2009 ICCE TUTORIALS

SATURAY
January 10, 2009

T1.1
2:30 - 6:00 PM

Organizer:
Simon Sherratt

Human Interface Design

Stefan Mozar
Principal Consultant
CCM Consulting

Abstract:
Coming Soon

Bio
Coming Soon

Stefan Mozar
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T1.2
2:30 - 6:00 PM

Organizer: TBA

The 3D Graphics Pipeline from an OpenGL ES Perspective

Mathieu Robart
STMicroelectronics R&D

Abstract:

Thanks to constant progress in hardware design and implementation, 3D Graphics Processing Units are now small, powerful and power-efficient enough to be integrated in devices such as handheld consoles or mobile phones. Their API of choice is OpenGL ES, the embedded version of the highly popular OpenGL 3D API, present today in virtually every desktop computer system. This streamlined version of the API has not sacrificed any efficiency, and compatible applications range

from high-end games and GUIs, to scientific visualization, for example. This tutorial will provide a global overview of what OpenGL ES is, and will describe the corresponding graphics pipeline supporting the API. The fixed-functionality pipeline supported by OpenGL ES 1.x will be presented in some detail, from vertex transformation, lighting, clipping and rasterization to texturing, fragment blending and image generation. Then, the shading system introduced by OpenGL ES 2.0 will be described and ESSL, the associated shading language, will be reviewed with some examples. Finally, some future extensions of the graphics pipeline will be addressed.

Bio
Mathieu Robart

Mathieu Robart received a Ph.D. in Computer Graphics in 1999 from Paul Sabatier University in Toulouse, France. From 2000, he is working for STMicroelectronics, in Bristol, UK.

At ST, Mathieu's research and developments covered different domains of computer graphics, including graphics hardware architecture, OpenGL and OpenGL ES-oriented graphics pipelines, global illumination, shaders and real-time rendering. He is currently working as Senior Graphics Engineer for the Advanced System Technology (AST) division of ST, specialized in R&D on Computer Graphics for Mobile Devices.

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SUNDAY
January 11, 2009

T2.1
8:30-12:00 Noon

Organizer:
Uwe E. Kraus

Architecture Trade-Offs for Embedded Audio/Video Processing

Jens Franzen
Johan Janssen
NXP Semiconductors

Abstract

This tutorial will give a historic overview of the evolution of audio/video processing in television including an outlook on the growth of media processing requirements in the coming years. It will address some of the key architectural parameters of media processing like data rates, required processing power and memory bandwidth. Also a short overview will be given of the interfaces in a television system and their main characteristics.

In the codec section, we will address various audio/video codec standards (e.g. h.264, avs, mpg4, mp3, aac etc.) and their architectural considerations. One view we will present is the implementation flexibility for future requirements versus the cost-effectiveness. Another topic we will discuss is the embedding of the codec subsystem in a larger SoC, We focus here on the interaction with the memory controller, on minimizing memory traffic and on techniques to reach latency tolerance in the overall system.

In the video and audio post-processing parts we will address the trade-off between on-chip vs. off-chip memory bandwidth and its relation to fifo and cache implementations. Next to that, we will address and discuss benefits and drawbacks of programmable vs. dedicated hardware solutions. On the video post-processing side, we will especially give attention to the important aspect of motion-based processing. The motion based processing, e.g. frame rate conversion is typically a high-performance requiring sub-system, in which the various architectural trade-offs are relevant.

Bio

Jens Franzen
Johan Janssen

Jens Franzen (D'88 - P'94) was born in Himmelpforten, Germany in 1959. He received the Diploma degree in electrical engineering and the Ph.D degree, in 1988 and 1994 respectively, from the University of Hannover, Hannover, Germany. From 1988 to 1994 he was a Research Assistant with the Information Technology Laboratory, University of Hannover. In 1994, he joined Philips Semiconductors resp. NXP Semiconductors, Hamburg, starting at system and algorithm pre-development. Since 2000 he is working on TV system definition and implementation.

Johan Janssen graduated in electrical engineering at the Eindhoven University of Technology in 1993. In 1994, he joined Philips Research Labarotories Eindhoven, the Netherlands, and became a member of the TV system Department. In 1998, he moved to Philips Research Briarcliff, NY. During his research period, he led various research projects related to video enhancement. In addition, he was responsible for defining various high-end TV signal processing functions and their architectural requirements. In 2002, he joined Philips Semiconductors. Within NXP, he is currently responsible for the architecture definition of Video and Media subsystem solutions for the various semiconductor markets. He has authored and co-authored many papers and holds more than 15 patents.

T2.2
8:30-12:00 Noon

Organizer: TBA

Optical Storage

Richard (Dick) G. Zech
Curt Shuman, Ph.D.
Di Chen, Ph.D.

Abstract

For more than 40 years, optical data storage technology and products have fascinated much of the computer industry. And although much has been written about it, much is still unknown or misunderstood. In this tutorial we have the objective of explaining both the "what" and "how" of optical data storage (including a few of its secrets). In our introduction we trace the history and evolution of optical data storage (ODS). This section is followed by sections on product types and features and primary applications and markets, respectively. With this human-comprehensible background in place, we then turn to the technology and engineering of ODS. One section is dedicated to drives, another to optical storage media. Design issues and components are featured. Both replication systems and the impact of standards are discussed for optical storage media. Next, holographic memory (holomem) principles and technologies are reviewed. The key question to be answered herein is when or if this concept will succeed. An entire section will be devoted to the future of ODS. Key strategies addressed will be multilayer and near field. New and unconventional types of components will be highlighted. The impact of nanotech on achievable storage densities will be summarized. Finally a section is devoted to competing technologies. We will complete the seminar with a summary and conclusions. Some time will be budgeted for a Q&A period.

Bio
Richard (Dick) G. Zech
The ADVENT Group

Dr. Dick Zech has over 43 years of optical data storage, consumer electronics, and photonics experience. He earned his Ph.D. in 1974 at the University of Michigan as a student of E.N. Leith. He has been a consultant for more than 20 years and a patent litigation expert witness for more than 18 years. Dick's main research interests are (1) consumer electronics, including flat panel displays, lasers, LEDs, and solar energy; (2) manufacture and replication of optical media (technology, materials, processes and systems); and (3) the impact of MEMS/NEMS on data storage design and performance. He has published over 100 papers, reports, presentations on these subjects. Dick is currently President & Managing Principal of the ADVanced ENTerprises (ADVENT) Group.

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Bio

Curt Shuman, Ph.D.

Dr. Curt Shuman has over 35 years of optical data storage and optical design experience. He received his Ph.D. in Applied Physics from U.C. San Diego in 1973 as a student of Adolf Lohmann. Since then, he has worked in several fields of optics, including optical disk, optical tape, digital holographic data storage, imaging systems, components and sensors, lens design, phase control, anamorphic optics, laser conditioning, and servo signal modeling. Curt is a named inventor on 19 US and WIPO patents, and has coauthored numerous publications and reports. Curt is currently president of CA Shuman Inc.

Bio
Di Chen, Ph.D

Dr. Di Chen has over 45 years of optical data storage experience. He received his Ph.D. in Electrical Engineering at Stanford University, and taught and did research at the University of Minnesota. He joined the Honeywell Research Center where he did pioneering research in magneto-optic recording and laser beam control. He founded Optotech Inc. in 1984, and introduced the world's first high density WORM drive and media to the market. He has published over 100 papers, presentations, and reports on optical data storage. Di is currently the President of Chen and Associates, a consulting company in the field of optical data storage.

T3.1
2:30 -6:00 PM

Organizer:
TBA

Home Networking in Embedded Devices

Adam Powers
Macrovision's Embedded Solutions

Abstract:

As the number of digital and network-enabled devices proliferate throughout the home, the problem of how those devices interoperate and share information is becoming a larger focus for end-users and OEMs alike. In the past, technologies such as HTTP, HTML and JavaScript have enabled desktop computers to retrieve information from virtually any source, but as network connectivity moves into specialized and BOM-cost sensitive embedded devices new technologies are being developed.

This tutorial covers emerging protocols that enable virtually any kind of embedded devices to be automatically discovered and utilized by other networked devices. The Universal Plug and Play (UPnP) standards and Digital Living Network Alliance (DLNA) guidelines, and the relationships between them, will be highlighted.

The tutorial will cover how SSDP, GENA and SOAP allow devices to provide complex functionality despite the constraints of an embedded system. Specific UPnP technologies that enable the sharing of Audio / Video media, home control, QoS, security and more will be explored in detail. The tutorial will end with a highlight of how these protocols are being used in other standards bodies, such as OCAP HNP, DVB-HN, ARIB ISDB-T and ATIS IIF.

Bio
Adam Powers

Adam Powers is Principal Engineer and Architect for Macrovision's Embedded Solutions Business Unit. He is primarily responsible for Macrovision's Connected Platform, a middleware solution for consumer electronics and customer premise equipment that provides DLNA, UPnP, DRM and Internet Services functionalities to a wide range of embedded devices. Adam is also involved in monitoring and contributing to a variety of standards bodies, ranging from DLNA to DTCP to CableLabs.

Prior to his position at Macrovision, Adam was Co-Founder and Chief Technology Officer of the IPTV home-networking company Coaxsys, and he has been involved in various aspects of home networking for service providers and consumer electronics markets for ten years.

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T3.2
2:30 - 6:00 PM

Organizer:
Aldo Morales

Vibrant Picture Quality Enhancement for Display Systems

Pierre de Greef
NXP Semiconductors

Abstract:

LCD panels are now the main stream TV displays. High-end TV's are now featured with 120 Hz full-HD panels. Yet, the picture quality of these display systems can still be improved in the field of: sharpness, noise-rejection, black-level, contrast, brightness, color-gamut, motion-judder, motion-blur, power-efficiency, styling and costs. In this tutorial all these quality aspects are addressed and state-of-the-art system solutions are discussed for mobile and home applications.

Aspects covered by the tutorial:

Scaling and sharpening are used to address the high spatial resolution of these displays. Advanced RGB-LED backlight systems contribute to an improved picture quality, as they enable techniques as Adaptive Local Dimming which is used to improve black-level and contrast (High Dynamic Range), while at the same time saving power or boosting brightness. Agile dimming implementations can be used to drive slim, side-lit LCD displays. Furthermore, Adaptive Color Gamut Mapping is required to enable realistic and vivid color reproduction (Wide Gamut) and uniform light distribution. Natural Motion technology can be used to reduce motion-judder and motion-blur on fast display panels. As display resolutions and frame-rates are still increasing, there is a demand for more processing power and bandwidth, hence advance system architectures are required to provide cost effective solutions.

Bio
Pierre de Greef

Pierre de Greef was born in Breda, the Netherlands, in 1963. He graduated from the Polytechnical College in Breda in 1984. He joined Philips Semiconductors Eindhoven, The Netherlands where he worked for 16 years in the group Solid-State Special Products as a digital design engineer, where he was involved in various projects. From the year 2000 Pierre joint Philips components as a system design engineer where he was involved in development of electronics for large display systems. In 2002 he joined Philips Semiconductors as a system architect and was involved in the development of video and display processing circuits. He is currently working for NXP Semiconductors display solutions in the field of silicon, software and systems. He holds six US patents and more than 20 patent applications in the field of picture quality for display systems.