ART && CODE 3D

DIY 3D SENSING & & VISUALIZATION

21-23 october 2011 • carnegie mellon university • pittsburgh

ART && CODE: DIY 3D Sensing & Visualization is sponsored by:

Microsoft Research

Center for Computational Thinking Carnegie Mellon

STUDIO for Creative Inquiry

Additional sponsorship provided by:
Stamen • MakerBot Industries • HackPittsburgh • ITT Dublin • CMU School of Art • CMU School of Computer Science
CMU School of Design • CMU School of Drama • CMU Entertainment Technology Center • CMU BXA Intercollege Degree Programs

MISSION STATEMENT

ART && CODE:

DIY 3D Sensing and Visualization

is a festival and conference concerned with the aesthetic, technical, tactical and cultural potentials of low-cost 3D scanning devices — especially, but not exclusively, including the revolutionary Microsoft Kinect sensor. This highly interdisciplinary event brings together, for the first time, tinkerers and hackers, computational artists and designers, professional game developers, and leading researchers in the fields of computer vision, robotics and human-computer interaction. Half maker's festival, half academic symposium, ART && CODE takes place October 21-23 at Carnegie Mellon University in Pittsburgh.

An Event Series for Arts Engineering

The ART && CODE initiative is organized by the STUDIO for Creative Inquiry — a laboratory for atypical and interdisciplinary research at the intersection of arts, science, culture and technology. Under a broad educational mandate to promote computational thinking, the STUDIO seeks to transform culture through critically-aware freestyle computing and curiosity-driven engineering. Our ART && CODE events follow a magic formula that combines hands-on workshops in a wide variety of arts-engineering platforms, with demonstrations and lecture presentations by leading international practitioners. ART && CODE: 3D is the third in our series of events featuring software programming tools for artists, designers, students and makers.

New Culture from a New Community

It's been less than a year since Microsoft released the Kinect depth sensor. In that time, the device has revolutionized the field of computer vision and prompted a vibrant and global new community of makers to create thousands of innovative new interactive experiences. Whether working in classrooms, university research laboratories, personal garages, or independent artists' studios, these individuals have explored the possibilities of using the Kinect to control real-time robotics, assist the disabled, perform music, interact with virtual environments, or simply have fun in new and unexpected ways. ART && CODE: DIY 3D Sensing and Visualization presents a variety of contexts, such as educational workshops and a hacking marathon, for the appreciation and development of these new modes of cultural expression.

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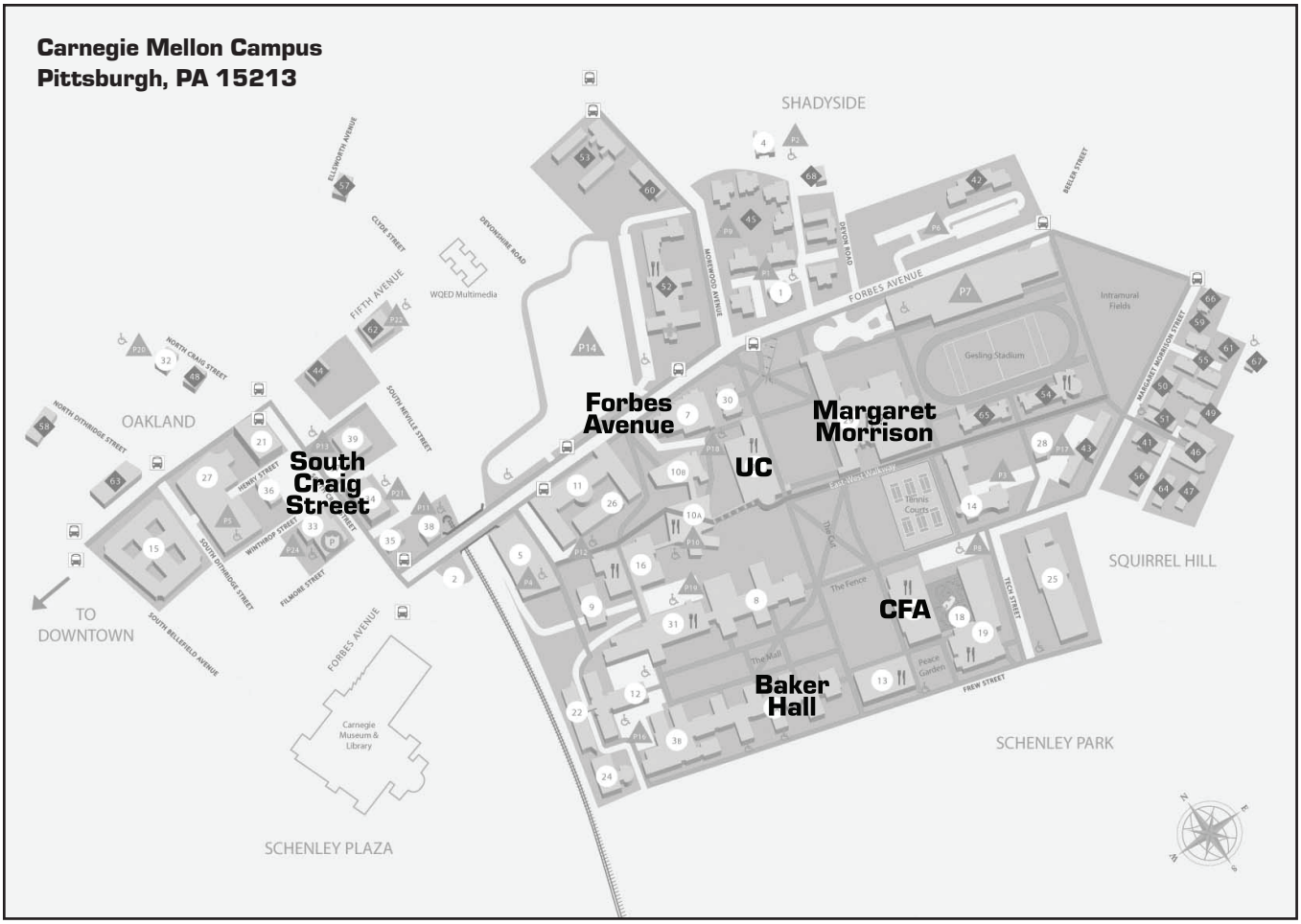
CAMPUS MAP & GENERAL INFO



Chill out in THE LOUNGE (ACH)

See live demos, check out antique 3D technologies and hang out with other ART && CODE 3D participants. The Lounge will be open on Saturday, 8:30am-5:30pm and Sunday from 8:30am-noon. Conference staff and volunteers will be available in the Lounge to answer questions and provide assistance.

3D Before Now (exhibit)

Twenty-first century 3D technology is the third Great Craze over stereoscopy. The late 19th century introduced the stereoview to the masses, only to see its decline in the age of cinema. Hollywood resurrected the technology in the mid twentieth century for monster movies, launching a popular fad for plastic red and blue glasses. As Avatar and the Kinect mark the newest iteration of stereoscopic entertainment, this exhibit looks at centuries of popular three-dimension images and devices--some part of mass entertainment, some as niche applications of stereoscopic techniques.

3D Printing with Kinect and MakerBots (demo)

Kinect > .STL file > MakerBot > 3D-printed portraits!

Matt Mets of MakerBot Industries will present live demonstrations — in which 3D scans from the Kinect are used to create plastic portraits of Art && Code attendees using free software and the popular MakerBot 3D printer.

Friday in the GE Lobby during registration and breaks
Saturday in the Lounge during lunch, 1:00-2:00pm

ART && CODE 3D LOCATIONS:

GE Auditorium - Giant Eagle Auditorium (Baker Hall A51)

GE Lobby - Giant Eagle Lobby (Baker Hall A51)

CFA - College of Fine Arts

ACH - Alumni Concert Hall (CFA first floor)

Kresge Theatre (CFA first floor, across from ACH)

STUDIO - STUDIO for Creative Inquiry (CFA 111)

Peace Garden (Behind CFA on Frew Street)

Great Hall (CFA first floor lobby)

MM - Margaret Morrison

UC - University Center (food, ATMs, bookstore)

Need espresso? Sundries? An ATM?

A variety of services are available in the University Center, including a food court, juice bar, ATMs, a convenience store, the campus bookstore and more. Visit **www.cmu.edu/dining/locations/** for the complete list of on-campus eateries.

Looking for a restaurant or bar within walking distance of campus?

Scan this QR code to see the official ART && CODE 3D Google map, with links to hotels, restaurants, shopping and more:

Friday, October 21

noon-1:30pm	**Registration** [GE Lobby]	Demo: **3D Printing with Kinect and MakerBots** *(see p. 4)* [GE Lobby]
1:30-5:00pm	**Artist Lectures** [GE Auditorium] *(with breaks at 2:40-3:00pm and 4:30-5:00pm)*	
5:00-6:00pm	**ARTS KEYNOTE: Stereoscopy and the Artistic Imagination** *(Huhtamo)* [GE Auditorium]	
6:00-7:00pm	**Opening Reception** [GE Lobby]	
7:00-7:30pm	**Update from PrimeSense** *(Galor)* [GE Auditorium]	
7:30-late	**Speed Presentations** [GE Auditorium]	

Saturday, October 22

7:30-8:30am	**Breakfast & Late Registration** [CFA Great Hall]			
8:30-10:30am	**1A: Using the Kinect with Processing** *(Borenstein)* [STUDIO]	**1B: Algorithms for Point Clouds and Other 3D Data** *(Kramer)* [GE Auditorium]		**Lounge** [ACH] *closes at 5:30pm* Exhibit: **3D Before Now** *(see p. 4)* Demo: **3D Printing with Kinect and MakerBots** *(see p. 4)*
10:30-10:45am	**Break**			
10:45-12:45pm	**2A: Getting Started with the Kinect for Windows SDK** *(Blake)* [GE Auditorium]	**2B: Introductory Teledildonics with the Kinect and Arduino** *(Machulis)* [STUDIO]	**2C: Teaching Kids Programming with Scratch & Kinect** *(Howell)* [CFA 317]	
12:45-1:00pm	**Break**			
1:00-2:00pm	**Lunch** [ACH & CFA Great Hall] **ticket required*			
2:00-4:15pm	**Unconference Sessions 1 and 2** [rooms TBA]			
4:30-5:30pm	**TECHNICAL KEYNOTE: The History and Future of Kinect** *(Tansley & Blinn)* [Kresge]			
5:30-7:00pm	**Dinner on your own**			
7:00-8:00pm	**Festival-as-Laboratory Presentations** [Kresge Theatre]			
8:00-late	**Audiovisual Performances** *(Levine, Huhtamo & Woods)* [STUDIO & Kresge Theatre]			

Sunday, October 23

7:30-8:30am	**Breakfast** [CFA Great Hall]			
8:30-10:30am	**3A: 3D Scanning with Structured Light Projectors** *(McDonald)* [CFA 303]	**3B: Using the Kinect with OpenFrameworks** *(Lieberman & Wilcox)* [STUDIO]	**Unconference Session 3** ***(9:30am)*** [rooms TBA]	**Lounge** [ACH] *closes at noon*
10:30-10:45am	**Break**			
10:45-12:45pm	**4A: Calibrating Projectors and Cameras: Practical Tools** *(Woods & McDonald)* [STUDIO]	**4B: Using the Kinect with Max/MSP/Jitter** *(Goldberg)* [CFA 303]		
12:45-1:00pm	**Break**			**Mini-Maker Faire** *noon-6* *Shuttles leave at 2:00 and 3:30, return at 4:00 and 5:30*
1:00-2:00pm	**Lunch** [CFA Great Hall] **ticket required*			
2:00-4:15pm	**5A: Using the Kinect with Pure Data** *(Yuditskaya)* [CFA 303]	**5B: Kinect-Based MoCap for Flash and AfterEffect** *(Fox-Gieg)* [STUDIO]		

ARTIST LECTURES: On 3D Sensing and Visualization

Giant Eagle Auditorium

1:30-1:40pm
GOLAN LEVIN // *Introduction*

1:40-2:00pm
KYLE MCDONALD

2:00-2:20pm
JOSHUA BLAKE

2:20-2:40pm
HEATHER KELLEY

2:40-3:00pm
COFFEE BREAK & 3D PRINTING DEMO
See demo description on page 2

3:00-3:20pm
JOEL GETHIN LEWIS

3:20-3:40pm
GREG BORENSTEIN & SOFY YUDITSKAYA

3:40-4:00pm
ELLIOT WOODS

4:00-4:20pm
ZACHARY LIEBERMAN

4:20-4:30pm
Q & A WITH THE ARTISTS

4:30-5:00pm
3D PRINTING DEMO

ARTS KEYNOTE: Erkki Huhtamo, Media Archeologist

5:00-6:00pm
LOST (AND FOUND) IN THE THIRD DIMENSION: STEREOSCOPY AND THE ARTISTIC IMAGINATION
[Giant Eagle Auditorium]

Stereoscopic 3D has been a constant presence in Western societies for more than 150 years, and many of its features were anticipated even earlier. Stereoscopy is often treated as a cult phenomenon, a gimmick that appears and disappears over and over again. But it is much more than that. Beside popular-cultural applications, it has played roles in science, medicine, warfare – and art. There are numerous artists who have been drawn to it, often commenting on the past uses of stereoscopy by their works. By developing an archaeology of stereoscopic 3D, this lecture reveals some of its earlier (often forgotten) manifestations, and demonstrates how these have been applied and developed further by a wide range of artists.

OPENING RECEPTION, PRIMESENSE & SPEED PRESENTATIONS

6:00-7:00pm
OPENING RECEPTION
[Giant Eagle Lobby]

Enjoy hors d'oeuvres and beverages as you mingle with other ART && CODE 3D participants.

7:00-7:30pm
AN UPDATE FROM PRIMESENSE
[Giant Eagle Auditorium]

Presented by Micha Galor, Director of Applications and User Experience at PrimeSense, this half-hour talk will show some of the latest results from the PrimeSense R&D labs, and discuss the future of technologies like OpenNI and NITE.

Wave hello, point to an object, or call someone over with a flick of the wrist. These subtle movements are our most natural forms of communication. So intuitive almost anyone, anywhere — even some pets — will understand. They just need to see it. What if that same form of natural communication could control your digital devices? PrimeSense has worked to make this possible, in an initiative they call Natural Interaction. It is the ability to interact with the digital world without the need for props such as remote controls or joysticks. In short, natural interaction removes the 'middle man' and opens up direct communication with the digital world right in one's own living room. Natural interaction isn't limited to hands, moreover; PrimeSense technologies permit interactions through hand gestures, body motion tracking, and coordination of speech with gesture.

7:30pm-late
SPEED PRESENTATIONS
[Giant Eagle Auditorium]

Starting at 7:30 on Friday night, and running every 8 minutes 'til late, nearly 40 ART && CODE participants will present short video presentations of their own projects. Visionary infonaut and global teledildonics authority, Kyle Machulis, will emcee! The presented projects all center around the theme of DIY 3D sensing and visualization — many, using the inexpensive Microsoft Kinect sensor. *See page 14 for details.*

8:30-10:30am

1A: USING THE KINECT WITH PROCESSING

[STUDIO]

Greg Borenstein will provide hands-on experience in using the Kinect sensor with Processing, a popular Java-based environment for arts-engineering.

In this workshop you'll learn how to integrate the Kinect into Processing using Max Rheiner's extension library based on PrimeSense's OpenNI system. This library provides access to many advanced features of the Kinect including skeleton tracking. Learn how to detect the exact position of the user's joints and to use this data to build interactive applications people can control with their bodies.

Processing is a free, cross-platform, open-source Java-based programming language and environment for people who want to create images, animations, and interactions. Initially developed to serve as a software sketchbook and to teach fundamentals of computer programming within a visual context, Processing also has evolved into a tool for generating finished professional work. Today, there are tens of thousands of students, artists, designers, researchers, and hobbyists who use Processing for learning, prototyping, and production.

8:30-10:30am

1B: ALGORITHMS FOR POINT CLOUDS AND OTHER 3D DATA

[Giant Eagle Auditorium]

Robotics expert **Jeff Kramer** will present techniques and algorithms for managing and interpreting the 3D data produced by depth sensors like the Kinect and LIDAR/laser scanners. Among other tools, this workshop will discuss the use of the Point Cloud Library (PCL), a large scale, open project for 3D point cloud processing which contains numerous state-of-the art algorithms including filtering, feature estimation, surface reconstruction, registration, model fitting and segmentation.

This presentation will cover many desired core 3D tasks – object detection, gesture recognition, people tracking, skeletonization and more. The presentation will focus on OpenKinect and the Point Cloud Library, mostly covering algorithms written in C/C++.

10:45am-12:45pm

2A: GETTING STARTED WITH THE KINECT FOR WINDOWS SDK

[Giant Eagle Auditorium]

Learn the basics of the Kinect for Windows SDK, see some examples of interesting and inspiring Kinect applications, and get your hands dirty creating a basic Windows program for your Kinect. This workshop is hands-on (or hands-off, since we're talking about Kinect!) so come prepared to write some C# code for Kinect on your Windows 7 laptop.

Workshop leader, Kinect hacker/author/speaker **Joshua Blake** brings a unique experience and perspective to this session. As a Microsoft MVP and author of *Natural User Interfaces in .NET: WPF 4, Surface 2, and Kinect*, Joshua has deep working knowledge of Microsoft's development tools and metaphors; as founder of the OpenKinect Community, Joshua is also well-versed with alternatives to Microsoft's SDK and is deeply involved in the various Kinect communities.

10:45am-12:45pm

2B: INTRODUCTORY TELEDILDONICS WITH THE KINECT AND ARDUINO

[STUDIO]

Using the Arduino hardware platform, the skeletal sensing capabilities of the Kinect, and Processing, sex-tech researcher **Kyle Machulis** will show how to create a complete, "hands-free" interaction pipeline, incorporating everything from network communication to joint sensing to hardware control. By the end of the workshop, participants will have an idea of what a fully integrated system for control of remote sex hardware requires, and how it can affect the user experience. Along the way, participants will learn about the history and current state of "intimate" technology, as well as design concerns to be taken into account when creating new interfaces.

10:45am-12:45pm

2C: TEACHING KIDS PROGRAMMING WITH SCRATCH & KINECT

[CFA 317]

This workshop by **Stephen Howell** will provide the means by which anybody age 8 and up can develop their own interactive motion-capture games for the Kinect! Using Kinect2Scratch, the workshop will demonstrate 5-minute game creation with the free Scratch language, and provide methods for interfacing Kinect "skeleton" data (the users' body joints) into Scratch programs.

Many primary and secondary schools have no formal programming instruction at any level, and evangelizing computational thinking and logical problem-solving is a major challenge. Scratch, a free educational tool from MIT, addresses this by framing computer programming as a curiosity-driven, arts-oriented, creative activity — in a "building block" environment which students and teachers can learn very easily. More than 2 million programs, many of which are interactive games, have been written and shared by young people using the Scratch language.

The Kinect depth sensor offers young programmers enticing possibilities for new forms of game design, but as C# and C++ are not languages in which they are likely to be skilled, kids can't easily write code for the Kinect. Until now. With Scratch, a Kinect, and the software provided in this workshop, a teacher can have a class writing motion-capture based games very quickly!

*Workshop assisted by **Elizabeth Perry** (@elizabethperry), Scratch educator at the Ellis School, Pittsburgh.*

*Stephen's participation at Art && Code is made possible through the generous support of the **Institute of Technology Tallaght, Dublin.***

UNCONFERENCE

What is an "Unconference"? Wikipedia defines it as "a participant-driven meeting." We call it "your chance to program the schedule." You'll get to propose topics that you care about, and then attend the sessions that seem most interesting. For tips, check out Kaliya Hamlin's article "How to prepare to attend an unconference" (**www.unconference.net**) for more information on how Unconferences work — and be prepared to show, ask, and discuss!

We'll have **three blocks** of Unconference sessions: Saturday from 2:00-3:00pm and 3:15-4:15pm, and Sunday from 9:30-10:30am. Various ART && CODE attendees have already proposed five topics — and you'll get to choose the rest! **Suggest ideas and vote for your favorite sessions on the whiteboard** (available at registration, the Friday evening opening reception, and in the Lounge Saturday morning). Session topics will be determined by popular vote; rooms will be assigned based on number of participants in each session.

FIRST SESSION - SATURDAY, OCTOBER 22, 2:00-3:00pm

TOPIC 1:
KINECT: IMPLICATIONS FOR GAME DESIGN

Introduced by Heather Kelley

TOPIC 2:
KINECT + MAKERBOT: DIY 3D PRINTING!

Introduced by Matt Mets

TOPIC 3:
THE KINECT AND SPECIAL EFFECTS

Introduced by Greg Borenstein

TOPIC 4: _____

TOPIC 5: _____

TOPIC 6: _____

SECOND SESSION - SATURDAY, OCTOBER 22, 3:15-4:15pm

TOPIC 1:
KINECT + BEAGLEBOARD: USING THE KINECT WITH STANDALONE MICROPROCESSORS

Introduced by Goksel Dedeoglu / Texas Instruments

TOPIC 2:
KINECT + UNITY3D: MAKING INTERACTIVE 3D WORLDS WITH A MODDED GAME ENGINE

Introduced by Phoenix Perry and Amir Hirsch / Zigfu.com

TOPIC 3: _____

TOPIC 4: _____

TOPIC 5: _____

TOPIC 6: _____

THIRD SESSION - SUNDAY, OCTOBER 23, 9:30-10:30am

TOPIC 1: _____

TOPIC 2: _____

TOPIC 3: _____

TOPIC 4: _____

TOPIC 5: _____

TOPIC 6: _____

TECHNICAL KEYNOTE: Stewart Tansley & Arnold Blinn

4:30-5:30pm

THE HISTORY AND FUTURE OF KINECT

[Kresge Theatre]

Microsoft. They're a little late to their own party — but it's a *hella* fun party. The folks who gave us the Kinect present an inside view of its development, a snapshot of its current place in the world, and a sneak peek at what's in store for this revolutionary device. Plus, maybe some anecdotes about how Microsoft came to love the hacks :) Co-presented by **Stewart Tansley** — director of Natural User Interface (NUI) research and acting product manager of the Kinect SDK at Microsoft Research — and Microsoft Partner Architect **Arnold Blinn**, who organizes development of Kinect titles within Microsoft Studios.

FESTIVAL-AS-LABORATORY PRESENTATIONS

7:00-8:00pm

FESTIVAL-AS-LABORATORY PRESENTATIONS

[Kresge Theatre]

ART && CODE is conceived as a new form of cultural event, a "festival as laboratory". In this scheme — inspired by such models as the OF Lab and FutureEverything — conferences and festivals serve not only as venues for sharing the 'finished' and the 'refereed', but also as incubators for the 'experimental', the 'half-baked', the 'unknown', and the 'WTF'. Indeed. In the week immediately prior to ART && CODE, we invited a l33t group of hackers, artists and researchers — many of them, the expert ART && CODE workshop leaders — to huddle in a coding marathon at our STUDIO for Creative Inquiry and make stuff. We provided water, sunlight, and coffee; they've bashed together some new cultural forms. Come see what they came up with! A series of world premieres.

Presenters include:

- **Dan Wilcox**
- **Diederick Huijbers**
- **Elliot Woods**
- **Heather Kelley**
- **James George**
- **Joel Gethin Lewis**
- **Joshua Blake**
- **Kyle Machulis**
- **Kyle McDonald**
- **Matt Mets**
- **Meg Richards**
- **Nick Fox-Gieg**
- **Rachel Binx**
- **Rick Companje**

AUDIOVISUAL PERFORMANCES

8:00-8:15pm

BAUDI(O) PAINTING

[STUDIO]

High-performance beatboxing meets interactive realtime visualization in the work of Montreal-based performance artist, musician, and creative coder **Jason Levine.**

8:15-9:15pm

MAREORAMA RESURRECTED

[Kresge Theatre, CFA]

The perfect finish to a long day. Experience a century-old immersive virtual reality — a moving panorama, the new media performance of its time — in this highly unusual "illustrated lecture" by **Professor Erkki Huhtamo**.

Performed throughout the 1800s, moving panoramas were among the most popular entertainment of the 19th century. In this poetic lecture-demonstration, scholar and media archeologist Erkki Huhtamo draws on his research into moving panoramas and dioramas to discuss various historical apparata that laid the groundwork for 20th and 21st century immersive applications—including those created now by game designers and media artists. The particular focus of this presentation will be on the Maréorama, a huge multi-sensory spectacle created by Hugo d'Alesi and his team for the Universal Exposition of 1900 in Paris. Drawing from high-resolution scans and the original piano music composed for the Maréorama by Henri Kowalski, Huhtamo reconstructs several sequences from this simulated sea voyage on the Mediterranean. The performance features live piano accompaniment by Stephen L. I. Murphy.

10:00pm

LIT TREE

[Location will be announced on Twitter @artandcode and on the whiteboard in STUDIO]

The design team Kimchi and Chips (**Mimi Son** and **Elliot Woods**) create dances of light across the leaves of a tree. Through the use of interactive video projections, a tree is augmented in a non-invasive way, enabling the presentation of volumetric light patterns using its own leaves as voxels (3D pixels).

WORKSHOPS

8:30-10:30am

3A: 3D SCANNING WITH STRUCTURED LIGHT PROJECTORS

[CFA 303]

"Structured Light" 3D scanning techniques begin with video imagery of special image patterns (like stripes and checkers) projected onto a subject. When observed by a camera and processed by software, these flickery patterns permit the creation of extremely high-resolution 3D models. With less noise and higher spatial resolution than Kinect scans, structured light is (under certain circumstances) an important low-budget alternative to depth cameras like the Kinect.

In this 3-hour workshop, **Kyle McDonald** explains and demonstrates the basics of creating 3D scans with structured light. Open-source tools for structured light 3D scanning, such as Kyle's DIY 3D Scanner, will be presented, discussed and distributed. The relative merits of low-budget 3D scanning techniques will be productively compared.

8:30-10:30am

3B: USING THE KINECT WITH OPENFRAMEWORKS

[STUDIO]

The Microsoft Kinect sensor — the first consumer depth-camera — has radically altered the landscape of possibilities for the use of machine vision in interactive art and computational design. This workshop presented by **Zachary Lieberman** with the assistance of **Dan Wilcox** introduces libraries and techniques for Kinect programming in OpenFrameworks, a popular arts-engineering toolkit for creative coding in C++. You'll learn how to access the depth buffer and export a 3D point cloud using Libfreenect via ofxKinect; how to obtain the skeleton approximation of a person using OpenNI; and some helpful computation techniques for working with these data.

Also on Sunday morning:
UNCONFERENCE Session 3 runs from 9:30-10:30am
(see page 8 for details)

10:45am-12:45pm

4A: CALIBRATING PROJECTORS AND CAMERAS: PRACTICAL TOOLS

[STUDIO]

"Camera calibration" is the process of deriving the numeric parameters of a camera (such as focal length, principal point, and lens distortion) that produced a given photograph or video. Calibrating devices together is essential for augmented reality (AR) and other activities (like augmented projection) in which light must be accurately projected onto geometries observed by cameras.

This 2-hour workshop, led by **Elliot Woods** with additional contributions from **Kyle McDonald**, will present the mathematics of calibration in simple terms, and provide a number of practical open-source tools for calibrating projectors and depth cameras like the Microsoft Kinect.

10:45am-12:45pm

4B: USING THE KINECT WITH MAX/MSP/JITTER

[CFA 303]

In this workshop, presented by **Joshua Goldberg**, you'll get to experiment with the Microsoft Kinect sensor in Max/MSP/Jitter, a powerful environment for arts engineering and interactive sound. The Kinect becomes available to the Max environment with the help of Jean-Marc Pelletier's free Jit.Freenect.Grab library. You'll be able to:

- Retrieve RGB images.
- Retrieve depth maps.
- Retrieve images from the infrared camera.
- Retrieve accelerometer readings.
- Control the Kinect's tilt motor.
- Use multiple Kinects simultaneously.

2:15-4:15pm

5A: USING THE KINECT WITH PURE DATA

[CFA 303]

Dancing with Technology; The Kinect and the Temporal Lobe:
This 2-hour workshop with **Sofy Yuditskaya** will get you started using the Kinect for gestural interaction in Pure Data, a free, open-source, cross-platform toolkit for "patching-based" arts engineering. Assisted by **Dan Wilcox**.

Pd (aka Pure Data) is a real-time graphical programming environment for high-quality audio, video, and graphical processing — considered by many as a free alternative to Max/MSP. For this workshop, prior experience in Pure Data is not required, but some experience with "patching-based" programming environments (like Max/MSP, VVVV, or Grasshopper) is a plus. We will use the Kinect as an input mechanism to control objects and mechanisms in the physical world with a focus on the spacial and the performative.

2:15-4:15 pm

5B: KINECT-BASED MOCAP FOR FLASH AND AFTEREFFECTS

[STUDIO]

Animators — create your own 3D motion capture studio in your living room! This introductory 2-hour workshop by animator **Nick Fox-Gieg** will get you started using the Kinect for inexpensive, DIY, full-body motion capture. With little or no programming, you'll be able to acquire OpenNI "skeleton" data and use it to rig characters and other movements in Adobe Flash and/or AfterEffects.

DAN WILCOX

Dan Wilcox (@danomatika) is an artist, composer and engineer currently working towards an MFA in new-media performance arts at Carnegie Mellon University. Dan spent two years as a creative coder at the Ars Electronica Futurelab, Linz, prior to which he earned a Masters in Art and Technology from the IT University of Goteborg, Sweden. Dan performs regularly as the cyborg Robot Cowboy, and is an active contributor to open-source arts toolkits like Pure Data and OpenFrameworks. In late 2010, Dan had a surprise Internet hit with his speed project, Kinect Titty Tracker, which he hacked together in just one evening. In this project, Dan writes, "the computer searches for my manboobs and draws a bra or pasties on top." Music is played when his manboobs are detected.

DIEDERICK HUIJBERS

Diederick Huijbers (@roxlu) is a game designer, programmer and designer who works with with OpenFrameworks to create interactive visualizations.

ELLIOT WOODS

Elliot Woods (@elliotwoods) completed his Masters in Physics at the University of Manchester and has since been working on new media installations and developing technologies and products. He has worked on and exhibited interactive arts in Seoul, Yokohama, Sao Paulo, Manchester, London, Berlin, Milan and Arhus (Denmark). His key interest is simplifying technology to create elegant, sustainable solutions. Through this, Elliot aims to develop a future with less information and materials that are used more thoroughly and thoughtfully. Elliot and his partner Mimi Son co-direct Kimchi And Chips, a cross-disciplinary art and design studio based in Manchester and Seoul, where they create design and artworks that focus on storytelling and the sharing of memories through installations and products.

Elliot is an expert in the inter-calibration of cameras and projectors — a crucial problem in creating effective augmented realities and augmented projections. He is known for his recent project, Lit Tree, a structured light projection system in which the leaves of a tree are used as the voxels in a 3D display, and a Kinect is used to input 3D shapes into the voxels.

GOLAN LEVIN

Golan Levin (@golan) is the founder and director of the ART && CODE event series. Levin ia an artist/engineer interested in the exploration of new modes of reactive expression. His work focuses on the design of systems for the creation, manipulation and performance of simultaneous image and sound, as part of a more general inquiry into formal languages of interactivity, and of nonverbal communications protocols in cybernetic systems. Through performances, digital artifacts, and virtual environments, Levin applies creative twists to digital technologies that highlight our relationship with machines, make visible our ways of interacting with each other, and explore the intersection of abstract communication and interactivity. Presently he is Associate Professor of Electronic Art and Director of the STUDIO for Creative Inquiry at Carnegie Mellon University, Pittsburgh.

GREG BORENSTEIN

Greg Borenstein (@atduskgreg) is a New York based artist and educator whose work explores the use of special effects as an artistic medium. He is fascinated by how effects techniques cross the boundary between images and the physical objects that make them, in media like miniatures, motion capture, 3D animation, animatronics, and digital fabrication. Greg is a Resident Researcher at the Interactive Telecommunications Program at NYU, and is currently writing "Making Things See", the O'Reilly book on Kinect hacking.

Greg's work with the Kinect has stretched from media art to health applications. He was part of a team that won the 2011 national Health 2.0 developer challenge for the Kinect Abnormal Motion Assessment System, an application for automating the detection and tracking of movement disorders such as Sydeham Chorea and Tardive Dyskensia using the Kinect. Greg has also used the Kinect to create lasercut animations for modern zoetropes, and used its skeleton tracking abilities to create a video performance piece in which he puppeteers a 3D model of his own head.

Greg is an experienced workshop leader, having co-directed, for example, a workshop at Open Source Bridge which developed techniques for playing web browsers like violins, managing windows like marionettes, and controlling text editors with one's chin.

HEATHER KELLEY

Heather Kelley (@PerfectPlum) also known as moboid, is a media artist, curator, and game designer. Currently Ms. Kelley heads her interaction and experience design studio Perfect Plum. Perfect Plum's first product is the OhMiBod Remote, an intuitive and beautiful iPhone interface to control a connected vibrator. She is co-founder of Kokoromi, an experimental game collective, with whom she has produced and curated the renowned GAMMA event promoting experimental games as creative expression in a social context, and and developed the stereoscopic motion-controlled game superHYPERCUBE.

JAMES GEORGE

James George (@obviousjim) is a media artist and programmer using code to create experiences in physical space. His projects takes the form of permanent architectural installations, public projections, and mobile applications. An active participant in creative software communities, through creating work he contributes to open source initiatives.

His installations, collaborations, and workshops have been presented at Beall Center for Art and Technology (USA 2010), and Festival Enter (Czech Republic 2011) and DHUB Museum (Barcelona, Spain 2011), Coded Cultures (Vienna, 2011) , and The Creators Project Event (New York, 2011). This year he lead software development to create permanent installations for the University of Central Florida and the National Maritime Museum in London.

JASON LEVINE

Jason Levine (@xulululuuuum) is quickly becoming known for creating otherworldly performance-installations using the latest technologies to augment his voice and body. Cutting-edge yet accessible, his performances are well-suited to festivals, events, and art galleries.

Jason taught himself to program computers at age 7 and performed with the I MUSICI orchestra at age 9. From then on, his passion was split between technology and performance. Fascinated by the voice, he began experimenting with beatboxing and throatsinging. Too avant-garde for traditional music school, he attended the Institute for Living Voice in Marseilles, France in 2003, Buenos Aires, Argentina in 2007, and Antwerp, Belgium in 2010. During his time at the Institute, he studied under renowned contemporary vocalists such as David Moss, Joan La Barbara, Tran Quang Hai, and Jaap Blonk. In 2006, Jason completed a Bachelor in Computer Science with a specialization in Music Technology from Concordia University. That same year he was given the Award for Outstanding Vocal Percussion by the International Collegiate Championship Acapella and went on to beatbox at Lincoln Centre in New York City with the acapella group Effusion.

Jason began his new media performance career in 2001 with his live looping group entitled Tabula Rasa. In 2004, Jason came in contact the graphical programming environment Max/MSP and pandora's box was opened. Jason began constructing his own instruments out of sensors, creating gesture-controlled surround sound diffusion systems, and working with interactive lighting. In 2008, he began working in the worlds of circus and dance as a musical performer with his unique voice and innovative inventions. Finally, Jason began working with what would become his primary medium: interactive video. In November 2010, the Kinect was released and a brand new pandora's box was opened….

JEFF KRAMER

Builder, botter, hacker and dreamer, **Jeff Kramer** (@Qworg) is a Research Programmer and roboticist at the National Robotics Engineering Center (NREC). He also breaks things and rebuilds them at HackPGH, Pittsburgh's very own hacker space. He writes: "I expect the best out of people and out of myself. I love collaborative projects, the startup atmosphere, and doing great, world-changing things."

Jeff is currently writing a book for APress, entitled *Hacking the Kinect* — with a focus on teaching algorithms and the depths of 3D data processing.

JOEL GETHIN LEWIS

Joel Gethin Lewis (@joelgethinlewis) is an interactive director and artist. From 2005 to 2008 he was the interaction designer at United Visual Artists, working with clients such as U2, Massive Attack, Nokia and the British Council. He currently lives and works in London at the company he co-founded in 2008, Hellicar&Lewis.

Educated in London at Imperial College and the Royal College of Art, Joel split his time between his studies and working at Dazed&Confused magazine, where amongst other things he launched AnotherMag.com and assisted the photographer Rankin. In other work he has collaborated with such varied clients as Benetton, Rem Koolhaus, IBM, and Wieden+Kennedy. He is one of the founders of the interaction design meet-up, This Happened.

JOSHUA BLAKE

Joshua Blake (@joshblake) is an integrator (developer-UX designer hybrid) with extensive experience developing Natural User Interfaces (NUI) for Kinect, Microsoft Surface, and Windows 7 touch. He is a Microsoft Surface MVP and is deeply involved in the Microsoft Surface and NUI communities. He maintains several open source NUI projects and founded the OpenKinect community. Joshua has a blog "Deconstructing the NUI" and is currently writing a Manning book Natural User Interfaces in .NET. Joshua is the Technical Director of the InfoStrat Advanced Technology Group in Washington, DC and specializes in using NUI technologies for enterprise collaboration and education.

Joshua is an authority on the Microsoft libraries for natural user interface (NUI) development, including the Microsoft Kinect SDK. He was selected by community vote to speak at both the MIX10 and MIX11 conferences, and regularly speaks about various NUI topics at local and regional conferences. He has used the Kinect sensor to control Powerpoint and conduct music, among many other projects.

JOSHUA GOLDBERG

Joshua Goldberg (@wugmump) is an artist and programmer based in New York, with more than a decade of experience in using and teaching Max/MSP for interactive media arts.

Emerging from an undergraduate indoctrination in theatre direction, Joshua switched gears at NYU's Interactive Telecommunications Program to multimedia sampling and live video performance. He is continually working against the impulse of coherent narrative, to improvisationally create dynamic, abstract collages of the flotsam and jetsam of the media sphere. His work 13 Hours of The Discovery Channel, a prime example of this aesthetic, has been shown in galleries and public access television stations in Manhattan, Frankfurt and Amsterdam, and was a Rhizome Net-Art "Pick of the Day". Live visualists across the world use his application Dervish, a mixer and distorter of both live video and Quicktime files, to shred narrative and manipulate feedback transformations. He has used Max/MSP for nontraditional visualist work since 2000, and serves as a Harvestworks Jitter tutor. He regularly performs live video in club and party venues across the city and nation.

KYLE MCDONALD

Kyle McDonald (@kcimc) works with sounds and codes, exploring translation, contextualization, and similarity. With a background in philosophy and computer science, he strives to integrate intricate processes and structures with accessible, playful realizations that often have a do-it-yourself, open-source aesthetic. Presently (Autumn 2011) Kyle is Artist-in-Residence at the Yamaguchi Center for Arts and Media, Japan.

Kyle is a regular contributor to open-source arts-engineering initiatives such as OpenFrameworks, having developed a number of extensions which provide connectivity to powerful image processing and computer vision libraries. For the past few years, Kyle has applied these techniques to problems in 3D scene capture, first using structured light techniques, and later with the Microsoft Kinect sensor. Kyle's camera-based artworks range from the hyper-formal to the tactical and interrogative.

KYLE MACHULIS

Kyle Machulis (@qDot) is known as a tinkerer/hacker/pioneer/visionary in the realm of sex technology (or at least, a ton of bloggers seem to think so). Through his Slashdong webpage, he uses the topic of teledildonics (remotely actuated sexual experience) to teach the basic concepts of electrical and mechanical engineering. He also tracks the convergence of sex and technological advances in toys and interaction. He was the recipient of the Lifetime Achievement Award at Prixxx Arse Elektronika.

Kyle runs the OpenYou Project, reverse engineering and documenting protocols and hardware for consumer health tracking. His interest stems from the idea of taking biometrics beyond health and sports tracking, and integrating it into the quality of his every day activities, whether these are physically active (like rock climbing) or sedentary (like programming).

MATT METS

Matt Mets (@cibomahto) is is an Artist/Maker/Creator. One of the founding members of local hackerspace HackPittsburgh, he now lives in Brooklyn and works for MakerBot Industries on the next generation of DIY, open-source 3D-printers. He is also a contributing writer for Makezine. At ART && CODE, Matt will present and discuss ways of producing physical sculptures from data captured with low-cost 3D scanners, such as the Microsoft Kinect.

MICHA GALOR

Micha Galor manages the Applications and UX team in PrimeSense, maker of the 3D sensing technology behind Kinect. His team focuses on Natural Interaction research. This involved prototyping numerous working concepts and demos, in an exciting journey to define the future language of man-machine interaction.

Prior to his role in PrimeSense, Micha led the Digital Photography team in Zoran, a multi-media chip manufacturer, where he developed the imaging technology of several bestselling camera-phones models. Micha lives with his (totally awesome) wife and two kids in Tel-Aviv, Israel.

NICK FOX-GIEG

Nick Fox-Gieg (@n1ckFG) is an animator, educator and creative coder based in Toronto. His short film awards include the jury prize for Best Animated Short at SXSW 2010 and runner-up Best Animation at Palm Springs 2011. His films have also screened at the Ottawa, Rotterdam, TIFF, and Zagreb film festivals, at the Centre Pompidou in Paris, and on CBC TV. His projections have been featured at the 2009 Governor General's Awards and in the Broadway musical Squonk; he's performed his live sound and video works at the Paradiso in Amsterdam and the REDCAT Theater in Los Angeles.

Fox-Gieg received his MFA from the California Institute of the Arts in 2004, and his BFA from Carnegie Mellon University in 1999. He has received Bravo!FACT and Canada Council commissions, Pennsylvania and West Virginia Media Arts Fellowships, Ontario and Toronto Arts Council Media Artist grants, and a Fulbright fellowship to the Netherlands.

As a new-media arts educator, Nick has developed a wide-ranging set of helpful tutorials for beginners. Most recently he has turned this focus to the creation of Kinect-based motion capture tools for Flash and AfterEffects animators.

RACHEL BINX

Rachel Binx (@rachelbinx) works as a Design Technologist at Stamen Design in San Francisco. She enjoys using both the creative and analytical sides of her brain, and gets particularly fired up about projects that combine the two. She has a double degree in Mathematics and Art History from Santa Clara University. She completed her honors thesis with a portfolio of data visualization pieces, after having studied the aesthetics of visualization and learning to code in Processing. Her recent projects have included the website for MoMA's Talk To Me exhibition, and the twitter visualization site for the MTV Video Music Awards.

RICK COMPANJE

Rick Companje (@companje) is a media artist, developer and Inventor. In 2005 he invented Globe4D, an interactive physical globe with Time as extra dimension. Rick also developed an interactive timeline for the Rijksmuseum Amsterdam and worked at a stereoscopic videocamera for the European Space Agency (ESA). In 2007 Rick was one of the nerds in the KRO TV program "Het Lab". Since a few years Rick is a member of artist collective "De Spullenmannen" where he works on inventions-nobody-is-asking-for. Within this context he is cofounder of the open-knowledge community OpenToko.org and FabLab Amersfoort. Furthermore he is a teacher at the HKU and gives programming workshops about Processing, OpenFrameworks and Arduino. Rick's work has been exhibited worldwide in museums, conferences and during festivals like NEMO Science Center, ACM Siggraph, Wired Nexfest, Laval Virtual, TodaysArt, Cinekid and ScienceLinx.

SOFY YUDITSKAYA

Sofy Yuditskaya (@horusVacui) is a non-disciplinary researcher and practitioner, examining the nature of objects and human action in relationship to their fragmented digital representations. Her practice coils together a variety of performance types, including musical performance with her own transmission based instruments, the uttered word, interactive dance, techno-futuristic occult rituals, and a variety of site specific social experiments. In addition to making art Sofy is a facilitator of the chaos, and art machines as Projects Director at 319 Scholes in Brooklyn. On good days she adds a line to the PD starter-kit repo.

At ART && CODE, Sofy will introduce the use of the Kinect in the free patcher-based arts engineering environment, Pure Data. Sofy recently conducted a similar workshop in "Breakneck Prototyping with Microsoft Kinect and Pure Data" at the Gray Area Foundation for the Arts in San Francisco.

STEPHEN HOWELL

Stephen Howell (@saorog) is a computer science lecturer with the Institute of Technology Tallaght, Dublin, Ireland, where he lectures on Software Development and Interactive Media Design & Development. He focuses on creative coding and interactive art using technologies such as Processing, openFrameworks, Cinder and OpenGL. A native of Louth, Stephen attended Dublin City University and was awarded first class honours in B.Sc. (Hons) Computer Applications in 1998. After graduating he worked as a software engineer for IBM.

Stephen is the author of Kinect2Scratch, a bridge from the revolutionary Microsoft depth-camera to Scratch, a widely-used toolkit for teaching programming to kids. At ART && CODE, Stephen presents a Kinect2Scratch workshop for kids (8-13), parents and teachers alike.

Stephen's participation at Art && Code is made possible through the generous support of the ***Institute of Technology Tallaght, Dublin.***

ZACHARY LIEBERMAN

Zachary Lieberman (@zachlieberman) is an artist with a simple goal: he wants you surprised. He creates artwork that uses technology in a playful andseamless way to explore the nature of communication and the delicate boundary between the visible and the invisible. He makes performances, installations, and on-line works that investigate gestural input, augmentation of the body, kinetic response and magic. Most recently, he helped create visuals for the facade of the new Ars Electronica Museum, wrote software for an augmented reality card trick, performed by Marco Tempest, and helped develop an open source eye tracker to help a paralyzed graffiti artist draw again. In addition to making artistic projects, Lieberman is co-creator of openFrameworks, an open source C++ toolkit for creative coding. He teaches at Parsons School of Design in New York City.

SPEED PRESENTATIONS

Friday, 7:30pm-late, Giant Eagle Auditorium

The ART && CODE attendees show off their goofy, their serious, their indescribable Kinect hacks and other 3D efforts in this high-energy evening of speed-presentations! The evening is broken into three sessions:

1. Kyle Machulis
2. Dan Wilcox
3. Chris Sugrue
4. Toby Schachman
5. Eunsu Kang
6. Debaleena Chattopadhyay
7. Rui Pereira
8. Ferhat Sen
9. Meg Richards
10. Timothy Sherman
11. Asa Foster & Caitlin Rose Boyle

(Pizza Break)

12. Brad Tober
13. Phoenix Perry
14. Christopher Coleman
15. Nova Jiang
16. Marco Pinter
17. Lining Yao
18. Sha Hwang
19. Francisco Zamorano
20. Barry Threw
21. Caitlin Morris
22. Rick Compajne

(Pizza Break)

23. Nick Hardeman
24. Seb Lee-Delisle
25. Reha Discioglu
26. Matt Parker
27. Sean Kean
28. Molmol Natura
29. Friedrich Kirschner
30. Silvia Ruzanka
31. James George
32. Eric Mika
33. Rachel Binx
34. David Stolarsky
35. Shawn Lawson
36. Shawn Sims

ARTS KEYNOTE

ERKKI HUHTAMO

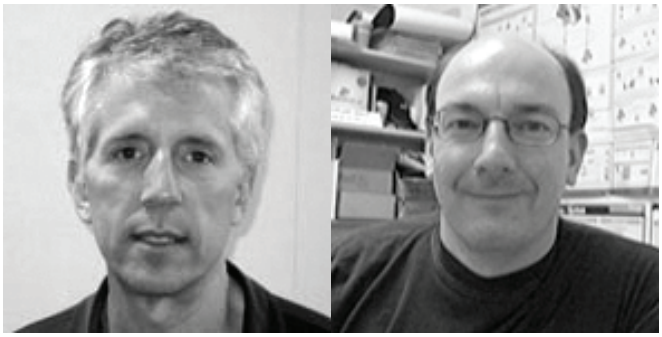
Professor **Erkki Huhtamo** is a media archaeologist, writer and exhibition curator. At the UCLA Department of Design | Media Arts his area is media history and theory. Professor Huhtamo has written extensively on media archaeology and the media arts; he holds a Ph.D. in Cultural History. At **ART && CODE**, Erkki presents an arts keynote lecture about the history of 3D imaging, and an audiovisual performance of a state-of-the-art virtual reality from 1900 — a reconstructed **Mareorama**.

Professor Huhtamo is a leading practitioner of *media archaeology*, an emerging critical approach he has developed (together with a few other scholars) since the early 1990's. It excavates forgotten, neglected and suppressed media-cultural phenomena, helping us to penetrate beyond canonized accounts about media culture. Huhtamo pays particular attention to the "life" of topoi, or clichéd elements that emerge over and over again in media history and provide "molds" for experiences. What may seem new often proves to be just new packaging of ideas repeated during hundreds and even thousands of years. In recent years, Professor Huhtamo has applied this approach to phenomena like peep media, the notion of the screen, games and mobile media. He has also written about the ways in which media artists like Paul deMarinis, Rafael Lozano-Hemmer and Bernie Lubell have integrated media-archaeological elements into their work. Professor Huhtamo's most recent books are *Media Archaeology: Approaches, Applications, and Implications* (co-edited with Jussi Parikka, University of California Press, 2011) and a forthcoming monograph titled *Illusions in Motion: a Media Archaeology of the Moving Panorama and Related Spectacles*.

As a curator Professor Huhtamo has created many media art exhibitions, such as the major project *Alien Intelligence* (KIASMA Museum of Contemporary Art, Helsinki, 2000). He has served in exhibition and festival juries worldwide, including Siggraph, Ars Electronica and the Interactive Media Festival. He has lectured widely in Europe, the US, Japan, and elsewhere, and he has also written and directed television programs about media culture, such as the series *Archaeology of the Moving Image* (YLE, The Finnish Broadcasting Corporation, 1995-96). Huhtamo also maintains one of the world's most extensive collections of antique optical viewing devices, such as magic lanterns, peep show boxes, camera obscuras, praxinoscopes, and kinoras, which form primary resources for his research, pedagogy, and performance work.

TECHNICAL KEYNOTE

ARNOLD BLINN & STEWART TANSLEY



Arnold Blinn is an architect at Microsoft Corporation. He currently works for Microsoft Studios running development for Good Science. Good Science focuses on new and innovative gaming experiences and built many of the initial Kinect experiences, including Kinect Adventures and Kinect Fun Labs. Arnold has a long history of building and launching new applications and services, not only including gaming but also services for photo sharing, online communication, digital rights management, and online shopping.

Prior to working at Microsoft, Arnold was a co-founder of Ink Development corporation in 1991. This company built new applications for Pen Based Tablet computers, and was eventually morphed into eShop Inc. building software for electronic commerce. This company was acquired by Microsoft in 1996. Arnold has approximately 25 patents issued and another 25 pending in electronic commerce, digital rights management, photo manipulation and other online services.

Stewart Tansley (@dswtan) is a Senior Research Program Manager at Microsoft Research Connections and acting product manager for the Kinect for Windows SDK from Microsoft Research. He is responsible for Microsoft's academic research partnerships related to Natural User Interface (NUI), especially device-oriented, including Cyber-Physical Systems (CPS), Robotics and Sensor Networks. Before joining Microsoft in 2001, he spent 13 years in the telecommunications industry in software research and development, focusing on technology transfer. Stewart has a PhD in Artificial Intelligence applied to Engineering from Loughborough University, UK. He has published a variety of papers on robotics for education, artificial intelligence, and network management as well as several patents, and co-authored a book on software engineering for artificial intelligence applications. In 2009, he co-edited *The Fourth Paradigm*, a book that collates visionary essays on the emerging field of data-intensive science. His recent research interests have centered on multi-device NUI, social human-robot interaction, robotics as a context for computer science education, sensor networks, and ubiquitous computing.

DEMOSPLASH 2011

Demosplash 2011
Friday, October 21 & Saturday, October 22

Demosplash is a computer art festival in the spirit of the demoscene, going into greater depth on the artistic and technical skills of the demoscene through a series of short talks, tutorial/hacking events, and several competitions. In addition to demos, of course. The highlight of this event is of course a thorough screening of many classic and modern demos on a bunch of platforms. With very few exceptions (to save you all from absolutely insane loading times or to cope with last minute hardware failures), all demos are being shown on real, original hardware using one of the largest collections actively maintained for this purpose in the United States.

Demosplash will be held in the Gates Hillman Center (Computer Science building) on the Carnegie Mellon campus.

For tickets and more information, visit **Demosplash.org**

DEMOSPLASH SCHEDULE OF EVENTS

Friday, October 21

6:00pm — Opening ceremony, demoscene introduction, and introductory demos

7:00-11:00pm —Classical retro and a scattering of modern demos
A short introduction to each platform and historical context will be provided

8:00-11:00pm — Retro gaming

Saturday, October 22

2:00-7:00pm —Talks and hack events
Learn more about the demoscene and retrocomputing, plus Android phone hacking, embedded assembly hacking and lockpicking.

6:00pm —Film screening of *23: Nothing is as it seems*
("A dramatization of the true story of Karl Koch, a German hacker loosely affiliated with the German Chaos Computer Club and who became involved in selling secrets gleaned from his hacking endeavors to the KGB before dying mysteriously.")

8:00-9:00pm — Classical retro demos
(Amiga, Apple, Atari, Commodore, Sinclair, TI-99, etc.)

8:00-9:00pm — Final competitions
Processing demo, Lockpicking challenge, Hacking (Capture the Flag) challenge

9:00-10:00pm — Competition screenings and awards ceremony

8:00-11:00pm — Retro gaming

10:00-11:00pm — Demo finale: modern demos

Pittsburgh Mini Maker Faire®

Pittsburgh Mini Maker Faire
Sunday, October 23
noon-6:00pm

A Maker Faire is place where we celebrate the processes of learning and doing. It's a place to share what we are learning as inquisitive, explorative amateurs. Not every project has produced a finished, successful end product, but every project is an expression of constructing, creating, mixing, deconstructing, inventing and tinkering – the do-it-yourself (DIY) character and spirit. A family-friendly event that will feature both established and emerging local "makers," the faire will feature rockets and robots, DIY science and technology, urban farming and sustainability, alternative energy, bicycles, unique hand-made crafts, music and food, and educational workshops and installations.

The Pittsburgh Mini Maker Faire will take place at Children's Museum of Pittsburgh, located on Pittsburgh's historic Northside. **Admission** to Mini Maker Faire is included in the price of Museum admission:

$12 for adults
$11 for kids 2-18 and seniors
Free for children under 2

We are providing **free shuttles** between Carnegie Mellon and the Children's Museum for ART && CODE 3D participants (***seating is limited;*** please sign up in advance to reserve your seat!) Please have your badge with you. Shuttles depart at 2:00 and 3:30, and return at 4:00 and 5:30. Pick-up point is the Peace Garden on Frew Street, behind CFA.

For more information and a list of projects to be shown, visit **PghMakerFaire.com**