International Symposium on Technologies for Digital Photo Fulfillment 2009

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Technical Papers Program: Schedule and Contents

SATURDAY FEBRUARY 28, 2009

Image Capture and Processing

Session Chair: Herb Stein, consultant

9:00 – 11:40 AM

A CCD image sensor and an imaging system, which can change their movements to adapt to various shooting conditions, have been developed by utilizing characteristics of human eyes as hints. They are a switchable system between wide dynamic range mode, high sensitivity mode, and high resolution mode. As a result of this, the most suitable mode for the shooting conditions can be selected, like human eyes.

This presentation will focus on the key technologies Hewlett-Packard uses to enhance images and how a central team of color, imaging, and software engineers created an imaging pipeline that has been ported across consumer, commercial, and retail photo printing products.

Many real world examples are cited along with specific discussion of algorithms such as "Pet Eye" (red eye correction for animals). Some insights into our upstream techniques for image classification and analysis are discussed.

Ideas for future areas of research and development are also suggested.

An increasing consumer problem concerns the disappointing image quality of many digital prints, and the unavailability of simple, user-friendly remedial procedures. Thus the proportion of pictures printed from those acquired using digital cameras is falling dramatically, and especially from those taken with the newer generations of portable devices. We have previously described the evolution of a real-time image-processing methodology that enables non-technical consumers to optimize their personal images according to individual preference in an entirely intuitive manner. In light of the ability to place this software at any point where a consumer interacts with an image (camera, portable device, scanner, printer, photo-kiosk, desk-top, document processor, etc), we have used the term ubiquitous image processing to encompass all these applied fields. Here we will describe our experiences in applying this user-friendly technology to the latest-generations of touch-screen portable devices, and the technical problems encountered while doing so. These problems have included adapting the image-quality choice hierarchy to the smaller screen sizes, and solving the computational limitations imposed by these devices in order to provide real-time user access to optimum image quality. In addition, it has been necessary to adapt and develop software versions across the gamut of competing operating systems used by these latest touch-screen devices, while at the same time minimizing the application file-size. Practical examples

Welcome to Technologies for Digital Photo Fulfillment!

We are very pleased to have you join us in Las Vegas for the second International Symposium on Technologies for Digital Photo Fulfillment. Building on the success of our first meeting in 2007, we are proud to bring you photofinishing in the 21st century and the opportunity to stay on top of the latest technologies. We call this trend "The Personalization of Photo Imaging Output." We urge you to take advantage of the opportunity to network and discuss the advances, synergy, and the directions of creating, printing, sharing, and keeping consumer and professional images.

We are very fortunate to have Ben Nelson, general manager Snapfish by HP, as our Saturday luncheon keynote speaker discussing "Why Trying to Resell Wireless Minutes Leads to Success in Online Imaging." We are also excited to present 25 excellent papers covering image capture and processing, printed product fulfillment, and output equipment over the two days of the conference.

In addition, on Saturday afternoon, there is an opportunity for attendees to present an overview of their respective companies. Please also be sure to join your colleagues at the Conference Reception on Saturday evening.

An informative and interesting session highlighting new business needs for our industry is presented on Sunday afternoon.

On behalf of the conference committee, let me be the first to welcome you to this exciting conference in an exciting and evolving industry. Enjoy!

—Stuart T. Gordon, 2009 General Chair

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will be demonstrated of fully operational installed versions, including automatic features and a sharpness capability, yet with overall size as installed kept below 100kbs.

10:25 – 10:50 Coffee Break

10:50 **Automatic Photo Enhancement Server (HIPIE 2),** *Renato Keshet, Carl Staelin, Boris Oicherman, Mani Fischer, Pavel Kisilev, Sagi Schein, Doron Shaked, Marie Vans, Hila Nachlieli, Ruth Bergman, Ron Maurer, Michal Aharon, and Alexander Berkovich, Hewlett-Packard Laboratories (Israel); Ran Waidman, Oren Bengigi, Gal Amit, Shlomo Harush, Alon Asher, Hewlett-Packard Indigo Division (Israel); Hui Chao, Hewlett-Packard Laboratories (USA); Darryl Greig, Hewlett-Packard Laboratories (UK); and Matthew Gaubatz and Steven J. Simske, Hewlett-Packard Laboratories (USA)* **13**

HIPIE 2 is an internal code name for the HP Smartstream Photo Enhancement Server—a robust, scalable, and automatic photo image enhancement application designed for photo specialty workflows fulfilled using Indigo presses. It is intended for 24/7 operation, without human intervention, and is part of HP Indigo's Smartstream workflow offering. The code name HIPIE stands for the original "HP Indigo Photo Image Enhancement" name, with HIPIE 2 being its second version. This paper describes the various modules of HIPIE 2, giving an overview of the technology inside the product and its usage.

11:15 **Metadata for Consumers,** *Jean F. Barda, International Imaging Industry Association (I3A) (France)* **19**

A metadata policy must be defined when trying to give images a value in time, by attaching to the basic "data" an amount of selected information. Creation, preservation, and downstream usage should be considered the three main topics to take care of. Automatic input is not enough to personalize photos at the consumer level, which is our focus point today. Storage, but mainly preservation during the different operations a consumer set of photos has to endure is a critical problem. Obviously, the main motivation is "how useful it will be" in the coming years and decades, and how can I make sure that it will be re-usable. In the second part of the paper, a proposition of metadata set devoted to consumer level is explained and valued with a number of typical use cases, as an example of consensus on that delicate problem, when addressing a specific type of workflow: consumers. Other types of specific uses, professional and commercial, will be shortly tackled as well.

Keynote Luncheon

11:40 AM – 1:35 PM

Why Trying to Resell Wireless Minutes Leads to Success in Online Imaging, *Ben Nelson, Hewlett-Packard Company (USA)**

Printed Product Fulfillment

Session Chair: Rita Hofmann, ILFORD Imaging Switzerland GmbH

1:35 – 4:10 PM

1:35 **Kodak Adaptive Picture Exchange (APEX),** *Robert Mindler and William T. Rochford, Eastman Kodak Company (USA)* **22**

The KODAK Adaptive Picture Exchange (APEX) system is a modular, scalable, integrated solution that is being positioned for use by an entire on-site retail photo department. The system is affordable, easy to use, and delivers a low total cost of operation and a positive environmental impact while enabling the production of premium, high-margin consumer photo products. APEX software centralizes production of local and remote

* No paper available for this presentation.

digital and film orders behind the counter and offers a clean, eco-friendly alternative to today's wet AgX minilabs. This paper will describe the details and features of the new system and show how it has been designed to integrate operations of an entire photo department in a way that is easy and efficient for the retail environment.

2:00 **The Importance of Quality in Photo Gift Production,** *Mark B. Mizen, Creative Memories (USA).* **25**

Photo gifts include a far greater variety of materials than used in traditional photo finishing operations. Durability and image permanence play important roles in the quality of these products, which include photo books, poster, mugs, mouse pads, and other items. In some cases, traditional test methods may be modified to assess the quality of these products. In other cases, entirely new test methods are required. This presentation will compare the performance of photo gifts to traditional photographic materials under a variety of test conditions.

2:25 **New Technologies Provide a Wider Array of Products via Digital Fulfillment,** *Jay Hitchens, Qualex, Inc (USA)* **28**

New digital technologies mean that a wider array of personalized products is available to the consumer via digital fulfillment. Qualex and its competitors have concentrated considerable effort to employ new technologies and provide leading edge products to web site and retail customers. As digital images become the photographic standard, there are more possibilities than ever for a consumer to express themselves with photographic products and displays. Driven by more powerful processing systems and affordable software, there is a convergence of technologies that utilize digital images. The printing, sign making, textile, engraving, photographic, and entertainment industries all utilize digital images in new product offerings. The convergence of technologies is generating higher quality products and lower costs for both business and consumers. Products as diverse as full color etchings in granite, a 3D version of a Wii alter-ego, or a digitally woven wall hanging can be created and ordered from the comfort of the home or office by the consumer. This paper will highlight and describe a variety of these products and the technologies behind them.

2:50 – 3:20 Coffee Break

3:20 **Shifts in Retail Photofinishing and Their Impact on Printing Technologies,** *Michael Devoy, Joseph E. LaBarca, and Pete Rudak, Eastman Kodak Company (USA).* **33**

The shift from film-based to digital photography in the past decade has resulted in significant changes in the photo printing needs at retailers. Consumers now want to choose the pictures that they print, compose and edit their images, and expect a choice of service levels (instant, one-hour, and two-day fulfillment) for their "standard" prints. At the same time, some retailers have experienced significant declines in their daily print volumes, making it difficult for those retailers to continue operation of a silver halide minilab in those locations. In response to this changing market landscape, Kodak and other suppliers of innovative retail printing solutions have had to look beyond traditional AgX printing technology to meet market needs. This paper will identify the key attributes a printing technology must meet for each of the three retail printing segments – instant (kiosk), behind-the-counter (minilab), and off-site (wholesale)—and then compare how each of the digital printing technologies—silver halide (AgX), dye diffusion thermal transfer, electrophotography, and inkjet—addresses those needs.

3:45 **Increasing Online Photo Gift Sales Through Emotional Interplay,** *Ulf Unbehaun, DAZZ.com (Germany).* **36**

Understanding the rapid advances in image processing and photo gift creation technology is a challenge for the traditional customer. For them, it is hard to imagine what great products can be made out of their personal photos let alone visualize how they

will eventually look. Photo gift producers need a tool to show their clients the possibilities available. In 2007, Personello, the German photo gift company, interviewed 500 potential photo gift clients and found out that there were two major reasons why potential clients did not buy a photo gift. Reason One: Clients felt they did not have a suitable image. Reason Two: Many clients preferred traditional products like mugs because they did not want to risk buying something they couldn't imagine. We took our studies one step further and analyzed what made our customer's photos unsuitable and discovered that a lot of good images were spoiled by bad backgrounds. As a result of this, Personello created the DAZZ.com 'Photostyle' creation service which eliminates the original background of the customer's photo, restyles it and sets it into a collection of new backgrounds to suit a variety of products and occasions. In order to introduce the customer to our complete range of photo gift products, and give them a variety to choose from, their collection of 'Photostyles' is presented on all of our photo gifts. To recreate a store-like shopping experience the customer can take a closer look at the gift by clicking on the picture. A video file opens enabling the customer to visualise the final product from all sides. For example, see jigsaw pieces drop onto a desk and fly together piece by piece until the customer's personal image appears. The DAZZ.com service increases the customer base by opening up a channel to reach out to new customers who previously considered their photos unworthy. Once the customer sees the 3D video clips of their restyled photo on a range of products an emotional bond is created to the product which, more often than not, leads to a sale. The innovative video presentation serves to create a buzz amongst users triggering them to share their experience with others. This paper outlines the problems that hold potential customers back from having a photo gift made, and shows how offering choice and providing entertainment can arouse emotions that stimulate customers to buy. Thus increasing photo gift sales.

Company and Product Profiles

Session Chair: Stuart Gordon, Eastman Kodak Company

4:10 – 5:10 PM

Five minute overviews of digital photo fulfillment and other related companies, presented by attendees.

5:30 – 8:00 Conference Reception

SUNDAY MARCH 1, 2009

Output Equipment

Session Chair: Kurt H. Freund, Imaging Power

8:30 – 10:20 AM

8:40 **The Exploration of Dry-Micro/Minilabs,** *Kurt H. Freund, Imaging Power (Switzerland)* **40**

The most important fact from analog to digital is not the technical change; it is the change of consumer habits and there new demands!

It is not true that we have today less outputs of pictures, we have today much more possibilities to print out at many new and different locations. While in the past, picture outputs where printed most on silver halide, there are today hardly borders on which media we can produce pictures.

This development has lead to a decrease of turnover in wholesale labs and of course has touched also very strong Minilabs!

9:05 **A Universal Printer Benchmark Test Protocol,** *Michel F. Molaire, Michael Sykes, and Richard Greenaway, Eastman Kodak Company (USA)* **41**

Digital printing devices (electrophotographic, inkjet, thermal) are competing fiercely in the digital fulfillment space. Image quality and cost per page are two important yardsticks helping the choice of a device for a given application. What is often overlooked is the robustness of that device under various usage conditions. This paper will discuss a universal benchmark test protocol that is robustness based, and present quantitative ranking of printers' performance. The test can be used for benchmarking printers from several manufacturers, or benchmark new components of a particular printer for quality improvement. We will benchmark specifically several electrophotographic printers. However, the method can be applied to inkjet or thermal printers.

9:30 **Investigation of Workflows for High Quality, Fine Art Black & White, Digital Publishing,** *Kok-Wei Koh, Hewlett-Packard Laboratories; and Nitin Sampat and Franz Sigg, Rochester Institute of Technology (USA)* **44**

Despite the advent of color printing, for many artists and photographers a high quality black and white image is still the preferred output medium for their fine art work. Classically, the highest quality black and white photography books are printed using offset presses equipped with multiple gray inks for rich, smooth and detailed prints. Similar quality is difficult to achieve on modern digital presses, where the output production is typically limited to a standard 4-color (CMYK) ink set. HP Indigo digital presses have the ability to print with up to 7 different inks. While the typical use of the additional 3 channels is for custom colorants deployed in spot color applications, they also have the potential to be deployed for fine art black and white printing using multiple gray inks similar to those deployed in conventional offset presses. Such custom, black and white ink based workflows, deployed on digital presses, have the added advantage of being able to print short-run productions that are very desirable in limited-edition, fine art reproduction applications. This paper summarizes some general results of experiments performed at HP Labs, along with work-in-progress in attempting to produce high-quality reproductions of a silver halide portfolio on an HP Indigo digital press at RIT using 2 different workflows—one using standard 4 color (CMYK) inks and the other using custom mixed gray inks (3 grays and black—hence referred to as GGGK). While acceptable results were achieved using the CMYK method, it was found that the GGGK method produced noticeably better results. However, the transfer curves and separations could benefit from some additional mathematical rigor. There was some unacceptable posterization in areas of density transition in some images. The workflow is being refined to fix this problem and new results will be reported later.

9:55 – 10:25 Coffee Break

10:25 **The purePhoto™ Book Production System,** *Bill Orr, Imaging Solutions (USA)* **48**

Automated production of silver halide photo based photo books has presented challenges to imaging service providers. Most traditional bookbinding techniques are not suitable for photos produced on conventional silver halide paper. This paper describes a comprehensive, highly automated workflow for the production of case-bound books made with real photo paper. The implementation of a unique gluing machine is the key enabling component to this new system. The gluing machine is supported by a set of equipment that addresses all the production steps required to deliver high quality photo books at high-volume levels.

10:50 **An Improved Automated Workflow for Digital Photo Print Production,** *Zac Bogart, ZBE Incorporated (USA)* **50**

Changes in the photo industry have moved printing demand to more complex order compositions, consisting of multiple sizes of final prints. Customers are requiring the variety of multiple "standard" and non-standard sizes within a single order. Current

photo printing & processing equipment designs were developed based on a standardization of product (e.g. print sizes) and on the principles of "batch processing," with multiple production steps. Existing printing equipment does not have the flexibility to intermix a variety of sizes, nor to easily print "non-standard" sizes. "Mixed size" orders require multiple print batch runs, sometimes on different printers. Handling "mixed size" orders is consequently labor intensive, requiring multiple machines, manual sorting, manual collating, and sometimes manual cutting. Current workflows and systems evolved from the principles and practices of batch manufacturing, which has been the main stay of manufacturing for the last century. Opportunity exists to convert the photo printing process from a batch process to a flow process utilizing the principles of "lean manufacturing." The development of a new printer system and workflow is described. The Chromira Pro Lab system was designed to bring lean manufacturing processes and principles to professional photo printing. Mixed size order printing is converted from a "batch" process to a "flow" process. Multiple and mixed sized orders are printed and processed concurrently, and in a continuous flow. Previously manual operations required for handling multiple sizes are automated or removed. Reliance on "standard" sizes is completely eliminated. The process is re-designed from the "ground up," replacing multiple pieces of equipment with one. The result is a system that delivers complete orders consisting of multiple sizes, ready to ship, without manual handling. Complete and automated integration into existing software image workflow systems is achieved without compromising any new workflow efficiency gains. Integration of Lean Manufacturing principles throughout the photo production process generates additional, consequential, related efficiencies.

Media

Session Chair: Thomas A. Curley, FUJIFILM USA, Inc.

11:15 AM – 3:15 PM

11:15 **Advanced Display Material for Inkjet Printers,** *Thomas A. Curley, FUJIFILM USA, Inc. (USA)* **54**

FUJIFILM has developed a new technology that has resulted in a breakthrough backlit film product for inkjet printers. Traditionally, such display materials utilize silver halide or screen printing techniques, but new inkjet capable materials provide ease of use and increased productivity. Designed for commercial applications such as retail and outdoor display, FUJIFILM's new backlit film product requires no backside (mirror) printing, saving inks, and provides high image quality with or without back illumination, allowing significant savings in energy consumption. The presentation will explore how this product can provide new opportunities for utilizing photographic content in the market for professional display.

11:40 **Kodak Professional Ektar 100 Film,** *Daniel Kennelly, Eastman Kodak Company (USA)* **57**

This new film with ISO 100 speed, high saturation, and ultra-vivid color offers the finest, smoothest grain of any color negative film available today. This film incorporates KODAK VISION Motion Picture Film Technology to achieve its extremely fine grain. It is ideal for scanning and offers extraordinary enlargement capability from a 35 mm negative. This paper will describe the new components and their features. These include emulsion improvements: optimized tabular grain technology, advanced cubic crystals, antenna dye sensitization, and improved spectral sensitivity. Chemical improvements are also described: advanced development accelerators, a new high-efficiency masking coupler, and improved DIR couplers.

12:05 – 1:35 Lunch Break (on own)

1:35 **New Equipment Designs for Evaluation of Fade Stability of Color Photographic Images in the Presence of Ozone Gas,**
Dave Miller, Eastman Kodak Company (USA) **58**
The Image Stability Technical Center of Eastman Kodak Company is evaluating various media in a new system for testing image permanence in the presence of elevated levels of ozone. This initial presentation will discuss experimental findings relating to media type, within chamber uniformity, impingement method, and impingement velocity only. Follow-up studies will also include ozone replenishment rate and reciprocity effects over a 10:1 range of concentration.

2:00 **Kodak Professional Supra Endura VC Digital Paper—A New Silver Halide Paper Optimized for Color Managed Professional Digital Labs,**
Patrick Webber, Eastman Kodak Company (USA) **63**
To meet the needs of professional labs that focus on portrait/social digital imaging, Eastman Kodak Company has developed a new professional digital paper that is optimized for color-managed professional digital labs. This document will review the technologies used in this product as well as the customer benefits provided by this digital paper.

2:25 **Development of FUJIFILM Quality Thermal Photo Paper: A New Thermal Photo Printing Material,** *Shigeaki Ohtani and Shigeru Shibayama, FUJIFILM Corporation (Japan)* **66**
We developed a new thermal receiving paper having improved image quality and handling. Compared with conventional thermal printing papers, the new paper has achieved better image quality (5% increase in whiteness; 20% increase in gloss). The new paper resulted in reducing the antistatic property of the surface resistance to approximately 1/1000 compared with previous papers. This property will help prevent the freshly printed thermal photo prints from clinging and achieve a significantly easier handling. The application of our coating technology based on the aqueous dispersion system hardly uses organic solvents. Therefore, during its production, a significant amount of environmental pollution shall be reduced.

2:50 **Thermal Printing for Digital Output,** *David G. Foster, Eastman Kodak Company (USA)*. **68**
Resistive-head thermal dye transfer printing is a digital printing method in which thermal energy is used to create photographic quality output by the transfer of dyes from a donor ribbon to a receiver that are in intimate contact. Like many systems, thermal printing is a synergistic combination of many parts. Thermal dye donor elements consist of support, dye layers, adhesive layers, laminate overcoat layers, and slipping or heat-resistant layers. Thermal receivers are also multilayered structures consisting of a dye-receiving layer, interlayers, antistatic layers, and a high-quality paper support. Thermal hardware and software in combination with thermal media elements result in high-quality photographic images. This paper will focus on the thermal media contribution to the system.

3:15 – 3:45 Coffee Break

The TDPF Business Space

Session Chair: Don Franz, Photo Imaging News
3:45 – 5:25 PM

3:45 **The Picture to Print Value Chain,** *Reiner Fageth, CeWe Color AG, and Philipp Sandhaus, OFFIS-Institute for Information Technology (Germany)* . . . **70**
This paper describes the changes in the value chain from taking the picture to displaying it. In the days of analog imaging, there was only one option for displaying images after they had been taken: developing the film and prints. Nowadays the consumer

has various display possibilities that do not necessarily include tangible products. Possible integrations and real data of consumers' behavior while ordering tangible products are presented and analyzed.

4:10 **The Consumer Knowledge Gap in Digital Photography,**
Jay Hitchens, Qualex, Inc. (USA). **74**
For all the recent advancements in science and technology in the photographic and imaging fields, the general consumer is now expected to have a higher level of knowledge of photography than they were just a decade ago. While digital cameras at all price points offer greatly improved algorithms and better image quality than just a few years ago, the process of turning a captured image into a print or gift requires more knowledge and involvement on the part of the consumer than ever before. Only eight years ago, virtually all photographic images were captured on film. These could be viewed only by having a lab process and print the photos. Consumers wanting to purchase from the limited assortment of photographic gifts had only to take a print, slide, or negative to a drug or camera store, fill out the envelope, give it to the clerk, and pick up the item days later. Contrast that with the growing variety of photo-based products today, and the level of understanding required of the consumer to successfully manage the purchase of one or more of those products. Resolution, aspect ratio, image compression, file format, storage, and back-up are subjects that did not require consumer understanding in 2000. Today, there is a great deal of confusion and inaction on the part of the consumer, a new approach from the industry could increase sales and help get images off the hard drive. This paper is the culmination of a project by the members of the PMA SPFE Advisory Committee, and offers insights into problems encountered by website and retail photo consumers.

4:35 **Automatic Geotagging: Technology and Opportunities,**
Mark Terry, Geotate (UK). **79**
The value of auto geotagging is providing location data to digital images—to consumers, camera manufacturers and most significantly to fulfillment companies. The opportunities for geotagging go beyond simply storing, cataloguing, and sharing digital images—Geotate will demonstrate, using existing examples, how the technology is currently being used. We will also explore the future potential of geotagging and how the industry can monetize this technology in the coming years. Traditionally, the digital imaging industry generated revenue from camera sales and printing alone but today these images are a growing source of user generated web content, which provides the commercial basis for many Web 2.0 organizations such as Google, Facebook, Flickr, etc. We will explore what major brands in the digital imaging industry can do to recapture these commercial opportunities and take geotagging to the next level.

5:00 **The New Personalized Photo Products Business Model,**
Don Franz, Photo Imaging News *(USA)* **80**
In the consumer photofinishing business, the print business model is not only becoming rapidly outdated, it is even becoming unviable. It has been replaced by a model focusing on promoting life stories, produced in the form of multi-image prints, calendars, posters, and especially photobooks. Franz reviews the development of the worldwide personalized photo products market, and how it is changing the industry.

5:25 pm closing remarks