1. **Announcement: The library will be closed on 8/30 and 8/31 due to large area of carpet replacement on first floor. Library will be open again once the job completes. If you need further assistance, please contact the Circulation Desk. We apologize if it causes your inconvenience, and thank you for the cooperation. Reader Services Section, NHU Library.**

2. **Announcement: 1.Winter break borrowing policy are effective starting on 12/20/2013. The due date of the books and lnterlibrary cards checked out or renewed will be automatically extended to 3/6/2014. 2.Before you leave school for the break, please be sure that your books due on or before 12/20/2013 are either returned or renewed. 3.For books on interlibrary loans, please check their library policy to avoid overdue penalty. Please contact Circulation Desk (05-2721001 ext.1421) if you need assistance. Reader Services Section, Dec. 20, 2013**

3. **If the address bus has up to 35 lines (bits) and each addressing location stores 2 bytes (2B), how the main memory space can be addressed?**

4. **Please show the operation steps for the subtraction of (103–57) using 8-bit two's complement in a computer and verify your answer.**

5. **If MP3 (44100 samples per second and 16bits per sample) is used for storing audio, what memory size is needed for storing a 90-second music.**

6. **Given a number 104 = $01101000_2$, if we want the calculation of 104 ÷ 8 = 13, how to do in a computer.**

7. **If the main memory space has up to 16GB and each addressing location stores 4 bytes (4B), how the number of lines (bits) is required in the address bus?**

8. **Applying logical operations for a 5-LED indicator such that it has the following function of right-turn direction, where symbols "0" and "1"are represented as LED off and LED on, respectively.**

9. **Please fill the following space to setup your e-Mail in NHU e-Mail server such that you can send or receive e-Mail messages in internet.**

10. **What at least number of binary bits is required if a number $99999999_{10}$ is transformed to be a binary.**

11. **The information transmitted (including attachments) is intended only for the person(s) or entity/entities to which it is addressed and may contain confidential and/or privileged material. Any review, retransmission, dissemination or other use of, or taking of any action in reliance upon, this information by persons, or entities other than the intended recipient(s) is prohibited. If you received this in error, please contact the sender and delete the material from any computer.**

- **Integrated Circuit**

**An integrated circuit (also referred to as an IC, a chip, or a microchip) is a set of electronic circuits on one small plate ("chip") of semiconductor material, normally silicon. This can be made much smaller than a discrete circuit made from independent components.**

**Integrated circuits are used in virtually all electronic equipment today and have monolithic the world of electronics. Computers, mobile phones, and other digital home appliances are now inextricable parts of the structure of modern societies, made possible by the low cost of producing integrated circuits.**

**ICs can be made very compact, having up to several billion transistors and other electronic components in an area the size of a fingernail. The width of each conducting line in a circuit (the line width) can be made smaller and smaller as the technology advances; in 2008 it dropped below 100 nanometers and in 2013 it is expected to be in the tens of nanometers.**

- **Solid-State Drive**

**A solid-state drive (SSD) (also known as a solid-state disk or electronic disk, though it contains no actual "disk" of any kind, nor motors to "drive" the disks) is a data storage device using integrated circuit assemblies as memory to store data persistently. SSD technology uses electronic interfaces compatible with traditional block input/output (I/O) hard disk drives, thus permitting simple replacement in common applications. Also, new I/O interfaces like SATA Express are created to keep up with speed advancements in SSD technology.**

**SSDs have no moving mechanical components. This distinguishes them from traditional electromechanical magnetic disks such as hard disk drives (HDDs) or floppy disks, which contain spinning disks and movable read/write heads. Compared with electromechanical disks, SSDs are typically more resistant to physical shock, run silently, have lower access time, and less latency. However, while the price of SSDs has continued to decline in 2012, SSDs are still about 7 to 8 times more expensive per unit of storage than HDDs.**

**As of 2010, most SSDs use NAND-based flash memory, which retains data without power. For applications requiring fast access, but not necessarily data persistence after power loss, SSDs may be constructed from random-access memory (RAM). Such devices may employ separate power sources, such as batteries, to maintain data after power loss.**

**Hybrid drives or solid state hybrid drives (SSHD) combine the features of SSDs and HDDs in the same unit, containing a large hard disk drive and an SSD cache to improve performance of frequently accessed data.**

- **Operating System**

**An operating system (OS) is a collection of software that manages computer hardware resources and provides common services for computer programs. The operating system is an essential component of the system software in a computer system. Application programs usually require an operating system to function.**

**Time-sharing operating systems schedule tasks for efficient use of the system and may also include accounting software for cost allocation of processor time, mass storage, printing, and other resources.**

**For hardware functions such as input and output and memory allocation, the operating system acts as an intermediary between programs and the computer hardware, although the application code is usually executed directly by the hardware and will frequently make a system call to an OS function or be interrupted by it. Operating systems can be found on almost any device that contains a computer—from cellular phones and video game consoles to supercomputers and web servers.**

**Examples of popular modern operating systems include Android, BSD, iOS, Linux, OS X, QNX, Microsoft Windows, Windows Phone, and IBM z/OS. All these, except Windows, Windows Phone and z/OS, share roots in UNIX.**

- **iPad**

**iPad (/ˈaɪpæ d/ *EYE-pad*) is a line of tablet computers designed and marketed by Apple Inc., which runs Apple's iOS. The first iPad was released on April 3, 2010; the most recent iPad models, the iPad Air and second generation iPad Mini, were revealed on October 22, 2013 and went on sale November 1, 2013, and November 12, 2013, respectively. The user interface is built around the device's multi-touch screen, including a virtual keyboard. The iPad has built-in Wi-Fi and, on some models, cellular connectivity.**

**An iPad can shoot video, take photos, play music, and perform Internet functions such as web-browsing and emailing. Other functions—games, reference, GPS navigation, social networking, etc.—can be enabled by downloading and installing apps. As of October 2013, the App Store has more than 475,000 native apps by Apple and third parties.**

**There have been five versions of the iPad. The first generation established design precedents, such as the 9.7-inch screen size and button placement, that have persisted through all models. The iPad 2 added a dual core Apple A5 processor and VGA front-facing and 720p rear-facing cameras designed for FaceTime video calling. The third generation added a Retina Display, the new Apple A5X processor with a quad-core graphics processor, a 5-megapixel camera, HD 1080p video recording, voice dictation, and 4G (LTE). The fourth generation added the Apple A6X processor and replaces the 30-pin connector with an all-digital Lightning connector. The iPad Air**

**added the Apple A7 processor and reduced the form factor for the first time since the iPad 2. iOS 6 added Siri to the third and fourth generations and the iPad Mini.**

**There have been two versions of the iPad Mini. The first generation features a reduced screen size of 7.9 inches and features similar internal specifications as the iPad 2. It also uses the Lightning connector. The second generation features the Retina Display and the Apple A7 processor, matching the internals specifications of the iPad Air.**

- **4G**

**In telecommunication systems, 4G is the *fourth generation* of mobile phone mobile communication technology standards. It is a successor to the third generation (3G) standards. A 4G system provides mobile ultra-broadband Internet access, for example to laptops with USB wireless modems, to smartphones, and to other mobile devices. Conceivable applications include amended mobile web access, IP telephony, gaming services, high-definition mobile TV, video conferencing, 3D television, and cloud computing.**

**Two 4G candidate systems are commercially deployed: the Mobile WiMAX standard (first used in South Korea in 2006), and the first-release Long Term Evolution (LTE) standard (in Oslo, Norway and Stockholm, Sweden since 2009). It has however been debated if these first-release versions should be considered to be 4G or not, as discussed in the technical definition section below.**

**In the United States, Sprint (previously Clearwire) has deployed Mobile WiMAX networks since 2008, and MetroPCS was the first operator to offer LTE service in 2010. USB wireless modems have been available since the start, while WiMAX smartphones have been available since 2010, and LTE smartphones since 2011. Equipment made for different continents is not always compatible, because of different frequency bands. Mobile WiMAX is currently (April 2012) not available for the European market.**

- **Stylus Pen**

**In computing, a stylus (or stylus pen) is a small pen-shaped instrument that is used to input commands to a computer screen, mobile device or graphics tablet. With touchscreen devices, a user places a stylus on the surface of the screen to draw or make selections by tapping the stylus on the screen.**

**Pen-like input devices which are larger than a stylus, and offer increased functionality such as programmable buttons, pressure sensitivity and electronic erasers, are often known as digital pens.**

**The stylus is the primary input device for personal digital assistants. It is used on the Nintendo DS, Nintendo 3DS game consoles and the Wii U's Wii U GamePad. Some smartphones, such as Windows Mobile phones, require a stylus for accurate input. However, devices featuring multi-touch finger-input are becoming more popular than**

**stylus-driven devices in the smartphone market; capacitive styli, different from standard styli, can be used for these finger-touch devices (iPhone, etc.).**

**Graphics tablets use styli containing circuitry (powered by battery or operating passively by change of inductance), to allow multi-function buttons on the barrel of the pen or stylus to transmit user actions to the tablet. Some (probably most) tablets detect varying degrees of pressure sensitivity, e.g. for use in a drawing program to vary line thickness or color density.**

**The first use of a stylus pen in a computing device was the *Styalator*, demonstrated by Tom Dimond in 1957.**

- **Mobile phone**

**A mobile phone (also known as a cellular phone, cell phone, and a hand phone) is a device that can make and receive telephone calls over a radio link while moving around a wide geographic area. It does so by connecting to a cellular network provided by a mobile phone operator, allowing access to the public telephone network. By contrast, a cordless telephone is used only within the short range of a single, private base station.**

**In addition to telephony, modern mobile phones also support a wide variety of other services such as text messaging, MMS, email, Internet access, short-range wireless communications (infrared, Bluetooth), business applications, gaming and photography. Mobile phones that offer these and more general computing capabilities are referred to as smartphones.**

**The first hand-held cell phone was demonstrated by John F. Mitchell and Dr Martin Cooper of Motorola in 1973, using a handset weighing around 2.2 pounds (1 kg). In 1983, the DynaTAC 8000x was the first to be commercially available. From 1990 to 2011, worldwide mobile phone subscriptions grew from 12.4 million to over 6 billion, penetrating about 87% of the global population and reaching the bottom of the economic pyramid.**

- **Bluetooth**

**Bluetooth is a wireless technology standard for exchanging data over short distances (using short-wavelength radio transmissions in the ISM band from 2400–2480 MHz) from fixed and mobile devices, creating personal area networks (PANs) with high levels of security. Created by telecom vendor Ericsson in 1994, it was originally conceived as a wireless alternative to RS-232 data cables. It can connect several devices, overcoming problems of synchronization.**

**Bluetooth is managed by the Bluetooth Special Interest Group (SIG) , which has more than 19,000 member companies in the areas of telecommunication, computing,**

**networking, and consumer electronics. Bluetooth was standardized as IEEE 802.15.1, but the standard is no longer maintained. The SIG oversees the development of the specification, manages the qualification program, and protects the trademarks. To be marketed as a Bluetooth device, it must be qualified to standards defined by the SIG. A network of patents is required to implement the technology, which is licensed only for that qualifying device.**

- **MOOC**

**A massive open online course (MOOC) is an online course aimed at unlimited participation and open access via the web. In addition to traditional course materials such as videos, readings and problem sets, MOOCs provide interactive user forums that help build a community for the students, professors, and teaching assistants (TAs). MOOCs are a recent development in distance education.**

**Although early MOOCs often emphasized open access features, such as open licensing of content, open structure and learning goals and connectivism, to promote the reuse and remixing of resources, some notable newer MOOCs use closed licenses for their course materials, while maintaining free access for students.**

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- **Digital Camera**

**A digital camera (or digicam) is a camera that encodes digital images and videos digitally and stores them for later reproduction. Most cameras sold today are digital, and digital cameras are incorporated into many devices ranging from PDAs and mobile phones (called camera phones) to vehicles.**

**Digital and film cameras share an optical system, typically using a lens with a variable diaphragm to focus light onto an image pickup device. The diaphragm and shutter admit the correct amount of light to the imager, just as with film but the image pickup device is electronic rather than chemical. However, unlike film cameras, digital cameras can display images on a screen immediately after being recorded, and store and delete images from memory. Many digital cameras can also record moving video with sound. Some digital cameras can crop and stitch pictures and perform other elementary image editing.**

**The resolution of a digital camera is often limited by the image sensor (typically a CCD or CMOS sensor chip) that turns light into discrete signals. The sensor is made up of millions of "buckets". The brighter the image at a given point on the sensor, the larger the value that is read for that pixel. Depending on the physical structure of the sensor, a color filter array may be used which requires a demosaicing. The number of resulting pixels in the image determines its "pixel count". The pixel count is the product of the row and the column. For example, a 1,000x1,000 image would have 1,000,000 pixels.**

**Digital camera, partly disassembled. The lens assembly (bottom right) is partially removed, but the sensor (top right) still captures an image, as seen on the LCD screen (bottom left).**

**Since the first digital backs were introduced, there have been three main methods of capturing the image, each based on the hardware configuration of the sensor and color filters.**

***single-shot* capture systems use either one sensor chip with a Bayer filter mosaic, or three separate image sensors (one each for the primary additive colors red, green, and blue) which are exposed to the same image via a beam splitter.**

***multi-shot* exposes the sensor to the image in a sequence of three or more openings of the lens aperture. There are several methods of application of the multi-shot technique. The most common originally was to use a single image sensor with three filters passed in front of the sensor in sequence to obtain the additive color information. Another multiple shot method is called Microscanning. This method uses a single sensor chip with a Bayer filter and physically moved the sensor on the focus plane of the lens to construct a higher resolution image than the native resolution of the chip. A third version combined the two methods without a Bayer filter on the chip.**

**The third method is called *scanning* because the sensor moves across the focal plane much like the sensor of an image scanner. Their *linear* or *tri-linear* sensors utilize only a single line of photosensors, or three lines for the three colors. Scanning may be accomplished by moving the sensor e.g. when using color co-site sampling or rotating the whole camera; a digital rotating line camera offers images of very high total resolution.**

**The choice of method for a given capture is determined largely by the subject matter. It is usually inappropriate to attempt to capture a subject that moves with anything but a single-shot system. However, the higher color fidelity and larger file sizes and resolutions available with multi-shot and scanning backs make them attractive for commercial photographers working with stationary subjects and large-format photographs.**

**Improvements in single-shot cameras and image file processing at the beginning of the 21st century made single shot cameras almost completely dominant, even in high-end commercial photography.**

## ● MOOC

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**that help build a community for the students, professors, and teaching assistants (TAs). MOOCs are a recent development in distance education.**

**Although early MOOCs often emphasized open access features, such as open licensing of content, open structure and learning goals and connectivism, to promote the reuse and remixing of resources, some notable newer MOOCs use closed licenses for their course materials, while maintaining free access for students.**

**Early approaches**

**A network diagram showing the distributive nature of Stephen Downes' and George Siemens' CCK08 course, one of the first MOOCs and the course that inspired the term MOOC to become adopted.**

**The first MOOCs emerged from the open educational resources (OER) movement. The term *MOOC* was coined in 2008 by Dave Cormier of the University of Prince Edward Island and Senior Research Fellow Bryan Alexander of the National Institute for Technology in Liberal Education in response to a course called *Connectivism and Connective Knowledge* (also known as *CCK08*). CCK08, which was led by George Siemens of Athabasca University and Stephen Downes of the National Research Council, consisted of 25 tuition-paying students in Extended Education at the University of Manitoba, as well as over 2200 online students from the general public who paid nothing. All course content was available through RSS feeds and online students could participate through collaborative tools, including blog posts, threaded discussions in Moodle and Second Life meetings.[21][23][24] Stephen Downes considers these so-called cMOOCs to be more "creative and dynamic" than the current xMOOCs, which he believes "resemble television shows or digital textbooks."**

**Other MOOCs then emerged. Jim Groom from The University of Mary Washington and Michael Branson Smith of York College, City University of New York hosted MOOCs through several universities. Early MOOCs did not rely on posted resources, learning management systems and structures that mix the learning management system with more open web resources.[25] MOOCs from private, non-profit institutions emphasized prominent faculty members and expanded existing distance learning offerings (e.g., podcasts) into free and open online courses.[26]**

**Recent developments (North America)**

**Several well-financed American providers emerged, associated with top universities, including Udacity, Coursera, edX, and Canvas Network.**

**In the fall of 2011 Stanford University launched three courses. The first of those courses was *Introduction Into AI*, launched by Sebastian Thrun and Peter Norvig. Enrollment quickly reached 160,000 students. The announcement was followed within weeks by the launch of two more MOOCs, by Andrew Ng and Jennifer Widom. Following the publicity and high enrollment numbers of these courses, Thrun started a**

**company he named Udacity and Daphne Koller and Andrew Ng launched Coursera. Coursera subsequently announced university partnerships with University of Pennsylvania, Princeton University, Stanford University and The University of Michigan.**

**Concerned about the commercialization of online education, MIT created the not-for-profit MITx. The inaugural course, 6.002x, launched in March 2012. Harvard joined the group, renamed edX, that spring, and University of California, Berkeley joined in the summer. The initiative then added the University of Texas System, Wellesley College and Georgetown University.**

**In November 2012, the University of Miami launched first high school MOOC as part of Global Academy, its online high school. The course became available for high school students preparing for the SAT Subject Test in biology.**

**In January 2013, Udacity launched its first MOOCs-for-credit, in collaboration with San Jose State University. In May 2013 the company announced the first entirely MOOC-based Master's Degree, a collaboration between Udacity, AT&T and the Georgia Institute of Technology, costing $7,000, a fraction of its normal tuition.**

**"Gender Through Comic Books," was a course taught by Ball State University's Christina Blanch on Instructure's Canvas Network, a MOOC platform launched in November 2012. The course used examples from comic books to teach academic concepts about gender and perceptions.**

**In March 2013, Coursolve piloted a crowdsourced business strategy course for 100 organizations with the University of Virginia. A data science MOOC began in May 2013.**

**In May 2013 Coursera announced free e-books for some courses in partnership with Chegg, an online textbook-rental company. Students would use Chegg's e-reader, which limits copying and printing and could use the book only while enrolled in the class. In June 2013, the University of North Carolina at Chapel Hill launched Skynet University, which offers MOOCs on introductory astronomy. Participants gain access to the university's global network of robotic telescopes, including those in the Chilean Andes and Australia. It incorporates YouTube, Facebook and Twitter.**

**In September 2013, edX announced a partnership with Google to develop Open edX, an open source platform and its MOOC.org, a site for non-xConsortium groups to build and host courses. Google will work on the core platform development with edX partners. In addition, Google and edX will collaborate on research into how students learn and how technology can transform learning and teaching. MOOC.org will adopt Google's infrastructure.**

**In October 2013, edX announced that China and France would be adopting edX's open source platform to increase access to education in their countries. Through these**

**collaborations, 10 Chinese universities have joined together for the largest online education initiative in China, and 120 higher education institutions have joined together under the direction of the French Ministry of Education to offer online courses throughout the country.**

**In November 2013, Her Majesty Queen Rania Al Abdullah of Jordan announced Edraak, an education initiative of the Queen Rania Foundation for Education and Development (QRF), the first MOOC portal for the Arab world, adopting edX's open source platform.**

**EdX currently offers 94 courses from 29 institutions around the world (as of November 2013). During its first 13 months of operation (ending March 2013), Coursera offered about 325 courses, with 30% in the sciences, 28% in arts and humanities, 23% in information technology, 13% in business and 6% in mathematics. Udacity offered 26 courses. Udacity's CS101, with an enrollment of over 300,000 students, was the largest MOOC to date.**

**Some organisations operate their own MOOCs – including Google's Power Search. As of February 2013 dozens of universities had affiliated with MOOCs, including many international institutions.**

- **Bluetooth**

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**Name and logo**

**The word "Bluetooth" is an anglicized version of the Scandinavian *Blåtand*/*Blåtann*, the epithet of the tenth-century king Harald I of Denmark and parts of Norway who united dissonant Danish tribes into a single kingdom. The idea of this name was proposed in 1997 by Jim Kardach who developed a system that would allow mobile**

**phones to communicate with computers (at the time he was reading Frans Gunnar Bengtsson's historical novel *The Long Ships* about Vikings and king Harald Bluetooth). The implication is that Bluetooth does the same with communications protocols, uniting them into one universal standard. The Bluetooth logo is a bind rune merging the Younger Futhark runes ᚼ (Hagall) (ᚼ) and ᛒ (Bjarkan) (ᛒ), Harald's initials.**

## Implementation

**Bluetooth operates in the range of 2400–2483.5 MHz (including guard bands). This is in the globally unlicensed Industrial, Scientific and Medical (ISM) 2.4 GHz short-range radio frequency band. Bluetooth uses a radio technology called frequency-hopping spread spectrum. The transmitted data is divided into packets and each packet is transmitted on one of the 79 designated Bluetooth channels. Each channel has a bandwidth of 1 MHz. The first channel starts at 2402 MHz and continues up to 2480 MHz in 1 MHz steps. It usually performs 1600 hops per second, with Adaptive Frequency-Hopping (AFH) enabled.[11]**

**Originally Gaussian frequency-shift keying (GFSK) modulation was the only modulation scheme available; subsequently, since the introduction of Bluetooth 2.0+EDR, π/4-DQPSK and 8DPSK modulation may also be used between compatible devices. Devices functioning with GFSK are said to be operating in basic rate (BR) mode where an instantaneous data rate of 1 Mbit/s is possible. The term Enhanced Data Rate (EDR) is used to describe π/4-DPSK and 8DPSK schemes, each giving 2 and 3 Mbit/s respectively. The combination of these (BR and EDR) modes in Bluetooth radio technology is classified as a "BR/EDR radio".**

**Bluetooth is a packet-based protocol with a master-slave structure. One master may communicate with up to 7 slaves in a piconet; all devices share the master's clock. Packet exchange is based on the basic clock, defined by the master, which ticks at 312.5 µs intervals. Two clock ticks make up a slot of 625 µs; two slots make up a slot pair of 1250 µs. In the simple case of single-slot packets the master transmits in even slots and receives in odd slots; the slave, conversely, receives in even slots and transmits in odd slots. Packets may be 1, 3 or 5 slots long but in all cases the master transmit will begin in even slots and the slave transmit in odd slots.**