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DEPARTMENT OF
ELECTRONICS
&
COMMUNICATION ENGINEERING

Presents

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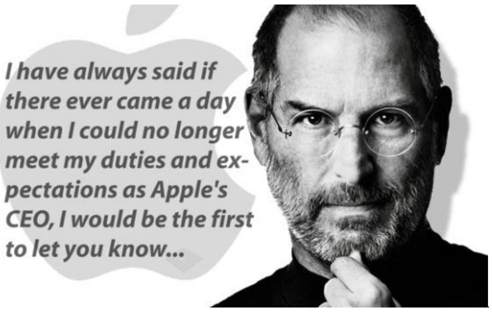
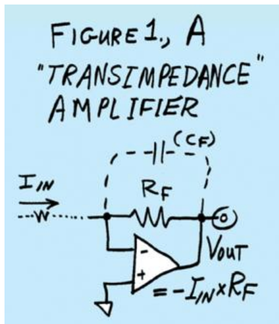


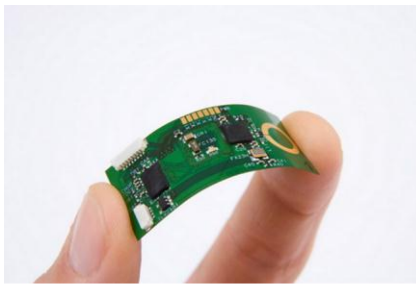
STEVE JOBS AND HIS JOURNEY THROUGH APPLE

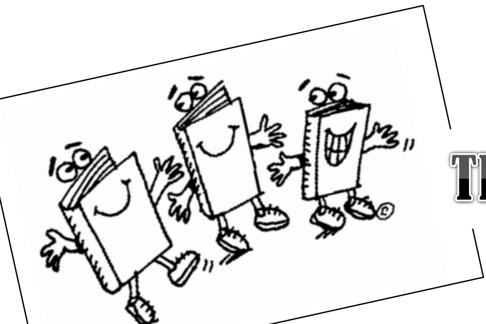


TRANSEIMPEDANCE AMPLIFIER RECEIVER USED IN OPTICAL COMMUNICATION SYSTEM

SO WHAT'S SO SPECIAL ABOUT ANDROID

NANOTECHNOLOGY – THE SIZE OF FUTURE





The art corner

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THE ART CORNER

So what's so special about Android anyway???

Android originally began as a product of Android Inc. in 2003. A group of people including Andy Rubin, a co-founder of Sidekick phone manufacturer Danger, and Nick Sears, a former vice president at US mobile phone carrier T-Mobile, were its initial founders.

So what is cool about Android?

In 2005, Google bought the company, leading to speculations whether Google was interested in getting into the mobile phone market. During the years following the acquisition, Google worked to develop a Linux-powered kernel for phones. Soon, Google reportedly began meeting device manufacturers to make phones with the new operating system. That is how Android came into being.

Android is an open source software platform and operating system for mobile devices. Android offers all the regular features we expect from mobile devices. It supports a camera, GPS, Bluetooth, EDGE, 3G, Wi-Fi, and plays all common media files. However, this does not come as a surprise.

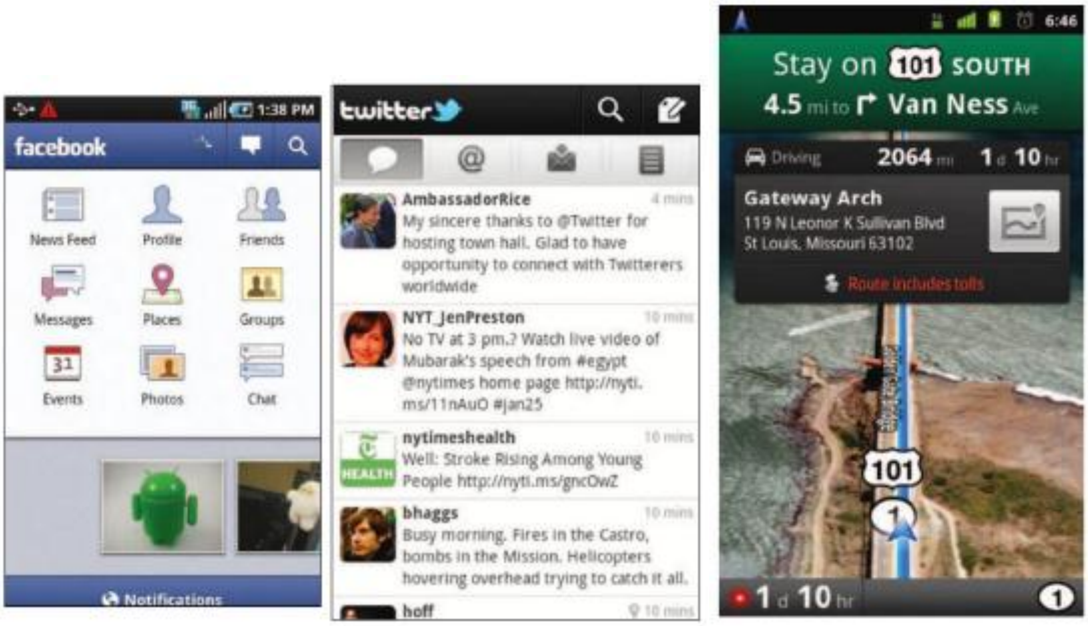
To begin with, Android supports ‘apps’, just like its competitor, the iPhone. What makes Android cool is that it is developer-friendly, and is an open source platform. Google encourages developers to build for Android by offering huge prize money to popular and winning applications in the Android Market. Android’s Market (the equivalent to the Apple App Store or Windows Mobile Marketplace) has a smaller fee that developers have to pay to submit applications. Android also has an easier-to-learn and easier-to-use developer framework, which uses the widespread Java programming language. This open nature is seeing to it that more and more developers are switching to Android development.

- Android integrates social networking apps like Facebook and MySpace and other apps into one, making it possible to manage them simultaneously, instead of opening multiple apps.
- Another great thing about Android is ‘widgets’. Widgets offer a variety of information on the home screen without opening the apps concerned. For instance, a news widget or a twitter widget with scrolling updates of the latest tweets is very handy.
- Android is very tolerant and understanding as it offers options to replace many things that someone might not like or would prefer over the default.

- The search is exceptionally smart. It allows speaking the search term and clicking a button to search. In addition, Android allows searching the entire phone. For example, if a search is initiated for the word 'party', Android will pull results from text messages with the word 'party' in them, contacts with 'party' in the name, and emails containing the word 'party'!

- Android apps are mostly free and more are getting developed as I write! Here are some apps that work wonders.

'Evernote' that allows you to take notes easily
'PicSay' a picture editor
'Locale' that can switch all important mobile settings according to the location of your phone
'TuneWiki' that is a music based application that lets users share what they're listening to with each other, or to use Google Maps to find what users around the world are listening to. Additional feature of the TuneWiki is that it plays audio and video for songs while scrolling synchronized lyrics as they play.



- Android offers true multi-tasking. Since its first version, Android , since apps has been able to run multiple apps at the same time regardless of whether they are system apps, or apps from the Android Marketplace. It allows the user to receive notifications, listen to music, and keep a record of GPS data without having to leave apps open. This makes the Android OS faster and more efficient.

- Developers find it tougher to develop for the iPhone, which ignores apps if they are too simple or if a similar app already exists. The Android Marketplace does not reject or censor apps on the other hand. Therefore, Android apps are flooding the scenario.

- Android source code is modifiable by handset manufacturers without having to share back the modifications. This protection of intellectual property is bound to attract handset manufacturers towards Android. Therefore, you can bet Android will only get more popular in the days to come.

WINDOWS 8

Windows 8 is the newest sensation created Microsoft. It is an advanced version of windows 7 OS with a lot of additional features designed to make our computer experience memorable.

There have been a few changes from previous version. Microsoft has added support for ARM microprocessors in addition to the x86 microprocessors from Intel and AMD that were used previously. The ARM microprocessor is a 32 bit RISC architecture developed by ARM Holdings. A new Metro-style interface has been added that was designed for touchscreen input in addition to mouse, keyboard, and pen input.

It is scheduled to be released in late 2012. Microsoft has announced that the public BETA version will be released in mid February 2012 along with Windows Store BETA. According to Microsoft, there were more than 500,000 downloads of the Windows 8 Developer Preview within the first 12 hours of its release showing its popularity among the computer and tech enthusiasts.

Windows store:

Microsoft has introduced Windows Store on Windows 8, similar to the Ubuntu Software Center, and Mac App Store, that allows developers to publish their Metro-style applications on Windows 8 devices. The Windows Store will also allow developers to publish their Win32 or "traditional desktop" applications.

Some of the new features are:

There is a whole lot of new features available in windows 8 including USB 3.0 support, Live ID integration, the Windows Store, the ability to run from USB Flash drives with Windows To Go and also easier system restore options.

Metro style

A new "Start screen", similar to the one in Windows Phone 7, includes live application tiles. The start screen replaces the Start menu, being triggered by the Start button or Windows key, and is also the first screen shown on start up. The user can go to the desktop, which is treated as a Metro app with its own "Desktop" tile on the Start screen. Starting a traditional desktop-based application also switches to the desktop. The Start screen also displays the user's name and picture.

Windows 8 features a new login/lock screen that shows the date and time and notifications, along with a customizable background.

Picture password

Windows 8 allows users to select from a list of pictures and even gestures to set as a pass word. It has limited the gestures to shapes like drawing circles, squares or tapping your fingers etc as it was found to remove chances of faulty login. It allows five unsuccessful attempts when it locks the PC till a text password is provided.

Taskbar

Windows 8 provides a configurable taskbar in the traditional Windows desktop that spans multiple monitors. The Multiple Monitor Taskbar can be turned on and off and is used to display the minimized windows. Similarly, Windows 8 provides the user with the ability to show different wallpapers on different monitors, or the same wallpaper stretched across multiple monitors.

Windows Explorer

The redesigned Windows Explorer uses the ribbon interface so as to facilitate users with a variety of functions when a particular file (picture, video) is selected. This Ribbon Interface brings up options for slideshow, rotating photos etc to save users the trouble and enable easy access. Users can view all simultaneous file operations in one consolidated window, and can pause file operations in progress. A new interface has also been introduced for managing file name collisions in a file operation, allowing users to easily control which conflicting files are copied.

Task Manager

A new Task Manager has replaced Windows Task Manager although the old version is also included. However some changes brought into effect include:

1. The tabs are hidden by default.
2. This view only shows applications.
3. The Performance tab is split into CPU, memory, disk, Ethernet, and wireless network (if applicable) sections.
4. A new Startup tab has been added that lists startup applications.[13]
5. The Processes tab now lists application names, application status, and overall usage data for CPU, memory, hard disk, and network resources for each process.

Windows Live ID integration

Probably the best change is that user accounts do not have to be local-only anymore but can be linked up to one's Windows Live ID. This has the advantage that users can retain their settings and files as they move from their home computer to their workplace or to any other computer also using Windows 8.

Windows To Go

Windows To Go is an upcoming Windows 8 feature that will allow users to create a bootable USB Flash drive (usually called a Live USB) with Windows 8 in it, including the user's programs, settings, and files. Bootable Windows To Go USB flash drive allows users to boot the system from the flash drive itself.

Windows 8 will have built-in support of USB 3.0 for better power management and longer battery life.

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Hardware requirements

- 1 GHz processor
- 16 GB Hard Drive space
- 1 GB RAM
- DirectX 9 graphics device with WDDM 1.0 or higher driver

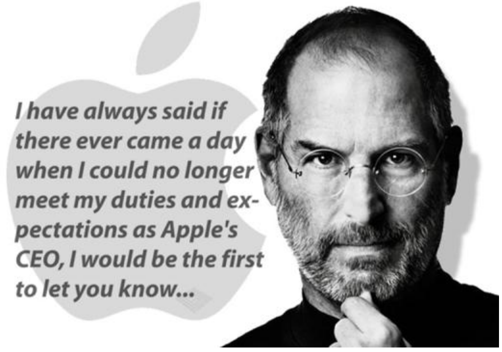
Operation and Compatibility

The languages which are directly supported by Microsoft for writing applications for Windows 8 are JavaScript and HTML. In addition Visual Basic, C++, and C# are also supported. But there are many third party compilers which allow application development for the platform, for example, Free Pascal allows writing Object Pascal applications.

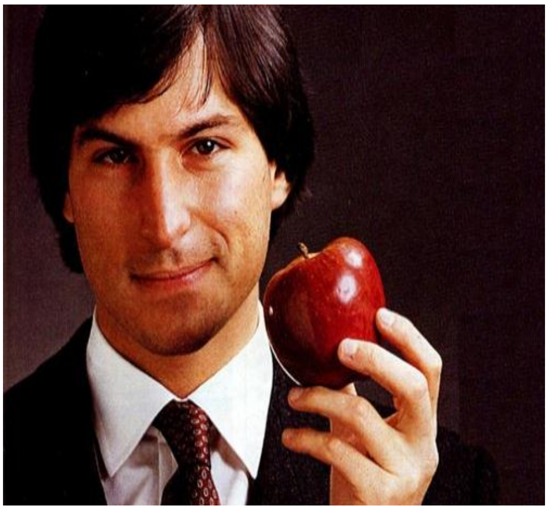
With the introduction of Windows 8 with its bagful of exciting features, the universe of computing is going to be one exciting journey. I am sure the tech addicts can’t wait to get their hands on the new and improved OS.

The whole world waits for the day Microsoft launches Windows 8.

DEBOPAM GHOSH
ECE 3RD year



Steve jobs and his journey through apple



"Remembering that I'll be dead soon is the most important tool I've ever encountered to help me make the big choices in life. Because almost everything - all external expectations, all pride, all fear of embarrassment or failure - these things just fall away in the face of death, leaving only what is truly important."

Feb. 24, 1955: Steven Paul Jobs is born in San Francisco to Joanne Carole Schieble and Abdulfattah Jandali. The couple give up their son to adoption. Paul and Clara Jobs become Jobs' non-biological parents.

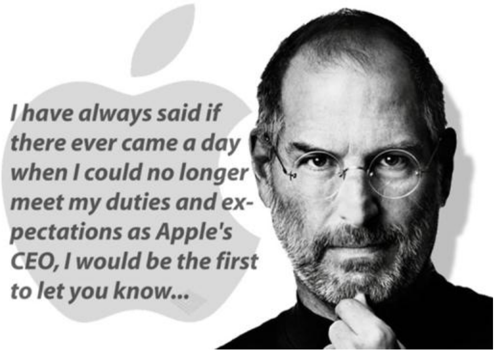
1961: The Jobs family moves to Mountain View, California, where Silicon Valley is now located.

1968: Jobs calls Bill Hewlett, the co-founder and co-namesake of Hewlett-Packard, looking for spare parts to build a frequency counter. Hewlett gives Jobs an internship with the company that summer.

1970: Meets Steve Wozniak.

In 1975, Jobs and Wozniak begin working on the Apple I in Jobs' bedroom. They offer the PC to HP.
1972: Graduates and enrols at Reed College in Portland, only to drop out a semester later. Jobs attended classes that interested him, such as calligraphy, despite not getting credit for them.

1974: Jobs works for video game maker Atari and attends meetings of the Homebrew Computer Club with Steve Wozniak.



1976: Apple Computer is formed in Jobs' garage. A third co-founder, Ronald Wayne, leaves the company after less than two weeks. The Apple I computer goes on sale by the summer for $666.66.

Jan. 3, 1977: Apple is incorporated by its founders and a group of venture capitalists.
Jun. 5, 1977: It unveils Apple II, the first personal computer to generate colour graphics. Revenue reaches $1 million.

Apple logo in 1977, created by Rob with the rainbow colour theme used until 1998.

1979: Jobs visits Xerox Palo Alto Research Center. Jobs saw the commercial potential of Xerox PARC's mouse-driven graphical user interface, which led to the creation of the Apple Lisa.

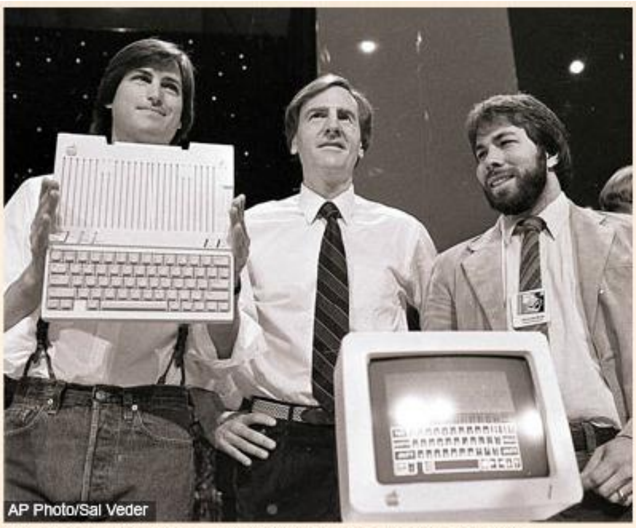
1980: Apple employee Jef Raskin invented the Macintosh.

Dec. 12, 1980: Apple goes public, raising $110 million in one of the biggest initial public offerings to date. Jobs became a multi-millionaire before the age of 30.

1982: Annual revenue climbs to $1 billion.

1983: The Apple Lisa goes on sale, only to be pulled two years later. Jobs lures John Sculley away from Pepsico Inc. to serve as Apple's CEO.

Jan. 24, 1984: The Macintosh computer goes on sale.



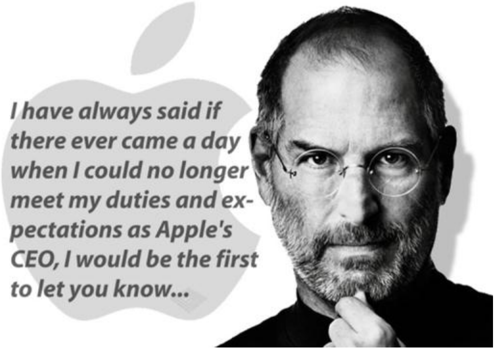
At the launch of the Apple IIc in 1984, Apple is headed by Jobs, left, as chairman, John Scully, centre, as president and CEO and co-founder Steve Wozniak, right.

Sept. 12, 1985: Jobs and Sculley clash, leading to Jobs' resignation. Wozniak also resigns from Apple this year.

Feb. 3, 1986: Jobs starts Next Inc., a computer company making high-end machines for universities. Tim Berners-Lee at CERN uses a NeXT workstation to build the first server of the World Wide Web.

1986: Jobs buys Pixar from "Star Wars" creator George Lucas for $10 million.

1989: First NeXT computer goes on sale with a $6,500 price tag.



1991: Apple and IBM Corp. announce an alliance to develop new PC microprocessors and software. Apple unveils portable Macs called PowerBook.

1993: Apple introduces the Newton, a hand-held, pen-based computer. The company reports quarterly loss of $188 million in July. Sculley is replaced as CEO by Apple president Michael Spindler. Sculley resigns as chairman. Jobs' company is renamed NeXT Software, Inc.

1994: Apple introduces Power Macintosh computers based on the PowerPC chip it developed with IBM and Motorola. Apple decides to license its operating software and allow other companies to "clone" the Mac.

1995: The first Mac clones go on sale. Microsoft releases Windows 95, which is easier to use than previous versions and is more like the Mac system. Apple struggles with competition.

November 29, 1995: Jobs becomes Pixar's president and CEO. Jobs brings Pixar pubic one week after the release of "Toy Story". Pixar goes to Wall Street with an IPO that raises $140 million. Over the next 15 years, the company produces box-office hits-A Bug's Life, Toy Story 2, Monsters, Inc., Finding Nemo, The Incredibles, Cars, Ratatouille, WALL-E, Up and Toy Story 3.

1996: Apple announces plans to buy NeXT for $430 million for the operating system Jobs' team developed. Jobs is appointed an adviser to Apple. Gil Amelio replaces Spindler as CEO.

July 9, 1997: Becomes CEO, initially as the de facto chief, then as interim chief in September after Gil Amelio is pushed out. Jobs puts an end to Mac clones.

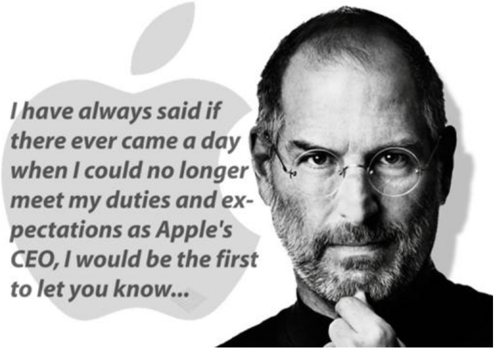
August 6, 1997: Announces a $150 million investment from Microsoft, coupled with a partnership on Microsoft Office and Internet Explorer for the Mac.

November 10, 1997: Introduces the Apple Store, which let consumers custom-order Apple products directly from the company online.

January 8, 1998: Apple returns to profitability. It shakes up personal computer industry in 1998 with the iMac desktop.

May 6, 1998: Introduces the iMac, which becomes commercially available in August.
The iMac's launch was accompanied by an advertising campaign that for the first time used the phrase 'Think Different'.

January 5, 2000: Drops the "interim" from his CEO title at the Macworld Expo, joking that he would be using the title "iCEO". Takes a $1 annual salary. Changes licensing terms to make Mac-cloning cost-prohibitive. Technologies developed at NeXT ultimately evolve into Apple products such as the Mac OS.



January 9, 2001: Introduces iTunes, then exclusively for Mac users.

March 24, 2001: Apple ships the the first version of Mac OS X, code-named Cheetah.

May 19, 2001: Opens Apple's first retail stores.

October 23, 2001: Introduces the iPod.

July 17, 2002: Apple introduces the first Windows-compatible iPods at Macworld.

April 28, 2003: Apple launches the iTunes Music Store with 200,000 songs at 99 cents each. It sells 1 million songs in the first week.

October 16, 2003: Announces iTunes' compatibility with Windows.

August 1, 2004: Jobs undergoes surgery for a rare but curable form of pancreatic cancer. Apple discloses his illness.

January 11, 2005: Apple introduces iPod Shuffle.

June 6, 2005: At Worldwide Developers Conference, announces switch from IBM chips to Intel's Core Duo chips with Apple's new Mac Book Pro and iMac.

September 7, 2005: Introduces iPod Nano.

October 12, 2005: Apple introduces an iPod that can play video.

January 13, 2006: That year, Apple's market capitalization surpasses Dell's.

January 25, 2006: Disney buys Pixar for $7.4 billion. Jobs becomes Disney's largest individual shareholder.

January 9, 2007: Drops ‘Computer’ from Apple’s name. Apple Inc. releases the iPhone.

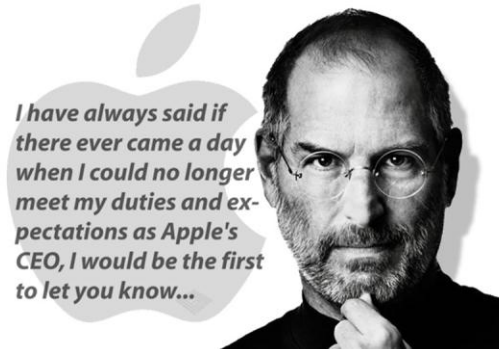
September 5, 2007: Introduces the iPod Touch.

January 15, 2008: Introduces the App Store as an update to iTunes. Also introduces the MacBook Air.

June 9, 2008: Unveils MobileMe, Apple's first cloud offering.

Jobs addressing concerns about his health in 2008.

January 14, 2009: Jobs takes a 6-month leave of absence for medical reasons.



January 27, 2010: Introduces the iPad. Apple sells 500,000 iPads in the first week and gains 84 percent of the tablet market by the end of 2010.

January 17, 2011: Goes on medical leave of absence.

March 2, 2011: Jobs makes a surprise appearance to take the wraps off the iPad.

June 6, 2011: Gives a keynote speech at Apple's Worldwide Developers Conference. It is Jobs' last public appearance at an Apple event.

August 9, 2011: Apple shares become the most valuable among U.S. companies, in terms of market capitalization, at $337.17 billion.

August 24, 2011: Resigns from Apple CEO post; becomes chairman.

Oct. 5, 2011: Jobs dies at 56 at his California home, due to complications from a relapse of his previously treated islet-cell neuroendocrine pancreatic cancer. Apple announced his death in a statement, which read:

We are deeply saddened to announce that Steve Jobs passed away today. Steve's brilliance, passion and energy were the source of countless innovations that enrich and improve all of our lives. The world is immeasurably better because of Steve. His greatest love was for his wife, Laurene, and his family. Our hearts go out to them and to all who were touched by his extraordinary gifts.

COMPILED BY

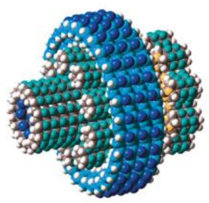
Sampurna Ray

ECE 3RD year

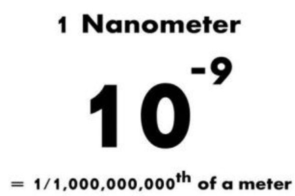
NANOTECHNOLOGY – THE SIZE OF FUTURE

An Introduction to Nanotechnology

NANOTECHNOLOGY



Hundreds of years ago, when technology was a wheel, lift or floating device, philosophers would spend days and weeks arguing about "how many angels could dance on the head of a pin." Hundreds of years later, with technology appearing and evolving at an incredible speed, only the subject of this thought has changed. In the 21st century philosophers and scientists spend days, weeks arguing about "how many worlds can we build on the head of a pin." That question is the essence and reality of a new scientific playing field called Nanotechnology[1]. This rather new science is examining the physical principles of matter at a molecular level and has evolved as far as to where objects have been created solely by combining atoms. One of the first inventions in nanotechnology was created by Nobel Prize laureate Richard Smelly who has recently invented "Bucky Tubes. These tubes are nano-size conductive wires which are 100,000 times thinner than a human hair that will give the word "cable" a completely new meaning. If these tubes one day can replace a copper cable, then suddenly the alchemistic goal to change base metals into gold does not seem that farfetched anymore. According to an article by the Foresight Institute, nanotech research is very "widespread, and scientific knowledge of the molecular world is advancing rapidly." (The Foresight Institute, 2010) Right now, researchers all over the world are finding new ways of using nanotechnology to create advanced technology.



The Simplest Explanation of Nanotechnology

While reading about nanotech and glazing at the miniature size products created by it is rather easy, the explanation of how the process of nanotechnology actually works is usually a bit too complex for most to fully comprehend. The main reason for this is the fusion of multiple scientific concepts such as chemistry, physics, cellular microbiology, crystallography, math, computer science, and engineering, and many more. Nonetheless, I will attempt to simplify this process in order to explain what nanotechnology really is and in order to do this, we have to look at the basics of the basics: Neutrons, Protons and the patterns of Electron movements. Molecules basically have two properties; they are either philic[2] or phobic[3] depending on their electron charges. In the case where two molecules are philic and the base requirements are met (temperature, magnetic charges, aggregate state etc.) they will bond and form new substances. A very simple example of this is one molecule of oxygen (O). When this O molecule comes in contact with two molecules of hydrogen (H) it becomes water (H_2O) and if we add another molecule of oxygen, we just created hydrogen peroxide (H_2O_2) which is an oxidizer that commonly used as bleach. This concept of molecule bonding is the basic philosophy behind nanotechnology but usually contains far more complex molecules such as ^{64}Zn (Zinc) or Cu (Copper). Many of these bonds, like water, occur naturally when atoms form molecules, these molecules form chains of properties (usually carbon-based) and once enough chains have been formed and bonded together as solid material is formed. Scientists for the last centuries have spent thousands of research hours and billions of dollars in discovering *"what happens when nature creates a solid material"*. Nowadays however, the emphasis rests not on "what" but rather the "how". The "how" aspect is crucial as the manufacturing approach has pretty much reached its saturation point to externally influence the size of an object.

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[1] Nano, Greek for "Dwarf" – (symbol n) is a prefix in the metric system denoting a factor of 10^{-9} or 0.000000001

[2] -philic – A substance/molecule having an affinity to another substance/molecule

[3] -phobic – A substance/molecule having an aversion to another substance/molecule

Limitations of Microtechnology

One example of the physical limitations is a blood pressure sensor created by a company called NovaSensor. This sensor is introduced to the bloodstream, more specifically the arteries, where it sends back signals that are then read by a computer to analyze the blood flow, pressure etc. According to NovaSensor, about 16,000 of these pressure readers can be created out of one 4-inch silicon wafer. The problem however arises when the size of the machines that can be carved out of the wafer run into physical limitations. According to Science Daily, “On nano-scale dimensions, silicon, which is at the present stage the most commonly used material in semiconductor technology, reaches however a limit, preventing further miniaturization and technological progress.” (Swiss Federal Laboratories for Materials Science and Technology, 2010) NovaSensor therefore believes that strategy of building machines from individual molecules and atoms using nanotechnology will be a more profitable way and will guarantee competitiveness in the long-run. Nowadays, nanotechnologists are researching a very wide range of projects adopting a so-called "bottom-up" approach of taking atoms and molecules, and custom building them into larger objects. Their ultimate goal is to create extremely strong materials, custom designed foods, tiny robots, super-fast computer chips and much more. One thing however is sure, if these scientists accomplish even a fraction of what they deem possible, the implications for mankind’s future will be dramatic.

Appearance & Marketing of Nanotechnology in Information Systems

One of the major uses of nanotech is the creation of molecular electronics. The creation molecular circuits that are only a few atoms in size, offers the new ways of using components in electronic devices such as computers. Not only do they greatly reduce the size of a computer but also allow for much greater speeds and storage capacity as well as reduced power consumption.

Computer Industry & Central Processing Units

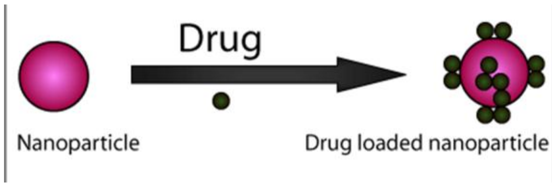
Intel, a leading microchip and processor manufacturer currently creates their CPU’s with circuits of 32-nanometers and will “bring out the 22-nanometer Ivy Bridge processor family in the second half of next year.” (Crothers, 2010) Intel however will not stop at a size already unimaginable to most of us, but is on the track to create even smaller processors with a size of 10-nanometers and smaller. However, Intel being solely the manufacturer and not distributor, the marketing of their microchips requires close connections with OEM motherboard manufacturers on which their CPU’s will be placed. Asus and many other companies in similar industries, work together with Intel in order to create the best computers available. With the appearance of custom computer manufacturers such as Dell or Alienware, Intel’s market has increased tremendously. Now that the customer can decide what kind of processor, graphic card, RAM etc. he needs for his custom system, Intel has a more direct link to the end consumer.

Unlike before where a buyer would walk into a store like Best now knows what kind of technology he has in his computer. W the computer industry, it is imperative to know what your clien Intel therefore closely monitors customer inputs and ideas to possible. Intel therefore has created the Intel Partner Program where “together they can deliver powerful solutions that help customers do more.” (Intel, 2010)

Medical Industry

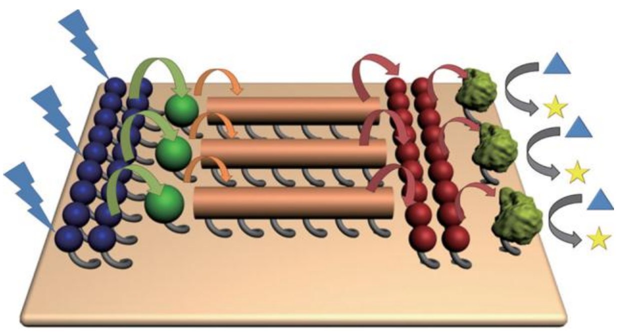
Clearly, Intel is not the only company that found almost limitless applications in nanotech. The medical field has already implemented several devices that use nanotechnology or nano-medicine. In the area of medical diagnostics, magnetic nano-particles are used to label specific molecules, structures or microrganisms within an organism. These label then help to monitor changes within the organism and allow for rapid-response treatment. In the area of medical treatments for diseases like cancer, medicine could be delivered to specific cells using nanoparticles. This will not only allow doctors to treat the patient more specifically but also reduces the problem of side effects. If we look at chemo-therapy today we realize that we are exposing the whole body of the sickened person to the treatment but with nanotechnology the affected areas would only be subject to changes. One of the things I found to be very applicable to most processes be it a business-, medical- or personal process is the use of "Speedboats" that effectively penetrate the problem rather than sending an aircraft-carrier.

Last but not least, the medical sector has made great advancement in tissue engineering which allow the replacement of skin on a burned victim or someone who has been in an accident that caused significant skin loss. The medical sector therefore will greatly benefit from future nanotech applications and treatment options will become more sophisticated than they already are. I believe that in the future, treatment for cancer cells or the human immunodeficiency virus (HIV) will not require more than an injection of nanotechnology to be cured. This will be especially true once we created nanotechnology that contains artificial intelligence which will monitor our body and respond to any diseases or bodily functions.



Energy Industry

Another and probably the most important field in which nanotech has put its foot in, is Energy. With the extensive use of fossil fuels to power our energy demanding world, many problems arose concerning its sustainability and impact on the environment. While one answer is clean and sustainable energy sources such as Hydroelectric Power Plants, Solar Power Plants, Wind farms and even future NPP's, nanotechnology offers a short and long term solution to our energy problem. A reduction of energy consumption can be reached by better insulation systems that are created from molecules specifically meant to insulate. In addition the use of lighter and stronger materials in the transportation sector would guarantee less power consumption. Another short-terms solution of nanotechnology would be nanotech-filters applied to exhaust systems and engines that would reduce the amount of CO_2 in the air. Another area of application would be the actual energy supply itself. Today, we have solar power panels that transform about 10-15% of the sunlight. With nanotechnology the efficiency could not only increase the efficiency but also the amount of photovoltaic cells per meter. Lastly nanotechnology is able to increase the energy efficiency of batteries in terms of storing and recharging.



Future Products

Even though we are already blessed by the advances of nanotechnology, the potential this technology holds for future applications is simply mind-blowing. As mentioned before the use of nanotech robots in our body to rapidly combat any diseases or the creation of artificial foods is just the beginning. If nanotechnology is applied to the agricultural sector as an example, we would not need chemicals to combat parasites but instead have nano-robots that quickly eliminate any threat to the crops. In terms of robotics, nanotechnology could be used to disarm bombs, providing the robot or human with a protective layer far superior to Kevlar; spacecraft as big as a fly, which explore the universe at incredible speeds. Molecular assembly lines that build devices atom by atom, allowing us to create ANYTHING. Ultimately nanotechnology could be used to change the climates of other planets to one that would allow life to exist. Even though a "habitat changer" is very, very far-fetched, we have to realize that we are not using nature given materials anymore but building them from scratch according to our own wishes and needs. With that said, we can clearly see that nanotechnology has a very bright future ahead but with everything that is new and u new responsibilities and regulations.

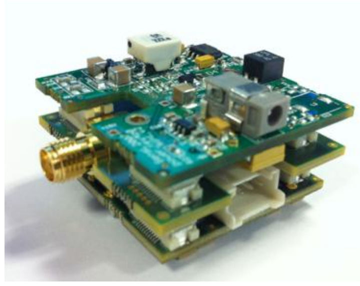
Ethical and Philosophical Considerations of Nanotechnology

Nanotechnology will clearly be the shaper of our future for many generations and undoubtedly bring many good things to mankind. However there will be arguments against the use of nanotechnology for various reasons, one of them being the voice that warns about abuse and the potential destruction and another that tries to preserve a belief system. At the beginning of this paper, I mentioned that philosophers would contemplate and debate how many angels could dance on the head of a pin. The purpose of this simple statement or exercise was to bring a notion of science (reason) to the idea of religion with the angels as a medium. Pragmatic knowledge was not important these days; important was that one believed in the angels. A very similar situation is now apparent in the field and studies of nanotechnology. Scholarly literature buried within journals with mind-numbing titles are only the beginning of what will be written about nanotechnology. But we already see attempts by the popular press to make nanotechnology "understandable" to the daily newspaper and blog readers, by methods of "dumbing it down" enough so that the average person will understand it. This however is simply impossible, if not even ridiculous to attempt.

I remember pre-school teachers telling me not to kick around the helpless snails or put bugs in a pot filled with water: telling me that it is not for us to decide over creation and destruction, telling me not to play god. With the very responsive and up-to-date internet, many webpages already promote the field of nanotechnology and the benefits it can bring to mankind. However, certain fundamentalists have already started posting messages on the forums or chat

rooms located on these pages, accusing the owner, participants, technicians and students of trying to learn the handiwork of "playing God," "being in league with the devil," and "tampering with the greatest creator in the UniverseNo matter how harmless these implications may sound, they show a trend that is in my opinion very serious and make me think about future conflict. What these fundamentalist are doing is slipping into the ancient arguments of Science versus Religion, ergo: faith versus knowledge. I hope that that these fundamentalists leave their opinions on the Internet, for nanotechnology is the perfect vehicle to attack but also the cornerstone to our future. Yes, nanotechnology IS complex, hard to understand, totally conceptual and its use of it is highly dependent on the decisions we make now. Most importantly, and reason as well as ground for debate, is that nanotech digs to the very heart of the universe, the creation of matter. Opportunely, the few people speaking out for more advanced uses of nanotechnology are still being dismissed as "dreamers" or "nerds" and therefore fundamentalist criticism will hopefully not become more focused or open. This will change however, when much of the research is being funded by government agencies. With government involvement the issue of nanotechnology will become a very present matter and will be in for very rough ride on the road to acceptance. On the positive side however, I believe that we have mastered similar situations in the past, always thinking about things we can’t create but always driven to find a way to do so. That is what science is all about and thus the science of nanotechnology.

Uday Lal Shaw
ECE 3RD year

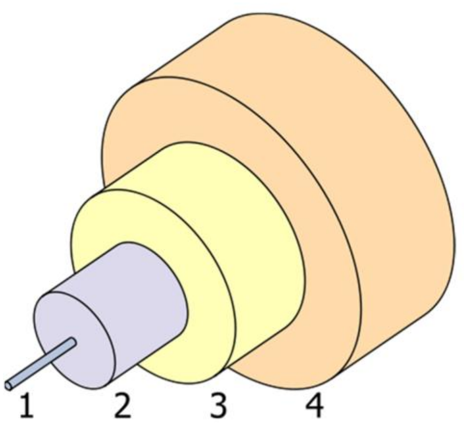


TRANSEIMPEDANCE AMPLIFIER RECEIVER USED IN OPTICAL COMMUNICATION SYSTEM

From editor

What is optical fiber?

An **optical fiber (or optical fiber)** is a flexible, transparent fiber made of a pure glass (silica) not much wider than a human hair. It functions as a waveguide, or "light pipe", to transmit light between the two ends of the fiber.[1] The field of applied science and engineering concerned with the design and application of optical fibers is known as **fiber optics**. Optical fibers are widely used in fiber-optic communications, which permits transmission over longer distances and at higher bandwidths (data rates) than other forms of communication. Fibers are used instead of metal wires because signals travel along them with less loss and are also immune to electromagnetic interference. Fibers are also used for illumination, and are wrapped in bundles so they can be used to carry images, thus allowing viewing in tight spaces. Specially designed fibers are used for a variety of other applications, including sensors and fiber lasers.



The structure of a typical single-mode fiber.

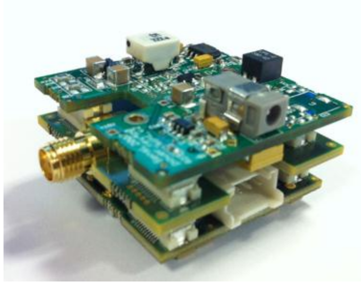
1. Core: 8 µm diameter
2. Cladding: 125 µm dia.
3. Buffer: 250 µm dia.
4. Jacket: 400 µm dia

Optical fibers typically include a transparent core surrounded by a transparent cladding material with a lower index of refraction. Light is kept in the core by total internal reflection. This causes the fiber to act as a waveguide. Fibers that support many propagation paths or transverse modes are called multi-mode fibers (MMF), while those that only support a single mode are called single-mode fibers (SMF). Multi-mode fibers generally have a larger core diameter, and are used for short-distance communication links and for applications where high power must be transmitted. Single-mode fibers are used for most communication links longer than 1,050 meters (3,440 ft).

Optical fiber communications are two types, wired and wireless. Especially we are focused on wireless optical communication system. In wireless system the receiver signal strength is very low. So, this type of signal required amplification. TIA must be sensitive enough to detect the weakest wideband signal (when receiver is far from transmitter). In other words, noise of TIA must be so low that the signal with a weak power can be amplified. This suitable amplifier is TIA and LA .But we are discuss only about TIA (Transimpedance Amplifier), it converts the low input receiving current signal to satisfied high output voltage signal or information. The receiver sensitivity is a strong function of the noise and the bandwidth of TIA. In addition to the wide bandwidth, the transimpedance amplifier requires high transimpedance gain in conjunction with low input referred noise for reliable operation at low photodiode input currents.

Introduction and Motivation

Today's broadband networks support ever-increasing data rates in order to cope with the global demand for bandwidth. Although modern network back-bones can usually service this traffic, bottlenecks occur at the nodes



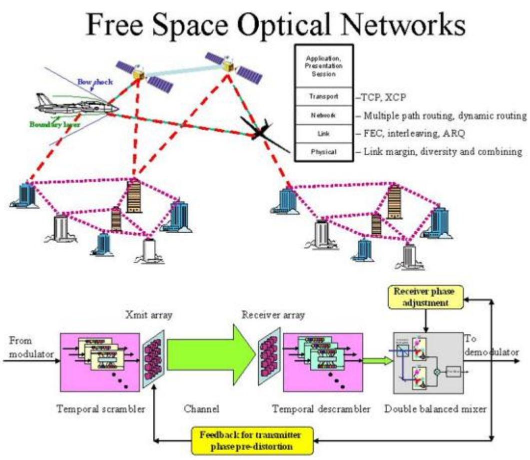
where end users access these bandwidth resources. Thus, it is clear that the need for high-speed 'last mile' connectivity is rapidly becoming an important consideration in the implementation of telecommunication infrastructures.

Even though fiber-optic systems form the backbone of our telecommunication networks, optical communication circuits have been slow to follow the integration trend. High speed data cannot travel through copper (Cu) or over radio waves at fiber optic speeds ; besides, for wideband communications, signal-to noise ratio (SNR) on copper (Cu) medium is insufficient, especially for large distances. Moreover, as speed increases the attenuation over Cu traces sharply increases, which causes signal loss and intersymbol interference (ISI). Fiber optical links can provide low attenuation at high speed and wideband communications for long-haul and short-haul systems without the electro-magnetic interference from which coaxial and twisted pair cables suffer.

Optical interconnections designed for low power consumption at high bit rates, offer an excellent means of overcoming data rate limitations imposed by conventional wiring between chips . Although networks of fiber-optic links have become a main stream for long-haul high speed communications, recent advances in laser diode output power combined with the global deployment of communications satellites and the need for more efficient communications have made free-space optics (or fiberless optics) very attractive.

Free-space optic links help fiber optic links in high traffic of data in short distance interconnections (<100m) such as cabinet level (1–100m), backplane level between boards (10cm–1m), chip to chip on a board (<10cm) and on-chip (<2cm) communications.

Demonstrations of high-bandwidth, long-range systems under realistic operating conditions further validate free-space optical communications, showing that it can provide high bandwidth, and secure inexpensive communications for a variety of applications. Using infrared beams, free-space optical interconnections find applications in laptop computers, cellular phones, digital cameras, computer peripherals, personal digital assistants (PDAs), and many other consumer electronics equipment.



An optical receiver consists of photodetector, an amplifier, and signal-processing circuitry. It has a work of first converting the optical energy emerging from the end of a fiber into an electric signal, and then amplifying this signal to a large enough level so that it can be processed by the electronics following the receiver amplifier. One of the special amplifier which can convert the optical current to the satisfied voltage level with a high gain and wide bandwidth is generally called **transimpedance amplifier**.

Presence of Noise

In this processes, various noise and distortions will unavoidably be introduced, which can lead to errors in the interpretation of the received signal. As we know that the current generated by the photo detector is generally very weak and is adversely affected by the random noises associated with the photo detection processes. When this electric signal output from the photodiode is amplified, additional noises arising from the amplifier electronics will further corrupt the signal. Noise considerations are thus important in the design of optical receivers.

Photodiode svmbol

In a photodiode receiver, the thermal noise is the most dominant noise, whereas in the avalanche Photodiode receiver, excess noise due to multiplication process and thermal noise are most prominent. The magnitude of the signal-to-noise ratio in a communications systems is an important factor in how well a receiver can recover the information-carrying signal from its corrupted version and hence how reliably

information can be communicated. Generally speaking, for a given value of *S*/*N* the performance depends on how the information quantities are encoded into the signal parameters and on the method of recovering them from the received signal.

The purpose of a digital receiver is to sample the incoming pulses at a rate equal to the bit of transmission and at each of the samples to decide whether it corresponds to a one or a zero. This decision is usually performed by setting a threshold level, and any signal above as the set threshold is taken as one and below, as zero.
If there is insufficient optical power in the received optical pulses, if there has been a large dispersion, or if or too much noise is added by the detector, then there could be errors in the retrieved information or in the reformed pulse streams. It is desirable to keep the error rates below 10^{-9} or 10^{-12} at every generator or receiver in any practical communication system.

Two fundamental noise mechanism, shot noise and thermal noise, lead to fluctuations in the current event when the incident optical signal has a constant power. The relation

$$I_p = RP_{in}$$

still holds if we interpret I_p as the average current. However, electrical noise induced by current fluctuations affects the receiver performance. The objective of this section is to review the noise mechanism and then discuss the signal-to-noise ratio (SNR) in optical receivers. The p-i-n and APD receivers are considered in separate sub sections, as the SNR is also affected by the avalanche gain mechanism in APDs.

p-i-n receivers

The majority of the noise sources mentioned here is from main type of optical detector is Avalanche photodiode. APDs are high sensitivity, high speed semi-conductor “light” sensors Compared to regular PIN construction photodiodes, APDs, have an internal region where electron multiplication occurs, by application of an reverse voltage, and the resultant “gain” in the output signal means low light levels can be measured at high speed.

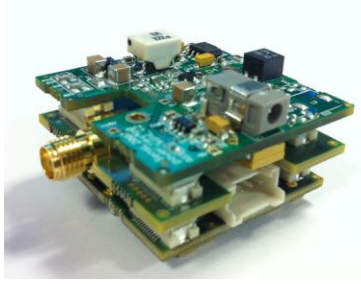
APD receivers

Further demand for fiber and free-space optical communications and generation of high speed networks, such as gigabit Ethernet, has led to the need for more flexible, low-cost and high performance circuits. Although using GaAs or Si-bipolar technologies for very high bandwidth designs is dominant, cost-effective optical link consumer products require low-power dissipation and small silicon area CMOS receivers. High performance wideband circuits can be designed on baseline CMOS processes with heterojunction-bipolar-transistors (HBTs).We can design it based on spice simulation process.

CMOS technologies have already been used for the standard receivers, especially for portable systems and consumer devices because of their low-cost, small size, low-power and highly integrated analog and digital circuits, still though, further designs are needed for less power consumption and area occupancy.

Receiver Sensitivity

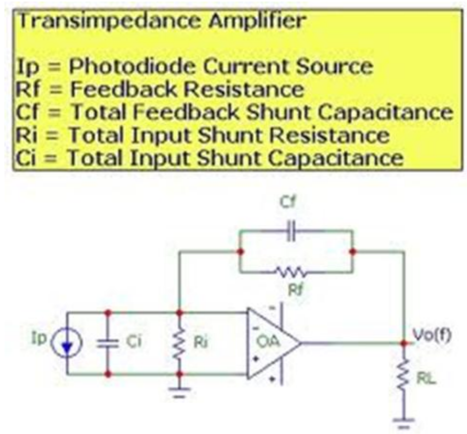
The minimum acceptable value of received power needed to achieve an acceptable BER or performance. It takes into account power penalties caused by use of a transmitter with worst-case values of extinction ratio, jitter, pulse rise times and fall times, optical return loss, receiver connector degradations, and measurement tolerances. The receiver sensitivity does not include power penalties associated with dispersion, or backreflections from the optical path; these effects are specified separately in the allocation of maximum optical path penalty. Sensitivity usually takes into account worst-case operating and end-of-life (EOL) conditions.



Among a group of optical receivers, is said to be more sensitive if it achieves the same performance with less optical power incident on it. The performance criterion for digital receivers is governed by the *bit-error rate* (BER), defined as the probability of incorrect identification of a bit by the decision circuit of the receiver. Hence, a BER of $2x10^{-6}$ corresponds to on average 2 errors per million bits. A commonly used criterion for optical digital receivers requires the BER to be $1x10^{-9}$. The receiver sensitivity is then defined as the minimum average received power P_{rec} required by the receiver to operate at a BER of 10^{-9} . Since P_{rec} depends on the BER.

Theory of TIA

In this chapter we deal with the design and performance of optical receiver. The receiver comprises the photo detector, a bias circuit, a pre-amplifier and filtering. This is depicted in the equivalent circuit representation of Figure 3.1.With suitable interpretation of the detector equivalent circuit elements and equivalent noise generators this representation holds for PIN diode, APD and photoconductor-based receiver.



The design of the optical receiver front-end is of critical importance since, as in all communication systems, it is at this point that the received signal is weakest and must be amplified with the introduction of minimum noise. Optic-al receiver determines performance of total system because it is the lowest signal point. Optical system designer must pay special attention when developing receiver part. It is here that the system SNR is determined which is a digital system will determine the minimum received signal power to achieve a given bit error rate (BER).

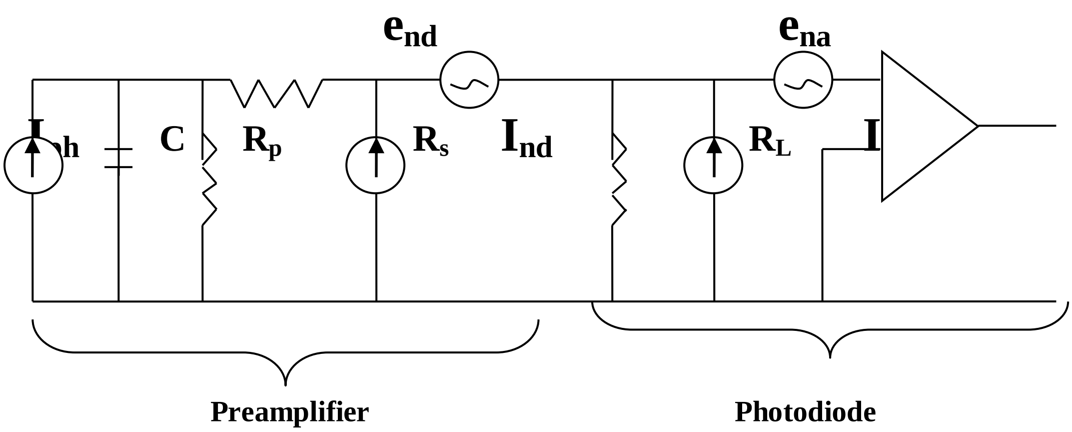


Figure: Equivalent circuit representation of an optical receiver front-end.

Preamplifier

The preamplifier characteristic depends on the circuit design and the transistor type. At present the choice of transistor tends to be between the silicon junction FET(JFET), the silicon bipolar transistor and the GaAs FET. Which is the most appropriate depends on the noise and frequency perform-ance required. Table contains a summary of the relevant attributes of these devices and gives a guide to their regimes of application. More exotic forms of device such as the GaAs heterojunction bipolar transistor (HJBT) and the GaAs high electron mobility transistor (HEMT) are now becoming available with attractive attributes, particularly for high speed ultralow noise receivers

Table : Attributes of transistor for use in optical receiver front-ends

	Input voltage noise	*Input current noise*	*1/f noise*	C_{in}	*Frequency response*
Si JFET	High	Very low	Low	Fair	Fair
Si bipolar	Low	High	Low	Fair	Can be very high
GaAs FET	Fair	Very low	High	Very low	Very high

Once a photo-current has been extracted by the detector structure, it has to be amplified for further processing. In order to amplify the equivalent drift current response, the receiver has to output the difference between the immediate and deferred current responses. This implies the need for two identical transimpedance-type preamplifier structures that feed into a high-speed difference amplifier, subtracting the immediate from the deferred current responses. As input signal strengths may vary considerably, a postamplifier that incorporates a limiting function for automatic gain control was included in the design.

Current to Voltage Converter Circuit

The current from the PIN detector is usually converted to a voltage before the signal is amplified. The current to voltage converter is perhaps the most important section of any optical receiver circuit.
An improperly designed circuit will often suffer from excessive noise associated with ambient light focused onto the detector. Many published magazine circuits and even many commercially made optical communications systems fall short of achievable goals from poorly designed front-end circuits. Many of these circuits are greatly influenced by ambient light and therefore suffer from poor sensitivity and shorter operating ranges when used in bright light conditions. To get the most from your optical through-the-air system you need to use the right front-end circuit.

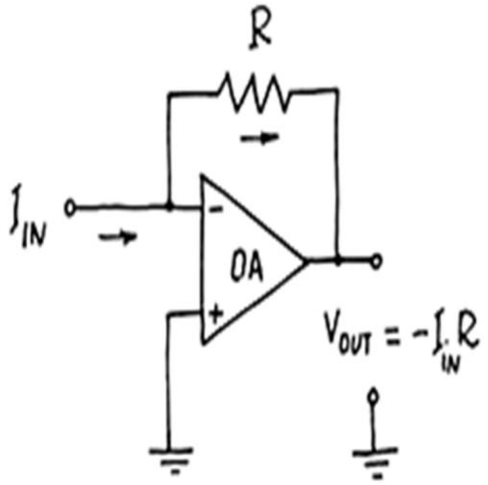


Figure : Op-amp current-to-voltage converter

High Impedance Detector Circuit

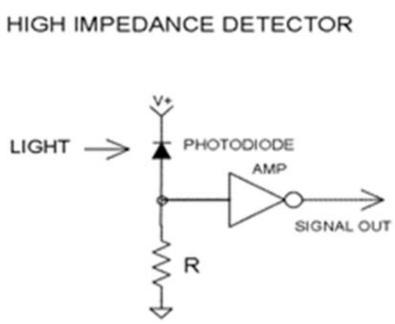
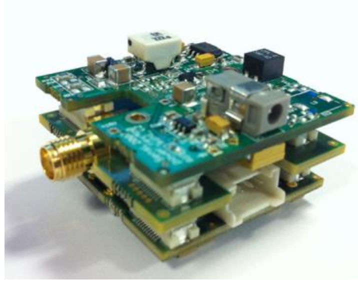


Figure: To convert the leakage current into a voltage

One method that is often shown in many published circuits, to convert the leakage current into a voltage. This simple "high impedance" technique uses a resistor to develop a voltage proportional to the light detector current.

However, the circuit suffers from several weaknesses. If the resistance of the high impedance circuit is too high, the leakage current, caused by ambient light, could saturate the PIN diode, preventing the modulated signal from ever being detected. Saturation occurs when the voltage drop across the resistor, from the photo diode leakage current, approaches the voltage used

to bias the PIN device. To prevent saturation, the PIN must maintain a bias voltage of at least a few volts.



Consider the following example. Under certain bright background conditions a PIN photodiode leakage current of a few milliamps may be possible. If a 12v bias voltage were used, the detector resistance would have to be less than 10,000 ohms to avoid saturation. With a 10K resistor, the conversion would then be about 10 millivolts for each microamp of PIN leakage current. But, to extract the weak signal of interest that may be a million times weaker than the ambient light level, the resistance should to be as high as possible to get the best current to voltage conversion. These two needs conflict with each other in the high impedance technique and will always yield a less than desirable compromise.

In addition to a low current to voltage conversion, there is also a frequency response penalty paid when using a simple high impedance detector circuit. The capacitance of the PIN diode and the circuit wiring capacitance all tend to act as frequency filters and will cause the circuit to have a lower impedance when used with the high frequencies associated with light pulses. Furthermore, the high impedance technique also does not discriminate between low or high frequency light signals. Flickering streetlights, lightning flashes or even reflections off distant car windshields could be picked up along with the weak signal of interest. The high impedance circuit is therefore not recommended for long-range optical communications.

Transimpedance Amplifier

A current-to-voltage converter (or transimpedance amplifier) is an electrical device that takes an electric current as an input signal and produces a corresponding voltage as an output signal. Three kinds of devices are used in electronics: generators (having only outputs), converters (having inputs and outputs) and loads (having only inputs). Most frequently, electronic devices use voltage as input/output quantity, as it generally requires less power consumption than using current.

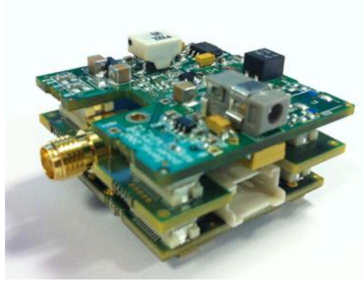
In some cases, there is a need for converters having current as the input and voltage as the output. A typical situation is the measuring of a current using instrument having voltage inputs. A **current-to-voltage converter** is a circuit that performs current to voltage transformation. In electronic circuitry operating at signal voltages, it usually changes the electric attribute carrying information from current to voltage. The converter acts as a linear circuit with transfer ratio $k = V_{OUT}/I_{IN}$, called the transimpedance, which has dimensions of [V/A] (also known as resistance). That is why the active version of the circuit is also referred to as a **transresistance** or **transimpedance amplifier**.

BER and Sensitivity of Transimpedance amplifier

There is several standard way of measuring the rate of error occurrence in a digital data stream. One common approach is to divide the number N_e of error occurring over a certain time interval t by the number N_t of pulses (ones and zeros) transmitted during this interval. This is called either the error rate or the bit-error rate, which is commonly known as BER. Thus we have

$$\mathbf{BER = N_e/N_t = N_e/Bt}$$

where $B=1/T_b$ is the bit rate (i.e. the pulse transmission rate). The error rate is expressed by a number, such as 10^{-9}, for example, which states that, on the average, one error occurs for every billion pulses sent. Typical error rates for optical fiber telecommunication systems range from 10^{-9} to 10^{-12}. This error rate depends on the signal-to noise ratio at the receiver (the ratio of signal power to noise power). The system error rate requirements and the receiver noise levels thus set a lower limit on the optical signal power level that is required at the photodetector.



To compute the bit-error rate at the receiver, we have to know the probability distribution of the signal at the equalizer output.The signal probability distribution at this point is important because it is here that the decision is made as to whether a 0 or a 1 is sent. These are

$$\mathbf{P_1(v) = \int_{-\infty}^{v} p(y/1)dy}$$

which is the probability that the equalizer output voltage is less than *v* when a logical 1 pulse is sent, and

$$P_0(v) = \int_{v}^{\infty} p(y/0)dy\ .$$

This is the probability that the output voltage exceeds v when a logical 0 is transmitted. The different shapes of the two probability distributions that the noise power for a logical 0 is usually not the same as that for a logical 1.This occurs in optical systems because of signal distortion from transmission impairments (e.g., dispersion ,optical amplifier noise, and distortion from nonlinear effects) and from noise and ISI contributions at the receiver. The functions p(*y*/1) and p(*y*/0) are the conditional probability distribution functions, that is, p(y/*x*) is the probability that the output voltage is *y*, given that an *x* was transmitted.

If the threshold voltage is v_{th} then the error probability P_e is defined as--

$$\mathbf{P_e = aP_1(v_{th}) + bP_0(v_{th})}$$

The weighting factor *a* and *b* are determined by the priori distribution of the data. That is, *a* and *b* are the probability that either a 1 or a 0 occurs, respectively. For unbiased data with equal probability of 1 or 0 occurrences, *a* = *b* = 0.5. The problem to be solved now is to select the decision threshold at that point where P_e is minimum.

Let us assume that a signal *S* (which can be either a noise disturbance or a desired information-bearing signal) has a Gaussian probability distribution

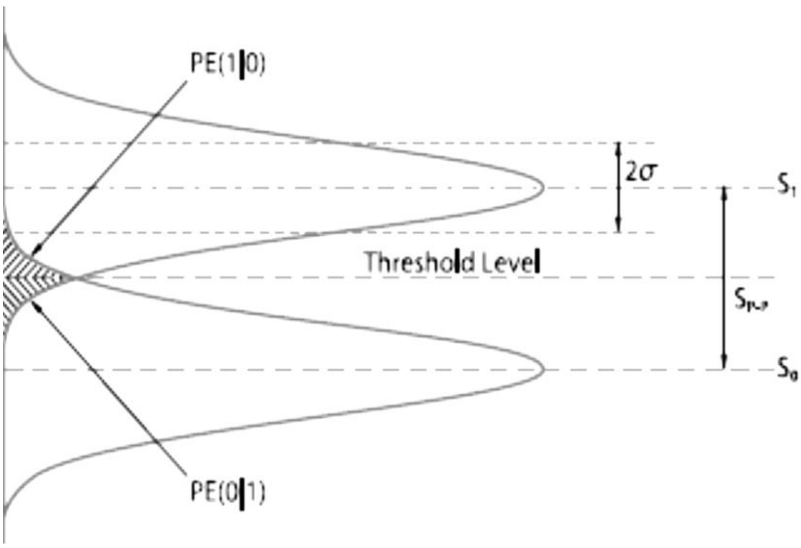
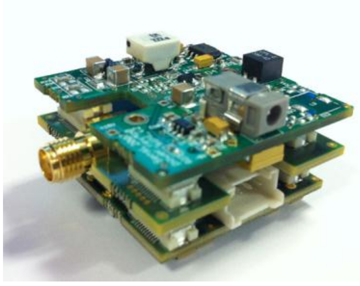


Figure: Probability Density Functions.

function with a mean value m. If we sample the signal voltage level *s(t)* falls in the range *s* to *s* + *ds* is given by

$$\mathbf{f(s)ds = \frac{1}{\sqrt{2\,\pi\sigma^{\wedge}2}}\, e^{-(s-m)2\,/\,2\sigma^{\wedge}2}\ \ ds}$$

where f(s) is the probability density function, σ^2 is the noise variance, and its square root σ is the standard deviation, which is a measure of the width of the probability distribution.



We can now use probability density function to determine the probability of error for a data stream in which the 1 pulse is all of amplitude V.

The mean and variance of the Gaussian output for a 1 pulse are b_{on} and σ^2_{on}, respectively, whereas for a 0 pulse they are b_{off} and σ^2_{off}, respectively. Let us first consider the case of a 0 pulse being sent, so that no pulse is present at noise will exceed the threshold voltage v_{th} and be mistaken for a 1 pulse. This probability of error in this case is the probability that the noise will exceed the threshold voltage v_{th} and be mistaken for a 1 pulse. This probability of error P_0 (v) is the chance that the equalizer output voltage $v(t)$ will fall somewhere between v_{th} and ∞.

$$P_0(v_{th}) = \int_{Vth}^{\infty} p(y/1)dy = \int_{Vth}^{\infty} f_0(y)dy \, .$$

Where the subscript 0 denotes the presence of a 0 bit. Similarly, we can find the probability of error that a transmitted 1 is misinterpreted as a 0 by the decoder electronics following the equalizer. This probability of error is the likelihood that the sampled signal-plus-noise pulse falls below v_{th} .

$$P_1(v_{th}) = \int_{-\infty}^{Vth} p(y/1)dy = \int_{-\infty}^{Vth} f_1(y)dy$$

Where the subscript 1 denotes the presence of a 1 bit. If we assume that the probabilities of 0 and 1 pulses are equally likely, then, using the above two equations, the bit –error rate (BER) or the error probability P_e given by

$$BER = P_e(Q) = \frac{1}{\sqrt{\pi}} \int_{Q/\sqrt{2}}^{Vth} e^{-x}\, dx = \frac{1}{2}[1 - erf(Q/\sqrt{2})] \approx \frac{1}{\sqrt{2\pi}} \frac{e^{-x2}}{Q}\, dx.$$

The approximation is obtained from the asymptotic expansion of erf(x). Here the parameter Q is defined as -

$$Q = v_{th} - b_{off} / \sigma_{off} = b_{on} - v_{th} / \sigma_{on}$$

The factor Q is widely use to specify receiver performance, since it is related to the signal-to-noise ratio required to achieve a specific bit-error rate. In particular, it takes in to account that in optical fiber systems the variances in the noise powers generally are different for received logical 0 and1 pulses.

Let us consider the special case when $\sigma_{off} = \sigma_{on} = \sigma$ and $b_{off} = 0$, so that $b_{on} = V$. Then we have that the threshold voltage v_{th}=V/2, so that Q=V/2σ. Since σ is usually called the *rms noise*, the ratio V/σ is the peak *signal-to-rms-noise ratio.*

$$P_e\,(\sigma_{on} = \sigma_{off}) = \frac{1}{2}\left[\, 1 - erf\left(\frac{V}{2\sqrt{2\sigma}}\right)\right]$$

Suggestions for Further Studies

The TIA could have a wide bandwidth while the gain is changeable.

Moreover, for a special gain the bandwidth can be varied. Thus, in a procedure of optimization the bandwidth and the gain of TIA can be adjusted in a way that power dissipation and delay are reduced. A loop can be employed to adjust the current of feedback and forward amplifiers online. Such optimization can be done for different rates and input swing voltage.

The TIA can be implemented in higher frequencies where using inductors are more affordable. Employing two peaking techniques can improve the performance such amplifier. This feature can be used in equalizers to compensate the deformation of digital data received in high speed lines. Expanding characterization and analysis in non-uniform TIA structure is necessary.

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CONTROL.......... COMPLEXITY........ ACTION ....

The word 'control' is indispensable for driving life, society or technology for progression. A system has to have a controlling block so that the desired outcome can be achieved in any given situation. But when this term "Control" creeps in to mind, it comes all along with its complex mathematics, derivations and hazardous calculations!! But that is really not all about Control. It is that form of engineering that has got real time interface with practical systems ranging from industries to micro-machines.

ICSs (Industrial control systems) are typically used in industries such as electrical, water, oil, gas and data. Based on information received from remote stations, automated or operator-driven supervisory commands can be pushed to remote station control devices, which are often referred to as field devices. Field devices control local operations such as opening and closing valves and breakers, collecting data from sensor systems, and monitoring the local environment for alarm conditions. Along with that, control systems have got application range starting from autopilots, road simulators, and hydraulic load simulators to ac machines.

There are different forms of control techniques viz. Robust, Optimal, Intelligent, Adaptive, Stochastic control to handle different requirements of the system. But all of them finally come to the very common and well known terminologies like stability, performance, feedback and error correction. The controllers are finally obtained by managing some pole placement and verification of the plant's performance with respect to its steady state error, setting time or some frequency domain criterions. So finally it is mostly about our semester syllabus which practically accounts.

Robust control is often on used in industries where the uncertainty remains a protagonist factor!! That is, robust control refers to the control of plants with uncertainties and disturbances. The goal of robust control is to design a controller which helps the system to meet its prior performance objectives despite of the uncertainties present in the environment and hence to offer flexibility to the design space. Optimal control has got beautiful applications in the purpose of optimizing any particular task like optimizing the cost function or minimizing the path traversed. Certain trade off has to be made for obtaining a particular optimized result. Adaptive control is the control method used by a controller which must adapt to a controlled system with parameters which vary, or are initially uncertain. For example, as an aircraft flies, its mass will slowly decrease as a result of fuel consumption; a control law is needed that adapts itself to such changing conditions. Adaptive control is different from robust control in that it does not need *a priori* information about the bounds on these uncertain or time-varying parameters; robust control guarantees that if the changes are within given bounds the control law need not be changed, while adaptive control is concerned with control law changes themselves. There are a lot many other control strategies that can be spoken of later on. Finally the design of controller can be achieved through lead lag compensation or P-PI-PD-PID controllers and the deadly manipulations start for stability and performance analysis. But finally, control remains not only an engineering technique in theoretical approach; it is a real time interface that enables handing capacity for various systems with different requirements. So control is not all about complexities…….. it is about conquering the complexities and moving towards a desired outcome!!

CHANDRIMA ROY
ASST. PROFESSOR

Longing for a Night

I was waiting for the moonlight, but the sun refused to set,
I was waiting on the seashore, for the waves that never met.
Those who passed by, they asked the same thing
That what I was to gain?
This hope that my wait would end
Was all that kept me sane.

I had waited all my life for one perfect moonlit night
With us walking on the seashore,
As we watch the waves hit by.
Out of some crazy thought, I'm still waiting
Though I should not
I should have left many days ago
And I wouldn't need this night.
But loving you is something girl,
I can't stop with all my might.

Deeptarka Das
ECE 3RD year

STORYTELLER

AUTOPSY

The light over the autopsy table was still flickering. The caretaker in spite of being reminded ten times during the day had left it unattended. The body to be examined was already in place over the table. Shirish looked at his watch impatiently. He had a reputation of attending to his work religiously and efficiently. In his two years in this small town medical college, Shirish has come across a varied range of cases. Most twitchy cases were profusely handed over to him.

Shirish felt himself to be more of a doctor of the dead…he had no complaints. He had quite a passion for this work.

Hearing footsteps approaching, Shirish turned around. The caretaker was hurrying forward with a big, goofy smile on his face.

"Ekhuni kore dichchi sir…sorry sir ektu deri hye gelo…ei dichi ekhuni" He said and rushed inside the room.

While putting in the new light over the table, the caretaker looked at the face of the body and wondered why all the female bodies came to this particular doctor.

Shirish put out his cigarette as he saw the caretaker emerge out of the room. It was already late.

Within moments Shirish had all his instruments and chemicals at the reach of his hand, and he put on his gloves slowly going over in his mind details of this particular case.

Sex: Female, Age: 25, Probable cause of death: hit and run, died on spot due to excessive bleeding and damage to the skull…

And then his eyes fell on the face, on her face…

Shirish had been unfamiliar his whole life with the feeling he was going through at the moment…emptiness engulfed his mind instantly. He couldn't feel his scalpel slipping out of his fingers as he pressed both his hands against the table to stop himself from collapsing. The world in front of his eyes was fading but his gaze was fixed at the face. A face he had been longing to see every moment for the past four years but not like this…

Her datasheet lay nearby. He had not checked her name in it before; he never did it with his cases. Only if he had this time…

Name: Nisha Ray

Sex: Female Age: 25

Probable cause of death: hit and run, died on spot due to excessive bleeding and damage to the skull.

He took his gloves off, ran through his pocket for the box of cigarette. His hands continued trembling as he took one out of the box and lighted it. His gaze was fixed at her face. He took a puff inviting into his brain the smoke along with memories he had kept shut away till then…

Shirish felt like experiencing the greatest hallucination of his life. . .flashes of a smiling face came up suddenly from some buried spot in his mind. Her long, silky hair left open as she used to. The fragrance emanating from it was as soothing as he remembered it to be.

His eyes opened and she lay in front of him in the autopsy table, pale and whitened, as quiet as he had never seen her in his life.

Another puff of smoke entered his lungs, and Shirish was again reliving his past.

She was walking alongside him, holding his hand. He said something that made her laugh. They both started laughing and then she looked at him and he was lost in her eyes.

Shirish went up to the table. Her eyes were shut never to open again.

He touched her face. Dead skin.

They were in bed together, wrapped in the same bed sheet. It was raining outside but couldn't match the turbulence of ecstasy within their bodies. He had touched her face in the same way. Softness that defined softness.

The cigarette butt slipped from his hand. He bent down to pick up the scalpel. He closed his eyes once and opened them immediately. Dr. Shirish had work to do. . .

[To be contd…]

Deeptarka Das
ECE 3RD year

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The entries of the next edition of "ece – DIARY" are to be sent by 5th March, 2012 at

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