Info Tech Talk

A Newsletter on Enabling Information Technologies by the IRMC Information Operations and Technology Department

Latest on Digital Cameras

By Jim Looney

Remember that it is picture quality and not only pixels that is important. Purchase a camera with pixels that meets your printing and display needs.

What do I need to know before buying a digital camera?

First, decide your purpose(s) for using the digital camera -- for printing photographs (professional or amateur snapshots), vacations, the web, display on monitor, etc.? Then, make a list of key things to consider before buying the digital camera:

* **Features**? Automatic or manual types of operations? A blend of the two?
* **Size of prints**? 4x6 (standard small size), 5x7, 8x10, or larger?
* **Size of camera**? Fits in my pocket, straps to my shoulder, or need a case?
* **Storage media?**
* **Budget?**

When you have addressed these factors, you will be closer to making the right decision.

What type of lens should I get?

Film and video type lens used in early cameras were limited in the resolution and the sharpness they could deliver. Today, there is no reason to compromise unless you are not aware of the camera specifications. Many of the ultra-compact cameras have 2x or 3x optical zoom. Look for the highest optical zoom possible within the budget and camera size.

Many camera manufacturers boast about the zooming capabilities by adding the digital zooming to the equation; be aware of this. Digital zoom merely "blows up" the image and crops in on a section of it. This results in a reduction in image quality.

Because of the extreme zooming capabilities (8x, 10x) of some cameras, the amount of pixels required can be reduced if you are not cropping a good portion of the image. In essence, you are keeping all the pixels and not throwing them away. Typical zooming capabilities (2x, 3x) generally end up getting cropped, hence, throwing away pixels resulting in a less then good quality picture.

If given a choice of 3x zooming, 5-mega-pixel camera or 10x zooming, 3-mega-pixel camera, I would choose the latter.

What's this about pixels?

The most talked about item in a digital camera is the amount of pixels the image is going to be. A pixel is the tiniest element of a graphic image. A digital camera

Internet Regulation in Singapore

By BG Tay Lim Heng, Singapore Army, International Fellow at NWC, and Information Highway Student

"It could be deviant religious teachings, which could offend other people. The conservative groups will reply and there could be warfare."

> *Goh Chok Tong, Prime Minister, on his concern about undesirable information becoming readily available.*

"The 100 sites we monitor are purely symbolic. You can get around them in so many ways. Any teenager who is well-informed will find out how to do it."

> *Lee Hsien Loong, Deputy Prime Minister*

"Technology was rapidly undermining whatever control of the media governments might have had."

> *Lee Kuan Yew, Senior Minister*

Introduction

The three quotes above reflect the double-edged impact of the Internet on societies around the world, not just in Singapore. But the impact of the Internet is likely to be felt more in nations such as Singapore, with its highly urban and highly networked population. Singapore, with a population of 4 million, has one of the highest Internet penetration rates in the world. More than half the population, 2.2 million people, accesses the Internet, and the number of broadband users is projected to grow to 2 million by 2005. Singapore leaders recognized early on that Information Technology (IT) has the potential of enhancing the country's competitive edge. As a country with no natural resources except for its people, it makes sense to invest in IT to improve work processes, lower costs of business and promote greater productivity. However, the government was also concerned about the negative impact of the Internet: pornography and inflammatory content that may upset the social order in a multi-culture, multi-religious society.

IT Vision of An Intelligent Island

The "IT 2000 Vision of an Intelligent Island" was formulated in August 1991 after a study covering the major economic sectors of Singapore. A strategic plan followed in 1992 to build a national high-speed network for the country's development as an Intelligent Island. As a densely populated city-state, the development of an intensive IT infrastructure was deemed economically viable. The nationwide information infrastructure would interconnect computers in virtually every home, office, school and factory. It was envisioned that the computer would evolve into an information appliance, combining the functions of the telephone, computer, TV, and more. It would provide a wide range of communication means and access to services. However, the plans for a nationally enclosed intranet, called Singapore One, were superseded by the take-off around the world of the Internet. Despite concerns of importing negative influences, the government made the pragmatic decision to upgrade their plans to allow for Internet connection. The IT 2000 plan was followed by other major initiatives such as Infocomm 21 and e-Government as the government forged ahead aggressively to harness infocomm technologies and create a networked nation at the cutting edge of IT. These efforts have won international recognition. The Harvard and World Economic Forum Survey in May 2002 mentioned that, "Singapore emerged as the nation with the most wired government and as the most effective in promoting the use of IT among its citizens."

Regulation of Internet

A statutory board, the Singapore Broadcasting Authority (SBA), is charged with the responsibility of both developing and regulating the Internet. In its website the SBA claims that it adopts a balanced and "light-touch" approach to ensure that minimum standards are needed for the responsible use of the Internet while giving maximum flexibility to the industry players to operate. It encourages industry self-regulation and public education to complement its "light-touch" regulatory apparatus.

Still, the SBA is criticized by western libertarians for censoring Internet sites. The SBA does not consider regulation of the Internet to be censorship. It argues that the Internet has opened up a Pandora's Box in terms of content that is unsuitable for children. It also pointed out that Singapore has a multi-racial and multi-religious society, and therefore political and religious websites are required to be registered to emphasize the need for such content providers to be responsible and accountable for what they say. It clarified that registration does not mean that that the promotion of political and religious causes is not allowed.

The SBA regulates Internet material by licensing Internet Service Providers who install proxy servers through which local users must route their Internet connections. It directs service providers to block access to Web pages that undermine public security, national defense, racial and religious harmony, and public morals. There are about 100 specific websites that are

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blocked, most of which are pornographic. However, as mentioned in the quote by the Deputy Prime Minister Lee, this effort is a symbolic one.

SBA also stated in the Q and A portion of their website that they do not monitor or track users' access to any sites on the Internet and do not interfere with what individuals access in the privacy of their homes. They are primarily concerned with the purveyors and distributors of pornography. The mere act of visiting such sites is not an offence. The SBA stated that it has no intention of monitoring Internet mail but will block access to material that contains pornography or excessive violence or that incites racial and religious hatred.

Websites with Political and Social Agenda

A quick search of the Internet reveals that despite fears that regulations may retard freedom of speech, there is no shortage of critical comments from websites that are openly critical or satirical of the government. Singaporeans participate and access these websites actively. These include:

TalkingCock.com. This satirical website promotes itself as "a website where Singaporeans are invited to read and discuss issues which concern them." It seems to be popular with the young as it deals with topical issues and uses a healthy dose of colloquialisms and slang to make irreverent digs at government policies.

Soc.Culture.Singapore. This is a long-established website where views have been vigorously traded on issues concerning Singapore. Some of these views have become so inflammatory of late that SBA has come out with a set of "posting guidelines." Tan Chee Keong has written an interesting book on this website, which is available online.

ThinkCentre. This is the website of the Singapore's People's Party whose tagline is "Towards a Vibrant Political Society." This left of center party led by a veteran opposition politician champions human rights and labor issues.

Home of The Singapore Democrats. This website of another opposition party, the Singapore Democratic Party, led by Chee Soon Juan, has a slew of "media releases" that attacks government policies.

Home Of The Singapore Democrats
Singapore Democratic Party
1357 Serangoon Road Singapore 328240

Internet Regulation in Western Countries

Western civil libertarians are particularly interested in studying the impact of the Internet on "paternalistic" societies like Singapore because of what it may portend for countries like Vietnam and China as they open up their societies to the Internet. But even within western countries, the verdict is still out on what levels of regulation is needed for the Internet.

Australia. The Australian Broadcasting Authority (ABA) rated as "pretty good" the Singapore system, which has been criticized elsewhere as having the potential to jeopardize freedom of information. Under the Broadcasting Services Amendment (Online Services) Act of 1999, the ABA was given powers to issue notices to ISPs to prevent access to the Australian hosted material and to take reasonable steps to prevent access, if technically possible, to foreign hosted ones. Not surprisingly, these new powers to censor Internet content raised a storm from civil rights groups during the public hearing of the bill. Typical was a comment from Darce Cassidy, executive director of Electronics Frontiers Australia, that "no western democracy implements the kind of scheme that is being proposed for Australia." He went on to say that "it won't work and isn't practical." The bill passed nevertheless.

France. In Sep 2001, a court in France was grappling with a lawsuit brought about by several anti-racist groups against 13 French ISPs, including AOL France. These groups, including the French International Action for Justice, wanted the court to block U.S. sites containing content sympathetic to Nazis and other hate groups. The French ISPs maintained that they should not be forced to act as online censors. Lawyers for the plaintiffs are expected to argue that the U.S. First Amendment is not applicable in France. A ruling is not expected for months.

United States. Even in the U.S., there is much debate over Internet regulation. In June 1996, a U.S. Federal Court in Philadelphia struck down the Communications De-

Singapore (cont.)

cency Act, declaring that it violates the First Amendment. "As the most participatory form of mass speech yet developed, the Internet deserves the highest protection from government intrusion," the court declared in its conclusion. Yet, a survey of 2,400 adults in Oct 2000 revealed that 64% wanted the government to develop rules to protect users.

Despite the Internet's popularity on "home ground", nearly half of all Americans surveyed see the Internet as a source of worry, and 70% of the public says, "you have to question most things you read on the Internet." Not surprisingly, in the "land of the free", there are quite a few groups fighting against Internet regulation. They include those listed below.

Electronic Frontier Foundation - The EFF was created "to defend our rights to think, speak, and share our ideas thoughts, and needs using new technologies, such as the Internet and the World Wide Web. EFF is the first to identify threats to our basic rights online and to advocate on behalf of free expression in the digital age.

Free-Market.Net - Supported by the Henry Hazlitt Foundation, Free-Market.Net's purpose is to use the Internet to encourage communication, cooperation, and positive action for freedom. Liberty Wire calls it "the best source of ideas and information from across the spectrum of the libertarian movement.

Global Internet Liberty Campaign - The Global Internet Liberty Campaign was formed at the annual meeting of the Internet Society in Montreal. Members include the American Civil Liberties Union, the Electronic Privacy Information Center, Human Rights Watch, the Internet Society, and other civil liberties and human rights organizations.

Conclusion

As a regional hub in a globalized economy, and as a nation that leverages on technology to stay ahead of the competition, Singapore promotes the Internet for education, business and government. However, it believes that some sort of moral stand, symbolic though it may be, has to be taken against the negative aspects of the Internet – pornography, and inflammatory racial and religious content. Dissent and disagreement are not as suppressed as civil libertarians claim, and there are plenty of that on the Internet.

Two factors call for caution in the regulation of the Internet in Singapore: first, the Internet's high penetration rate meant that its influence in more pervasive that that in another country where Internet access is limited, and hence where regulation can be more lax. Second, its multi-racial, multi-religious make-up, and its experience of inter-racial, inter-religious riots in the not-too- distant past, require net users to exercise a degree of responsibility and accountability in what they write. Western societies are not immune to this challenge, as can be seen from the examples of Australia and France. Even in the U.S., popular opinion seems to be calling for some sort of regulation, despite the court's interpretation of the First Amendment.

Flash: Cool Multimedia for the Web!

By Les Pang

What is Flash?

- Flash is a multimedia graphics program that enables you to create interactive "movies" on the Web. It is a product made by Macromedia, Inc.

- Flash uses vector graphics, which means that the graphics can be scaled to any size without losing clarity or quality. Vector-based content and applications download faster than their bitmap equivalents. Streaming data content appears immediately, without having to wait for the entire piece to download.

- Examples can be found at:

  http://www.macromedia.com/showcase

  http://members.aol.com/lpang10473/mm.htm#flash

Who can view Flash?

- About 96.4% of Web users can experience Macromedia Flash content without having to download and install a player plug-in. Roughly 50% of web users need to download the Flash 6 player which plays movies created using the latest version.

- If you do not have the Player installed you can download it for free from Macromedia's site:

  http://www.macromedia.com/downloads/

Who can create Flash movies?

- To create your own Flash movies you need to buy a Flash program. The latest version from Macromedia is Flash MX.

- You can also download a 30-day trial copy of the Flash software (for building Flash movies) at:

  http://www.macromedia.com/software/trial_download/

What has IRMC been doing with Flash?

- Flash has been used by the eLearning Solutions group to illustrate complex processes for online classes.

- Flash is taught as part of the "Applying Multimedia Technologies" elective. Developed for our students, you can download a quick start tutorial at:

 http://www.ndu.edu/irmc/newletters/winter03/flashtut.pdf

Global Positioning System: A Personal Experience

By Greg King, Information Highway and NWC Student

So just what is the Global Positioning System (GPS)....?

GPS is a worldwide radio-navigation system formed from a constellation of 24 satellites and their ground stations. The GPS uses these "man-made stars" as reference points to calculate positions that are accurate within a matter of meters. It's like giving every square meter on the planet a unique address.

Why should I care......? That used to be the $64,000 question. They were cool and lots of fun to use but..... GPS receivers have gotten smaller and smaller and the use of just a few inexpensive, integrated circuits has turned them into a technology that is now accessible to almost anyone. Today, GPS is finding its way into cars, boats, construction equipment, planes, movie making gear, farm machinery, and even laptop computers.

There I was .....my first expo-sure to GPS was just after Operation Desert Storm in the early 1990's. We used GPS receivers designed for infantry soldiers in our UH-60 Blackhawk helicopters. We
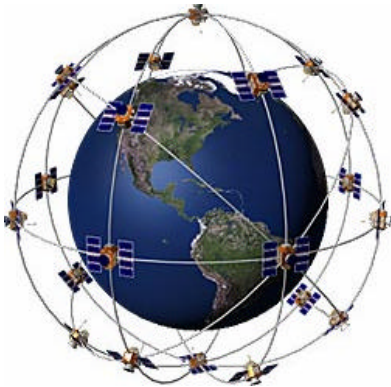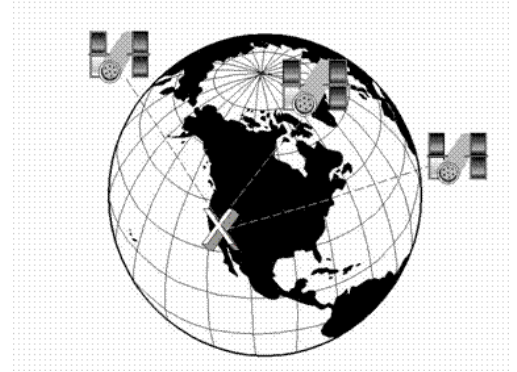
had to rig the antenna with 100-mph tape to the "greenhouse" section of the overhead. Having a GPS made navigation quick and easy and greatly reduced the pilot workload on long flights or complex missions. That early GPS receiver, called a "slugger" was about 8 inches by 8 inches by two inches thick. It wasn't a small unit by any means.   Within a couple of years, the GPS receiver had been integrated into the doppler navigation receiver and now was a standard item of avionics in the helicopter.

GPS technology has evolved well beyond the early plans for its use. Today, any number of different people --- scientists, sportsmen, farmers, soldiers, pilots, surveyors, hikers, delivery drivers, sailors, dispatchers, lumberjacks, fire-fighters, and people from many other walks of life are using GPS in ways that make their work more productive, safer, and sometimes even easier.

These everyday adventures fall into five broad categories.

Location - determining a basic position

GPS technology has evolved well beyond the early plans for its use. Today, any number of different people... from many other walks of life are using GPS in ways that make their work more productive, safer, and sometimes even easier.

Navigation - getting from one location to another

Tracking - monitoring the movement of people and things

Mapping - creating maps of the world

Timing - bringing precise timing to the world

The uses of GPS in the automobile are what really brought me to this subject. As enamored as I have been with GPS technology for the last ten years, the bottom line was always.....how do I sell my "need" for a GPS receiver to my wife? I am not a hunter or a fisherman and I am not a private airplane pilot...so buying a GPS to help me pursue my avocations was a non-starter. My answer was unexpected and came on a family vacation to the western United States two years ago.

We rented a car in Phoenix, Arizona from the local Hertz agency. Included in our rental was the on-board GPS system, the Hertz "Never Lost" system. Not only did it have a color screen, it issued audible commands! Too cool! Initially, my wife and daughter were less than enthused with my excitement but by the end of the trip, they were fighting over programming the next destination. Imagine my surprise when my wife said, "It sure would be nice to have a system like that in our car." YES!!

We gave the Hertz system a work out over the course of almost two weeks. We visited sites all over Arizona and California and the "Never Lost" system never let us down. The first night, we used it to find a restaurant. It had a database of attractions, restaurants, hotels, car dealerships....you name

it and it was in the database. My daughter's favorite direction from the audible system was as we set out for the Grand Canyon and the "Never Lost" advised us to prepare for a left turn in 157 miles!

When we returned from vacation, I began searching the internet for information on GPS systems like the "Never Lost". Much to my chagrin, I found the exact system and it cost over $2000. Well, that cooled my enthusiasm for a vehicle-mounted GPS. I continued to read ads and articles but the bottom line remained the same...I didn't have any real need for a portable GPS receiver. The prices of the small, handheld models continued to drop and manufacturers released modules that enabled a "Palm" handheld device to be used as a GPS. I still didn't have a legitimate use. I had a "want" but I didn't have a "need".

Recently, I bought my wife a new car, a 2003 Honda Accord EX. The EX can be equipped with a voice-activated dash-mounted GPS system similar to many of the upscale cars on the market today. No, we didn't get the GPS.... actually, it's not available until January 2003, but the price is still prohibitive (over $2000) for a nice-to-have system. I am looking very seriously though at a portable system that could migrate from my car to her car as the need arose.

The system that I am researching now is the Garmin Street Pilot III Deluxe. It has many of the same features of the Magellan "Never Lost" at

a fraction of the cost. The key feature from my point of view is the audible prompt. The prompt allows the driver to concentrate on driving and identifying turn points without taking his eyes off the road to focus on the GPS screen. I think that a device like this is a safety feature in any car....especially in a unfamiliar area. I'm not sure when or if I'll get a GPS...but for the time being, I'll keep shopping and reading.

I did actually run across a new use of the GPS technology recently that was intriguing but not compelling enough to buy. Timex and Garmin are marketing a system for runners that tracks distance, speed and exact pace. The system is composed of a wristwatch and receiver. The receiver straps onto the runner's arm or belt clip. It retails for around $200, so it is still a little pricey but as the price comes down or new features are added, it will probably become a little more common. I am not in a rush to buy one today but if they released one with a heart monitor function....my days of excuses would be over and I'd finally own a GPS!

Here are some GPS-related resources you may want to check out:

GPS World News Magazine
Garmin International
Trimble
Magellan
Timex GPS
The GPS Store
GPS Now
Adventure GPS

Bluetooth: Wireless Connectivity for Now and into the Future

By Frank Caruso, Information Highway and ICAF Student

Bluetooth is a global technology standard (open interface specification) for short-range local area network communications, currently data and voice. Requirements for video and streaming multimedia will be part of future versions of the standard.

Bluetooth was originally designed to replace the cable(s) connecting portable and /or fixed electronic devices. It defines a uniform structure to allow a wide range of different devices to communicate with each other with little or no effort. Low complexity, low power and low cost make it especially suitable to mobile handheld devices.

Bluetooth has achieved global acceptance; the vision is that any Bluetooth device, anywhere in the world, can connect to other Bluetooth devices in its proximity, regardless of brand. Bluetooth is named after Harald Blaatand II, the King of Denmark from 940-981 AD. Blaatand translated into English is "Bluetooth". One of this monarch's strengths was his ability to get different peoples to talk. During his rule, Denmark and Norway were Christianized and united. Bluetooth today is all about different devices produced by different companies talking with each other.

History and Motivation L.M. Ericsson Mobile Communications did the initial work on Bluetooth technology in 1994 at their Research and Development Lab in Lund, Sweden. Their goal simply was to develop a low cost radio interface between mobile devices and accessories to replace cables. They realized early on the potential to universally bridge existing data networks and enable wireless networks away from fixed infrastructures. Ericsson made the decision to not develop it

alone; the Bluetooth Special Interest Group (SIG) was formed in 1998.

Founding members were Ericsson, IBM, Intel, Nokia and Toshiba. Bluetooth specification version 1.0a was released in July of 1999. In December 1999, version 1.0b was released and it was announced that 3COM, Lucent, Motorola and Microsoft would assist in the development work and form a special Bluetooth "Promotion Team." SIG adopters now include over 2,800 companies from the telecommunications, computer and home-entertainment industry sectors. The Bluetooth standard is publicly available and royalty free. It is not proprietary technology owned by a single company. Ericsson is the legal owner of the brand and protects the name "Bluetooth" through trademark registration.

The motivations for Bluetooth come from both technology push and market pull. Moore's law and the attendant ability to pack more transistors on a silicon chip have made small embedded devices capable of running complex protocols. Embedded controllers in devices are now capable of being programmed, controlled and used in smart ways. They can be embedded in a user's work and home areas. Various ways can connect these embedded devices to the Internet, forming the "embedded Internet." Advances in integrated circuit technology, the increased use of hand-held and mobile devices, and the demand for more applications and Internet access are driving the wireless environment in which Bluetooth has emerged.

Technical Information and Progress
Bluetooth is an RF waveform in the
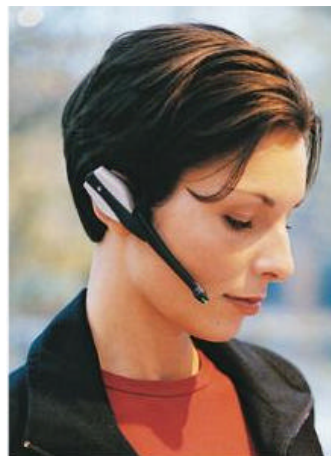
Bluetooth (cont.)

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2.4GHz band, 80MHz bandwidth. Using a spread spectrum, it uses full-duplex signal frequency hopping up to a maximum of 1600 Hops per second. The signal hops among 79 frequencies at 1 MHz intervals to give a high degree of interference immunity and to prevent interruptions caused by other radio signal devices. It uses a frequency-hopping signal capable of generating data rates of up to 723.2kbps.

Optimal range is from 10-30 meters, with line of sight not required. Features include error detection and correction, with re-transmissions and power conservation with sleep mode. Security features include challenge response authentication and encryption of packet payloads.

Bluetooth enabled devices connect and communicate wirelessly in ad-hoc networks called piconets. Piconets consist of one master unit and multiple slave units. Each Bluetooth enabled unit can communicate with up to seven other units per piconet and can simultaneously belong to several piconets. Piconets are established automatically as Bluetooth devices enter and leave radio proximity. The system uses an unlicensed band, the Industrial, Scientific and Medical (ISM) band, for universal acceptance and usage. The challenges are to make the system robust to interference from other sources in the band (other communications systems, microwaves) using the minimum power required to not increase noise for other users.

A "coexistence task group", subordinate to the IEEE Working Group, address Wireless Personal Area Networks (802.15) is trying to quantify the effects that Bluetooth and other wireless products will have on each other's performance. They are trying to develop methods to improve coexistence. An example is adaptive hopping, where specific frequencies are avoided if interference is detected at a level that will cause Bluetooth packet errors. Some of the pervasive networking issues currently under study include addressing, IP framing and routing support, plug and play networking, power aware routing, service discovery and security. Power aware routing is interesting. It seeks to reduce the overall transmission power involved in node-to-node communications. Suppose a network has several nodes in an area. If two nodes are communicating from the edges of the area, the power required for them to communicate directly might be more than the total power required for them to communicate through an intermediate node. Power aware routing will discover these conditions, and route communications to minimize the total power consumption in the network.

Applications A wireless headset was the first Bluetooth product released. Other applications tested or planned include home appliance control (such as home security systems, environmental control and lighting), electronic device data exchange (among desktops, laptops, PDAs), audio-visual equipment (wireless projection) and industrial equipment control and monitoring. During a recent Consumer Electronics Show, Bill Gates demonstrated the home of the future, a wireless local area network of embedded Internet enabled devices. One device was an electronic tablet for men with local newspaper downloaded to bring to the "reading room" vice the print version!

Bluetooth symbol
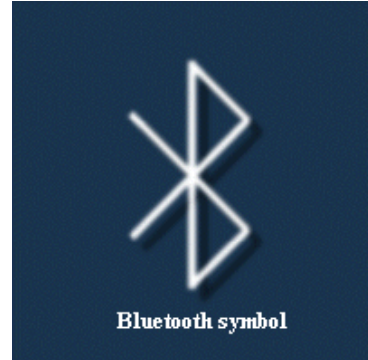
"Bluetooth... defines a uniform structure to allow a wide range of different devices to communicate with each other with little or no effort. Low complexity, low power and low cost make it especially suitable to mobile handheld devices."

Bluetooth (cont.)

(Continued from page 9)

Potential Vulnerabilities

What are the potential cavities regarding Bluetooth? There are potential vulnerabilities developers will need to take into account as they move forward. Jamming, denial of service, intercept in various operating modes and spoofing evaluations should be conducted. The potential misuses regarding denial of service are broad and might include home security and business data exchange. Industrial or trade secrets may be susceptible to interception. Unauthorized access could result in the planting of destructive agent software or the extracting of files.

Is development of an intercept device with a Bluetooth compliant receiver on the horizon? Might this device be capable of injecting corrupt data into other units? Such devices could appear in a proximity area as a Bluetooth device seeking to set up a link (as a master). There are numerous possibilities regarding encryption and the various scenarios regarding usage. Header and access code information and broadcast data are not likely to be encrypted, data addressed to an individual unit may be. It appears that regarding security, Bluetooth channels will be in the form of connection oriented and connectionless operations. Connection oriented is bi-directional communications between devices with a signaling exchange. Connectionless is unidirectional broadcast to a group of devices. The connectionless channels seem to offer those inclined the opportunity to interfere with things. There are challenges and no doubt opportunities in the area of information operations regarding Bluetooth.

Conclusions We seem to be headed to ubiquitous information access. More and more devices (phones, PDAs, cameras headsets, watches) can be increasingly useful if they are networked. As the number and type of devices increase, so does the number of connectivity solutions (2G, General Radio Packet Service (GPRS), 3G, Bluetooth, Home RF, WLAN) and the number of applications these networked devices must support.

The wireless network will consist of an integration of many different wireless technologies (including Bluetooth), providing an infrastructure to support an expanding variety of applications. In the near term, most of these applications will provide increasingly personalized services to people. Once the basic wireless infrastructure is established (technology, devices and software), it will be able to support independent interaction between devices. There does not seem to be much momentum towards combining all of the current device capabilities into a single device.

What is the maximum number of different devices a person should expect to need? There is also not likely to be a clear winner among all of the connectivity solutions. They must all operate together to provide a global wireless infrastructure. Bluetooth presents significant technical challenges, but offers significant capability as a bridging technology to a wireless future. Potential vulnerabilities deserve further study. It will be interesting to see how it all plays out.

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http://groups.yahoo.com/group/bluetooth
http://www.bluetooth.com/
http://www.cellular.co.za/

Digital Cameras (cont.)

(Continued from page 1)

uses an image sensor to that contains millions of pixels whose role is to catch and record light when the shutter button is pressed.

- For a 4″ x 6″ picture, you need at least 1.2 mega pixels. (Costs $.20 per picture at Sam's)
- For 8″ x 10″, you need at least 2 mega pixels. ($1.49 per picture at Sam's)
- For 11″ x 14″, you need at least 4 mega pixels.

I have found through much testing that the amount of pixels per print is less that you may expect when printing them through a standard photo process like the "one-hour" processing found everywhere.

From my experience a resolution of 200 pixels per inch is good enough.

Here is how I figure it out: Say that you took a picture (using highest quality setting on your camera) and using about a 3 mega-pixel camera. Your image size would be about 2048 pixels X 1536 pixels. And now you want to print an 8″ x 10″ photo. How do you know if it is good enough quality? Using my guidelines you would divide the longest side of the print (in this case 10″) into the horizontal dimensions of your image (in this case 2048.) Your answer is 204.8; more than good enough!

Remember that it is picture quality and not only pixels that is important. Purchase a camera with pixels that meets your printing and display needs.

What about the viewfinder?

I still prefer to take my pictures by looking through the viewfinder in-

stead of the Liquid Crystal Display (LCD) panel on the camera. However, if you are too close to your subject the viewfinder is not going to show you exactly what your lens is going to capture; the LCD panel will. The LCD panel is good to use for navigating through the camera's menu but it is a battery killer.

What determines image quality?

Basically, there are 2 variables that determine the resolution of an image: Mega pixel size (2MP, 3MP, 4MP, 5MP, etc.) and image quality setting (pixel dimensions/compression level) also known as the resolution setting.

What are the typical image quality settings?

- SQ (Standard Quality, JPEG)
- HQ (High Quality, JPEG)
- SHQ (Super High Quality, JPEG)
- TIFF (Tagged Image File Format)
- RAW (uncompressed, software specific)

Choosing a low image quality setting, such as SQ, will give you many images per card, but they will be smaller in size and the image quality may not be as good as it would be at a higher setting. For the largest size and highest quality image possible, choose the highest quality setting on your camera.

Shooting in TIFF mode will only allow you 2 images on an empty 32MB card. One alternative is to shoot in the SHQ mode. This allows 8 frames per 32MB card and the image quality is almost as good as with the TIFF format. It is also noticeably faster to

There are 2 variables that determine the resolution of an image: Mega pixel size and image quality setting (pixel dimensions/ compression level) also known as the resolution setting.

Digital Cameras (cont.)

(Continued from page 11)

shoot in SHQ mode, as it takes a few moments for the camera to store images to the card in both TIFF and RAW modes. If you do shoot in TIFF/RAW mode, we recommend you purchase larger media cards.

How do I get high quality prints?

If you want to be able to make high quality prints from the pictures you take, it's best to set your camera to one of the higher resolutions. Also, if lighting permits, set your ISO setting to 100. As an example: Set your file format to TIFF or your compression rate to SHQ (JPG file format.)

What is "White Balance?"

Cameras use white as a reference and adjust the color balance to give as true as possible a white, correcting all the other colors by doing this. Your eyes do not see the differences but your results from taking a picture with the wrong WB is obvious.

How do I download images?

When you want to import the images onto your computer, there are a couple of ways to do it.

⊕ Connect the camera directly to your computer using a USB cable which is usually included, or

⊕ Use a USB SmartMedia/CompactFlash (or similar) Reader to copy images to your computer. This unit can be connected to any USB port (PC or Mac) even while the computer is on. On a Mac, you can even

plug the Reader into the keyboard of the computer. The card (either SmartMedia or CompactFlash) can then be inserted into the appropriate slot of the Reader.

*(**IMPORTANT NOTE**: Keep in mind that if you want to delete any images from the camera's card, it is best to do it while the card is in the camera and not in the reader. Otherwise the card can become damaged.)*

Which type of digital media should I use?

Deciding what type of digital storage is most important if you are sharing the media with other devices or you previously invested in a certain type and do not want to spend the money needlessly.

The two most popular types of digital memory are SmartMedia and CompactFlash. Others include Secure Digital cards which are also being used in a wide array of digital devices (PDAs, cell phones, and digital video recorders) and Memory Sticks, a standard used by Sony, which is roughly the size of a stick of chewing gum.

A useful device is the "Dazzle 6 in 1" digital media reader which can handle all of the above formats (including the MultimediaCard and the IBM Microdrive) for under $50. (No endorsement implied.)

For a helpful glossary of terms relating to digital photography, visit:

http://www.ndu.edu/irmc/newletters/winter03/digital _photo_definitions.htm

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