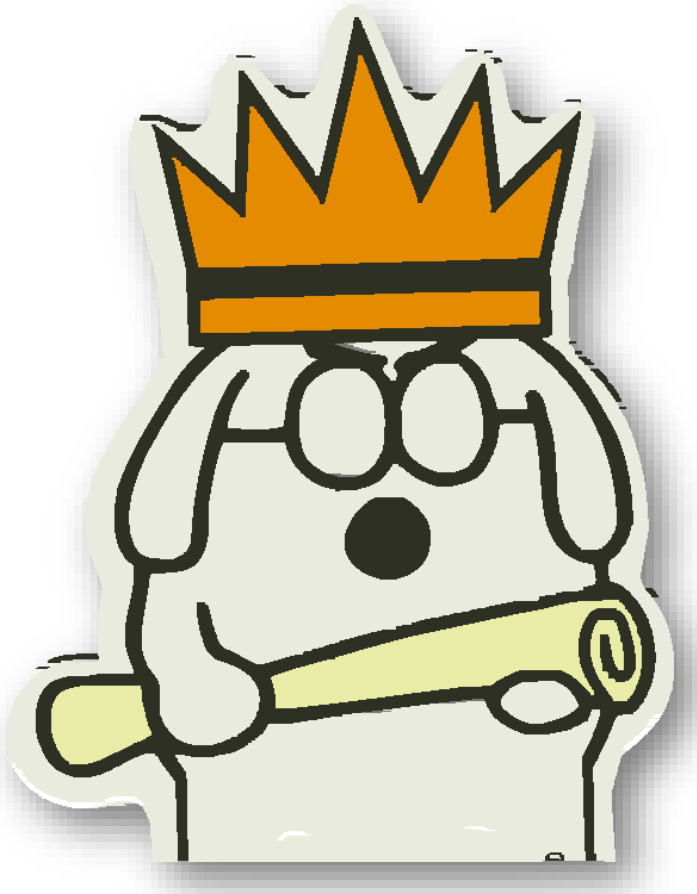

Professional Considerations in Digital System Design

LEGAL & REGULATORY HURDLES BRINGING YOUR PRODUCT TO MARKET

PURDUE UNIVERSITY

OUTLINE

- Regulatory Agencies
  - International Electrotechnical Commission (IEC)
  - Underwriters Laboratories (UL)
  - Conformité Européenne (CE)
  - Restriction of Hazardous Substances (RoHS)
  - Federal Communications Commission (FCC)
  - Federal Aviation Administration (FAA)
  - Food and Drug Administration (FDA)
  - Center for Devices and Radiological Health (CDRH)
- Patent Liability
  - Definitions
  - Patent Types and Contents
  - Patent Perspectives
  - Patent Infringement Analysis
  - Why There Are Lawyers
  - Nest Learning Thermostat Patents
  - Patent Reform Act of 2011

PURDUE UNIVERSITY

REGULATORY

International Electrotechnical Commission (IEC)

- World's leading organization for the preparation and publication of International Standards for all electrical, electronic and related technologies ("electro-technology")
- Provides a platform to companies, industries and governments for meeting, discussing and developing the International Standards they require

Over 10,000 experts from industry, commerce, government, test and research labs, academia and consumer groups participate in IEC Standardization work.

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REGULATORY

Underwriters Laboratory (UL)

- Global safety science company - largest and oldest independent testing laboratory in the United States
- Tests the latest products and technologies for safety before they are marketed around the world (19,000 annually)
- Five strategic areas - product safety, environment, life & health, university and verification services
- UL Listing means that UL has tested representative samples of the product and determined that it meets UL's requirements

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REGULATORY

"Conformité Européenne" (literally "European Conformity") or CE

- Verifies product complies with all relevant EU legislation that mandates compliance with specific standards and requirements
  - product safety
  - environmental impact
  - consumer protection
- Products covered
  - medical devices
  - products that have an impact on energy consumption
  - products which are capable of generating EMI
  - radio and telecommunications equipment
  - electrical devices that operate in low voltage range (50-1000 VAC or 75-1500 VDC)
  - measuring instruments

CE

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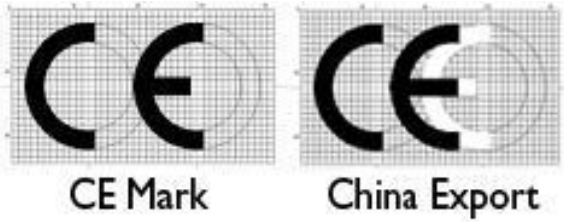
CAUTION – Be wary of authentic CE mark vs. China Export



REGULATORY

Restriction of Hazardous Substances (RoHS)

- RoHS, also known as Directive 2002/95/EC, originated in the European Union and restricts the use of six hazardous materials found in electrical and electronic products
  - **Lead (Pb)**: < 1000 ppm
  - **Mercury (Hg)**: < 100 ppm
  - **Cadmium (Cd)**: < 100 ppm
  - **Hexavalent Chromium: (Cr VI)** < 1000 ppm
  - **Polybrominated Biphenyls (PBB):** < 1000 ppm
  - **Polybrominated Diphenyl Ethers (PBDE)**: < 1000 ppm

- All applicable products in the EU market after July 1, 2006 must pass RoHS compliance
- Any business that sells applicable electrical or electronic products, sub-assemblies or components directly to RoHS countries, or sells to resellers, distributors or integrators that in turn sell products to these countries, is impacted if they utilize any of the restricted materials

REGULATORY

Federal Communications Commission (FCC)

- Any device that communicates via RF or (unintentionally) generates electromagnetic interference (EMI)
  - **Class A** digital device (commercial/industrial)
    - product not marketed for residential use
    - intended application generally precludes operation in residential areas
    - price high enough that there is little likelihood of use in a residential environment
  - **Class B** digital device (marketed for use in a residential environment)

Any electronic circuit with a clock can be a source of EMI; anything that emits EMI complicates spectrum management

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REGULATORY

Federal Communications Commission (FCC)

- **Part-15 rules: unlicensed RF devices**
  - **Interference** – effect of unwanted energy
  - **Harmful interference** – endangers functioning of radio navigation service
  - **Spurious emission** – harmonic, parasitic, intermodulation products
  - **Intentional radiator** – “radio transmitter”
  - **Unintentional radiator** – e.g. computer with a high-frequency clocking circuit
  - **Incidental radiator** – arcs in DC motors (brushes) and light switches
  - **Digital device** – generally unintentional radiators
  - **Carrier-current system** – transmits RF energy by conduction over power lines

REGULATORY

Federal Aviation Administration (FAA)

- **Restrictions on use of drones for commercial purposes**
  - unmanned aircraft must weigh less than 55 lbs. (25 kg)
  - visual line-of-sight (VLOS) only
  - at all times the small unmanned aircraft must remain close enough to the operator for the operator to be capable of seeing the aircraft with vision unaided by any device other than corrective lenses
  - small unmanned aircraft may not operate over any persons not directly involved in the operation
  - daylight-only operations (official sunrise to official sunset, local time)

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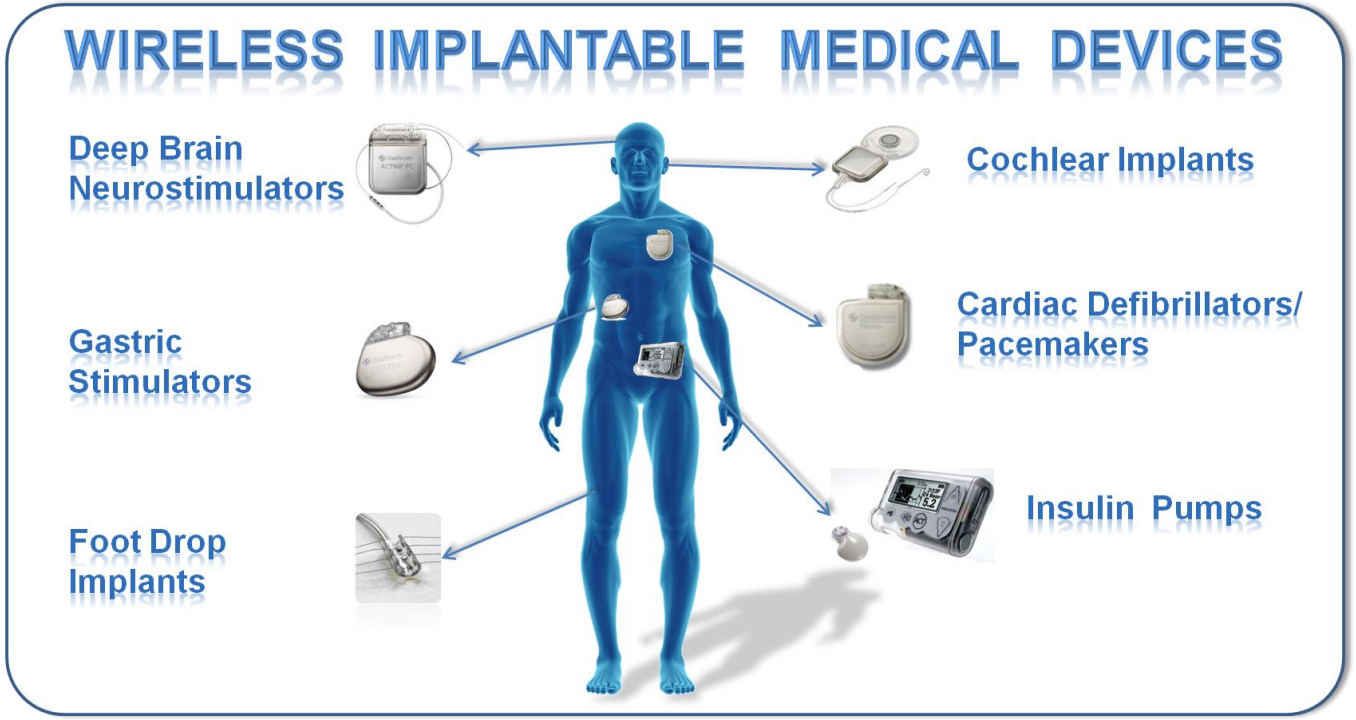
REGULATORY

Food and Drug Administration (FDA)

- Medical devices, implantable devices
  - Class 1 – low risk
  - Class 2 – medium (pre-notification, but not pre-approval)
  - Class 3 – preapproval (high barrier to show low risk of harm)

Also, FDA will regulate mobile apps that turn smartphones into medical devices (EKG, heartrate, ultrasound, etc.)



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REGULATORY

Center for Devices and Radiological Health (CDRH)

- Division of FDA, responsible for administering most U.S. regulations which apply to laser light emitting products
- Laser products are classified into categories depending on the level of hazard they present (hazard level based mainly on laser power output

Example: A laser product such as a "line leveler" would fall under the category of “surveying, leveling or alignment”. Lasers in this category are limited to Class IIIa and lower power levels. The maximum power level for Class IIIa is 4.95 milliwatts, for a small diameter, collimated beam. This is the same power level allowed in an over-the-counter laser pointer.

PURDUE UNIVERSITY

LASER COMPLIANCE

C·D·R·H Center for Devices and Radiological Health

REGULATORY

Center for Devices and Radiological Destruction (CDRD)

- Division of the Force, responsible for administering Empire-wide regulations which apply to laser light combat products
- Laser light combat products (*aka* Lightsabers) are classified into categories depending on the level of hazard they present to an opponent

Example: A JEDI Master lightsaber capable of wiping out Lord Palpatine is a Class Ia+ device while a lower power device such as the storm trooper (ST) variety is a Class IIId- device.

LASER COMPLIANCE

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CLICKER QUIZ

Question 1

Mobile apps that turn smartphones into medical devices are regulated by the:

A. FCC
B. FDA
C. CE
D. UL
E. none of these

PURDUE UNIVERSITY

CLICKER QUIZ

Question 1 - Answer

Mobile apps that turn smartphones into medical devices are regulated by the:

A. FCC
B. FDA
C. CE
D. UL
E. none of these

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CLICKER QUIZ

Question 2

Devices that incorporate (low power) lasers are regulated by a division of the:

A. FCC
B. FDA
C. CE
D. UL
E. none of these

PURDUE UNIVERSITY

CLICKER QUIZ

Question 2 - Answer

Devices that incorporate (low power) lasers are regulated by a division of the:

A. FCC
B. FDA
C. CE
D. UL
E. none of these

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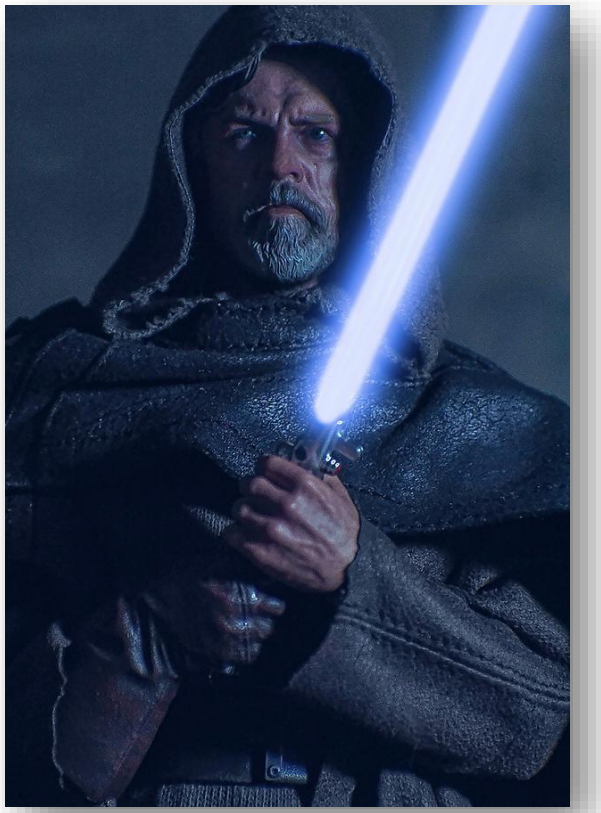
CLICKER QUIZ

Question 3

According to the Center for Devices and Radiological Destruction (CDRD), the class of Lightsaber suitable for use by a JEDI Master is:

A. Class Ia
B. Class Ia+
C. Class IIIa
D. Class IIId-
E. none of these



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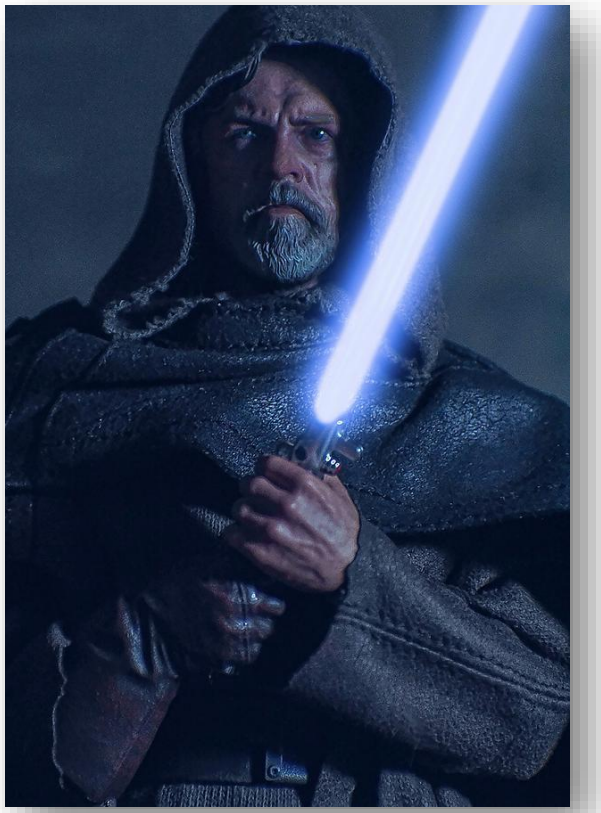
CLICKER QUIZ

Question 3 - Answer

According to the Center for Devices and Radiological Destruction (CDRD), the class of Lightsaber suitable for use by a JEDI Master is:

A. Class Ia
B. Class Ia+
C. Class IIIa
D. Class IIId-
E. none of these



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LEGAL & REGULATORY ANALYSIS REPORT

- Regulatory Analysis

  Analyze your device; determine what regulatory certifications your device will require in order to be sold to your target market (FAA, FCC, UL, ITAR, Medical Device, etc.) and what steps you will have to plan for in the event of developing your prototype into a finished product.

- Patent Liability Analysis

  Describe 3 or more patents or commercial products that perform some or all functions in a manner similar to your project; use a separate subsection for each patent/product. For each patent/product, include one or more paragraphs describing:

  - *The results of your patent/product search: Include the filing date, a (condensed) abstract, and key patent claims for which the potential of infringement exists. If a commercial product is being used, list any functions being performed in substantially the same way as well as any pending or issued patents on the product.*
  - *Analysis of patent liability: Analyze your project's liability for literal or doctrine-of-equivalents infringement of the provided patent. Clearly and carefully describe how the function(s) performed by your project are similar/different than the function(s) performed by the patent/product described in this subsection. This will require you to carefully construe the claim language of each patent you cite.*

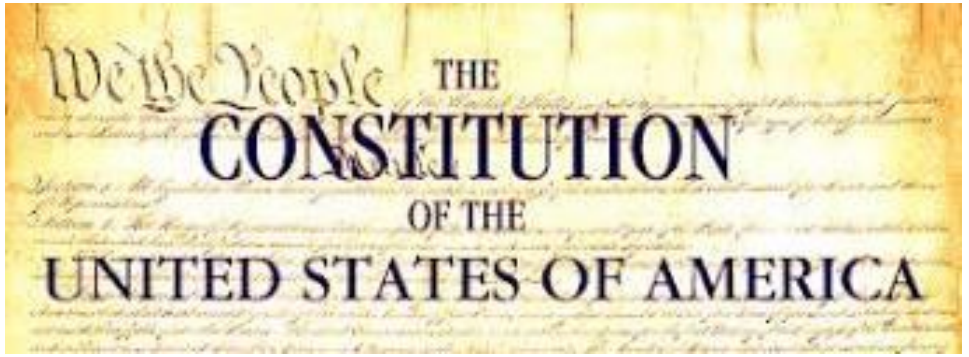
PURDUE UNIVERSITY

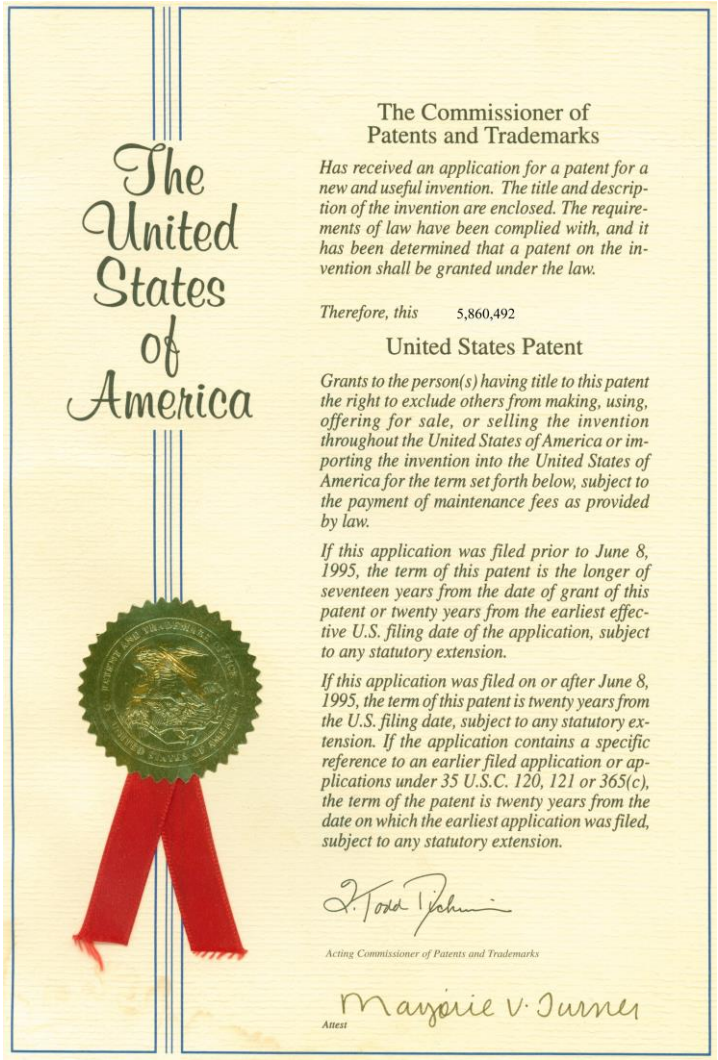
PATENT LIABILITY

Protection of Intellectual Property

Congress shall have the power . . . to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.

U.S. Constitution - Article 1, Section 8





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HOLIDAY QUESTION?

Question:

Why do programmers, software engineers, and computer engineers often get Halloween and Christmas mixed up?

Answer:

October 31 vs. December 25

OCT 31 vs. DEC 25

31_8 vs. 25_{10}

31 (base 8) = 25 (base 10)

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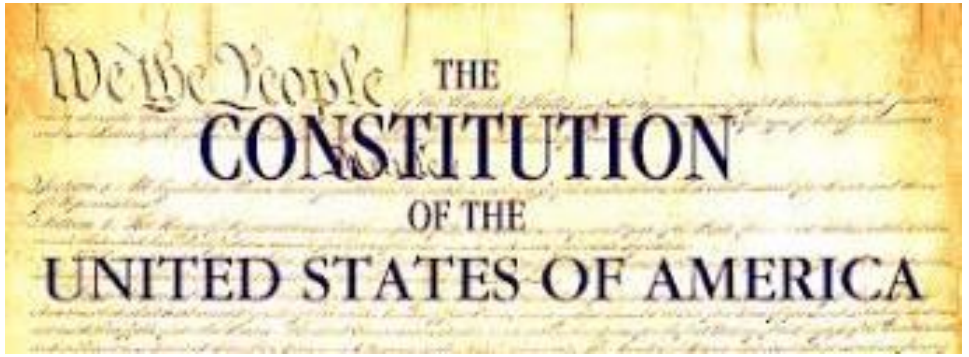
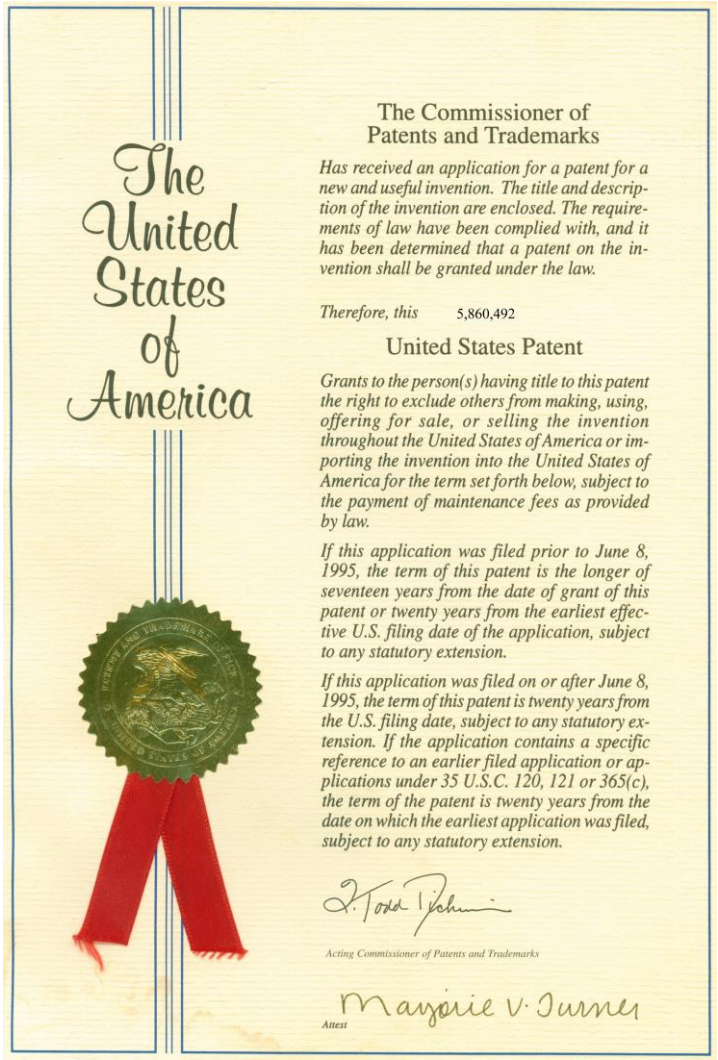
PATENT LIABILITY

Protection of Intellectual Property

Congress shall have the power . . . to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive right to their respective writings and discoveries.

U.S. Constitution - Article 1, Section 8





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PATENT LIABILITY

Patent = Right to Exclude

- Prevent others from making, using or selling your invention
- Right to **exclude** ≠ Right to **make**
  - ➢may not own all required components
  - ➢need for licensing
- Patent is *not* needed to manufacture a product
- Duration = 20 years from filing date

PURDUE UNIVERSITY

PATENT LIABILITY

Patent Requirements

- Useful
- Novel
- Non-obvious (to someone “skilled in the art”)

PATENT LIABILITY

Useful

The term "useful" means that the subject matter has a useful purpose. It also requires that the item is operable, since a machine that can't perform its intended purpose cannot be considered useful in the ordinary sense of the word. Since the decision over whether an invention is useful could be considered subjective, the U.S. Patent and Trademark Office (USPTO) has corresponding examination guidelines. These include the following:

- An invention has a well-established utility if (i) a person of ordinary skill in the art would immediately appreciate why the invention is useful based on the characteristics of the invention (e.g., properties or applications of a product or process), and (ii) the utility is specific, substantial, and credible.
- An applicant need only provide one credible assertion of specific and substantial utility for each claimed invention to satisfy the utility requirement.
- Any rejection based on lack of utility should include a detailed explanation why the claimed invention has no specific and substantial credible utility. Whenever possible, the examiner should provide documentary evidence.

PATENT LIABILITY

Novel

"Novelty" is strictly defined by patent law, essentially referring to the originality of the idea. An invention cannot be patented if:

- The invention was known or used by others in the United States before the patent applicant invented it.
- The invention was patented or described in any printed publication, before the patent applicant invented it.
- The invention was patented or described in a printed publication in any country more than one year prior to the inventor's U.S. patent application.
- The invention was in public use or on sale in the United States more than one year prior to the inventor's U.S. patent application.

These rules don't prevent a person from patenting an improvement to another invention, however. For example, tire makers have long known the formulas for making tire rubber. But what if an inventor found a way to make tire rubber twice as long-lasting by slightly changing the chemical composition? This could well be a patentable improvement as long as the difference wasn't obvious.

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PATENT LIABILITY

Non-Obvious

Even if a new invention differs in one or more ways from another patented invention, a patent may still be refused if the differences would be obvious. Non-obviousness is defined as a sufficient difference from what has been used or described before that a person having ordinary skill in the area of technology related to the invention would not find it obvious to make the change.

For example, sodium chloride (table salt) and potassium chloride (a chemically similar salt) can often be used interchangeably. A chemist working to improve road salt would consider it obvious to substitute potassium chloride for sodium chloride, so a formula that simply made this substitution in an already patented road salt formula would not be patentable.

PATENT LIABILITY

Patent Requirements

- Useful
- Novel
- Non-obvious (to someone “skilled in the art”)

“Trade secrets” can not be patented – patents must be ***fully disclosed*** *and include a* ***preferred embodiment***

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CLICKER QUIZ

Question 4

Patent requirements do not include:

A. useful
B. novel
C. cost-effective
D. non-obvious
E. none of these

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CLICKER QUIZ

Question 4 - Answer

Patent requirements do <u>not</u> include:

A. useful
B. novel
C. cost-effective
D. non-obvious
E. none of these

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CLICKER QUIZ

Question 5

The duration of a patent is 20 years from the _____ date.

A. inception
B. filing
C. publication
D. issue
E. none of these

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CLICKER QUIZ

Question 5 - Answer

The duration of a patent is 20 years from the _____ date.

A. inception
B. filing
C. publication
D. issue
E. none of these

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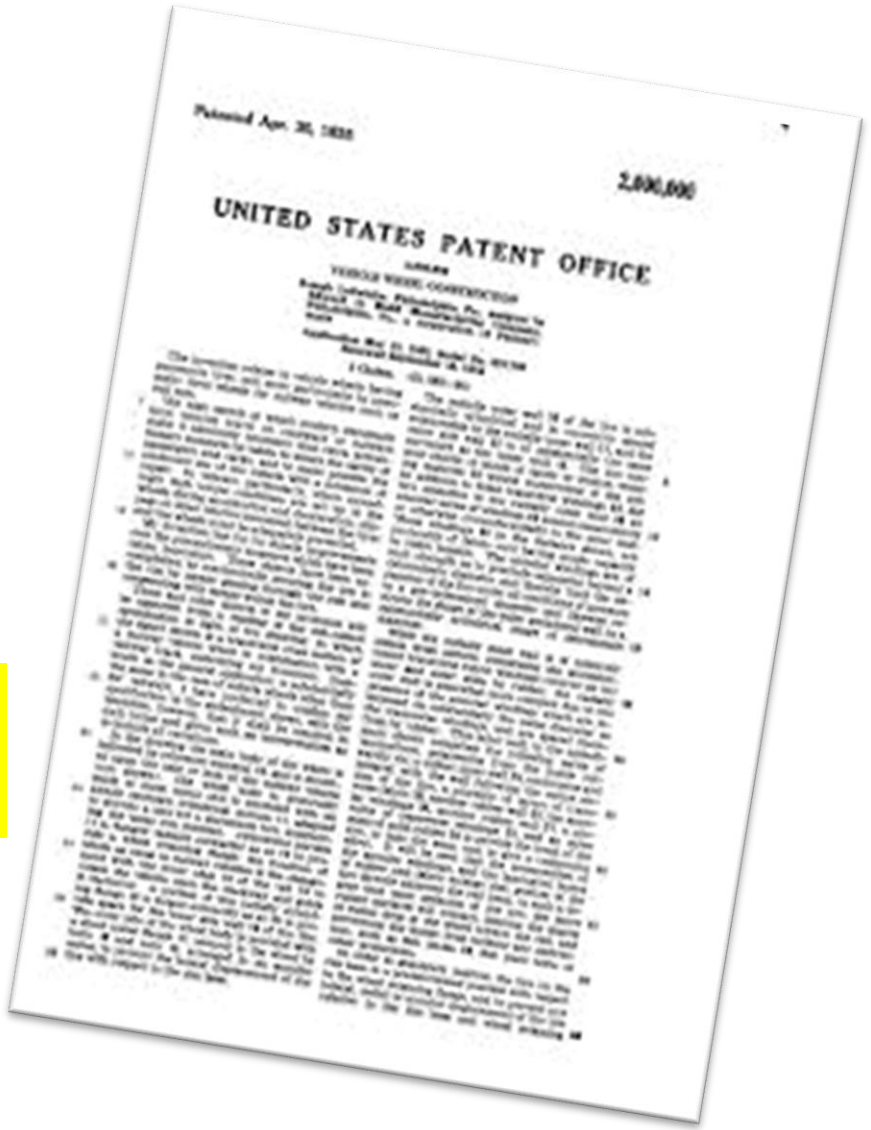
PATENT LIABILITY

Patent Contents

- Written description
- Drawings/schematics
- Claims
  - ➢ independent
  - ➢ dependent

How to read the front page of a patent:
http://www.bpmlegal.com/howtopat1.html


UNITED STATES PATENT OFFICE

PURDUE UNIVERSITY

PATENT LIABILITY

Types of Patents – Regular and Design

(12) **United States Patent**
Parker et al.

(10) **Patent No.: US 7,584,820 B2**
(45) **Date of Patent: Sep. 8, 2009**

(54) **ACOUSTIC RADIATING**

(75) Inventors: **Robert Preston Parker**, Westborough, MA (US); **Dewey Potter**, Holliston, MA (US)

(73) Assignee: **Bose Corporation**, Framingham, MA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 154 days.

(21) Appl. No.: **10/914,497**

(22) Filed: **Aug. 9, 2004**

(65) **Prior Publication Data**

US 2005/0205349 A1 Sep. 22, 2005

Related U.S. Application Data

(63) Continuation-in-part of application No. 10/805,440, filed on Mar. 19, 2004.

(51) **Int. Cl.**
H05K 5/00 (2006.01)

(52) **U.S. Cl.** **181/155**; 181/148; 181/199; 181/196

(58) **Field of Classification Search** 181/148, 181/155, 196, 199, 156, 145, 296, 197; 381/337, 381/338, 339, 352, 160, 349, 350, 351, 302, 381/86, 389, 342
See application file for complete search history.

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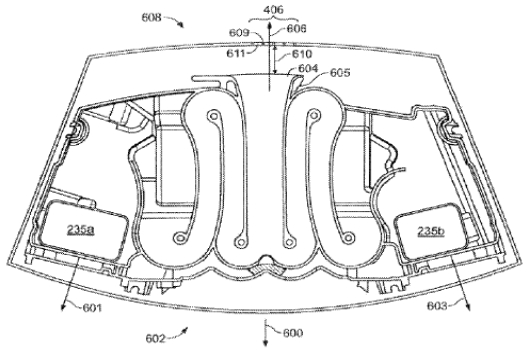
(Continued)

Primary Examiner—Jeffrey Donels
Assistant Examiner—Forrest M Phillips
(74) *Attorney, Agent, or Firm*—Fish & Richardson P.C.

(57) **ABSTRACT**

An apparatus includes an acoustic device comprising a waveguide having a sound opening at one end facing a space, an audio source, an acoustic driver at another end of the waveguide, the acoustic driver facing a listening area, and structure supporting the acoustic device, the audio source, and the acoustic driver, as an integrated audio system, the acoustic driver and the opening in the waveguide facing in substantially different directions from the structure.

29 Claims, 17 Drawing Sheets



(12) **United States Design Patent**
Green

(10) **Patent No.: US D498,742 S**
(45) **Date of Patent: ** Nov. 23, 2004**

(54) **RADIO**

(75) Inventor: **Seth N. Green**, Newton, MA (US)

(73) Assignee: **Bose Corporation**, Framingham, MA (US)

(**) Term: **14 Years**

(21) Appl. No.: **29/191,591**

(22) Filed: **Oct. 9, 2003**

(51) **LOC (7) Cl.** **14-03**

(52) **U.S. Cl.** **D14/188**

(58) **Field of Search** D14/188, 189, D14/168–171, 193–198; D10/2, 15; 455/344–351; 369/6, 7, 12, 75.1

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* cited by examiner

Primary Examiner—Prabhakar Deshmukh
(74) *Attorney, Agent, or Firm*—Fish & Richardson P.C.

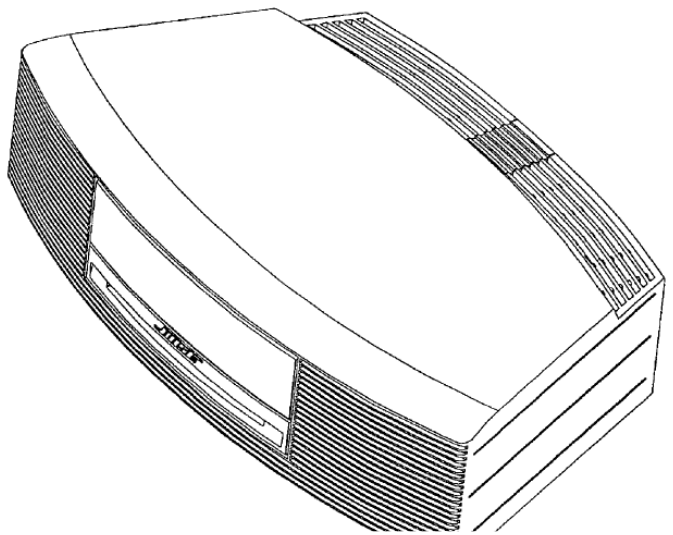
(57) **CLAIM**

The ornamental design for a radio, substantially as shown and described.

DESCRIPTION

FIG. **1** is a perspective view of a radio showing my new design;
FIG. **2** is a front elevational view thereof;
FIG. **3** is a top plan view thereof;
FIG. **4** is a rear elevational view thereof;
FIG. **5** is a bottom plan view thereof; and,
FIG. **6** is a right side elevational view thereof, the left side elevational view being a mirror image thereof.

1 Claim, 6 Drawing Sheets



PATENT LIABILITY

Types of Patents

- **Utility patent.** This is what most people think of when they think about a patent. It's a long, technical document that teaches the public how to use a new machine, process, or system. The kinds of inventions protected by utility patents are defined by Congress. New technologies like genetic engineering and internet-delivered software are challenging the boundaries of what kinds of inventions can receive utility patent protection.

- **Design patent.** This patent offer protection for an ornamental design on a useful item. The shape of a bottle or the design of a shoe, for example, can be protected by a design patent. The document itself is almost entirely made of pictures or drawings of the design on the useful item. Design patents are notoriously difficult to search simply because there are very few words used in a design patent. In recent years, software companies have used design patents to protect elements of user interfaces and even the shape of touchscreen devices.

PATENT LIABILITY

Types of Patents

- **Provisional patent.** United States law allows inventors to file a less formal document that proves the inventor was in possession of the invention and had adequately figured out how to make the invention work. Once that is on file, the invention is patent pending. If, however, the inventor fails to file a formal utility patent within a year from filing the provisional patent, he or she will lose this filing date. Any public disclosures made relying on that provisional patent application will now count as public disclosures to the United States Patent and Trademark Office (USPTO).

- **Plant patent.** Just what it sounds like, a plant patent protects new kinds of plants produced by cuttings or other nonsexual means. Plant patents generally do not cover genetically modified organisms and focus more on conventional horticulture.

PATENT LIABILITY

Patent Applications (Pending Patents)

US 20120273580A1

(19) **United States**

(12) **Patent Application Publication**

WARREN et al.

(10) **Pub. No.: US 2012/0273580 A1**

(43) **Pub. Date: Nov. 1, 2012**

(54) **THERMOSTAT WITH SELF-CONFIGURING CONNECTIONS TO FACILITATE DO-IT-YOURSELF INSTALLATION**

(75) Inventors: **DANIEL ADAM WARREN**, SF, CA (US); **HUGO FIENNES**, Palo Alto, CA (US); **JONATHAN ALAN DUTRA**, Saratoga, CA (US); **DAVID BELL**, Los Altos Hills, CA (US); **ANTHONY MICHAEL FADELL**, Portola Valley, CA (US); **MATTHEW LEE ROGERS**, Los Gatos, CA (US)

(73) Assignee: **NEST LABS, INC.**, Palo Alto, CA (US)

(21) Appl. No.: **13/531,486**

(22) Filed: **Jun. 22, 2012**

Related U.S. Application Data

(63) Continuation of application No. 13/467,029, filed on May 8, 2012, which is a continuation-in-part of application No. PCT/US11/61437, filed on Nov. 18, 2011, which is a continuation-in-part of application No. 13/034,666, filed on Feb. 24, 2011, which is a continuation-in-part of application No. 13/034,674, filed on Feb. 24, 2011, which is a continuation-in-part of application No. 13/034,678, filed on Feb. 24, 2011.

(60) Provisional application No. 61/627,996, filed on Oct. 21, 2011.

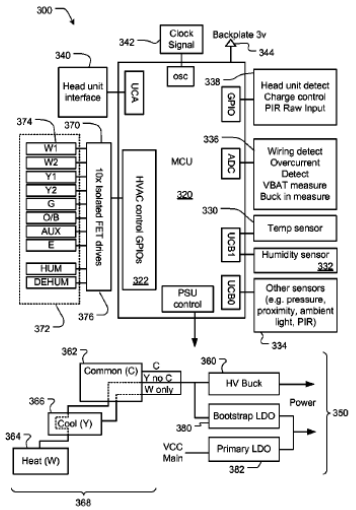
Publication Classification

(51) **Int. Cl.**
G05D 23/19 (2006.01)
B23P 11/00 (2006.01)

(52) **U.S. Cl.** ..... **236/1 C**; 29/428

(57) **ABSTRACT**

A thermostat is configured for automated compatibility with HVAC systems that are either single-HVAC-transformer systems or dual-HVAC-transformer systems. The compatibility is automated in that a manual jumper installation is not required for adaptation to either single-HVAC-transformer systems or dual-HVAC-transformer systems. The thermostat has a plurality of HVAC wire connectors including a first call relay wire connector, a first power return wire connector, a second call relay wire connector, and a second power return wire connector. The thermostat is configured such that if the first and second external wires have been inserted into the first and second power return wire connectors, respectively, then the first and second power return wire connectors are electrically isolated from each other. Otherwise, the first and second power return wire connectors are electrically shorted together.



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PATENT LIABILITY

A "Bad" ("Stupid") Patent

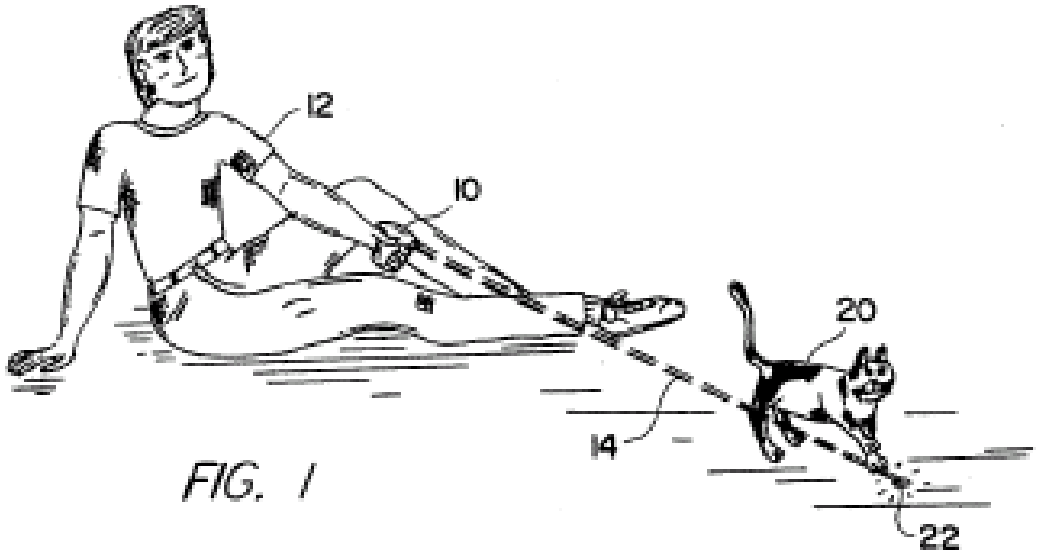

FIG. 1

US005443036A

United States Patent [19]

Amiss et al.

[11] **Patent Number: 5,443,036**

[45] **Date of Patent: Aug. 22, 1995**

[54] **METHOD OF EXERCISING A CAT**

[76] Inventors: **Kevin T. Amiss**, 255 S. Pickett St., #301, Alexandria, Va. 22304; **Martin H. Abbott**, 10549 Assembly Dr., Fairfax, Va. 22030

[21] Appl. No.: **144,473**

[22] Filed: **Nov. 2, 1993**

[51] **Int. Cl.**[6] **A01K 29/00**

[52] **U.S. Cl.** **119/707**

[58] **Field of Search** 119/702, 707, 174, 905; 446/485

[56] **References Cited**

U.S. PATENT DOCUMENTS

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4,208,701	6/1980	Schook .	
4,231,077	10/1980	Joyce et al. .	
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4,985,029	1/1991	Hoshino .	
5,056,097	10/1991	Meyers .	
5,194,007	3/1993	Marshall et al. .	

OTHER PUBLICATIONS

Carayan et al., "Effects of tianeptine on the Performance of a reaching movement in a cat", *Psychopharmacology*, vol. 104, Issue 3, Berlin, 1991, pp. 328–336.

Levesque et al., "Visual 'cortical-recipient' and tectal-recepient pontine zones play distinct roles in cat visuomotor performance", *Behavioral Brain Research*, vol. 39, Netherlands, 1990, pp. 157–166.

Primary Examiner—Todd E. Manahan

[57] **ABSTRACT**

A method for inducing cats to exercise consists of directing a beam of invisible light produced by a hand-held laser apparatus onto the floor or wall or other opaque surface in the vicinity of the cat, then moving the laser so as to cause the bright pattern of light to move in an irregular way fascinating to cats, and to any other animal with a chase instinct.

4 Claims, 1 Drawing Sheet

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PATENT LIABILITY

How Patents Are Used

- Shield – protect/shield IP, stop others from using it
- Sword – stop other businesses, extract revenue (license fees) from other businesses

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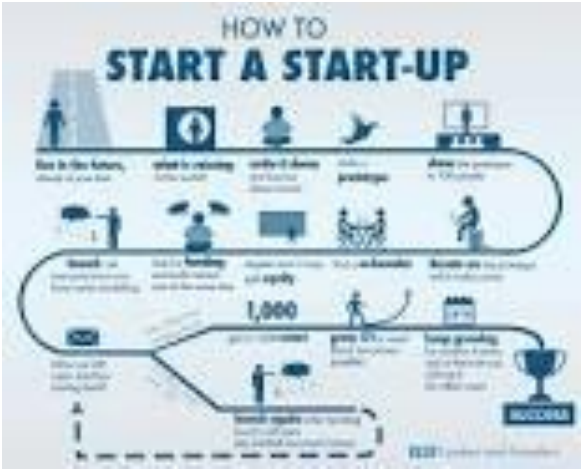
PATENT LIABILITY

Patent Perspectives

- CEO of large corporation
- Start-up
- Employee of large corporation
- Litigator/investor
- Expert witness



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PATENT LIABILITY

CEO Perspective

- Maximize revenues (“sword”)
  - Shut down competitors
  - Extract license fees
- Minimize liabilities (“shield”)
  - Minimize license fees
  - Prevent infringement penalties
  - Prevent catastrophic shutdown
- Strategy: assemble a large patent portfolio
  - Not necessarily limited to core business
  - “Offense is the best defense”

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PATENT LIABILITY

CEO Perspective

- Tactics
  - ➢ Toward employees
    - ❖ incentivize patent applications/awards
    - ❖ support processes that maximize yield
    - ❖ provide training to avoid willful infringement
  - ➢ Toward competitors
    - ❖ keep a large enough sword (to act as a shield – “mutually assured destruction” – MAD)
    - ❖ negotiate truce where possible

Truce example: Intel and AMD – each acquits other of liability for ongoing infringement that might exist, and each grants non-exclusive, non-transferable license to the other

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PATENT LIABILITY

Startup Perspective

- Informal view – what appears to be “old tech” falls within 20-year lifespan of many existing patents
- Incumbents hold large patent portfolios (“swords”)
- Startups (typically) hold no significant portfolios that can hurt incumbents (no “shields”)
- Strategies
  - Stay poor (cheaper for incumbents to ignore you than hire a lawyer to shut you down)
  - Contest patents of adversary (“sword is invalid”) – *very difficult to achieve in practice*
  - Get a strong ally and/or buy help (license a large/relevant portfolio of patents, obtain cash by selling startup stake to investors)

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PATENT LIABILITY

Nest Labs

Nest Labs was founded in 2010 by former Apple engineers Tony Fadell and Matt Rogers.[10] The idea came when Fadell was building a vacation home and found all of the available thermostats on the market to be inadequate, motivated to bring something better on the market.[6] Early investors in Nest Labs included Shasta Ventures and Kleiner Perkins.

Nest Learning Thermostat - 1st Generation
Released October 25, 2011

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NEST PATENT ISSUES

Patent Liability Lawsuit

- February 2012 - Honeywell filed a lawsuit claiming that some of its patents had been infringed by Nest (e.g., US 7,476,988 “Power Stealing Control Devices” – one of seven patents in question)

- Start-up vs Incumbent

Nest CEO Tony Fadell characterized Honeywell as "worse than a troll" when the suit was first raised, calling the patents the company invoked "hopelessly invalid," and arguing that the company was using old patents to stifle innovation in the thermostat market. "They are not trying to get money out of us," Fadell said at the time. "They are trying to maintain the status quo." Honeywell's own flagship thermostat, Nest said, showed "little more technological improvement to the flagship Honeywell thermostat than the replacement of a mechanical display with an LCD" in seven decades on the market.

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NEST PATENTS

Ease of Installation

US Patent 8,523,083 (filed Jun. 2012, issued Sep. 2013)

THERMOSTAT WITH SELF-CONFIGURING CONNECTIONS TO FACILITATE DO-IT-YOURSELF INSTALLATION

ABSTRACT *A thermostat is configured for automated compatibility with HVAC systems that are either single-HVAC-transformer systems or dual-HVAC-transformer systems. The compatibility is automated in that a manual jumper installation is not required for adaptation to either single-HVAC-transformer systems or dual-HVAC-transformer systems. The thermostat has a plurality of HVAC wire connectors including a first call relay wire connector, a first power return wire connector, a second call relay wire connector, and a second power return wire connector. The thermostat is configured such that if the first and second external wires have been inserted into the first and second power return wire connectors, respectively, then the first and second power return wire connectors are electrically isolated from each other. Otherwise, the first and second power return wire connectors are electrically shorted together.*

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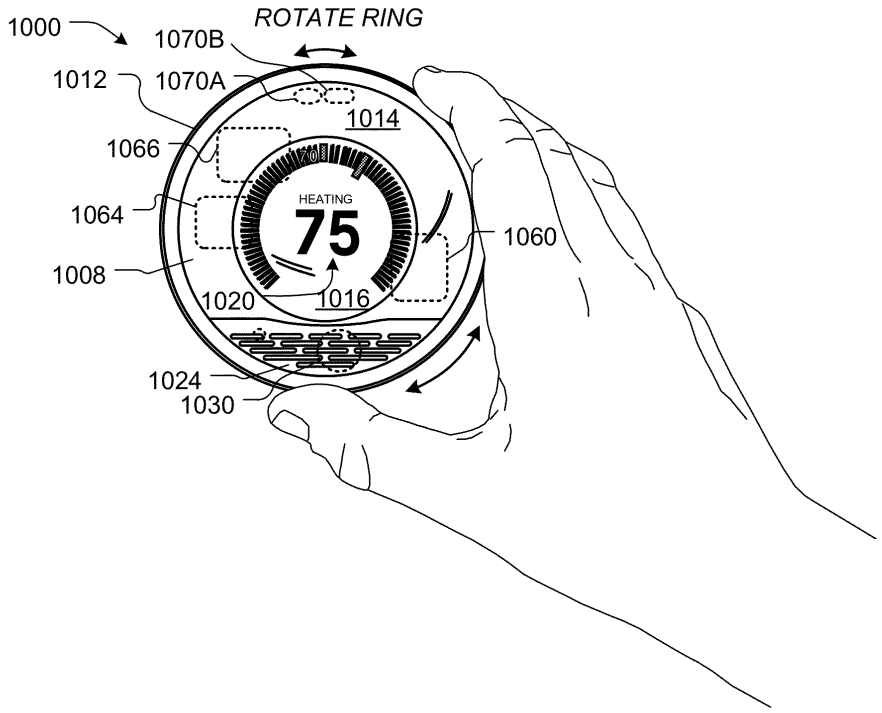
NEST PATENTS

Event Forecasting System

US Patent 8,620,841 (filed Aug. 2012, issued Dec. 2013)

DYNAMIC DISTRIBUTED-SENSOR THERMOSTAT NETWORK FOR FORECASTING EXTERNAL EVENTS

ABSTRACT *Systems and methods for forecasting events can be provided. A measurement database can store sensor measurements, each having been provided by a non-portable electronic device with a primary purpose unrelated to collecting measurements from a type of sensor that collected the measurement. A measurement set identifier can select a set of measurements. The electronic devices associated with the set of measurements can be in close geographical proximity relative to their geographical proximity to other devices. An inter-device correlator can access the set and collectively analyze the measurements. An event detector can determine whether an event occurred. An event forecaster can forecast a future event property. An alert engine can identify one or more entities to be alerted of the future event property, generate at least one alert identifying the future event property, and transmit at least one alert to the identified one or more entities.*



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NEST PATENTS

Advanced Energy Harvesting ("Power Stealing") Strategy

US Patent 8,511,577 (filed Aug. 2012, issued Aug. 2013)

Thermostat with power stealing delay interval at transitions between power stealing states

ABSTRACT A thermostat includes a plurality of HVAC (heating, ventilation, and air conditioning) wire connectors including a connection to at least one call relay wire. The thermostat may also include a powering circuit, including a rechargeable battery, which is configured to provide electrical power to the thermostat by power stealing from a selected call relay wire. The power stealing may include an active power stealing mode, in which power is taken from the same selected call relay wire that is used to call for an HVAC function, and an inactive power stealing mode in which, in which no active call is being made. The powering circuit may be configured to substantially suspend (or at least reduce the level of) power stealing for at least a first time period following each transition of the thermostat from between operating states.

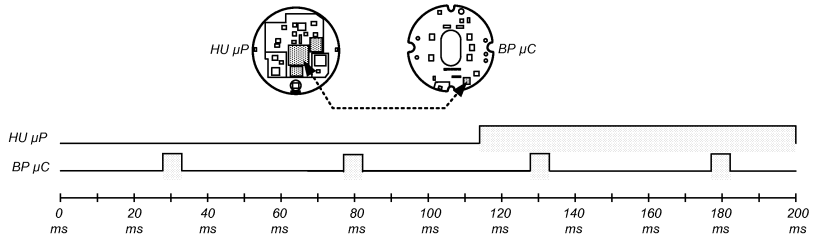


FIG. 17A

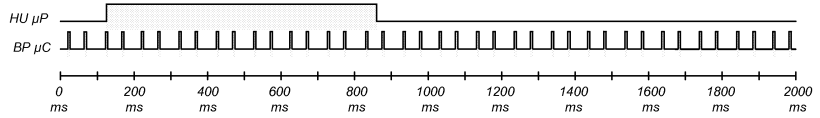


FIG. 17B

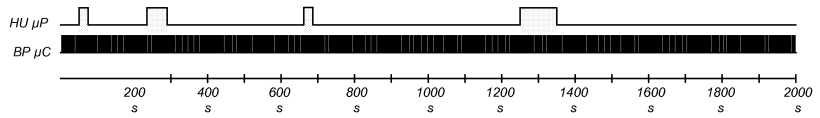
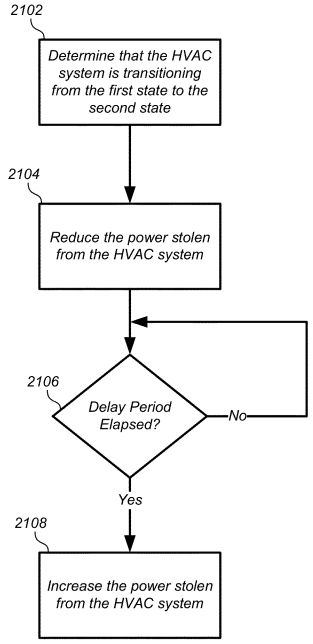


FIG. 17C



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NEST PATENT ISSUES

Beefing Up the Shield (Before More Swords Are Drawn…)

- September 2013 – Nest announced patent license agreement with Intellectual Ventures, and acquired several patents (unclear how many)

- February 2014 Google buys Nest for $3.2 Billion

Google and multinational manufacturer Honeywell have resolved their long-running patent dispute over the thermostats produced by Nest Labs, the two companies announced today [May 5, 2016]. Honeywell first filed a patent infringement suit against Nest's Learning Thermostat in early 2012, two years before the home automation company was purchased by Google. There are no details on what the settlement entails, but the two companies said they now shared a "long-term patent cross-license agreement reflecting the respective strength of the companies' patent portfolios."

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PATENT LIABILITY

Employee Perspective

- Incentives to protect IP of company (“patent everything”)
- Training to avoid willful infringement
  - ➢ Disclose what you know about closely related work
  - ➢ Do not actively look for patents while you are designing a product (hire lawyers to examine potential for infringement)

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PATENT LIABILITY

Investor/Litigator Perspective

- Goal: IP is property (invest and aggressively monetize property to maximize ROI)
- No interest in making anything (no MAD)
- Strategy
  - ➢ Buy broad patents from distressed companies
  - ➢ Sue everyone
- Spin
  - ➢ Patent trolls, hurting real businesses (“swords”)
  - ➢ Defending their property (“shields”)

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PATENT LIABILITY

Expert Witness

- Instruct lawyers on underlying science related to patent claims
- Study and construe claim language (requires tedious dissection and interpretation of claim language)
- Participate in Markman hearing (where both sides agree on interpretation of claim language, e.g., “acoustic radiation vents in a different plane”)
- Analyze validity of claims taught in patent
- Analyze functionality of the preferred embodiment disclosed in patent
- Analyze prior art including other patents, applicable literature, and existing products on market

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PATENT LIABILITY

Patent Application Process

- Applying for a patent requires
  - extensive search of prior art
  - protracted negotiation with assigned patent officer
  - patent lawyer
- Many patent search engines are available
  - freepatentsonline.com
  - google.com/patents
- Official web site of the U.S. Patent Office is www.uspto.gov

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PATENT LIABILITY

Patent Infringement Analysis

- Best time to search for possible patent infringement is at product conception stage
- If the possibility of infringement exists, either:
  - ➢ eliminate infringing function from your design
  - ➢ modify your design so that the infringing function is performed in a "substantially different way"
- Types of infringement
  - ➢ literal
  - ➢ doctrine of equivalents

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PATENT LIABILITY

Literal Infringement

- Exactly same function performed exactly the same way
- Should be “obvious”
- Either eliminate this function from your design -or- obtain license/pay royalty fee to use this function
- Note that simply “adding additional features” does not eliminate infringement

Patent infringement is the commission of a prohibited act with respect to a patented invention without permission from the **patent** holder. Permission may typically be granted in the form of a license.

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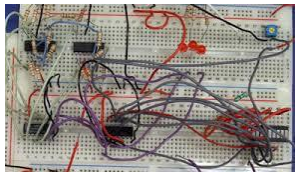
PATENT LIABILITY

Infringement Under Doctrine of Equivalents

- Substantially same function performed substantially the same way
- Hypothetical examples (Clicker: A – Yes, B – Maybe, C – No)
  - for fastening pieces of wood together, does a screw perform "substantially the same function" in "substantially the same way" as a nail?
  - for reproducing recorded music, does a vinyl LP perform "substantially the same function" in "substantially the same way" as a CD?
  - does software running on a microcontroller perform "substantially the same function" in "substantially the same way" as a state machine realized with discrete flip-flops and gates?



The **doctrine of equivalents** is a legal rule in most of the world's patent systems that allows a court to hold a party liable for patent infringement even though the infringing device or process does not fall within the **literal scope** of a patent claim, but nevertheless is **equivalent** to the claimed invention.

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PATENT LIABILITY

Doctrine of Equivalents

- Need a clear understanding of mechanism ("way") – the mechanism is the ***function* of interest** in analyzing infringement liability under the doctrine of equivalents
  - hypothetical #1: "fastening" is not what is patented; rather, the fastening mechanism (ribbing on nail vs. threads on screw)
  - hypothetical #2: "music reproduction" is not what is patented; rather, the music reproduction mechanism (needle vibration following molded groove vs. optically reading digital data from pits molded into plastic disc)
  - hypothetical #3: "doing something on a computer" is not what is patented; rather, the software method (algorithm)

***What** (some action) vs. **how** (method/mechanism/function)*

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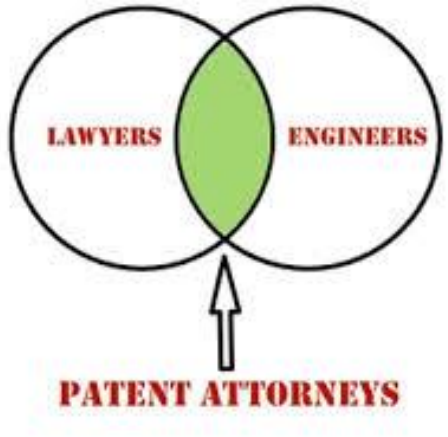
PATENT LIABILITY

Doctrine of Equivalents

- Stated another way, is the “software” implementation of <u>any</u> function the equivalent of a (digital) hardware implementation of that function under the doctrine of equivalents?
- Answer: “hard to say” – this is why there are patent lawyers!
- No case to date where software ruled the equivalent of hardware *per se* – but have been cases where <u>functions</u> (“algorithms”) of hardware and software devices ruled as performed in “substantially the same way”



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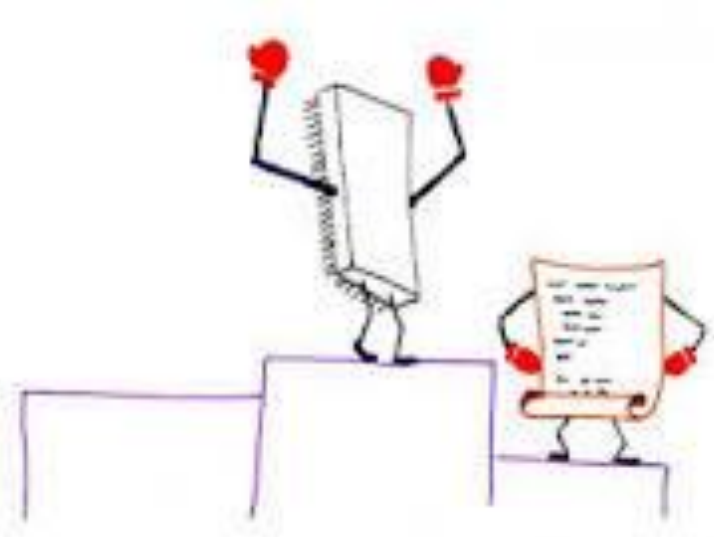
PATENT LIABILITY

Doctrine of Equivalents

- Discussion: What are some of the differences between a microcontroller-based “software” realization of a given function and a “discrete hardware” realization?
  - development tools
  - design process
  - clocking source / clock rate
  - execution (sequential vs. parallel)
  - ease of modification



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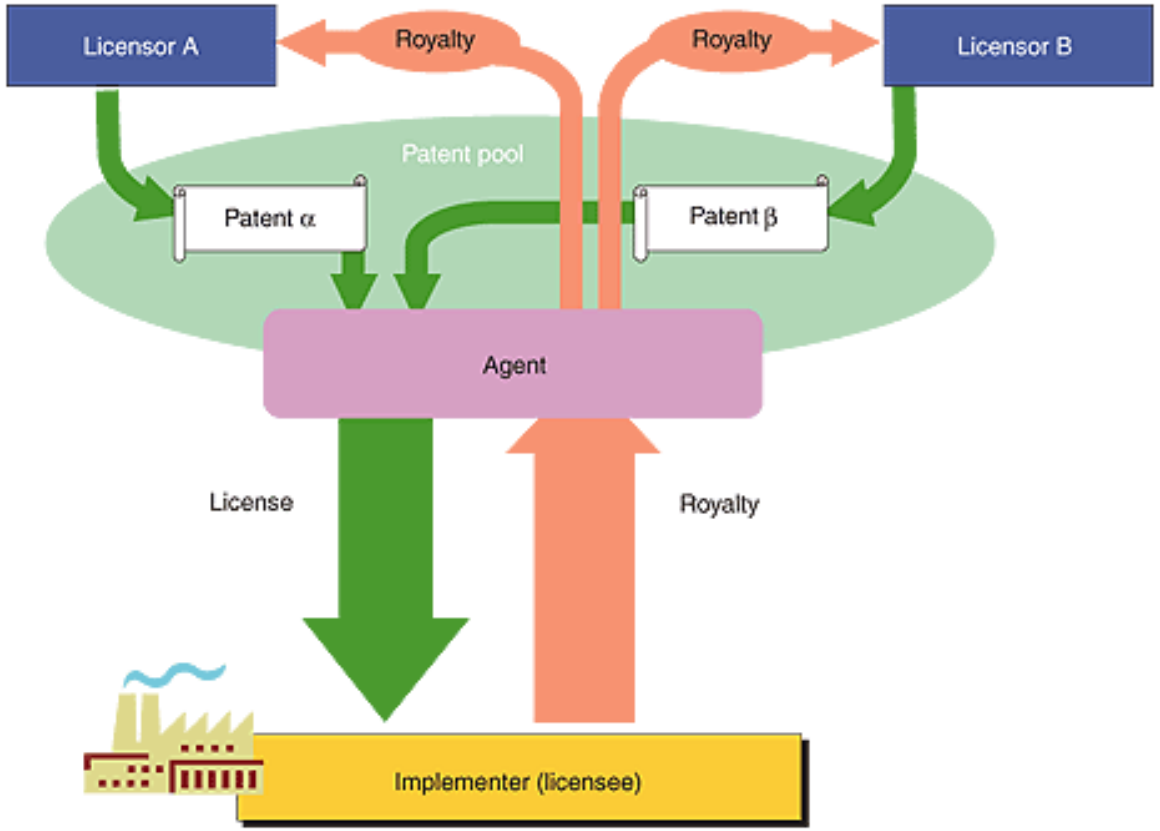
PATENT LIABILITY

Avoiding Infringement

- Designing around
- Licensing
  - ➢ straight license
  - ➢ cross-license
- Acquiring subject patent
- Declaratory judgment action
- Ceasing manufacturing



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PATENT LIABILITY

Why There Are Lawyers

- Construe meaning of words “substantially”, “novel”, “useful”, “non-obvious”, etc.
- Construe **claim construction** and interpret claim language (pretrial Markman hearing)
- Perform prior art search
- Problem 1: some individuals/companies obtain patents for the sole purpose of suing others (usually for functions many “skilled in the art” would consider “obvious” based on prior art)
- Problem 2: a substantial number of “bad patents” have been issued (even for devices/designs that *don’t even work* and/or “defy physics”)
- Problem 3: “bad people” have been known to take advantage of “bad patents”

Important note: The **“abstract”** of a patent typically does **not** describe what is **officially patented** – this must be determined by a careful analysis of the **claim language** (a process called “**claim construction**”)

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CLICKER QUIZ

Question 6

The intellectual property (IP) protected by a patent is detailed in its:

A. abstract
B. figures/drawings
C. written description
D. claim language
E. none of the above

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CLICKER QUIZ

Question 6 - Answer

The intellectual property (IP) protected by a patent is detailed in its:

A. abstract
B. figures/drawings
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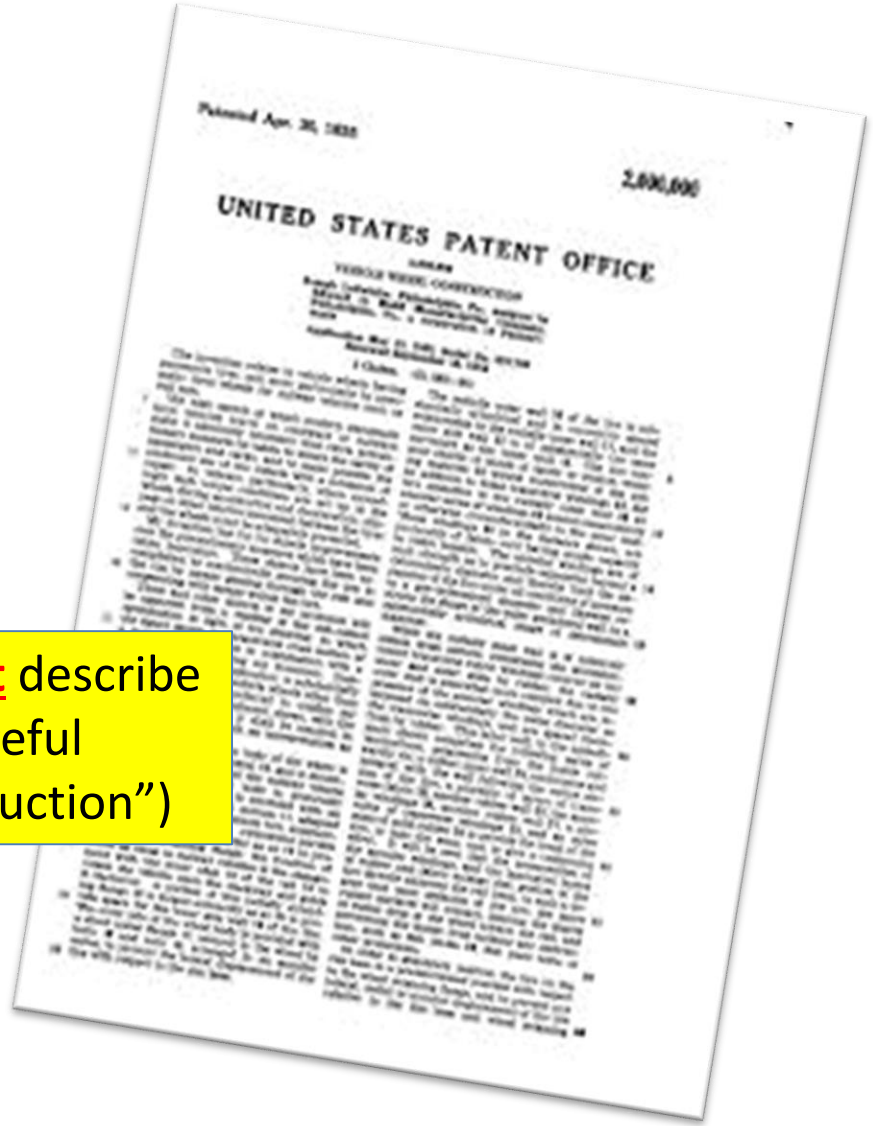
D. claim language
E. none of the above



Important note: The **"abstract"** of a patent typically does **not** describe what is officially patented – this must be determined by a careful analysis of the **claim language** (a process called "claim construction")

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CLICKER QUIZ

Question 7

Literal infringement of a patent means:

A. exactly the same function is performed exactly the same way
B. exactly the same function is performed substantially the same way
C. substantially the same function is performed exactly the same way
D. substantially the same function is performed substantially the same way
E. none of the above

CLICKER QUIZ

Question 7 - Answer

Literal infringement of a patent means:

A. exactly the same function is performed exactly the same way
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C. substantially the same function is performed exactly the same way
D. substantially the same function is performed substantially the same way
E. none of the above

Patent infringement is the commission of a prohibited act with respect to a patented invention without permission from the **patent** holder. Permission may typically be granted in the form of a license.

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CLICKER QUIZ

Question 8

Infringement of a patent under the *doctrine of the equivalents* means:

A. exactly the same function is performed exactly the same way
B. exactly the same function is performed substantially the same way
C. substantially the same function is performed exactly the same way
D. substantially the same function is performed substantially the same way
E. none of the above

CLICKER QUIZ

Question 8 - Answer

Infringement of a patent under the *doctrine of the equivalents* means:

A. exactly the same function is performed exactly the same way
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D. substantially the same function is performed substantially the same way
E. none of the above

The **doctrine of equivalents** is a legal rule in most of the world's patent systems that allows a court to hold a party liable for patent infringement even though the infringing device or process does not fall within the **literal scope** of a patent claim, but nevertheless is **equivalent** to the claimed invention.

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CLICKER QUIZ

Question 9

Infringement cannot be eliminated by:

A. licensing
B. ceasing manufacturing
C. acquiring subject patent
D. adding new/additional functions
E. none of the above

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CLICKER QUIZ

Question 9 - Answer

Infringement cannot be eliminated by:

A. licensing
B. ceasing manufacturing
C. acquiring subject patent
D. adding new/additional functions
E. none of the above

Simply "adding additional features" does not eliminate infringement

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CLICKER QUIZ

Question 10

A patent can potentially be rendered unenforceable due to:

A. a non-functional preferred embodiment
B. errors in the written description
C. invalidating prior art
D. generalizations made in the claim language
E. none of the above

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CLICKER QUIZ

Question 10 - Answer

A patent can potentially be rendered unenforceable due to:

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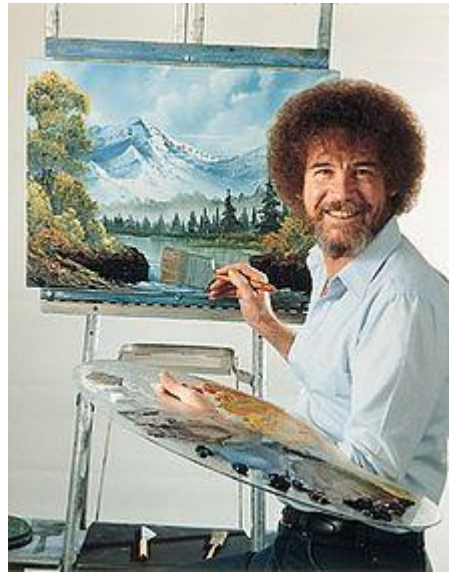

Prior art (state of the **art** or background **art**), in most systems of **patent** law, is constituted by all information that has been made available to the public in any form before a given date that might be relevant to a **patent's** claims of originality.

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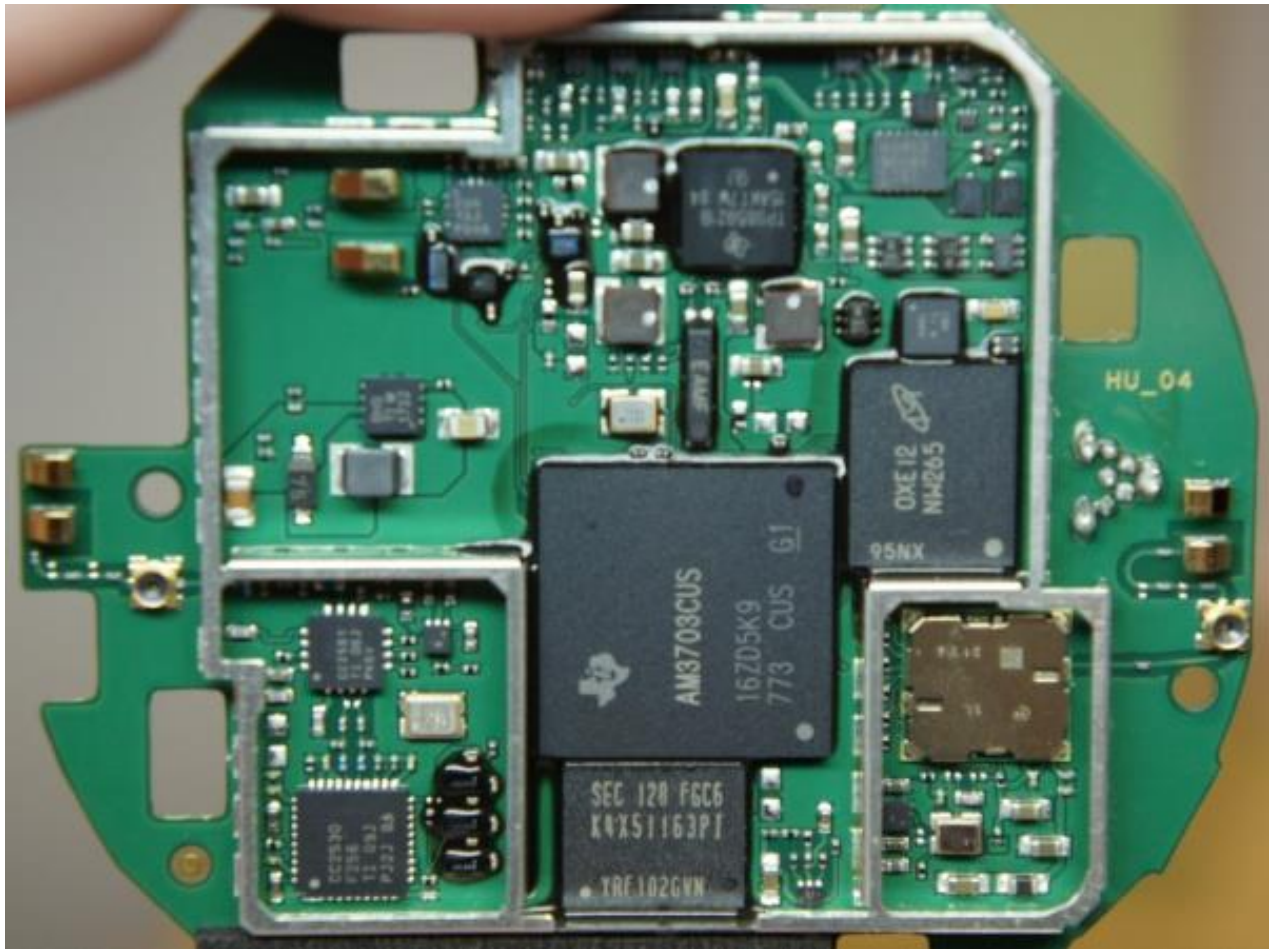
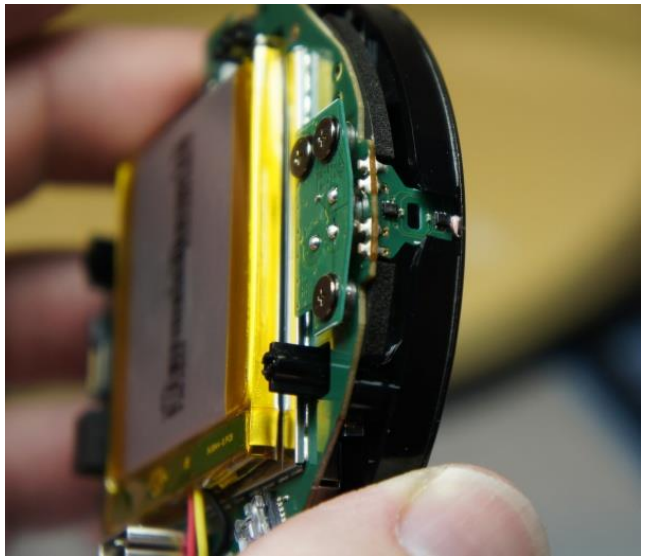
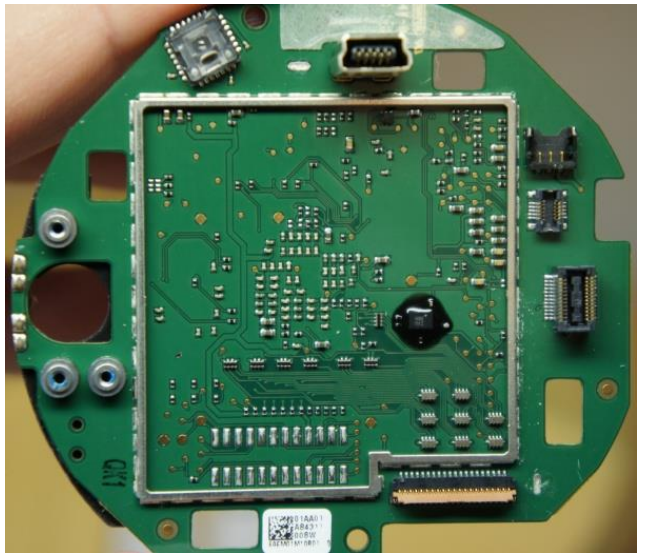
REVISITING THE NEST CASE STUDY

What's Inside







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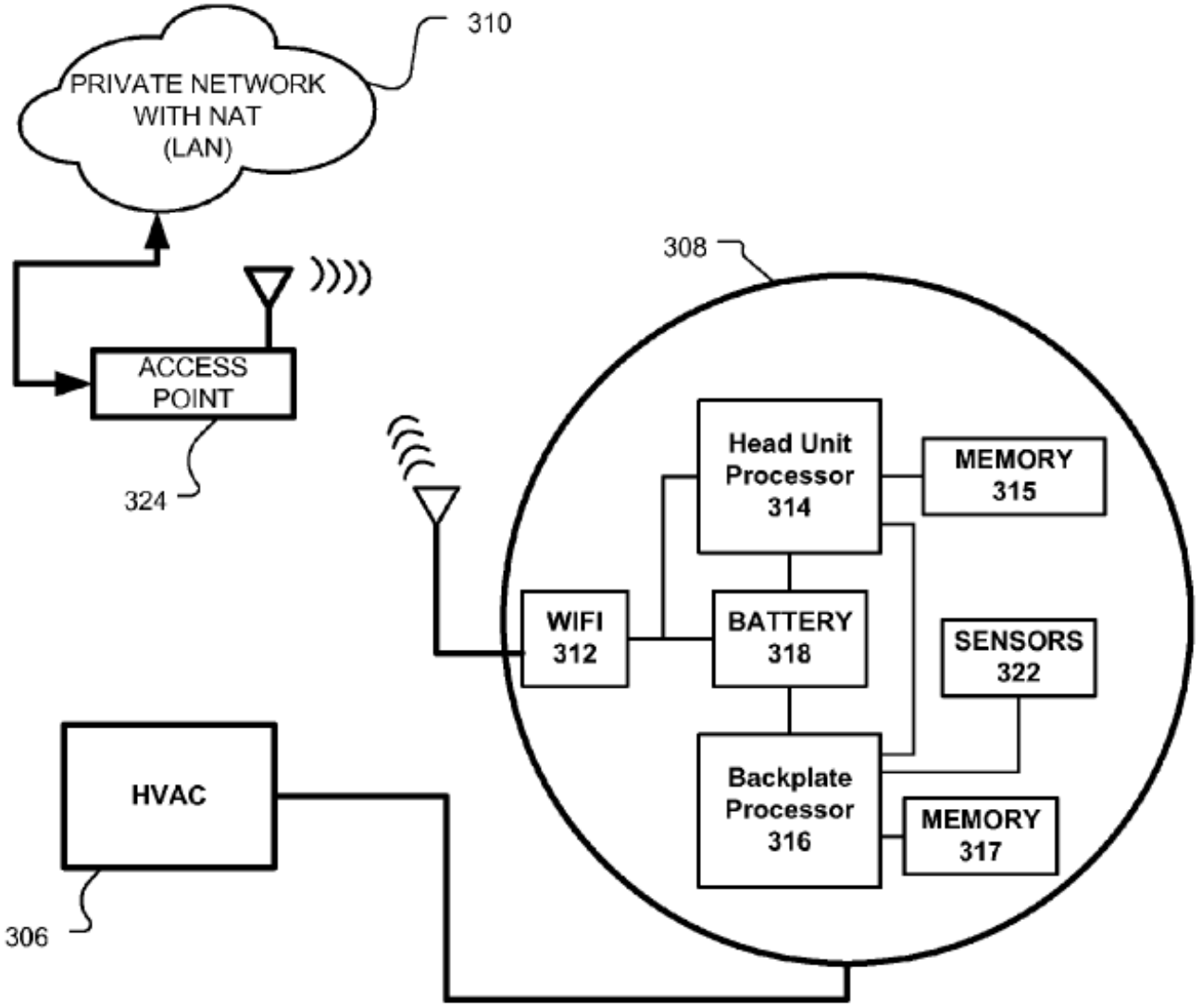
REVISITING THE NEST CASE STUDY

Conceptual Block Diagram



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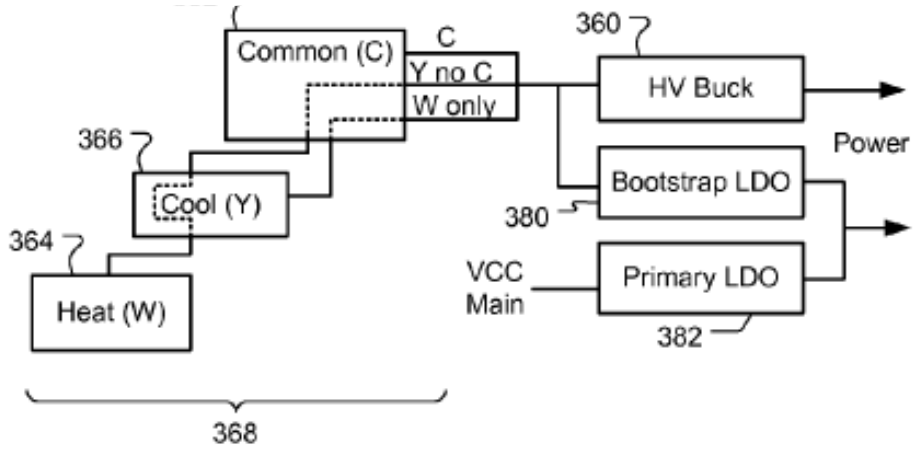
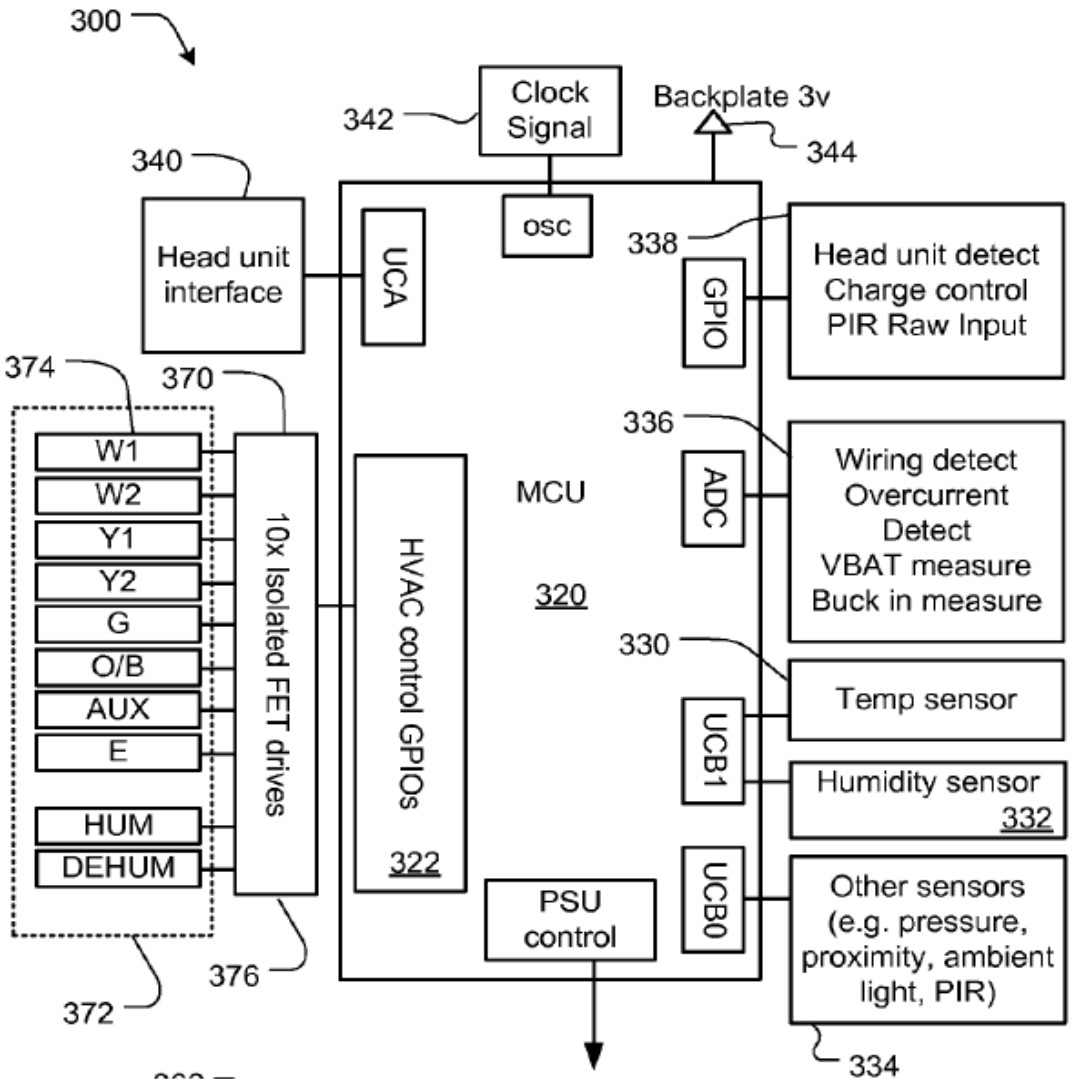
REVISITING THE NEST CASE STUDY

Block Diagram





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NEST PATENTS

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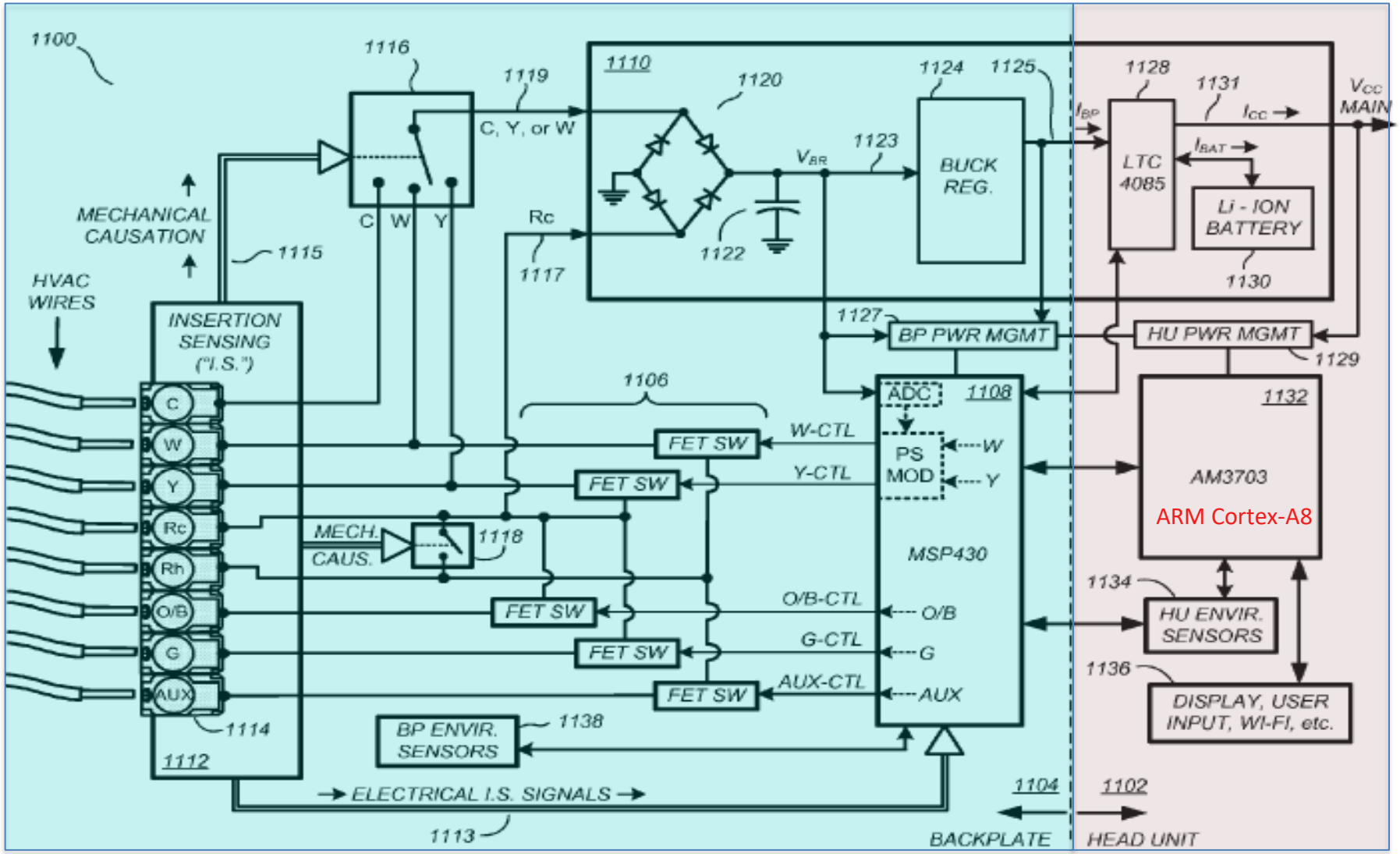
NEST KEY FUNCTIONS

Mechanical Causation of Insertion Sensing Signals



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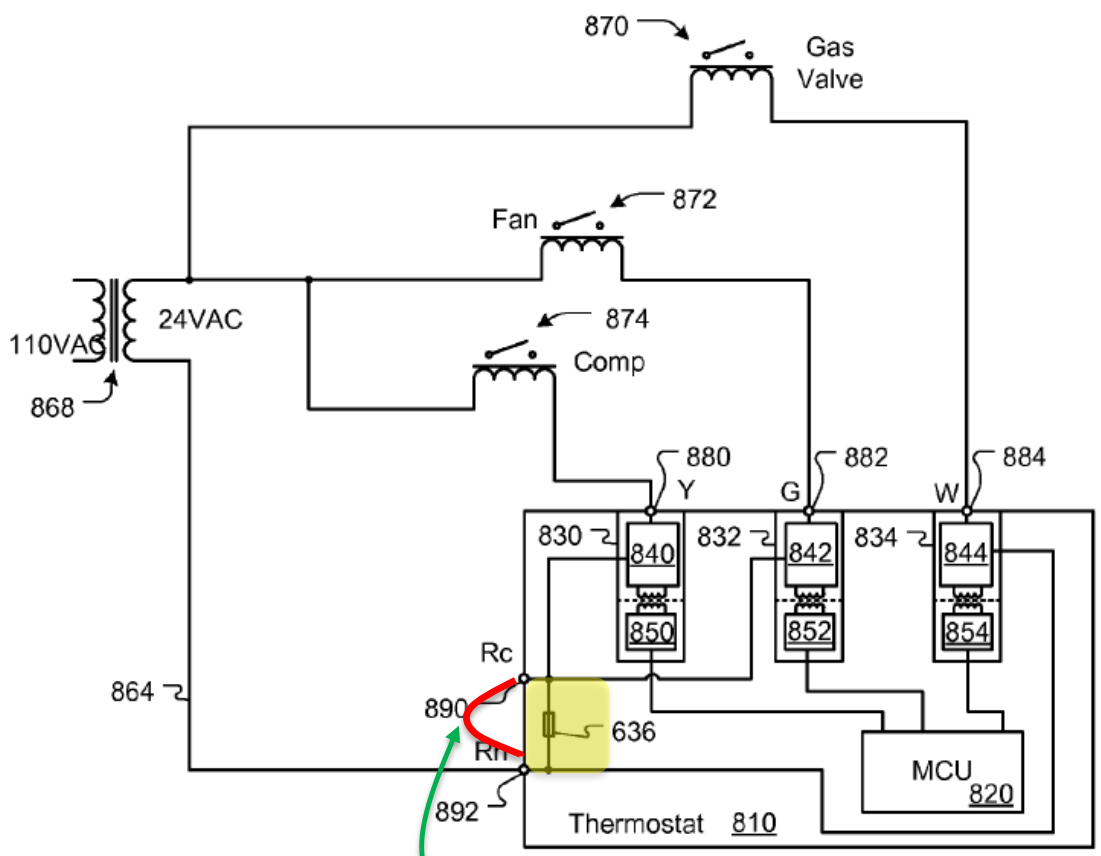
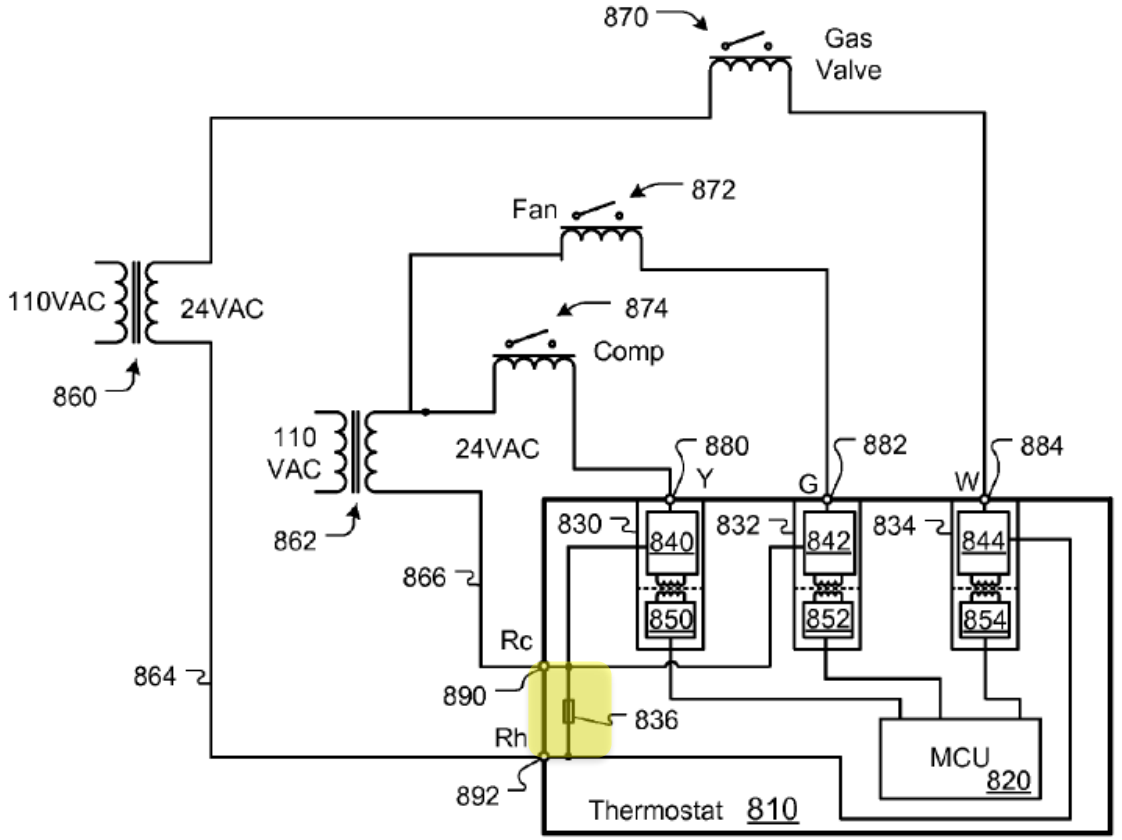
NEST KEY FUNCTIONS

Accommodation of Single and Dual Transformer Installations





The need for an external, user-installed (red) "jumper wire" is eliminated by this innovation

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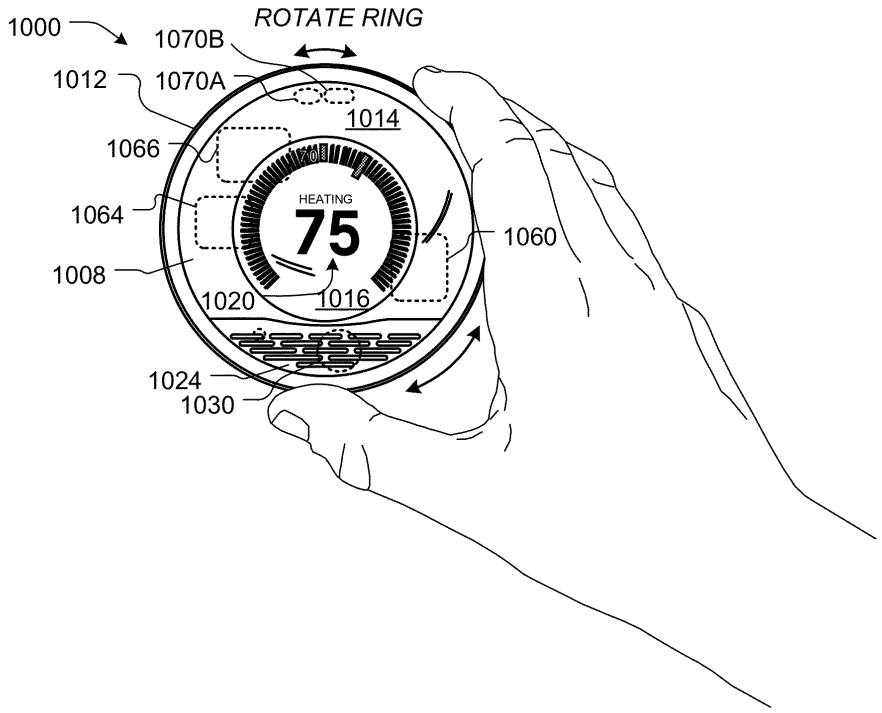
NEST PATENTS

Event Forecasting System

US Patent 8,620,841 (filed Aug. 2012, issued Dec. 2013)

DYNAMIC DISTRIBUTED-SENSOR THERMOSTAT NETWORK FOR FORECASTING EXTERNAL EVENTS

ABSTRACT *Systems and methods for forecasting events can be provided. A measurement database can store sensor measurements, each having been provided by a non-portable electronic device with a primary purpose unrelated to collecting measurements from a type of sensor that collected the measurement. A measurement set identifier can select a set of measurements. The electronic devices associated with the set of measurements can be in close geographical proximity relative to their geographical proximity to other devices. An inter-device correlator can access the set and collectively analyze the measurements. An event detector can determine whether an event occurred. An event forecaster can forecast a future event property. An alert engine can identify one or more entities to be alerted of the future event property, generate at least one alert identifying the future event property, and transmit at least one alert to the identified one or more entities.*



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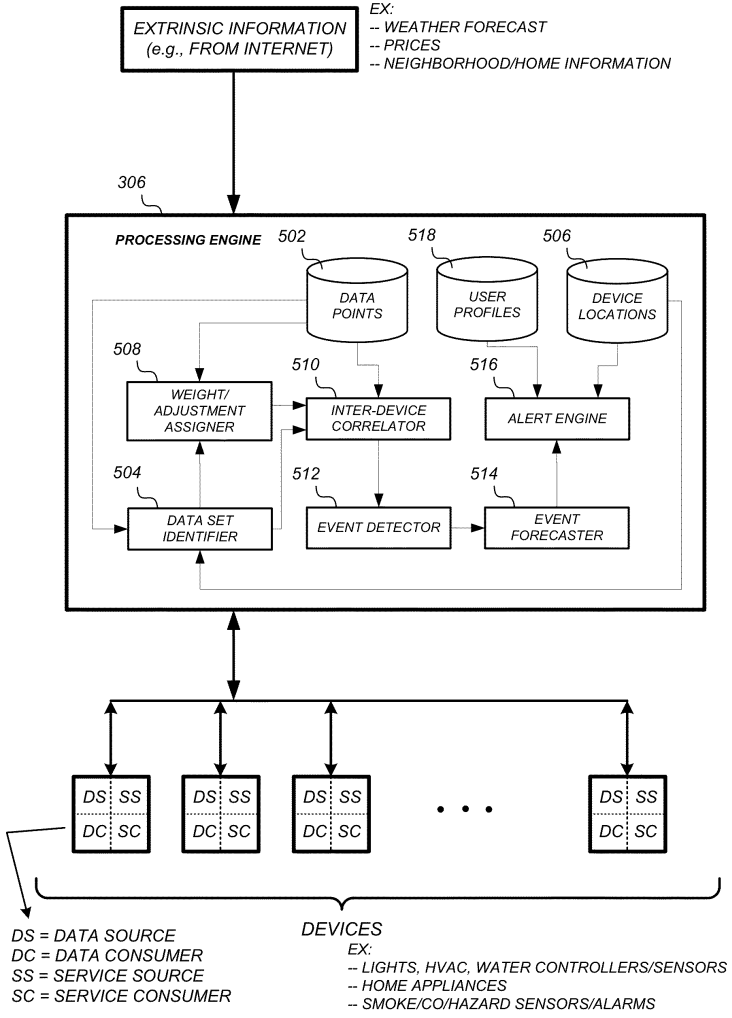
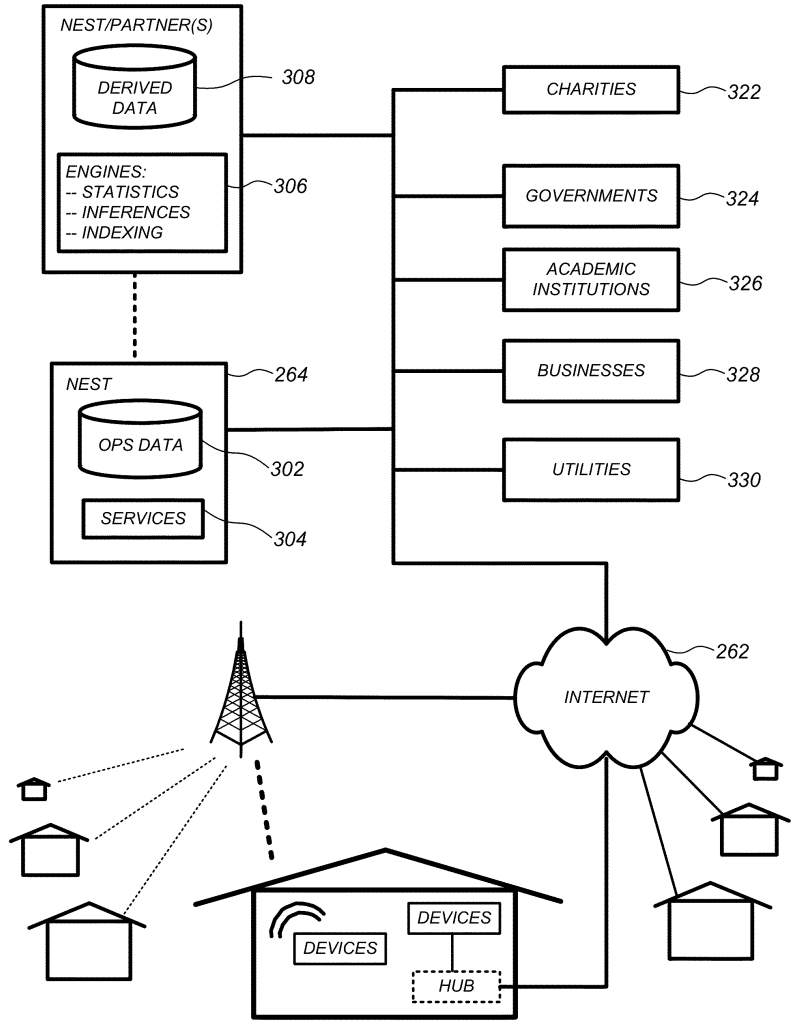
NEST PATENTS

Event Forecasting System is Key Patent Claim





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NEST PATENTS

Advanced Energy Harvesting ("Power Stealing") Strategy

US Patent 8,511,577 (filed Aug. 2012, issued Aug. 2013)

Thermostat with power stealing delay interval at transitions between power stealing states

ABSTRACT A thermostat includes a plurality of HVAC (heating, ventilation, and air conditioning) wire connectors including a connection to at least one call relay wire. The thermostat may also include a powering circuit, including a rechargeable battery, which is configured to provide electrical power to the thermostat by power stealing from a selected call relay wire. The power stealing may include an active power stealing mode, in which power is taken from the same selected call relay wire that is used to call for an HVAC function, and an inactive power stealing mode in which, in which no active call is being made. The powering circuit may be configured to substantially suspend (or at least reduce the level of) power stealing for at least a first time period following each transition of the thermostat from between operating states.

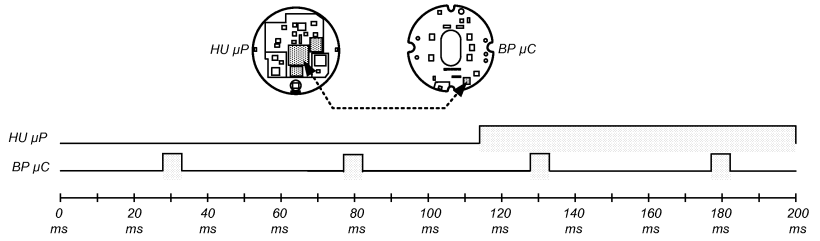


FIG. 17A

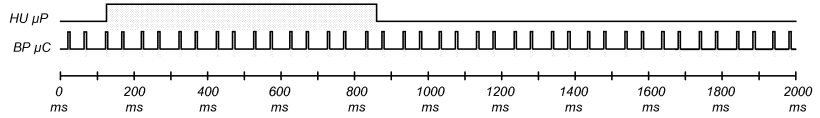


FIG. 17B

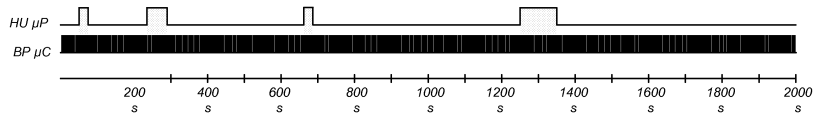
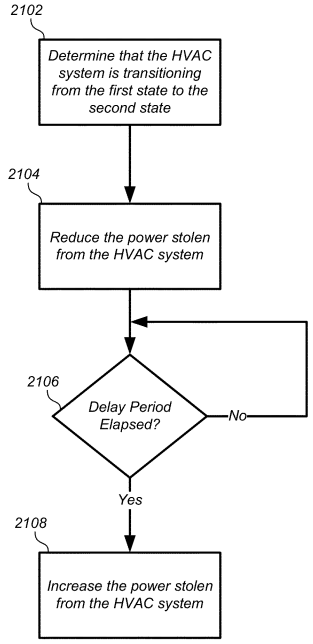


FIG. 17C



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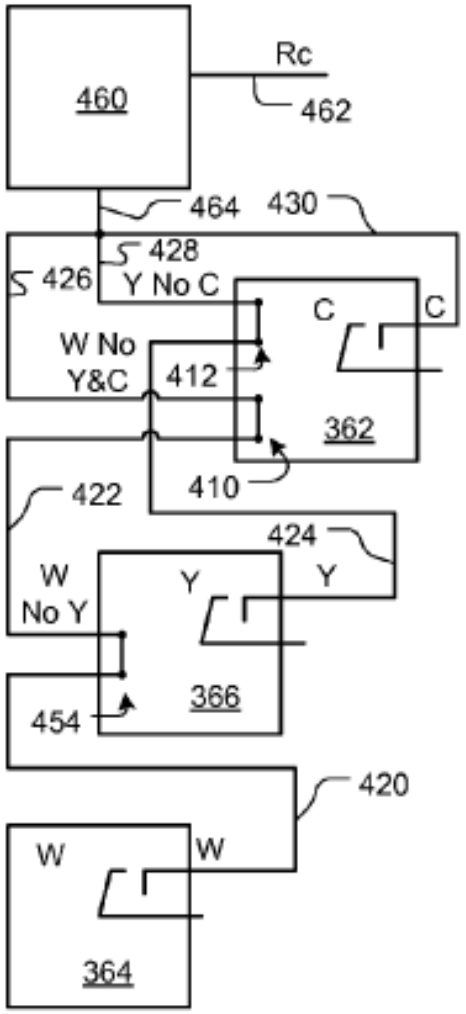
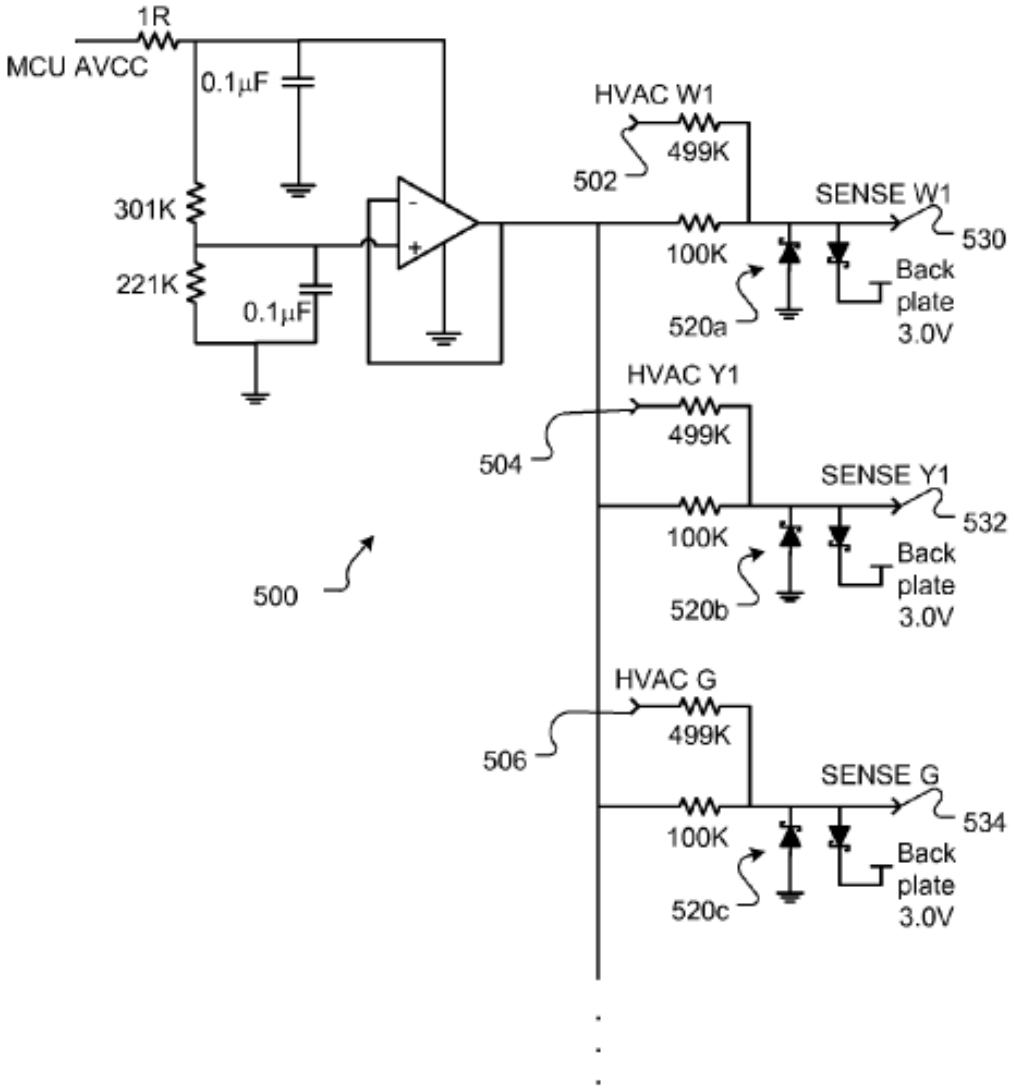
NEST SCHEMATIC DETAILS

Connection Sensing Mechanism

Use of auto-sensing connectors to enable automatic selection of a source for power harvesting





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NEST PATENT ISSUES

US PATENT 8,511,577 Claim Language

- **Claim 1 is the major independent claim**
  - Two mode operation of power stealing (active & inactive modes) with delay

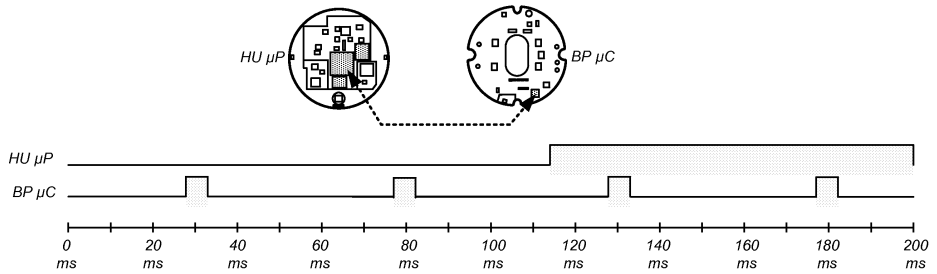

FIG. 17A

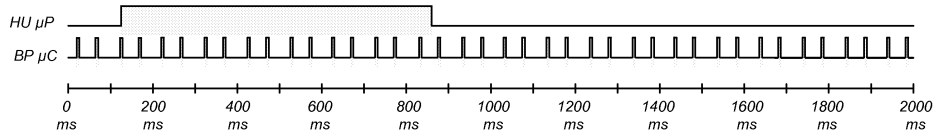

FIG. 17B

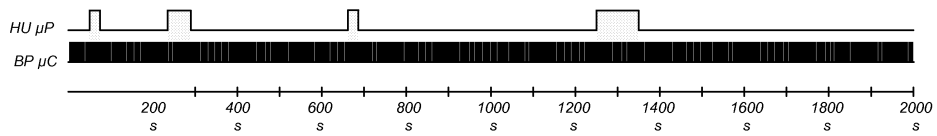

FIG. 17C

What is claimed is:

1. A thermostat, comprising:

a plurality of HVAC (heating, ventilation, and air conditioning) wire connectors configured to receive a plurality of HVAC wires, wherein:

the plurality of HVAC wires is associated with an HVAC system; and

the plurality of HVAC wires comprises at least one call relay wire;

a powering circuit, including a rechargeable battery, that is coupled to the plurality of HVAC wire connectors, the powering circuit being configured to provide electrical power to the thermostat by power stealing from a selected one of said at least one call relay wires, wherein:

said power stealing comprises an active power stealing mode in which power is taken from said selected call relay wire while the thermostat is in a first operating mode in which the thermostat is actively calling for an HVAC function associated with said selected call relay wire,

said power stealing further comprises an inactive power stealing mode in which power is taken from said

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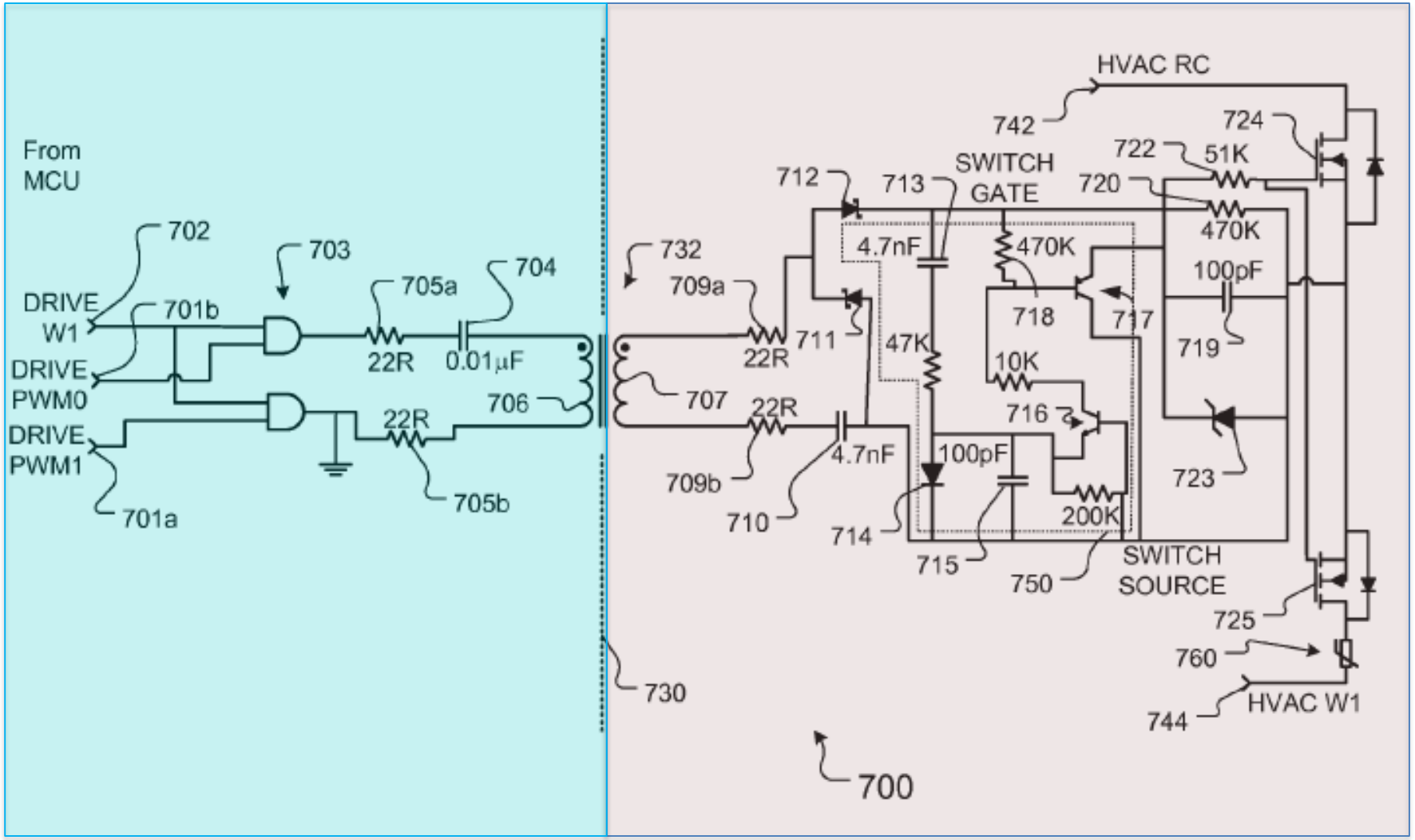
NEST SCHEMATIC DETAILS

Output Drive for Connection Between RC and W (or Y / G)

*Most electronic thermostats accomplish this function (switching 24 VAC signals) using a **latching relay** or an (optically isolated) **thyristor (triac or SCR)** – why is such a complicated circuit (driven by a PWM signal) used by the Nest Thermostat to perform the same function?*

Answer: To enable energy harvesting while a switch contact is "closed."



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NEST PATENT ISSUES

Patent Liability Lawsuit

- February 2012 - Honeywell filed a lawsuit claiming that some of its patents had been infringed by Nest (e.g., US 7,476,988 “Power Stealing Control Devices” – one of seven patents in question)

- Start-up vs Incumbent

Nest CEO Tony Fadell characterized Honeywell as "worse than a troll" when the suit was first raised, calling the patents the company invoked "hopelessly invalid," and arguing that the company was using old patents to stifle innovation in the thermostat market. "They are not trying to get money out of us," Fadell said at the time. "They are trying to maintain the status quo." Honeywell's own flagship thermostat, Nest said, showed "little more technological improvement to the flagship Honeywell thermostat than the replacement of a mechanical display with an LCD" in seven decades on the market.

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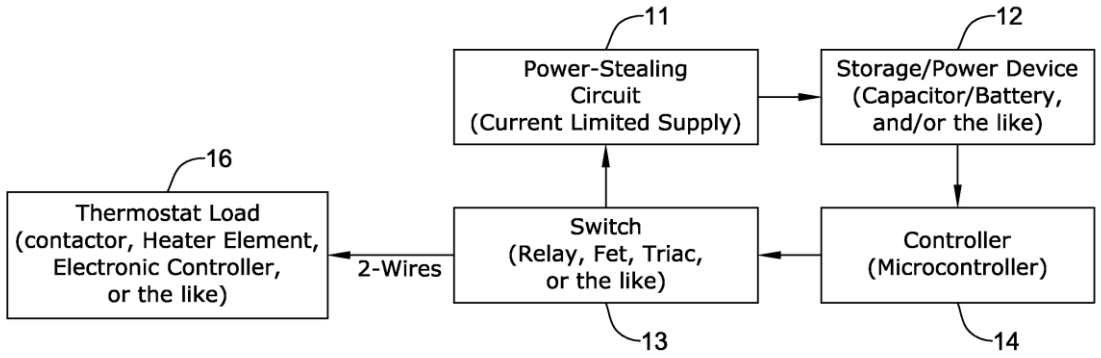
NEST PATENT ISSUES

Honeywell US 7,476,988 B2 Claim Language

- **Claim 1 is the major independent claim**
  - Energy harvesting technique for a “switched load” circuit (such as used in a thermostat)
  - Includes possibility of a storage device (e.g., battery or super capacitor)



What is claimed is:

1. A power stealing system comprising:

a switch for switching power on and off to an electrical load;

a control circuit connected to the switch;

a storage device connected to the control circuit, wherein the control circuit conveys power from the switch to the storage device when the switch is off;

a controller connected to the switch and control circuit, wherein the controller is configured to control the switching of the switch;

a secondary power supply; and

wherein the control circuit is configured to convey power from the storage device to the controller, and if the storage device does not have sufficient power to power the controller, the control circuit conveys power from the secondary power supply to the controller.

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NEST PATENT ISSUES

Beefing Up the Shield (Before More Swords Are Drawn…)

- September 2013 – Nest announced patent license agreement with Intellectual Ventures, and acquired several patents (unclear how many)

- February 2014 Google buys Nest for $3.2 Billion

Google and multinational manufacturer Honeywell have resolved their long-running patent dispute over the thermostats produced by Nest Labs, the two companies announced today [May 5, 2016]. Honeywell first filed a patent infringement suit against Nest's Learning Thermostat in early 2012, two years before the home automation company was purchased by Google. There are no details on what the settlement entails, but the two companies said they now shared a "long-term patent cross-license agreement reflecting the respective strength of the companies' patent portfolios."

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NEST PATENT ISSUES

Other Patent Infringement Lawsuits

- May 2013 – Allure Energy filed lawsuit against Nest for newly issued patent US 8,442,695 “Auto-Adaptable Energy Management Apparatus” (filed November 2011)

Kevin Imes, president and CEO of Allure Energy, first began developing a smart thermostat in 2009, filing its patent application in 2010, to manage home temperature and energy usage. Allure Energy also developed and patented “Proximity Control Technology” that instantly adapts to a user’s daily schedule to provide automatic comfort and energy savings at home based on the distance a user may be from a residence.

Case was mediated on May 21, 2015 (no details have been released, but likely a victory for Allure).

“With our own capital, we created a smart and original thermostat control that also syncs music, reports local weather and offers energy tips, and filed all the required patent documentation well before Nest Labs launched its products.”

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NEST PATENT ISSUES

Other Patent Infringement Lawsuits

- November 2013 – BRK (First Alert) filed a lawsuit against Nest alleging infringement on six of its patents (e.g., location warning voice alerts)

The location warning system, BRK says, was laid out in a series of patents that cover using pre-recorded voice alerts to "describe the type of environmental condition detected or the location" of the detector that senses it. That "exclusive" technology was first used in a 2003 smoke detector, and the company says it's sold 1.8 million units with voice and location alarm systems since then.

No publically posted information is available on the current status of this lawsuit.

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PATENT LIABILITY

Why There Are Lawyers

- Major concern: limited technical expertise of lawyers, judges, and jury pools
- Lawsuits are typically very expensive and often take years to resolve
- Questions
  - How can judges and juries with limited expertise decide cases involving hardware/software?
  - What could be done to make it harder for “bad people” to profit from “bad patents”?

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PATENT LIABILITY

Patent Reform Act of 2011

- Leahy-Smith America Invents Act (AIA), signed into law on September 16, 2011
- Represents the most significant change to patent law since 1952
- Switches U.S. patent system from a “first to invent” to a “first to file” system, eliminates interference proceedings, and develops post-grant opposition
- Part of a continuous process
  - Previous reforms targeted “submarine patents”
  - Patent protection from date of issue vs. patent protection from date of filing

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An **interference proceeding** is an administrative proceeding conducted by a panel of administrative patent judges of the USPTO to determine which applicant is **not** entitled to the patent if **both claimed the same invention** in: two or more pending patent applications, or at least one pending patent application and at least one patent issued within a year of the pending application's filing date.

PATENT LIABILITY

Patent Reform Act of 2011

- First-Inverter-to-File
  - move US further toward first-to-file system
  - discourages patent awards based on “secret knowledge”
  - each patent application given an “effective filing date”
  - patentability judged on whether any prior art was available prior to the filing date (retain one-year grace period, but only for inventor’s own disclosures)
  - obviousness also judged as of the effective filing date
- Damages
  - specific procedures and checks added on how a judge manages the damages portion of a case (identify methodologies and factors that are relevant to the determination of damages)
  - court required to consider either party’s contentions regarding evidentiary base

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PATENT LIABILITY

Patent Reform Act of 2011

- Enhanced damages
  - historically based on "willful" (or "reckless") infringement, allowing the court to increase damages up to 3 times the amount found or assessed
  - codified: infringement is not deemed "willful" unless claimant proves by clear and convincing evidence that accused infringer's conduct with respect to the patent was objectively reckless (i.e. that the infringer was acting despite an objectively high likelihood that his actions constituted infringement of a valid patent)
  - accusations of willful infringement must be pled with particularity (proof of knowledge of patent is insufficient to establish willful infringement)
  - in a "close case" there will be no willful infringement

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PATENT LIABILITY

Patent Reform Act of 2011

- Third-Party Challenges to Patent Rights
  - pre-issuance third-party submissions (allows a third party to submit any printed publication along with a description of the relevance to the USPTO during examination of pending patent application)
  - third-party requested post grant review (would allow a third party to present essentially any legal challenge to the validity of at least one claim…but must be filed within 9 months of issuance)
  - *inter partes* review proceedings (once 9-month window expired, a third party can request reconsideration of novelty and obviousness issues based on prior art patents and printed publications)

PATENT LIABILITY

Patent Reform Act of 2011

- Best mode
  - intended to prevent “less-than-full” patent disclosures by documenting only an inferior implementation of the patent
  - excludes failure to disclose a best mode from being used as a basis for invalidating an issued patent
  - PTO will still have a duty to only issue patents where the best mode requirement has been satisfied

PATENT LIABILITY

Patent Reform Act of 2011

- Concerns
  - further entrenchment of market incumbents
  - falling rate of startup formation
  - falling levels of venture capital
  - diminished incentives for investment and development
  - greater options for accused infringers and weakened rights of patentees
  - “better solution” would be to issue higher quality patents in the first place to help avoid the overhead (and possible inequities) associated with the reexamination process…(?)

CLICKER QUIZ

Question 11

An important objective of recent patent reform legislation is to:

A. repeal the “first-inventor-to-file” principle
B. include failure to disclose a “best mode” as a basis for patent invalidation
C. remove limits on punitive damages
D. expand third-party challenges to issued patents
E. none of the above

CLICKER QUIZ

Question 11 - Answer

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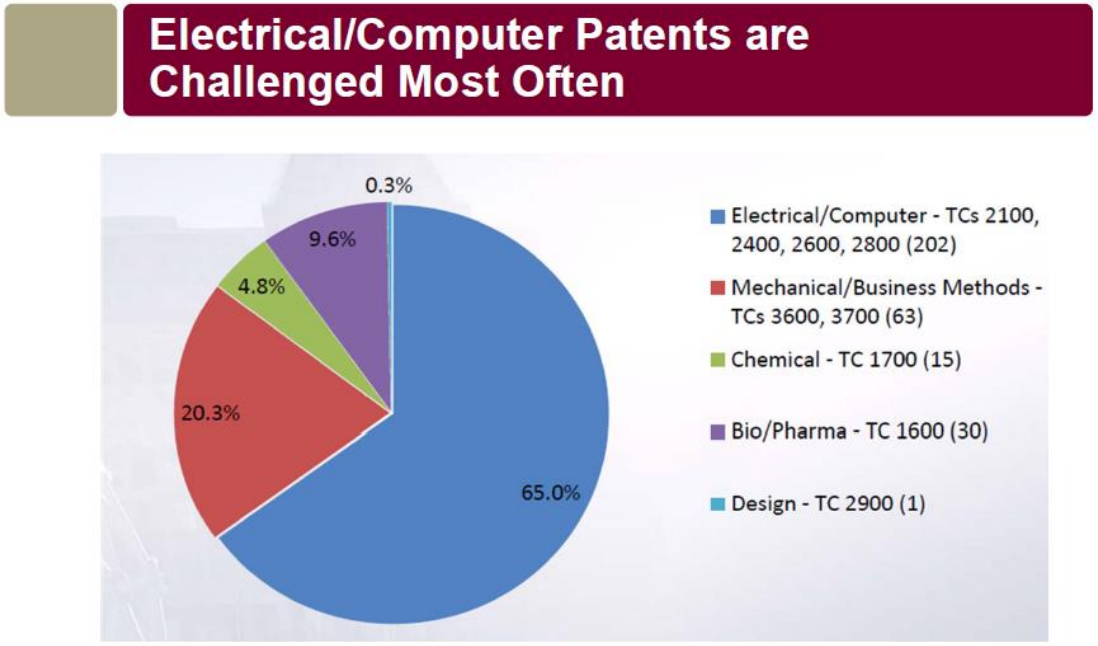

http://www.uspto.gov/ip/boards/bpai/stats/112714_aia_stat_graph.pdf

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LEGAL & REGULATORY ANALYSIS REPORT

- Regulatory Analysis

  Analyze your device; determine what regulatory certifications your device will require in order to be sold to your target market (FAA, FCC, UL, ITAR, Medical Device, etc.) and what steps you will have to plan for in the event of developing your prototype into a finished product.

- Patent Liability Analysis

  Describe 3 or more patents or commercial products that perform some or all functions in a manner similar to your project; use a separate subsection for each patent/product. For each patent/product, include one or more paragraphs describing:

  - *<u>The results of your patent/product search:</u> Include the filing date, a (condensed) abstract, and key patent claims for which the potential of infringement exists. If a commercial product is being used, list any functions being performed in substantially the same way as well as any pending or issued patents on the product.*
  - *<u>Analysis of patent liability:</u> Analyze your project's liability for literal or doctrine-of-equivalents infringement of the provided patent. Clearly and carefully describe how the function(s) performed by your project are similar/different than the function(s) performed by the patent/product described in this subsection. This will require you to carefully construe the claim language of each patent you cite.*

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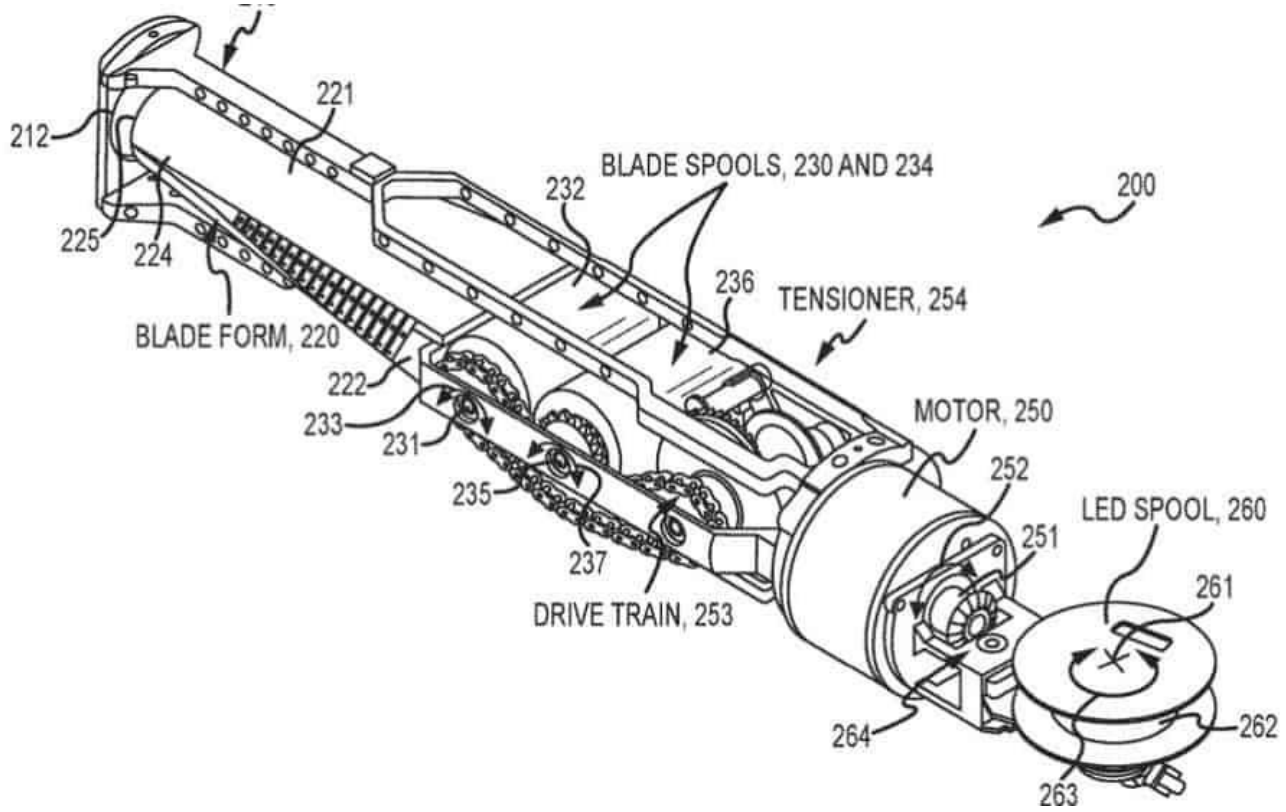
CLICKER QUIZ

Bonus Question

A patent on the Lightsaber has been filed by:

A. Luke Skywalker
B. Lord Palpatine
C. George Lucas
D. Disney
E. none of the above



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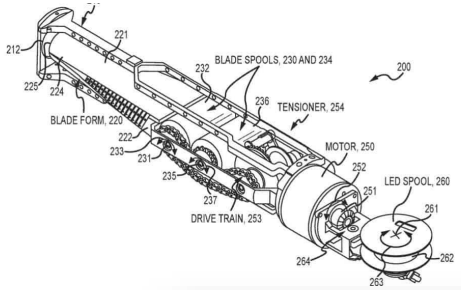

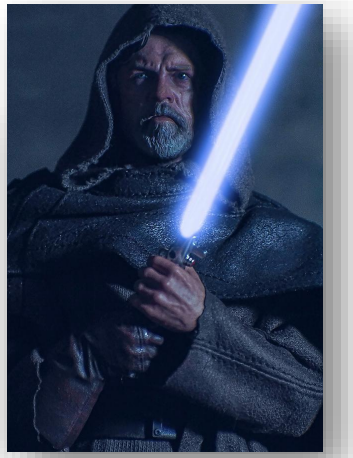

DISNEY FILES GAME-CHANGING RETRACTABLE LIGHTSABER PATENT (NEW SABER TECHNOLOGY)

December 18, 2018 *Disney has filed for a patent on a "Sword device with retractable, internally illuminated blade". The move could signal the company's intention to develop the most realistic officially licensed lightsaber to date. Disney has not yet announced a release date for new lightsabers that would use the patent filing's technology. Disney's patent filing describes the retractable blade design as including "two long plastic semi-cylinders, and these two blade body members are rolled perpendicular to their length, which creates compact cylinders of material of small volume that can be provided on a pair of spools in a hilt." A flexible lighting strip would illuminate the blade. The patent pending lightsaber technology could be game-changing in the lightsaber market.*

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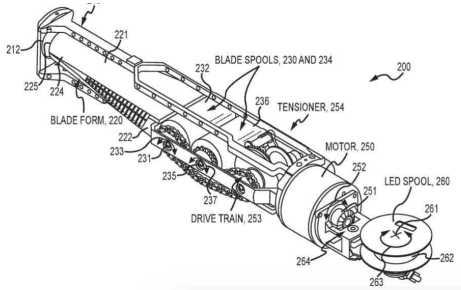

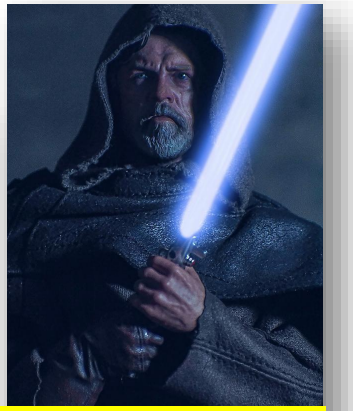

Luke and Lord Palpatine could not be reached for comment at the time of publication, as they have supposedly been wiped out in multiple movies.

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