Intellectual Property

20 January 2026 | ECE 445 – Senior Design

Intellectual Property (IP)

Intangible “creations of the mind”:

inventions, written works, art, designs, etc.

IP protection is a tool to help extract this value

- Patents
- Copyright
- Trademark
- Mask Works
- Trade Secret
- Know-How

Why "Protect" IP?

- Obtain a limited monopoly for IP owners to commercialize their idea

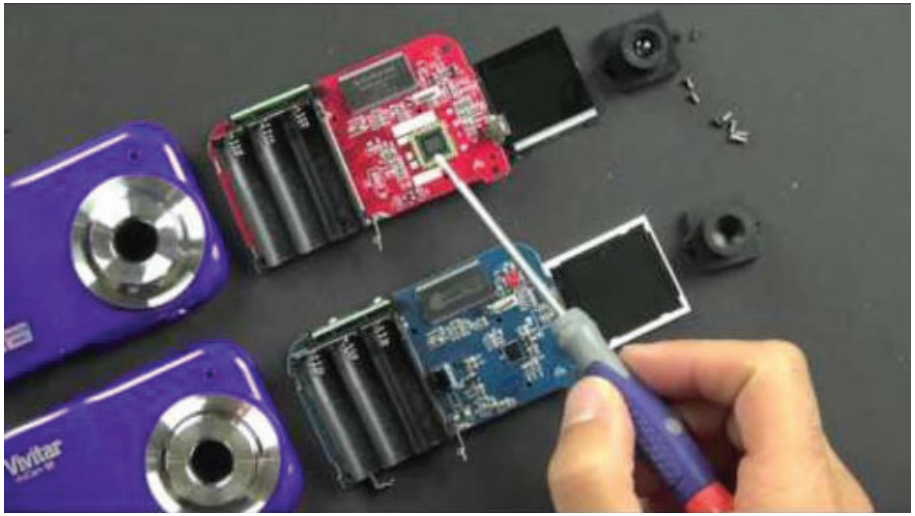
HOWEVER,

- IP owners, not governments, enforce IP
  - Sue infringers

IP Protection as a Public Good

R&D is expensive

…copying is not



- Without IP protection, many innovations would never be developed
- Not just relevant for companies/entrepreneurs: there's no reason for a company to pay its engineers if competitors can steal all their ideas.

Who Owns IP?

DEFAULT:

Inventors/creators own their own intellectual property

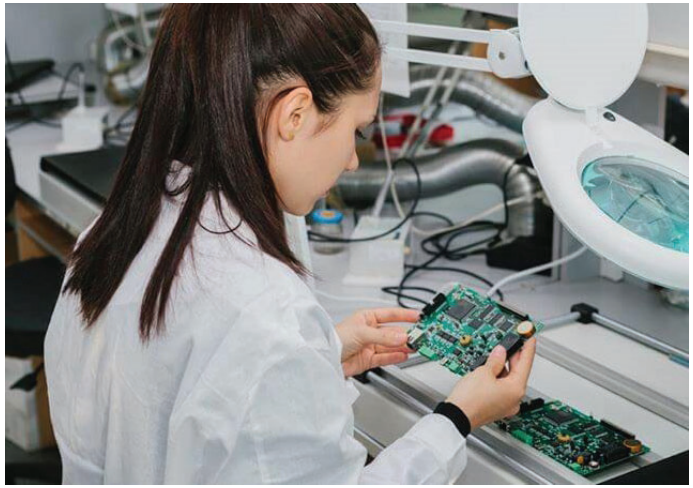
REALITY CHECK:

Most of us sign our IP rights over to employers

Uof I generally only asserts ownership over student work if it was developed using significant university resources.

- Ask OTM for determination if unsure

HOWEVER, project sponsors/clients may own IP for projects they offer.



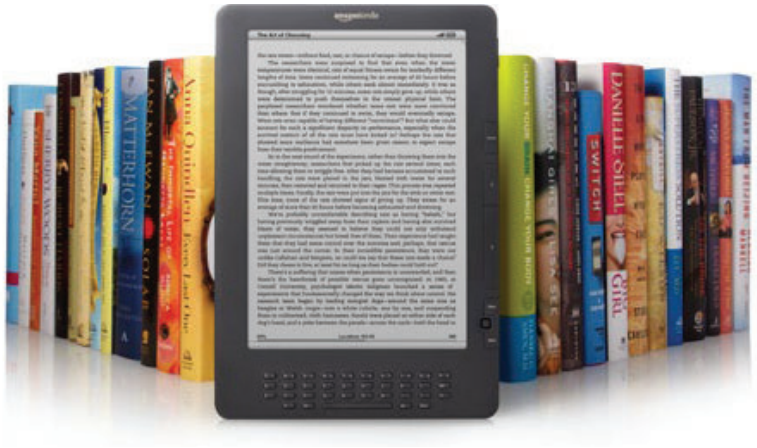
What Can Students Do With Their IP? (Example)

- A group of U of I students created a robotic pet toy to triggered cats' predator drive and increase play/exercise
- They started a company (Petronics), raising millions of dollars from investors
- The investors questioned whether Petronics' IP actually belonged to U of I, refusing to invest until the University reviewed
- OTM performed an ownership determination and provided a waiver

- U of I has amazing student entrepreneurship resources; for info see https://tec.illinois.edu/ and https://entrepreneurship.illinois.edu/

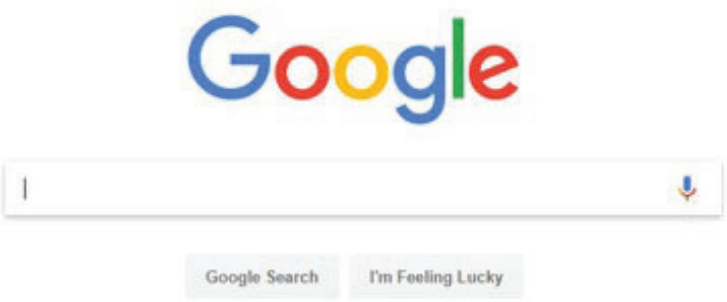
Types of IP: Copyright

- Copyright attaches automatically and instantaneously to “expressed form”
  - Words, photos, artwork, software code, music, video…
- Good practice to include copyright mark to avoid damage limitations
  - Copyright 2026 Board of Trustees of the University of Illinois
  - © 2026 Michelle Chitambar
- Generally expires 70 years after author’s death
- Register a copyright before suing an infringer
- Fair use exceptions



Types of IP: Trade Secrets & Know-How

- Keep information out of public domain
- “Protect” via confidentiality agreements, etc.
- Lasts until is disclosed, reverse-engineered or independently discovered



Types of IP: Patents

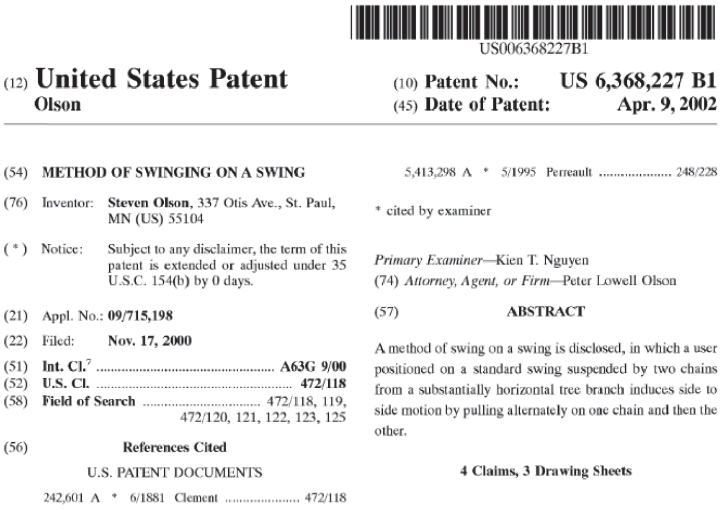
Last ~20 years

Requirements for patentability:

- Novel
- Non-obvious

Usually cost $20-$35k each

A patent does **not** mean the invention has academic merit, is valuable, or is even a good idea… just that it's patentable.



US006368227B1

(12) **United States Patent**
Olson

(10) **Patent No.: US 6,368,227 B1**
(45) **Date of Patent: Apr. 9, 2002**

(54) **METHOD OF SWINGING ON A SWING**

(76) Inventor: **Steven Olson**, 337 Otis Ave., St. Paul, MN (US) 55104

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/715,198**

(22) Filed: **Nov. 17, 2000**

(51) **Int. Cl.**[7] **A63G 9/00**
(52) **U.S. Cl.** **472/118**
(58) **Field of Search** 472/118, 119, 472/120, 121, 122, 123, 125

(56) **References Cited**

U.S. PATENT DOCUMENTS

242,601 A * 6/1881 Clement 472/118
5,413,298 A * 5/1995 Perreault 248/228

* cited by examiner

Primary Examiner—Kien T. Nguyen
(74) *Attorney, Agent, or Firm*—Peter Lowell Olson

(57) **ABSTRACT**

A method of swing on a swing is disclosed, in which a user positioned on a standard swing suspended by two chains from a substantially horizontal tree branch induces side to side motion by pulling alternately on one chain and then the other.

4 Claims, 3 Drawing Sheets

Example (hypothetical based on a 2022 ECE 445 project)

- A group of ECE 445 students chose to do their project on a UV sensor system.

ECE 445

Senior Design Laboratory

Final Report

UV Sensor and Alert System for Skin Protection

Abstract

This paper describes the design process and results for the UV Wearable Sensor and Alert System, which seeks to create a wearable device capable of tracking UV exposure over time and alerting the user when he or she is at risk of skin damage. This paper begins with the motivation for the project and a detailed description of the device design. Then, it describes the verifications for the design and any design changes that were made during the design process. Finally, the paper concludes with the final results and future work. Overall, the device was successful and able to track current UV exposure, measure exposure over time, and alert the user when he or she was at risk of skin damage due to UV exposure.

Example (hypothetical based on a 2022 ECE 445 project)

- A group of ECE 445 students chose to do their project on a UV sensor system.
- While doing a Google search, they run across patents that look similar to their project.

Publication	Publication Date	Title
US11029198B2	2021-06-08	Alternative approach for UV sensing
US20230270344A1	2023-08-31	Wearable monitoring device
US11666240B2	2023-06-06	Ultra-low power, miniaturized electronic systems for monitoring applications of same
US8428676B2	2013-04-23	Thermoelectric energy harvesting with wireless sensors
WO2019191703A1	2019-10-03	Wireless skin sensor with methods and uses
Haahr et al.	2008	A wearable "electronic patch" for wireless continuous monitorin
FR2949659A1	2011-03-11	DEVICE FOR DETERMINING PHYSICAL FUNCTIONS OF AN INDI
US20190391278A1	2019-12-26	Wearable systems with battery-free sensors
Sharma et al.	2016	Circuits and systems for energy efficient smart wearables
US12144579B2	2024-11-19	Wireless skin sensor with methods and uses
Kim	2021	Networks and near-field communication: up-close but far away
Gutruf	2020	Alex Burton, BS, Tucker Stuart, BS, Jokubas Ausra, BS
Wipiejewski et al.	0	ICT Applications in Health Monitoring

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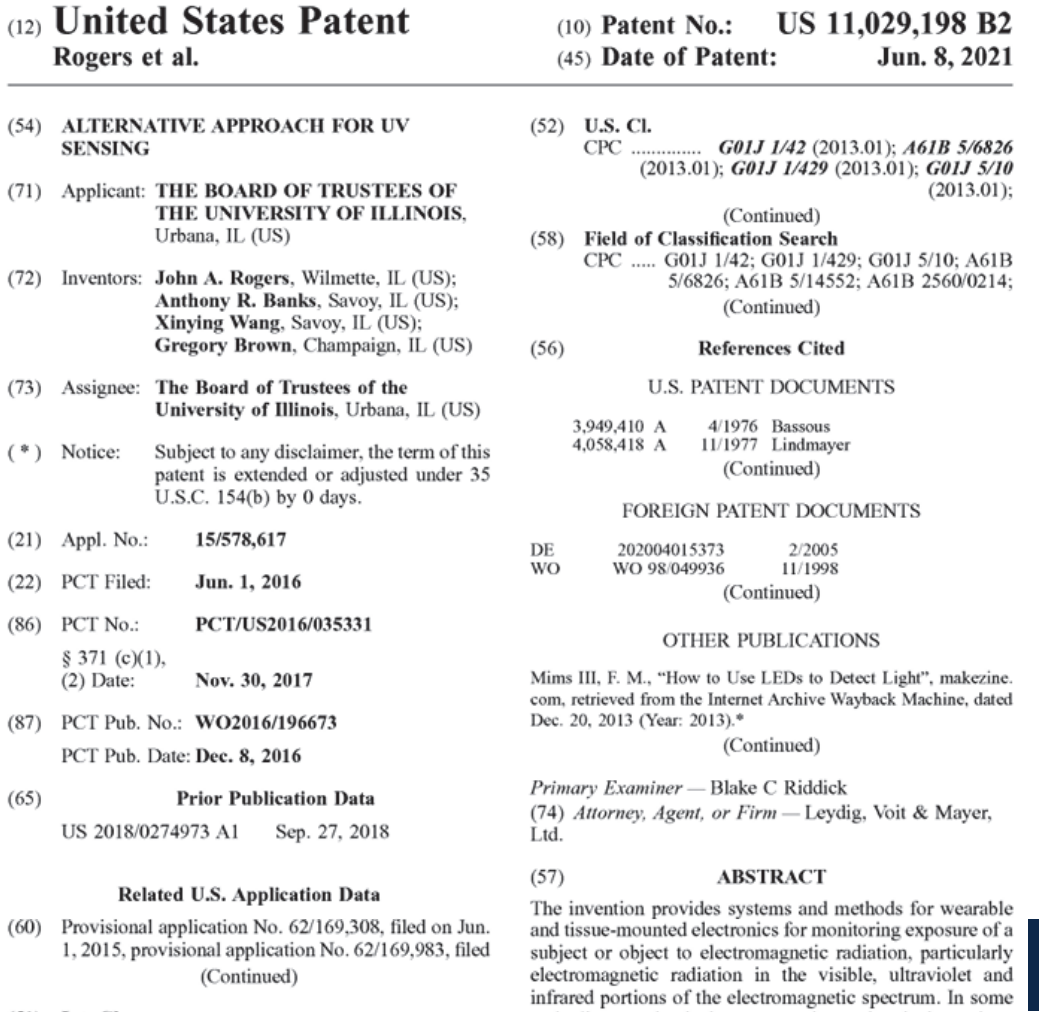
- A group of ECE 445 students chose to do their project on a UV sensor system.
- While doing a Google search, they run across patents that look similar to their project.
- **Do they have to be worried about being sued for patent infringement if they continue with their project?**



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

(10) **Patent No.: US 11,029,198 B2**
(45) **Date of Patent: Jun. 8, 2021**

(54) **ALTERNATIVE APPROACH FOR UV SENSING**

(71) Applicant: **THE BOARD OF TRUSTEES OF THE UNIVERSITY OF ILLINOIS**, Urbana, IL (US)

(72) Inventors: **John A. Rogers**, Wilmette, IL (US); **Anthony R. Banks**, Savoy, IL (US); **Xinying Wang**, Savoy, IL (US); **Gregory Brown**, Champaign, IL (US)

(73) Assignee: **The Board of Trustees of the University of Illinois**, Urbana, IL (US)

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(21) Appl. No.: **15/578,617**

(22) PCT Filed: **Jun. 1, 2016**

(86) PCT No.: **PCT/US2016/035331**
§ 371 (c)(1),
(2) Date: **Nov. 30, 2017**

(87) PCT Pub. No.: **WO2016/196673**
PCT Pub. Date: **Dec. 8, 2016**

(65) **Prior Publication Data**

US 2018/0274973 A1 Sep. 27, 2018

Related U.S. Application Data

(60) Provisional application No. 62/169,308, filed on Jun. 1, 2015, provisional application No. 62/169,983, filed
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(52) **U.S. Cl.**
CPC ***G01J 1/42*** (2013.01); ***A61B 5/6826*** (2013.01); ***G01J 1/429*** (2013.01); ***G01J 5/10*** (2013.01);
(Continued)

(58) **Field of Classification Search**
CPC G01J 1/42; G01J 1/429; G01J 5/10; A61B 5/6826; A61B 5/14552; A61B 2560/0214;
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4,058,418 A 11/1977 Lindmayer
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Primary Examiner — Blake C Riddick
(74) *Attorney, Agent, or Firm* — Leydig, Voit & Mayer, Ltd.

(57) **ABSTRACT**

The invention provides systems and methods for wearable and tissue-mounted electronics for monitoring exposure of a subject or object to electromagnetic radiation, particularly electromagnetic radiation in the visible, ultraviolet and infrared portions of the electromagnetic spectrum. In some

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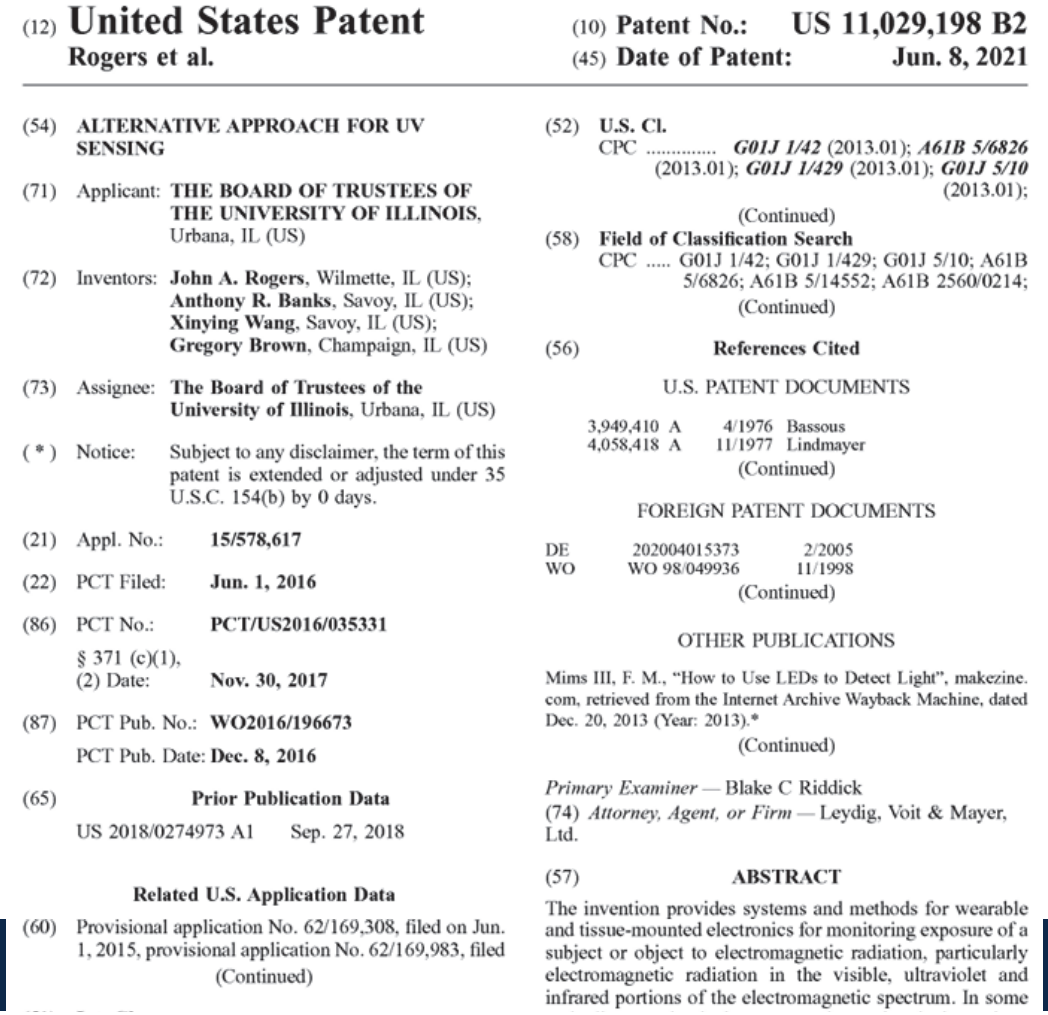

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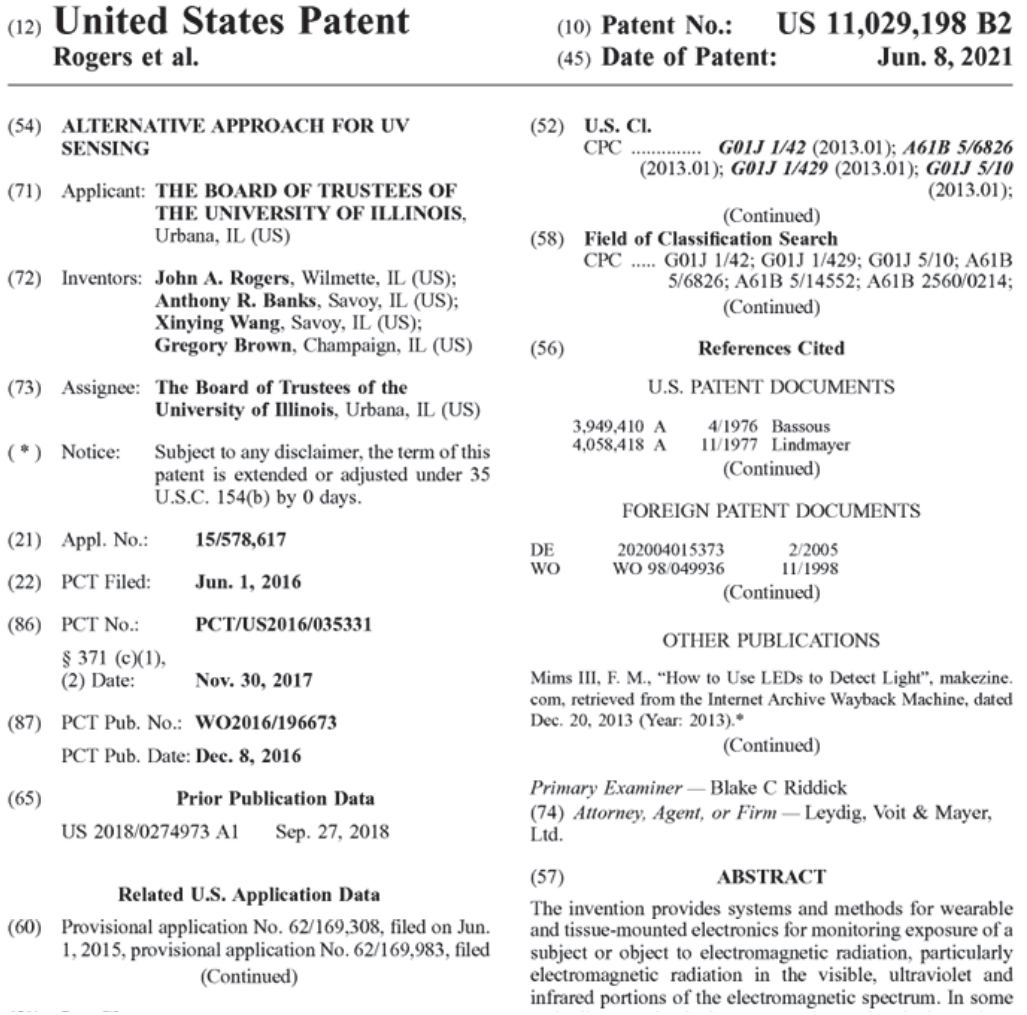

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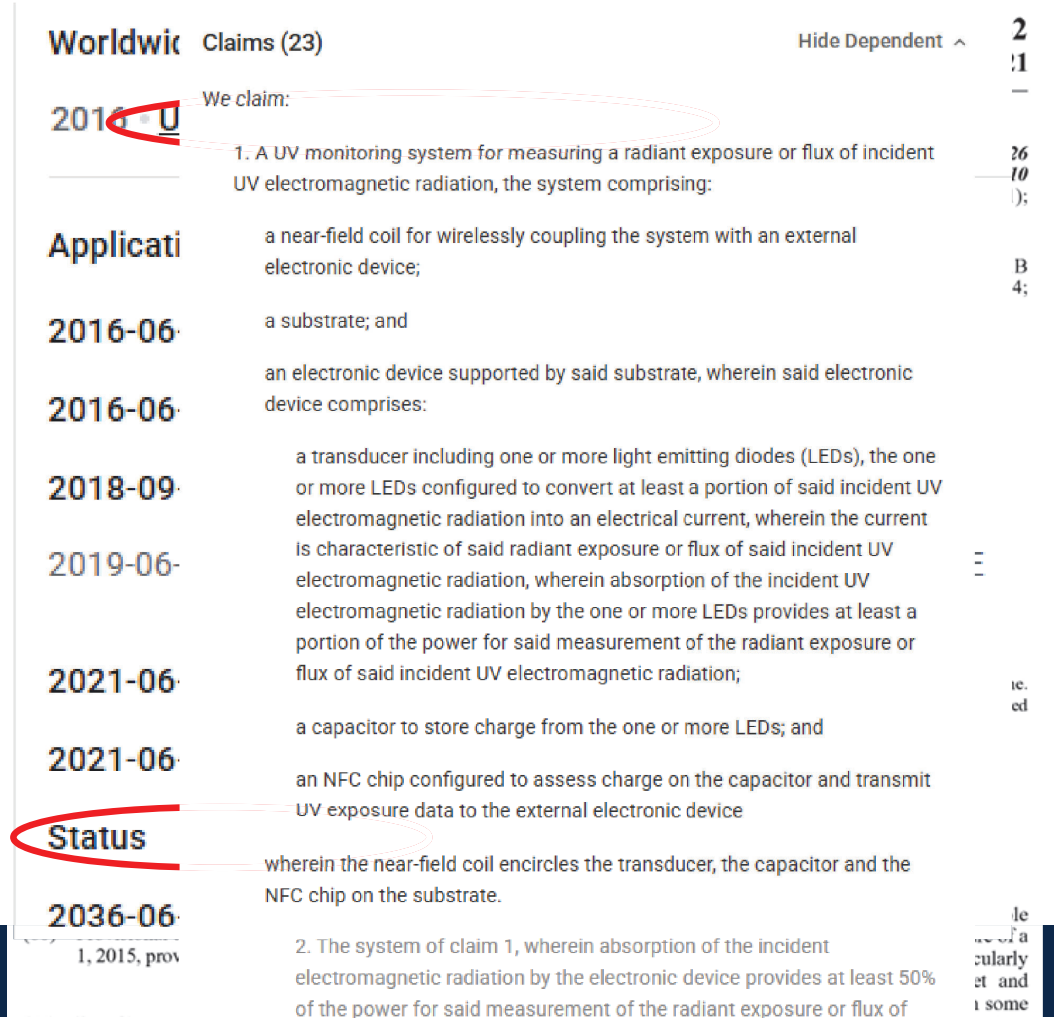
Example (hypothetical based on a 2022 ECE 445 project)

- **What if the students want to commercialize their invention?**
  - Discuss with someone knowledgeable about IP—there is a steep learning curve to IP and nuance matters!
  - Look for whether the patent is in force (versus expired/abandoned or pending), and where
  - Review the patent's claims; you're only infringing on the patent if you're doing everything in at least one claim.
    - If you're doing everything plus more, you're still infringing.



Questions?

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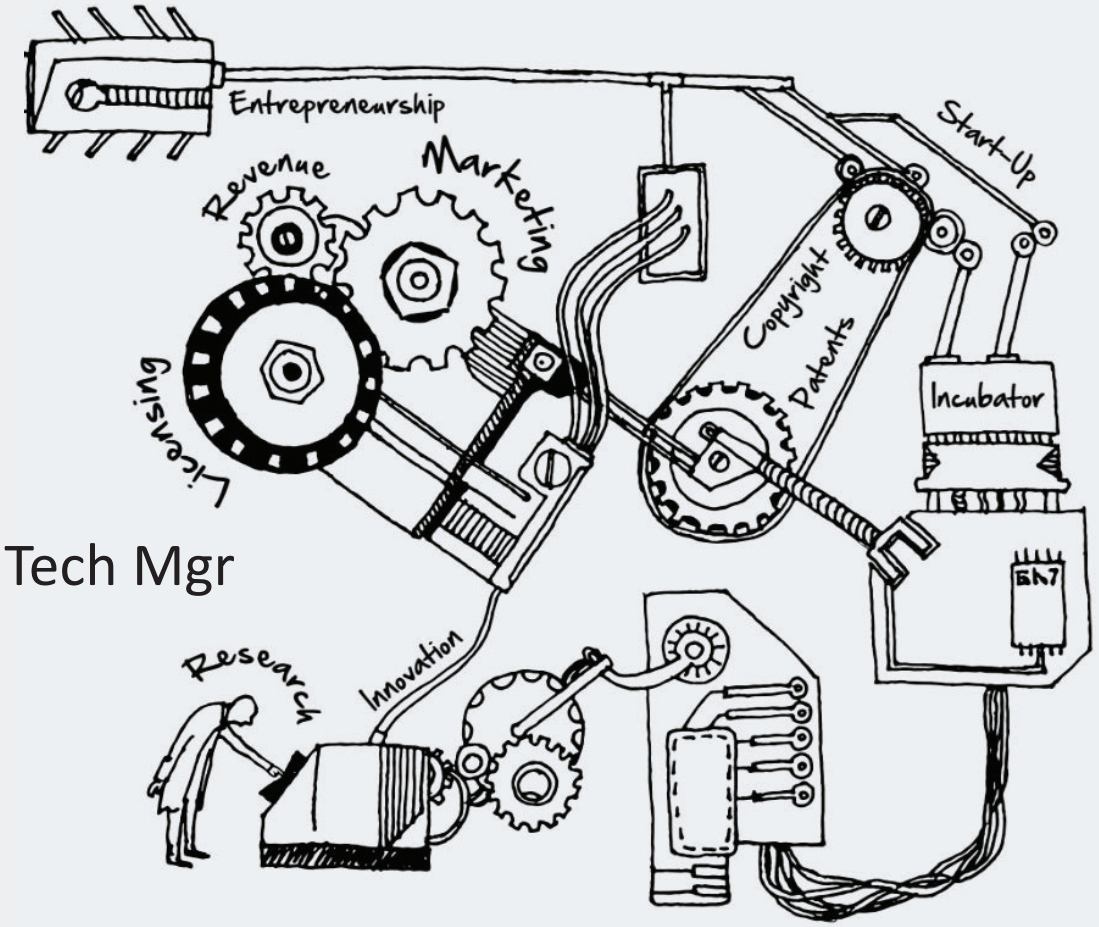

(12) **United States Patent**
Marron

(10) **Patent No.: US 10,000,000 B2**
(45) **Date of Patent: Jun. 19, 2018**

(54) **COHERENT LADAR USING INTRA-PIXEL QUADRATURE DETECTION**

(71) Applicant: **Raytheon Company**, Waltham, MA (US)

(72) Inventor: **Joseph Marron**, Manhattan Beach, CA (US)

(73) Assignee: **Raytheon Company**, Waltham, MA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 430 days.

(21) Appl. No.: **14/643,719**

(22) Filed: **Mar. 10, 2015**

(65) **Prior Publication Data**

US 2016/0266243 A1 Sep. 15, 2016

(56) **References Cited**

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(Continued)

Primary Examiner — Luke D Ratcliffe
(74) *Attorney, Agent, or Firm* — Munck Wilson Mandala, LLP

(57) **ABSTRACT**

A frequency modulated (coherent) laser detection and ranging system includes a read-out integrated circuit formed with a two-dimensional array of detector elements each including a photosensitive region receiving both return light reflected from a target and light from a local oscillator, and local

(19) **United States**
(12) **Patent Application Publication**
Marron

(10) **Pub. No.: US 2016/0266243 A1**
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(22) Filed: **Mar. 10, 2015**

Publication Classification

(51) **Int. Cl.**
G01S 7/486 (2006.01)

(52) **U.S. Cl.**
CPC ***G01S 7/4863*** (2013.01); ***G01S 7/4865*** (2013.01)

(57) **ABSTRACT**

A frequency modulated (coherent) laser detection and ranging system includes a read-out integrated circuit formed with a two-dimensional array of detector elements each including a photosensitive region receiving both return light reflected from a target and light from a local oscillator, and local processing circuitry sampling the output of the photosensitive region four times during each sample period clock cycle to obtain quadrature components. A data bus coupled to one or more outputs of each of the detector elements receives the quadrature components from each of the detector elements for each sample period and serializes the received quadrature components. A processor coupled to the data bus receives the serialized quadrature components and determines an amplitude and a phase for at least one interfering frequency corresponding to interference between the return light and the local oscillator light using the quadrature components.

- Can't infringe on a patent application, only an issued patent
- If "A widget comprising A, B, and C" is patented, you have to do A, B, and C to infringe
  - Doing A, B, C, and D still infringes; doing A and B doesn't; doing A, C, and D doesn't

Fast Facts

- Patents go to first inventor to file
- Everything known to public before filing date is “prior art”
- Can only protect what you disclose… and can’t add new matter
- All patents not made equal—quality matters
  - Invest in a good patent agent/attorney
  - Patents can be overturned in whole or part
- Provisional filings can be a cheap one-year placeholder

Freedom to Operate

- IP rights don't give you the right to make/use/sell an invention… just the right to exclude others

I need to license Bill Nye's IP to legally make/use/sell my HoverTrike

When Should You Patent?

- It depends
  - Is the technology marketable?
  - How strong/defensible will claims be (design-arounds)?
  - Is 20 years enough time to commercialize a product?
  - Is there current interest to license or start a company?
  - Do we already have blocking rights? Does someone else?
  - How long are technology/market cycles?