PDHonline Course G450 (2 PDH)

Recent Advances in Technology

2020

PDH Online | PDH Center

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Course Outline

Let us take a walk through the future. Included in this course is an overview of what the future holds. You will become familiar with the latest and greatest inventions that will change the path forward for everyone around the globe. Many of these inventions are already on the market and are applicable to your professions. Some of these inventions will help you spark ideas for design and innovation. And some are artifacts of the future—not yet on the market, but will soon enter mass production. As a licensed professional, you will benefit from learning about them early on.

The inventions included here are compiled through the personal knowledge of several contributors as well as through various news sources. If you know of any additional inventions relevant to our construction industry, please send them to us through email (PDHonline at cox.net) or through the "Contact Us" portal on our website. Your contributions will be credited in the next edition if they are included.

At the end of this course, there will be a multiple-choice quiz designed to test your understanding of the material presented. This quiz will be open note, but as long as you read carefully and process the information, you should do well.

Learning Objectives

Through this course, you will become familiar with recent inventions that can be incorporated into your work and lifestyle. These inventions will serve to increase your productivity, create new business, simplify your tasks, and have data always at your grasp whenever you need.

Intended Audience

This course is designed for engineers, architects and land surveyors, or anyone who wishes to be up to date on all the latest gadgets to improve their productivity, expand their business, and to seek inspiration for new designs and products.

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ACE Group, LLC

Introduction

The latest inventions are the talk of the block, the muse to the fuse, and the reason for this course. It's always important to know what goes on in the world around you. Knowing the latest and greatest will not only help you in the workplace, but also serve as inspiration in your life. These inventions serve as a good marker as to where the world is going and where it has already gone. This knowledge will enable you to keep in touch with the times and increase your safety and productivity at work.

Seeing Is Believing

1. Google Glass

Perhaps the most talked about invention of the year, Google Glass is a way to keep an eye on your smart device without taking said device out. The small screen in the corner of your vision keeps you updated, allowing you to view messages, emails, take pictures, etc. This enables you to keep up with the heavy demand of work, while being hands free, and enabling you to continue working on site. From business standpoint, you could even Hangout with your boss to show them the site or from wherever you happen to be. Google Glass will have its own app store that will even further expand its capabilities.

Image from:
http://assets.sbnation.com/assets/2215649/GoogleGlass_15.jpg

2. 3D glasses

Though variations on 3D glasses have been around for a long time, older 3D glasses eliminated nearly 50% of all incoming light, which made it difficult to see. Oakley and DreamWorks have created a new 3D glass that will enable you to see more clearly and with more light. Samsung is also creating a new line of prescription glasses which will enable you to actually see with the 3D glasses.
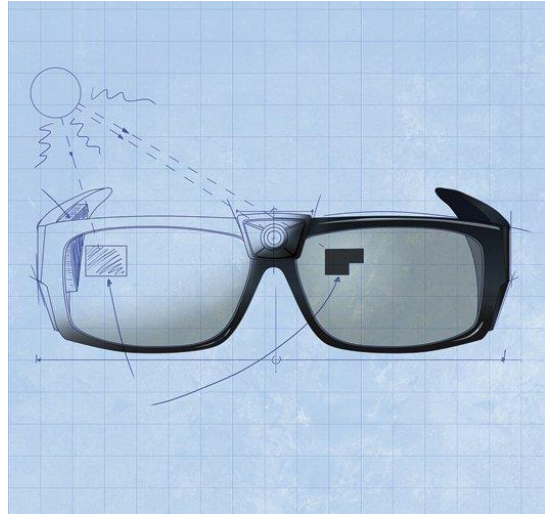
3. Looxie

The precursor to Google Glass is Looxie, a small hands-free device that clips onto your ear and can record up to five hours of audio and video. Though this does not have the same functionalities as Google Glass (but it can still connect to your smartphone and upload video from there), it also does not come with the same price-tag. With this device, you can easily capture interesting happenings on the job without getting in the way of what you're doing and potentially endangering your safety. This can also be used to take a short clip of a scene to take back to coworkers to analyze. You can even take it one step further and live stream your work to your coworkers for them to help keep an eye out for you.

Image from: http://www.looxcie.com/wp-content/themes/looxcie/images/media/Looxcie_1_light.jpg

4. Dynamic Eye

When you're driving along the road, the worst types of weather are super sunny and super stormy. The glare from the sun can cause drivers to slow down and drive more cautiously and can also cause accidents as blind spots (due to the sun) develop. When you take your hand off the wheel to cover your eyes, you also endanger yourself and others on the roads. The Dynamic Eye literally blocks the sun spots for you so that you can focus on the task at hand. Unlike ordinary sunglasses that dim the light across your entire field of vision, the Dynamic Eye only covers the brightest points. This is done by using a low-energy sensor and a LCD. The sensor detects the intensity in the scene and instructs the cells on the LCD to change to black to block the sun. This is useful for any situation, whether walking down the road, driving, operating machinery, or going from a dark room to somewhere bright. The glare-eliminating feature helps to protect your eyes and allow your eyes to adjust faster. This can be crucial when dealing with heavy machinery in bright light (you want to block out glare so you can see the machines better).

Our Planet

5. Recycling Shower

Does your morning shower routine seem to conflict with your energy and water conservation policies around the home? Showers not only use the most water out of any daily household activity, but also take a lot of energy to heat said water. The Recycling Shower combats this by reusing the water from your shower— after filtering out the debris you were scrubbing away and also the shampoo. This method conserves 70% of the water and also the majority of the heat still in the water that would otherwise be going down the drain. The treatment process utilizes pasteurization (as traditional methods are too slow for a shower). Pasteurization is traditionally used for milk and involves heating the liquid to a high temperature to kill off any additional bacteria. Then, the Recycling Shower uses centrifugal motion to spin away any debris. This way, the water can be reused. Even factoring in the amount of energy used to run the pasteurization process and the centrifuge, it still saves nearly 40% of energy. Your morning showers can reflect the same environmentally friendly policies that you use in designing without sacrificing water pressure. The next time you design a building, consider including this shower in place of the traditional showers to conserve water.
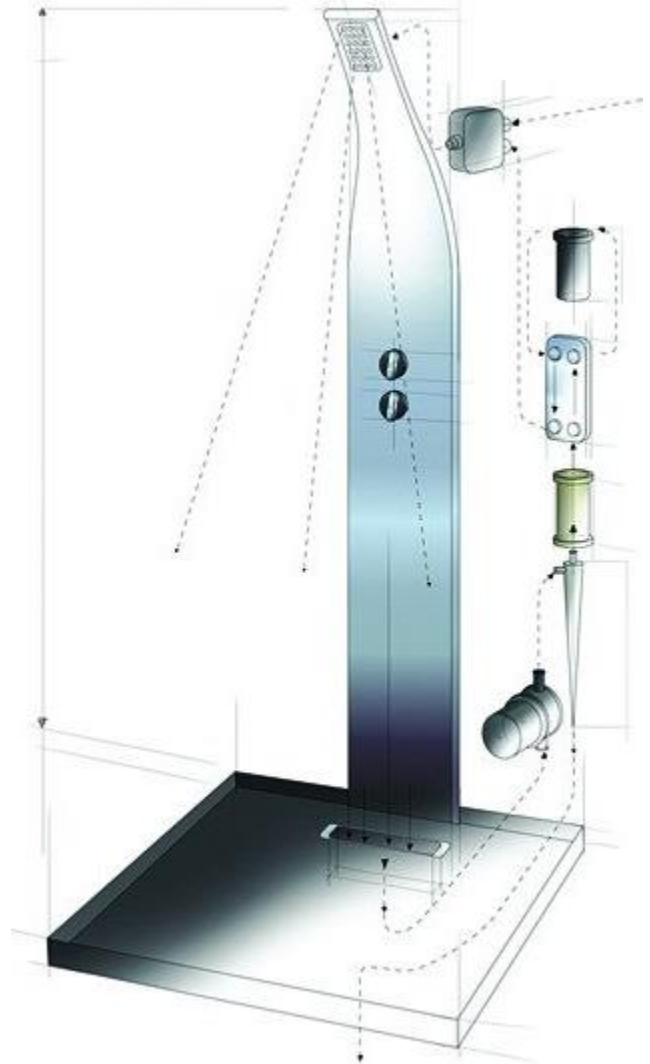
Image from:
http://www.popsci.com/files/imagecache/article_image_large/articles/shower.jpg

6. Power Flower

It's always difficult to understand numbers without having a comparison. When those numbers get larger, it becomes even more difficult. The Power Flower takes the guesswork out of this and lets you know how much energy you are consuming in the household. This metallic flower opens its petals when you are using relatively little energy and closes up when you are using more energy.

Image from:
http://img.timeinc.net/time/2006/techguide/bestinventions/cuts/fanlight.jpg

7. Power-Aware Cord

Out of sight, out of mind is exactly the mentality this product tries to reverse by keeping the amount of energy you use always in sight through varying intensities of lights that correspond to how much electricity is being used. This way, consumers can fully understand and appreciate how much electricity is being used even when a device is turned off and still plugged in.

Image from:
http://img.timeinc.net/time/photoessays/2010/best_inventions/bi_poweraw arecord_1122.jpg

8. Plastiki

To call public attention to the mass consumption of plastic materials in the developed world, a British man, David de Rothschild, created a ship made completely of plastic bottles and organic materials. This shows the ability to create meaningful structures out of what citizens discard at an alarmingly high rate each day. Plastic may be reformed and recycled to create strong building material, or it may be used in its current form. If that's not up your alley, consider using it as decoration.

Image from:
http://adventureblog.nationalgeographic.com/files/2010/03/6a00e55031d3a388340120a956e666970b.jpeg

9. Wireless Power Transmission

The concept of wireless power transmission has been around as long as Ampere's Law in the 19th century. Nicola Tesla, a Serbian American inventor, proposed theories of wireless power transmission in the late 1800s and early 1900s. One of his more spectacular displays involved remotely powering lights in the ground at his Colorado Springs experiment station. In the 1980s, Canada's Communications Research Centre created a small airplane that could run off power beamed from the Earth. In recent years, the idea has been expanded to charge trains through magnets on the rails.

Wireless power transmission has already entered our everyday life. For example, most electronic toothbrushes recharge through inductive coupling. The same method could be used to charge cell phones and other electronic devices. Wireless power transmission has much potential in the world of engineering, communication, and construction.

Building and Transportation

10. Le Project Triangle and the Chicago Spire

As the first skyscraper to be built in the heart of Paris in over 30 years, the Le Project Triangle is designed to eliminate shadows on the surrounding roads. The same company that designed the bird's nest in Beijing ran models to find the optimum shape of a skyscraper that would not cast a shadow and would be able to take advantage of both solar and wind energy to provide power to the residents and offices inside the building. Le Project Triangle has not yet finished construction and is said to be on track to be completed in 2017.

The Chicago Spire was first proposed in 2007 on the banks of the Chicago River. This building also utilizes a unique form to serve functionality. The exterior of the building is to be shaped in a spiral form to better allow the wind to funnel up the side of the building thus preventing the sway that skyscrapers often experience. Though the building has not been built due to the economic recession that struck in 2008, the concept is sound.

The strikingly different designs of these buildings demonstrate the importance of thinking outside the box while designing to better combat common issues. The elimination of shadow, sway, and the utilization of solar and wind energy enable these buildings to eliminate much expense and to serve as a futuristic symbol for the cities they represent.

Images from:
http://img.timeinc.net/time/photoessays/2008/50_inventions/inv_shadowless_skyscraper.jpg

http://www.theepochtimes.com/news_images/2005-7-28-2005-7-28-chicagospire.jpg

11. Amtrak Biodiesel Train

Though you may be wondering what a biodiesel train has to do with engineering and architecture, it is important to always consider energy needs inside buildings – particularly heating in cold climates. These trains are powered by a biofuel mix made from rendered beef fat, which burns cleaner than plant fat. It could become an interesting concept to generate emergency power and heating for buildings with this new biodiesel even if you never take the train.

12. The Straddling Bus

If there's no more room to the side of you, you've got two choices, go up or go down. A Chinese company is doing just that. The concept is of a bus that is raised 7 feet above the roadway and straddles two lanes for stability. Though you may never take this bus, you may use it as inspiration. When there's no room in the conventional sense, go up.

Image from: http://www.innovcity.fr/wp-content/uploads/2010/09/une_straddling-bus_100910.jpg

13. Icopod

Icopod is a laminated paperboard structure that can be set up quickly and taken down just as fast in times of disaster. However, disaster relief is not all that it is limited to. The Icopod can also be used simply as shelter from the hot sun on a busy day at the construction site or even for a rainy lawn party.

Image from:
http://www.prefabs2009.org/casestudy/emergencyhousing/files/Icopod---2006---Sanford-Ponder---Seattle-WA.jpg

Novel Materials

14. StrawJet

Simple and useful, StrawJet mixes clay and paper pulp with straw to create straw mats that can be used as building material. This innovative way of creating the building blocks may not be what you will be using to craft your next creation, but it certainly sends a message. The best ideas may be just in front of you and they might have been ignored for hundreds of years. You can make anything out of anything else if you think hard enough.

Image from: http://radio-weblogs.com/0119080/images/beam.jpg

15. Self-Cleaning Windows

The freedom from cleaning windows is within reach. The new self-cleaning windows have a film that enables them to break down debris that lands on the windows by taking advantage of sunlight. The next time it rains, the rain will then bring away the debris and, theoretically, will not streak. These windows may be useful for your next building project as they offer the inhabitants the ability to laze around (or at least not expend extra effort attempting to clean those upper-story windows). For skyscrapers, this also eliminates the need for dangerous missions to clean the outside of the building.

Image from: http://metropolitanwalks.com/blog/wp-content/uploads/2009/09/windows.jpg

16. Zoogles

The interesting name of this device serves to catch the eye. It promises the ability to maintain fog-free glass by using a formula and sensors to detect when fog will form and counteracting it by heating the glass. Perhaps when the price comes down to an appropriate point, this device (all of the calculations are done in a small chip) will be able to be applied to building windows in the warm temperate and tropical climate to ensure clear vision for all in the building. This is a device to keep on your "watch list."

17. IMX-101

IMX-101 is a high-performance insensitive explosive developed by BAE Systems and the United States Army to replace TNT. More thermally stable than conventional explosives, the IMX-101 promises to be safer as it is less volatile. Current TNT will explode when dropped or when hit, which can lead to accidents and casualties. The stability of the IMX-101 enables it to be packaged into tighter spaces, making it more portable and less accident-prone. This material, though more expensive, may be a better investment in the long run as safety comes first. When doing building demolition or rock excavation, one should try to use IMX-101 instead of TNT.

18. X-Flex Blast Protection

Structural integrity is a key part of designing and creating a building. Though there are many ways to fortify the building, here is another. X-Flex is a type of wallpaper that is designed to increase the strength of the walls. X-Flex is so strong that the US Military is considering using it to shield their overseas bases. This wallpaper is designed to protect against blasts and natural disasters—perfect for that building you're working on.

Image from: http://www.coolthings.com/wp-content/uploads/2009/11/bombproofwallpaper1.jpg

19. Spray-on Fabric

A spray called Fabrican has been in development for a decade. The liquid consists of short fibers mixed with a solvent and a binder. It can be sprayed directly onto the skin and molds to your body specifically. Marketed initially for the fashion world, the spray-on fabric has many potential applications for engineering and architecture. In case of an emergency or wound, this tight-fitting fabric could hold in place until help arrives.

Image from: http://www.wired.com/gadgetlab/wp-content/gallery/spray-on-fabric/fabrican3.jpg

20. TX Active

If only there were a way to install massive amounts of filters in the city. That would serve to clean out the air and to keep it clean. Now there is a way. First introduced in 2008, TX Active mixes ordinary cement with titanium dioxide to break smog down. This new cement can be used for building sidewalks and even buildings thus creating infrastructure that will help to keep the city clean.
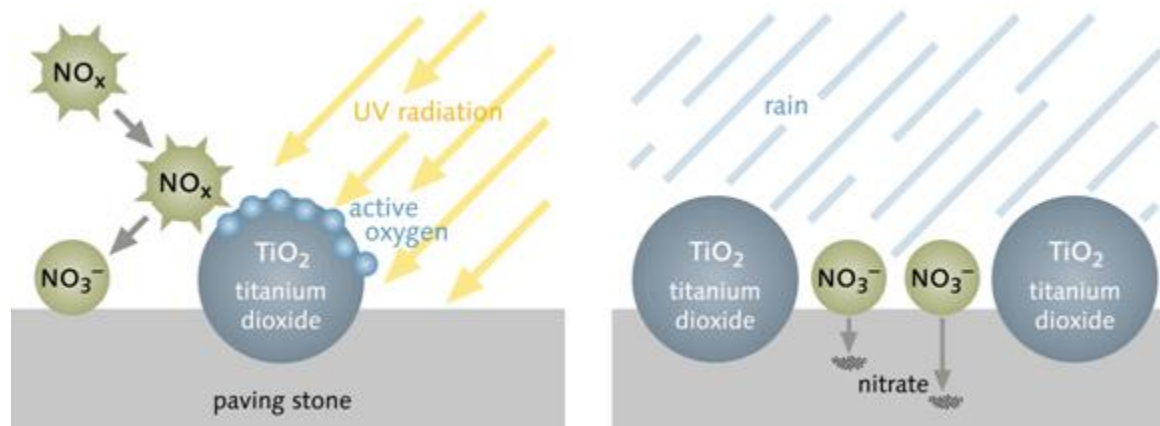
Image from: http://www.heidelbergcement.com/NR/rdonlyres/F12AB2D7-CE34-4EFE-A340-A4A6E5D9A144/0/TioCem_Grafik_en.jpg
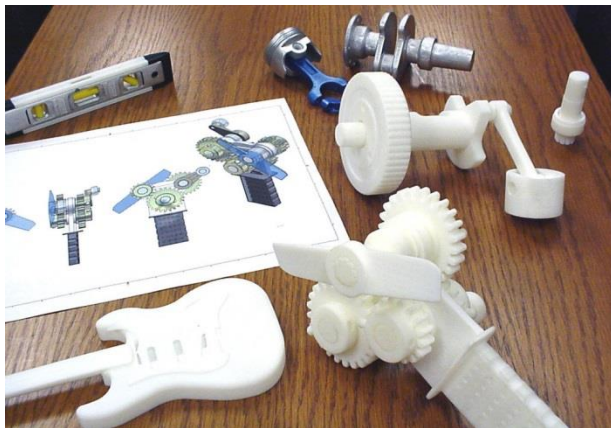
Cool Inventions

21. Tablets

Beginning with the introduction of the iPad by Apple in 2010, the tablet market has expanded to include various operating systems including Android and Windows. This variety has allowed the consumer to have even more choice in what they use. The benefits to use a tablet computer include its simplification and increased portability. Tablets are more portable than laptop computers and can thus be taken to factories, construction sites, on the go, etc. so you can have all your files with you. This alone is a tremendous plus as you can have your resume, current projects, and notes anytime you need it without the bulk of carrying paper. The added benefit of an app store enables the user to expand the functionalities of the tablet computer. Now, you can not only type up a short note, but full scale reports, display 3D models, and scan documents. Various physical add-ons can also allow the user to scan credit cards (see invention Square in Apps for Smart Devices), and take high resolution photographs.

Image from: http://i.i.com.com/cnwk.1d/i/tim2/2013/06/18/ipad-mini-game-small-2.jpg

22. 3D Printer

Often, the hardest part of creating something is visualizing it. When there are a lot of moving parts and little details, it becomes even more complicated. The best way to solve this is to have the physical object in front of you. Unfortunately, creating a model of something (even scaled down) can be very time consuming.

3D printers take the grunt work out for you. Though you have to do some visualizing to create the first edition of the product, you can then print it out and make changes on the physical object that you do not have to visualize. This can also be used to create smaller versions of machines or gears to test products and be sure that the machines work on a small scale before scaling them up into full blown production. Outside of testing and creating, a 3D printer can also be used to create spare parts that are needed immediately or are no longer in production. This enables you to extend the lives of your tools and continue working.

Image from:
http://www.instructables.com/files/deriv/FYW/LX0N/H6MF3FU3/FYWLX0NH6MF3FU3.LARGE.jpg

23. Kickstarter

Kickstarter embodies the crowdsourcing idea by enabling an individual or company to post an idea online and allow other individuals around the world to contribute money to make the idea a reality. Since the platform launched in 2009, Kickstarter has raised over $368 million for projects that met or passed their goals and has helped launch nearly 80,000 projects in the first four years. Though this website may not be applicable to large scale construction projects, it is perfect for a beginning entrepreneur who has an idea or product that just needs a little help to be on its way.

24. PrintBrush

Have you ever wanted to print anything on the go? This handy device enables you to do just that. PrintBrush allows you to upload an image or document and print it on the spot. This can be used to print short contracts to be signed on the spot, or even to print out a design that you want to get a better look at on any material that you have around you. This allows for increased flexibility with your job. The PrintBrush can also print on any flat surface. You could print on wood (design markings), on paper, or anything else that strikes your fancy. Image by Jonathan Worth/PopularScience

25. Holographic Telepresence

Invented by Nasser Peyghambarian of the University of Arizona, Holographic Telepresence is the next step toward 3D vision. As an engineer or architect, this means that you can create 3D models that your clients can use to view all the details in the next model. This is the closest that you will get to a complete model before creating a physical model of the part under construction. This invention provides all the benefits of 3D that are currently in place without the need for chunky glasses.

Image from: http://www.gnomonschool.com/blog/wp-content/uploads/blender_3d_hologram_by_logichy.jpg

26. SawStop

Someone should've thought of this sooner, but as of 2006, you can get an attachment to your table-saw blade that will sense when the blade comes in contact with squishy flesh. The blade will then stop and drop under the table to avoid a messy accident. This new safety mechanism has already protected countless fingers and hopefully soon yours.

27. Virtual Keyboards

These high-tech keyboards have been around since 2003 though you have likely never heard of them. Instead of a physical keyboard, the Virtual Keyboards project the image of a keyboard onto a smooth surface. Then, depending on which beam of light gets blocked, the sensor can detect what key you are pressing. This is a wonderful gadget for an on-the-go professional who can't stand the small keyboard on his/her phone, tablet, or netbook. This enables you to type out important documents while still maintaining comfort.

Image from: http://static.ddmcdn.com/gif/virtual-laser-keyboard-1.jpg

Apps for Smart Devices

With the introduction of tablets and smartphones, the app network has fully expanded within just the past few years. Now it is possible to download hundreds of apps geared to further the capabilities of your smart device whether you are running IOS, Android, or Windows. These apps vary in price from free to upwards of thousands of dollars and enable the user to have a laptop-like experience on their tablet or smartphone, or even use their smart device for even smarter things by taking full advantage of the touchscreen.

28. Paper by Fiftythree

Although there are many doodling apps on any store, Paper has driven the market for good reason. This app enables you to jot down by hand (or by stylus) information onto your smart device and organize the pages into journals. This expands on the key portability feature that smart devices provide by allowing you to make quick diagrams, take notes, and record information to be fixed right on the spot for viewing at a later date.

29. Microsoft Office 365

Sometimes handwriting things down on a tablet (which doesn't offer great precision) just won't cut it. Those times, Office is an invaluable asset. However, this app will cost you in its yearly subscription plan. The capabilities of Microsoft Office for a smart device are just like those for a computer; however, with the added bonus of a lightweight machine that can follow you to a site or meeting.

30. Square

First introduced in 2010, Square is an extension that can be added onto any smart device to enable the user to scan a credit card. This enables individuals and small business owners to make faster transactions and accelerate their companies. This also eliminates the need for large credit card readers and makes the business even more portable. With this invention, contracts and deals can be negotiated and then the payment can be made on the spot. The receipt will then be emailed to the customer to ensure that everyone is on the same page.

Image from: http://images.intomobile.com/wp-content/uploads/2011/04/square-credit-card-reader.jpg

31. Tempo

One of the most important things in juggling a job, family, and more is keeping a schedule. The easiest way to do this is to use a calendar whether online or on paper. Tempo is a free scheduling app that utilizes artificial intelligence to help you schedule your day. It is very convenient to have some form of a scheduler or calendar with you at all times so that you can manage meetings, determine when you have work, and when you have free time.

32. Evernote

Yet another scheduling app, Evernote is primarily known for the ability to create and organize task lists. A new added feature allows you to clip emails and save them offline under headings to be read later. As the internet is not available everywhere, this is useful on the go to check up on important messages.

33. NoteSuite

NoteSuite is a note-taking app that allows you to annotate PDFs, take notes, create tasks, and doodle, enabling you to take advantage of a touch screen

on the go. The ability to annotate PDF's is what sets this app apart from others. This feature creates a paper-like effect where you will be able to write on the documents that you carry with you. This can be useful to have a digital signature on a contract, or even just to check up on some important documentation and highlight various key parts.

34. LucidChart

As a professional, you know that it can be difficult to create expressive flowcharts that are both compact and look good. LucidChart makes all that easy by transforming the diagramming process into interactive dragging-and-dropping. Multiple users can work simultaneously on the same flowchart, encouraging collaboration. The iPad and Android apps allow you to make diagrams on the go that are ready for a presentation or just sharing with colleagues. If you have never used an online collaboration tool before, it is time to try LucidChart for free.
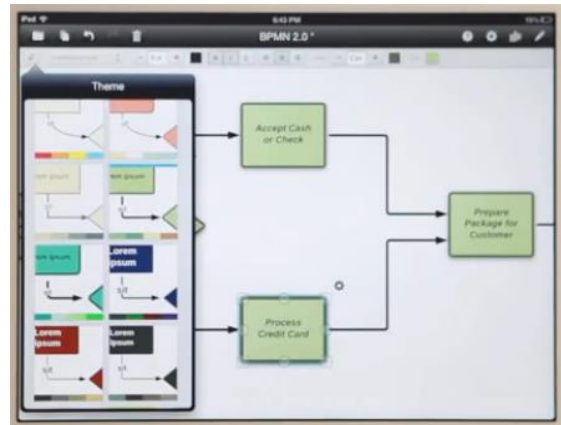
Image from: https://www.lucidchart.com/pages/tour/ipad_flowchart_app

Course Summary

Through this course, you have been exposed to the latest and greatest in the world of engineering and inventions. We hope that you have been as inspired as we were by these unique and game changing inventions. Though they may not all be applicable to your profession, the innovative ideas behind them and the possibilities they open up are worth pondering. Many of them can be readily found in online stores and can be added to your toolbox to increase your productivity at home or on the job.