Scientific Research), in 1997. Afterwards she was founder member of the French National Colour Imaging Group (GFINC) in 2002. She is currently treasurer of this association. The research activities of Christine Fernandez-Maloigne are focused on colour imaging, including fundamental researches about introduction of human visual system models in multiscale colour image processes as well as industrial contracts. The different studies concern image and video coding, indexing, watermarking and image quality assessment. The application areas deal with industrial quality control, biomedical, and audio-visual digital contents. The laboratory is involved in numerous national and european projects about colour imaging and Christine Fernandez-Maloigne participates to organization of numerous national meetings, summer schools, as well as coordination of special issues in scientific papers. She is co-author of numerous books, papers in journals and presentations in famous conferences about digital colour. In a parallel direction, Professor Fernandez-Maloigne won a national prize for the creation of an innovative computer engineering company, in 2001.

At a national level, Christine Fernandez-Maloigne is associated scientific director of a national research group of CNRS: GDR ISIS since 2005 and member of executive committee of AFRIF/IAPR. She is member of the National Council of the French Universities (CNU) since 2008. She is an expert for AERES (National Agency of Research and Teaching Evaluation), for DGA (General Direction of Armies), OSEO/ANVAR (National Agency for Research Valorisation) and for the European Commission (Information Society Technologies programme).

At an European level, she is also member of the French National Body for the ISO JPEG2000, since 2000, and French representative of the CIE Division 8 (Commission Internationale de l'Eclairage, ImageTechnology Division) where she manages a Technical committee about image and video compression quality assessment (TC8-12). Finally, she is a fellow of IS&T, she was General Chair and organizer of the first IS&T European Conference about Colour in Graphics Image and Processing (CGIV) held in Poitiers in 2002, which is now a reference in the area of colour imaging (last edition in Barcelona in 2008). She received a service award from IS&T for her European action in the area of colour imaging.

At the end, Christine Fernandez-Maloigne has 4 children and she is involved in humane associations regarding handicapped children in the world.

PANEL ON QUALITY OF EXPERIENCE: TOOLS, TARGETS AND TRENDS

Thursday, July 30, 16:30 - 18:00

Panel Chair: Fernando Pereira

Fernando Pereira is currently with the Electrical and Computers Engineering Department of Instituto Superior Técnico and with Instituto de Telecomunicações, Lisbon, Portugal. He is an Area Editor of the Signal Processing: Image Communication Journal, a member of the Editorial Board of the Signal Processing Magazine, and is or has been an Associate Editor of IEEE Transactions of Circuits and Systems for Video Technology, IEEE Transactions on Image Processing, IEEE Transactions on Multimedia, and IEEE Signal Processing Magazine. He is a member of the IEEE Signal Processing Society Technical Committees on Image, Video and Multidimensional Signal Processing, and Multimedia Signal Processing, and of the IEEE Circuits and Systems Society Technical Committees on Visual Signal Processing and Communications, and Multimedia Systems and Applications. He was an IEEE Distinguished Lecturer in 2005 and an IEEE Fellow in 2008. He has been a member of the Scientific and Program Committees of many international conferences and has contributed more than 200 papers. He has been participating in the work of ISO/MPEG for many years, notably as the head of the Portuguese delegation, Chairman of the MPEG Requirements Group, and chairing many Ad Hoc Groups related to the MPEG-4 and MPEG-7 standards. His areas of interest are video analysis, processing, coding and description, quality assessment and interactive multimedia services.

Panelists:

Al Bovik holds the Curry/Cullen Trust Endowed Chair at The University of Texas at Austin, where he is a Professor in the Department of Electrical and Computer Engineering and the Institute for Neuroscience. He is Director of the Laboratory for Image and Video Engineering (LIVE). He is well known for his work on image and video quality assessment, in particular as co-developer of the Structural Similarity (SSIM)

and the Visual Information Fidelity (VIF) indices for image quality assessment, other algorithms for no-reference quality assessment of JPEG and JPEG2000 images, and the LIVE Image and Video Quality Databases, which has become a de facto standard. He has published over 500 technical articles in these areas and holds two U.S. patents. He is also the author or co-author of The Handbook of Image and Video Processing, Modern Image Quality Assessment and two upcoming books, The Essential Guide to Image Processing and The Essential Guide to Video Processing. Dr. Bovik has received a number of major awards from the IEEE Signal Processing Society, including: the Education Award (2008); the Technical Achievement Award (2005), the Distinguished Lecturer Award (2000); and the Meritorious Service Award (1998).

Gary J. Sullivan received the B.S. and M.Eng. degrees in electrical engineering from the University of Louisville J.B. Speed School of Engineering, Louisville, KY, in 1982 and 1983, respectively, and the Ph.D. and Engineer degrees in electrical engineering from the University of California, Los Angeles, in 1991. He is the Rapporteur/Chairman of the ITU-T Video Coding Experts Group (VCEG), a Rapporteur/Co-Chairman of the ISO/IEC Moving Picture Experts Group (MPEG), and a Rapporteur/Co-Chairman of the Joint Video Team (JVT), which is a joint project between the VCEG and MPEG organizations. He is also the ITU-T video and image coding liaison representative to MPEG and JPEG/JBIG. Prior to joining Microsoft in 1999, he was the Manager of Communications Core Research at PictureTel Corporation (now Polycom), the world leader in videoconferencing communication at the time. He was previously a Howard Hughes Fellow and Member of the Technical Staff in the Advanced Systems Division of Hughes Aircraft Corporation and was a Terrain-Following Radar (TFR) System Software Engineer for Texas Instruments. He holds the position of Video Architect in the Core Media Processing Team of the Entertainment and Devices Division of Microsoft Corporation, Redmond, WA. At Microsoft he designed and remains lead engineer for the DirectX Video Acceleration (DXVA) API/DDI video decoding feature of the Microsoft Windows operating system. His research interests and

areas of publication include image and video compression, rate-distortion optimization, motion estimation and compensation, scalar and vector quantization, and scalable and error/packet-loss resilient video coding. Dr. Sullivan received the Technical Achievement award of the International Committee on Technology Standards (INCITS) in 2005 for his work on H.264/MPEG-4 AVC and other video standardization topics.

Sebastian Möller was born in 1968 and studied electrical engineering at the universities of Bochum (Germany), Orléans (France) and Bologna (Italy). He received a Doctor-of-Engineering degree in 1999 for his work on the assessment and prediction of speech quality in telecommunications, and the Habilitation (venia legendi) with a book on the quality of telephone-based spoken dialogue systems in 2004, both at Ruhr-University Bochum. From 1994 to 2005, he held the position of a scientific researcher and “Hochschuldozent” at Ruhr-University Bochum. In 2005, he joined Deutsche Telekom Laboratories, Berlin University of Technology, and in 2007, he was appointed Professor for Quality and Usability at the same university. His primary interests are in the areas of speech signal processing, speech technology, communication acoustics, as well as in quality and usability evaluation. Since 1997, he has taken part in the standardization activities of ITU-T Study Group 12, where he is currently Co-Rapporteur of question Q.8/12.

Stefan Winkler holds an M.Sc. degree in Electrical Engineering from the University of Technology in Vienna, Austria, and a Ph.D. degree from the Ecole Polytechnique Fédérale de Lausanne (EPFL), Switzerland. Dr. Winkler is currently Principal Technologist at Symmetricom. Prior to that, he was Chief Scientist of Genista, which he co-founded in 2001. He has also held assistant professor positions at the National University of Singapore (NUS) and the University of Lausanne, Switzerland. He is currently co-chair of the QoE Metrics Activity Group of the Video Services Forum (VSF). He has also been an active contributor to the Video Quality Experts Group (VQEG) since it was founded in 1997. Dr. Winkler has published more than 50 papers and is the author of the book “Digital Video Quality”.

WELCOME TO SAN DIEGO

California's second largest city and the United States' seventh largest, San Diego boasts a citywide population of nearly 1.3 million residents and more than 2.8 million residents countywide. Within its borders of 4,200 sq. miles, San Diego County encompasses 18 incorporated cities and numerous other charming neighborhoods and communities, including downtown's historic Gaslamp Quarter, Little Italy, Coronado, La Jolla, Del Mar, Carlsbad, Escondido, La Mesa, Hillcrest, Barrio Logan, Chula Vista just to name a few.

San Diego is renowned for its idyllic climate, 70 miles of pristine beaches and a dazzling array of world-class family attractions. Popular attractions include the world-famous San Diego Zoo and Wild Animal Park, Sea World San Diego and LEGOLAND California. San Diego offers an expansive variety of things to see and do, appealing to guests of all ages from around the world.

PARADISE POINT RESORT

Paradise Point Resort & Spa is a private 44-acre island tucked away on gentle Mission Bay, minutes from the heart of downtown San Diego and adjacent to the famous SeaWorld Adventure Park. This San Diego luxury resort features comfortable, California beach bungalow-style guest rooms amidst lush, tropical gardens and meandering lagoons. Perfect for families, weddings, groups and conferences, the resort features over 460 guestrooms, including everything from luxury suites, lanai patio room types, lanai garden rooms, and lanai bayside guestrooms, as well as studio garden suites.

http://www.paradisepoint.com/paradise_resortinfo.aspx

LOCAL WEATHER

San Diego enjoys beautiful weather year round, with an average daily temperature of 70.5° F (21.4° C). A marked feature of the climate is the wide variation in temperature within short distances due to the topography of the land.

You can enjoy coastal, mountain and desert environments all in the space of one day.

Average temperatures in July-August are between a high of 77°F (25°C) and a low of 67°F (19°C).

AIRPORT

San Diego International Airport – Lindbergh Field, which celebrates its 80th anniversary this year, is three miles northwest of downtown San Diego and ten minutes from the San Diego Convention Center. Several shuttle services operate from the airport, while taxis also are readily available. Please visit the airport website, **www.san.org**, and click on Ground Transportation on the left-hand side of the screen.

Please note - for departing flights from the airport, it is recommended to arrive two (2) hours prior to flight time for domestic flights and three (3) hours prior for international flights.

Ground Transportation from San Diego International Airport - Lindbergh Field

Shuttle, bus and taxi services are available at the Transportation Plazas across from Terminals 1 and 2 and curbside at the Commuter Terminal.

Taxi fares from the airport to the Paradise Point Resort range from \$16.00 - \$20.00. For more information, please visit <http://www.sandiego.org/nav/Visitors/GettingAround/TaxiServices>.

Car rental reservation boards are located near the baggage claim areas of Terminals 1 and 2. All car rental agencies are off-site and do not have counters inside the terminal facilities. Car rental shuttles at the Transportation Plazas will take you to their rental locations. For more information, please visit <http://www.sandiego.org/nav/Visitors/GettingAround/VehicleRental>.

DRIVING DIRECTIONS TO PARADISE POINT RESORT

San Diego Airport

Take North Harbor Drive to Laurel Street and follow signs to Interstate 5 North. Continue on Interstate 5 North and exit onto Interstate 8 West. Continue on Interstate 8 West and exit Sports Arena/West Mission Bay Drive. Turn right at the traffic light - Ingraham Street. Continue on Ingraham Street to the second traffic light - West Vacation Road. Turn left into the hotel main entrance.

I-8

Exit Sports Arena/West Mission Bay Drive and turn right at the traffic light - Ingraham Street. Continue on Ingraham Street to the second traffic light - West Vacation Road. Turn left into the hotel main entrance.

I-15 South

South on Interstate 15 to Highway 163 South to Interstate 8 West. Exit Sports Arena/West Mission Bay Drive and turn right at the traffic light - Ingraham Street. Continue on Ingraham Street to the second traffic light - West Vacation Road. Turn left into the hotel main entrance.

I-5 North

Exit Sea World Drive and turn left over freeway. Follow Sea World Drive to Ingraham Street exit on right. Continue on Ingraham Street to the second traffic light - West Vacation Road. Turn left into the hotel main entrance.

I-5 South

Exit Sea World Drive and turn right. Follow Sea World Drive to Ingraham Street exit on right. Continue on Ingraham Street to the second traffic light - West Vacation Road. Turn left into hotel main entrance.

CURRENCY

The US monetary system includes denominations of \$1, \$5, \$10, \$20, \$50 and \$100 bills. There are also four common denomination of coins: 1¢ (1 cent or 1 penny), 5¢ (a nickel), 10¢ (a dime), 25¢ (a quarter). The two less common types of coins are worth 50¢ and \$1.

Currency exchange can take place through banks in San Diego. Some hotels will offer currency exchange services, but often, the better exchange rate is at the bank. It is also wise to check for currency exchange services through American Express (800) 525-7623 or www.americanexpress.com or visit travel.americanexpress.com. Additionally, the Thomas Cook Currency Services are available and can be found at www.us.thomascook.com, or by calling (800) 287-7326.

Traveler's cheques are widely accepted and used as well as credit cards and ATMs. The most used credit cards include Visa, MasterCard, American Express, Discover, Diners Club and Carte Blanche.

GRATUITIES

In San Diego, 15-20 percent of the total bill is a good rule of thumb for tipping. Additional guidelines are below:

Hotel personnel: Generally tip \$1 to \$2 for each piece of luggage. If you are using concierge services, a \$5 tip is appropriate.

Taxi drivers and tour guides: Follow the 15 to 20 percent rule for taxi drivers. For tour guides, \$1 to \$2 for each person at the end of the tour.

Valet Parking and Housekeeping: You should tip \$2 to the parking valet. For housekeeping services, \$2 per day is appropriate.

TAXATION

There is a 8.75 percent (8.75%) sales tax on purchases and a 10.5 percent (10.5%) tax on hotel rooms in San Diego.

RESTAURANTS

Baleen San Diego - Fine Dining San Diego Seafood Restaurant & Lounge overlooking the Sparkling Waters of Mission Bay (Located in Paradise Point Resort) 858-490-6363

Barefoot Bar and Grill – (Located in Paradise Point Resort) 858-581-5960

Village Café – (Located in Paradise Point Resort) 858-274-4630

Blue Pearl Café, 1770 W. Mission Bay Dr., San Diego 619-222-4198 (1.06 mi)

Rocky's – 3786 Ingraham St., San Diego, CA – 858-273-9140 (1.14 mi)

Sportsmen's Seafood, 1617 Quivira Rd, San Diego, CA (619)224-3551 (1.22mi)

Red Marlin Waterfront Restaurant Bar and Terrace, 1441 Quivira Rd., San Diego CA – 619-221-4868 (1.49 mi)

Bahia Café – 998 W. Mission Bay Dr., San Diego 858-539-7635 (1.84 mi)

HELPFUL WEBSITES

San Diego Convention and Visitors Bureau

Useful information regarding things to see and do and local maps.

<http://www.sdcvb.org/>

Historic Gaslamp Quarter

Complete information on dining, nightlife, entertainment and shopping in The Gaslamp.

<http://www.gaslamp.org/>
or

<http://www.gaslampquarter.org/>

Paradise Point Resort

The host venue for QoMEX 2009

http://www.paradisepoint.com/paradise_resortinfo.aspx

Go San Diego Card.com

Places to go, things to see, great deals and discounts.

<http://www.gosandiegocard.com/info>

City of San Diego Official Website

Leisure information and local calendar of events.

<http://www.sandiego.gov/directories/leisure>

Wednesday, July 29, 10:50 - 12:30

Session 1**Multimodal Quality Assessment** (Lecture)

Time: Wednesday, July 29, 10:50 - 12:30

Place: Lecture Area

10:50 - 11:15

1.1 IMPAIRMENT-FACTOR-BASED AUDIO-VISUAL QUALITY MODEL FOR IPTVMarie-Neige Garcia, Alexander Raake,
Deutsche Telekom Laboratories, Germany

11:15 - 11:40

1.2 A TAXONOMY OF QUALITY OF SERVICE AND QUALITY OF EXPERIENCE OF MULTIMODAL HUMAN-MACHINE INTERACTIONSebastian Möller, Klaus-Peter Engelbrecht,
Christine Kühnel, Ina Wechsung, Benjamin Weiss, TU Berlin, Germany

11:40 - 12:05

1.3 INFLUENCE OF AUDIO-VISUAL ATTENTION ON PERCEIVED QUALITY OF STANDARD DEFINITION MULTIMEDIA CONTENTJong-Seok Lee, Francesca De Simone,
Touradj Ebrahimi, Ecole Polytechnique
Fédérale de Lausanne (EPFL), Switzerland

12:05 - 12:30

1.4 EVALUATING A MULTIMODAL REMOTE CONTROL: THE INTERPLAY BETWEEN USER EXPERIENCE AND USABILITYIna Wechsung, Anja Naumann, Deutsche
Telekom Laboratories, TU Berlin, Germany

Wednesday, July 29, 14:30 - 16:30

Session 2**Subjective Quality Assessment and Verification I** (Poster)

Time: Wednesday, July 29, 14:30 - 16:30

Place: Poster Area

14:30 - 16:30

2.1 ANALYSIS OF SSIM PERFORMANCE FOR DIGITAL CINEMA APPLICATIONSFitri N. Rahayu, Ulrich Reiter, Q2S-NTNU,
Norway; Marlon T.M. Nielsen, NTNU,
Norway; Touradj Ebrahimi, Peter Svensson,
Andrew Perkis, Q2S-NTNU, Norway**2.2 ASSESSING THE PERCEPTUAL INFLUENCE OF H.264/SVC SIGNAL-TO-NOISE RATIO AND TEMPORAL SCALABILITY ON FULL LENGTH MOVIES**Nicolas Staelens, Stefaan Moens, Ghent
University - IBBT, Belgium; Wendy Van
den Broeck, Ilse Mariën, Vrije Universiteit
Brussels - IBBT, Belgium; Brecht Vermeulen,
Peter Lambert, Rik Van de Walle, Piet
Demeester, Ghent University - IBBT, Belgium**2.3 MODELING SUBJECTIVE TESTS OF QUALITY OF EXPERIENCE WITH A GENERALIZED LINEAR MODEL**Lucjan Janowski, Zdzilaw Papir, AGH
Univerisity of Science and Technology,
Poland**2.4 SUBJECTIVE VIDEO QUALITY AS A FUNCTION OF BIT RATE, FRAME RATE, PACKET LOSS, AND CODEC**Gregory Cermak, Verizon Laboratories,
United States**2.5 MEASURING THE PERCEIVED AESTHETIC QUALITY OF PHOTOGRAPHIC IMAGES**Cathleen Daniels Cerosaletti, Alexander
Loui, Eastman Kodak Company, United
States

Wednesday, July 29, 14:30 - 16:30

Session 3**Objective Image Quality Assessment**
(Poster)

Time: Wednesday, July 29, 14:30 - 16:30

Place: Poster Area

14:30 - 16:30

3.1 ON THE MDCT-PSNR IMAGE QUALITY INDEX

Thomas Richter, University of Stuttgart, Germany

3.2 A GROUPELET-BASED REDUCED REFERENCE IMAGE QUALITY ASSESSMENT

Aldo Maalouf, Mohamed-Chaker Larabi, Christine Fernandez-Maloigne, University of Poitiers, France

3.3 A NO-REFERENCE SHARPNESS METRIC SENSITIVE TO BLUR AND NOISE

Xiang Zhu, Peyman Milanfar, University of California at Santa Cruz, United States

3.4 NO-REFERENCE IMAGE BLUR ASSESSMENT USING MULTISCALE GRADIENT

Ming-Jun Chen, Alan C. Bovik, The University of Texas at Austin, United States

3.5 NO REFERENCE BLOCK BASED BLUR DETECTION

Debing Liu, Zhibo Chen, Thomson, China; Huadong Ma, Beijing University of Posts and Telecommunications, China; Feng Xu, Xiaodong Gu, Thomson, China

3.6 LEARNING THE PROPERTIES OF RECEPTIVE FIELDS IN THE CONTEXT OF PERCEPTUAL IMAGE QUALITY ASSESSMENT

Koohyar Minoo, Motorola Inc., United States; Truong Nguyen, UCSD, United States

3.7 A NO-REFERENCE PERCEPTUAL IMAGE SHARPNESS METRIC BASED ON A CUMULATIVE PROBABILITY OF BLUR DETECTION

Niranjan Narvekar, Lina Karam, Arizona State University, United States

Thursday, July 30, 10:25 - 12:30

Session 4**QoE for Multimedia Communications I**
(Lecture)

Time: Thursday, July 30, 10:25 - 12:30

Place: Lecture Area

10:25 - 10:50

4.1 IMPACT OF ROUTER QUEUING DISCIPLINES ON MULTIMEDIA QOE IN IPTV DEPLOYMENTS

Prasad Calyam, Prashanth Chandrasekaran, Gregg Trueb, Nathan Howes, The Ohio State University, United States; Delei Yu, Ying Liu, Lixia Xiong, Huawei Technologies, China; Rajiv Ramnath, The Ohio State University, United States; Daoyan Yang, Huawei Technologies, China

10:50 - 11:15

4.2 E-MODEL SUPPORTED SWITCHING BETWEEN NARROWBAND AND WIDEBAND SPEECH QUALITY

Blazej Lewcio, Marcel Wältermann, Sebastian Möller, Pablo Vidales, Deutsche Telekom Laboratories, Germany

11:15 - 11:40

4.3 MEASURING MEDIATED COMMUNICATION EXPERIENCE

Viljakaisa Aaltonen, Nokia, Finland; Jari Takatalo, University of Helsinki, Finland; Jukka Häkkinen, Nokia, Finland; Miikka Lehtonen, Helsinki University of Technology, Finland; Göte Nyman, University of Helsinki, Finland; Martin Schrader, Nokia, Finland

11:40 - 12:05

4.4 TOWARDS A COMPUTATIONAL QUALITY MODEL FOR IP-BASED AUDIO

Eugene S. Myakotnykh, U. Peter Svensson, Norwegian University of Science and Technology, Norway

12:05 - 12:30

4.5 PSNRR,F -MOSR: AN EASY-TO-COMPUTE MULTIUSER PERCEPTUAL VIDEO QUALITY MEASURE

Jing Hu, Cisco Systems, United States; Sayantan Choudhury, Jerry Gibson, University of California, Santa Barbara, United States

Thursday, July 30, 14:30 - 16:10

Session 5**Subjective Quality Assessment and Verification II (Lecture)**

Time: Thursday, July 30, 14:30 - 16:10

Place: Lecture Area

14:30 - 14:55

5.1 IMPROVING THE VERIFICATION PROCESS OF VIDEO QUALITY METRICS

Christian Keimel, Tobias Oelbaum, Klaus Diepold, Technische Universität München, Germany

14:55 - 15:20

5.2 COMPARING APPLES AND ORANGES: SUBJECTIVE QUALITY ASSESSMENT OF STREAMED VIDEO WITH DIFFERENT TYPES OF DISTORTION

Ulrich Reiter, Jari Korhonen, Norwegian University of Science and Technology, Norway

15:20 - 15:45

5.3 GRADIENT ASCENT PAIRED-COMPARISON SUBJECTIVE QUALITY TESTING

Stephen Voran, Andrew Catellier, Institute for Telecommunication Sciences, United States

15:45 - 16:10

5.4 ON THE PROPERTIES OF SUBJECTIVE RATINGS IN VIDEO QUALITY EXPERIMENTS

Stefan Winkler, Symmetricom, United States

Friday, July 31, 10:50 - 12:05

Session 6**QoE Standards and Future Trends (Lecture)**

Time: Friday, July 31, 10:50 - 12:05

Place: Lecture Area

10:50 - 11:15

6.1 A TEST-BED FOR QUALITY OF MULTIMEDIA EXPERIENCE EVALUATION OF SENSORY EFFECTS

Markus Waltl, Christian Timmerer, Hermann Hellwagner, Klagenfurt University, Austria

11:15 - 11:40

6.2 DOES QUALITY IMPACT THE BUSINESS MODEL? CASE: DIGITAL CINEMA

Andrew Perkis, Norwegian University of Science and Technology, Norway

11:40 - 12:05

6.3 ENHANCED PESQ ALGORITHM FOR OBJECTIVE ASSESSMENT OF SPEECH QUALITY AT A CONTINUOUS VARYING DELAY

Nitay Shiran, Ben-Gurion University, Israel; Ilan Shallom, AudioCodes Ltd., Israel

Friday, July 31, 14:30 - 16:30

Session 7**Video, 3D and Multiview Quality Assessment (Poster)**

Time: Friday, July 31, 14:30 - 16:30

Place: Poster Area

14:30 - 16:30

- 7.1 NATURAL MOTION STATISTICS FOR NO-REFERENCE VIDEO QUALITY ASSESSMENT**
Michele Saad, Alan Bovik, The University of Texas at Austin, United States
- 7.2 HDTV OBJECTIVE VIDEO QUALITY ASSESSMENT METHOD APPLYING FUZZY MEASURE**
Jun Okamoto, Keishiro Watanabe, NTT Corporation, Japan; Aoi Honda, Masato Uchida, Kyushu Institute of Technology, Japan; Seiichiro Hangai, Science University of Tokyo, Japan
- 7.3 MOTION ESTIMATED TEMPORAL CONSISTENCY METRICS FOR OBJECTIVE VIDEO QUALITY ASSESSMENT**
Peshala Pahalawatta, Alexandros Tourapis, Dolby Laboratories Inc, United States
- 7.4 STEREOSCOPIC IMAGE QUALITY PREDICTION**
Z. M. Parvez Sazzad, Shouta Yamanaka, Yoshikazu Kawayoke, Yuukou Horita, University of Toyama, Japan
- 7.5 MIQM: A NOVEL MULTI-VIEW IMAGES QUALITY MEASURE**
Mashhour Solh, Ghassan AlRegib, Georgia Institute of Technology, United States
- 7.6 INFLUENCE OF DEPTH RENDERING ON THE QUALITY OF EXPERIENCE FOR AN AUTOSTEREOSCOPIC DISPLAY**
Marcus Barkowsky, Romain Cousseau, Patrick Le Callet, University of Nantes, France

Friday, July 31, 14:30 - 16:30

Session 8**QoE for Multimedia Communications II (Poster)**

Time: Friday, July 31, 14:30 - 16:30

Place: Poster Area

14:30 - 16:30

- 8.1 OPTIMAL RCPC CHANNEL RATE ALLOCATION IN AWGN CHANNEL FOR PERCEPTUAL VIDEO QUALITY USING INTEGER PROGRAMMING**
Ting-Lan Lin, Pamela Cosman, University of California, San Diego, United States
- 8.2 SUBJECTIVE ASSESSMENT OF H.264/AVC VIDEO SEQUENCES TRANSMITTED OVER A NOISY CHANNEL**
Francesca De Simone, Ecole Polytechnique Fédérale de Lausanne, Switzerland; Matteo Naccari, Marco Tagliasacchi, Politecnico di Milano, Italy; Frederic Dufaux, Ecole Polytechnique Fédérale de Lausanne, Switzerland; Stefano Tubaro, Politecnico di Milano, Italy; Touradj Ebrahimi, Ecole Polytechnique Fédérale de Lausanne, Switzerland
- 8.3 PERCEPTUAL QUALITY MEASUREMENT OF VIDEO FRAMES AFFECTED BY BOTH PACKET LOSSES AND CODING ARTIFACTS**
Tao Liu, Polytechnic Institute of New York University, United States; Hua Yang, Alan Stein, Thomson Corporate Research, United States; Yao Wang, Polytechnic Institute of New York University, United States
- 8.4 USE OF CONTENT COMPLEXITY FACTORS IN VIDEO OVER IP QUALITY MONITORING**
Jing Hu, Herb Wildfeuer, Cisco Systems, United States

Session 9

Applications and Beyond (Poster)

Time: Friday, July 31, 14:30 - 16:30

Place: Poster Area

14:30 - 16:30

**9.1 EVALUATION OF FLOATING POINT
IMAGE COMPRESSION**

Thomas Richter, University of Stuttgart,
Germany

**9.2 VISIBILITY THRESHOLDS FOR
QUANTIZATION DISTORTION IN
JPEG2000**

Han Oh, Ali Bilgin, Michael Marcellin, The
University of Arizona, United States

**9.3 TEMPORAL OPTIMIZATION OF QUALITY
DURING VIDEO COMPRESSION**

Kostas Gaitanis, Samer Youssef Al Chikhani,
Christophe de Vleeschouwer, UCL, Belgium

**9.4 A METHOD FOR SYNCHRONIZATION
MISMATCH PERCEPTION EVALUATION
FOR LARGE ULTRA HIGH RESOLUTION
TILED DISPLAYS**

Sachin Deshpande, Sharp Laboratories of
America, United States

**9.5 A TEMPORAL MOSQUITO NOISE
CORRECTOR**

Claire Mantel, Grenoble Polytechnic Institute
/ STMicroelectronics, France; Patricia
Ladret, Joseph Fourier University, France;
Thomas Kunlin, STMicroelectronics, France

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SCHEDULE OVERVIEW

Wednesday, July 29

08:00 - 09:00	Breakfast (provided)
08:00 - 18:00	Registration
09:00 - 09:30	Welcome Message from Conference Co-Chairs
09:30 - 10:30	Plenary Talk 1: Haptic Design Guidelines and Tools for the Next Generation of User Experience – Dr. Christophe Ramstein
10:30 - 10:50	Coffee Break
10:50 - 12:30	Session 1: Multimodal Quality Assessment
12:30 - 14:30	Lunch Break (on your own)
14:30 - 16:30	Session 2: Subjective Quality Assessment and Verification I
14:30 - 16:30	Session 3: Objective Image Quality Assessment
16:30 - 17:00	Coffee Break
17:00 - 18:00	Plenary Talk 2: Innovating the Multimedia Experience – Mr. Dave Blakely

Thursday, July 30

08:00 - 09:00	Breakfast (provided)
08:00 - 18:00	Registration
09:00 - 18:00	Exhibition
09:00 - 10:00	Plenary Talk 3: Light is a Two-Way Street: The Next 50 Years of Video – Dr. Bruce Flinchbaugh
10:00 - 10:25	Coffee Break
10:25 - 12:30	Session 4: QoE for Multimedia Communications I
12:30 - 14:30	Lunch Break (on your own)
14:30 - 16:10	Session 5: Subjective Quality Assessment and Verification II
16:10 - 16:30	Coffee Break
16:30 - 18:00	Panel: Quality of Experience: Tools, Targets and Trends
19:00 - 22:00	Banquet Dinner

Friday, July 31

08:00 - 09:00	Breakfast (provided)
08:00 - 18:00	Registration
09:00 - 12:30	Exhibition
09:00 - 09:30	Best Paper Award Ceremony
09:30 - 10:30	Plenary Talk 4: Comparison of Subjective Assessment Protocols for Digital Cinema Applications – Prof. Christine Fernandez-Maloigne
10:30 - 10:50	Coffee Break
10:50 - 12:05	Session 6: QoE Standards and Future Trends
12:05 - 14:30	Lunch Break (on your own)
14:30 - 16:30	Session 7: Video, 3D and Multiview Quality Assessment
14:30 - 16:30	Session 8: QoE for Multimedia Communications II
14:30 - 16:30	Session 9: Applications and Beyond
16:30 - 17:00	Coffee Break
17:00 - 18:00	Closing Ceremony