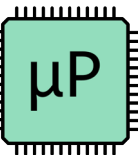


Digital Business

Lecture 21

Microprocessor-based Systems (E155)

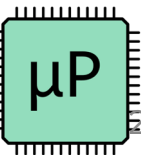
Prof. Josh Brake



Outline

- Jobs
 - Types of jobs
 - Grad school vs. industry
- Intellectual Property (IP)
 - Different types
 - Patents in detail
- Final Project Presentations (next week)

Embedded Jobs



Job titles to look for

- Embedded System/software engineer
- Firmware engineer
- Logic designer
- RTL designer
- Validation engineer
- Test engineer
- Application engineer

Companies

Huge ones

- Intel
- AMD
- NVIDIA
- Qualcomm
- Broadcom
- Microsoft
- Google

Medium/Small/Startups

- ViaSat
- Amazon Lab126
- Juniper Networks
- Aerospace Corporation
- MIT Lincoln Laboratory
- DE Shaw
- Citadel
- TrellisWare

Sectors

- Commercial electronics
- Aerospace companies all need these skills
- Automotive
- Industrial & controls
- Robotics
- Financial firms looking for accelerators

Grad School and Jobs

- A Master's degree is worth considering for everyone
 - Two main routes: pay yourself or employer-sponsored
 - Can also help for career switch
- Hard to go back to school after you are used to making money
- Ph.D. is only worth getting if you have a good reason for it
 - Required for professors, and this is satisfying work, but few places like Mudd.
 - Highly beneficial in a few areas
 - For most jobs, Ph.D. = MS + 3 years of job experience, less than time it to earn
 - Also has a high opportunity cost
- Consider applying and deferring if you want to work for a year

Finding Jobs

- Career fair is about 1/3 of jobs Mudders find – single biggest source
- Clinic liaison, liaisons of your friends
- Career services listings
- Listings posted by faculty
- Talk to professors in the areas you are interested
- Alumni
- Family connections
- **Job hunting is all about networking!**

Technical Interviews

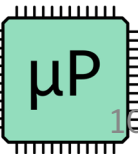
- Be honest about what you know and don't know, but be willing to venture a guess when you haven't learned something but have a good suspicion
- You can learn any programming language with a few days notice
 - Ask what languages are needed for interview, learn them over the weekend

Advancing Your Career

- Make commitments and live up to them – reliability is No. 1
- Get along well with people
- Engage your curiosity and learn about as much as you can
- Find opportunities to make a big impact and pursue them hard
- Decide if you want a technical or managerial track
- Those who advance far on the managerial track rotate through different company functions
- **You'll all make enough money to live a reasonably comfortable life: loving your job is more important than maximizing your income**

Intellectual Property (IP)

*I am not a lawyer. Talk to one if you are doing something important with IP!



Types of IP

- **Trademarks:** protects a sign, design, or expression that identifies a product or services
- **Copyrights:** protects original works of authorship fixed in a tangible medium
- **Patents:** Reward innovation by giving inventors a temporary monopoly to profit from their invention in exchange for the inventor disclosing the details so society can eventually benefit.
- **Trade Secrets:** formula, practice, process, design, instrument, pattern, commercial method, or compilation of information not generally known or reasonably ascertainable by others by which a business can obtain an economic advantage over competitors or customers

Purpose of a Patent

- Constitution Article I Section 8: "Congress shall have 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."
- Requirements to get a patent on an invention. Must be
 - New
 - Useful
 - Non-obvious.

What can be patented

- Doing your homework with a rainbow-colored pen: **not useful**
- Turning in your homework by email: **not new**
- Doing your homework with a patented new kind of pen that can write upside down: **obvious**
- A one-click system for accepting homework assignments: **yes**



or 1-Click Checkout



Requirements for a patent

- **Specification:** define terms and how it works
- **Diagrams:** parts labeled with numbers and referenced in specifications
- **Claims:** only thing actually protected

Obtaining a Patent

1. Come up with your idea
2. Write an invention disclosure that explains the idea and novelty
3. Hire a patent lawyer called a patent prosecutor
 1. Lawyer will file with the PTO.
 2. Months or years later, a overworked examiner at the PTO who knows little about the topic will respond

Cost is around \$20k

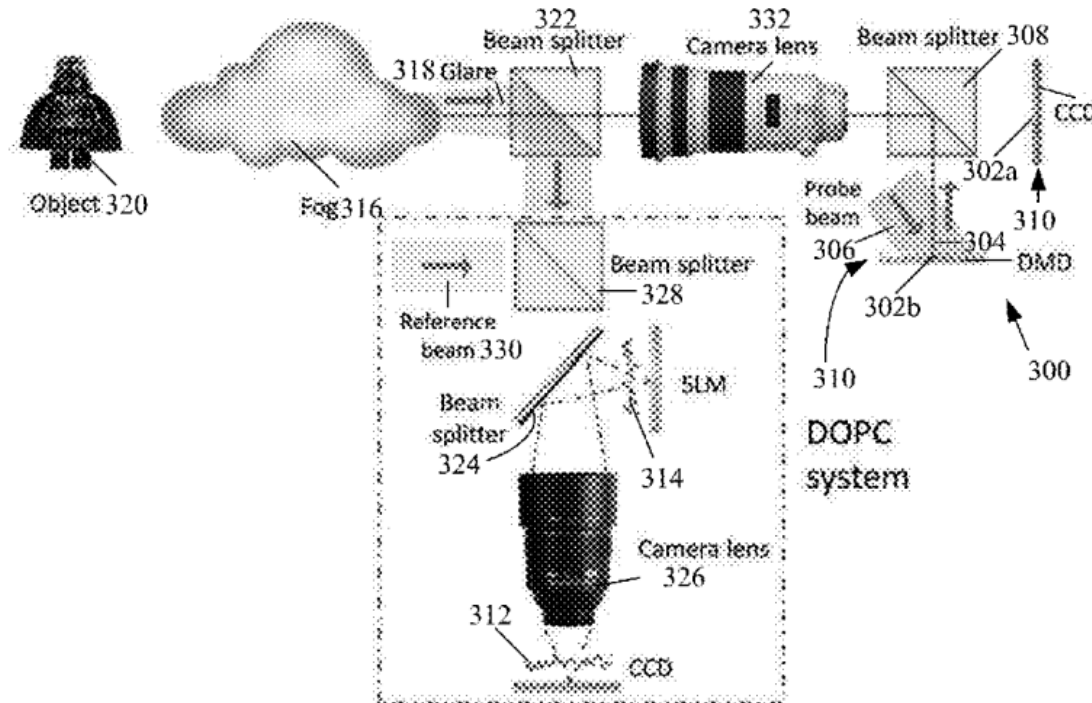
Using a Patent

- A competitor may want to use your invention but they can't without your permission.
 - You can license your patent for \$\$\$
 - Or forbid its use
- If they use it anyway, you can sue to collect damages
 - Triple damages if they willfully infringe
 - So your employer doesn't want you looking into patents because it could be evidence of willful infringement
- Must prove that defendant infringes (i.e., practices claims)
- They will try to prove your patent is invalid

Example



US010194100B2



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

(10) **Patent No.:** US 10,194,100 B2
(45) **Date of Patent:** Jan. 29, 2019

(54) **GLARE SUPPRESSION THROUGH FOG BY OPTICAL PHASE CONJUGATION ASSISTED ACTIVE CANCELLATION**

(58) **Field of Classification Search**
CPC G02B 26/06; G02B 27/0068; G02B 27/1066; H04N 5/357-5/3675
See application file for complete search history.

(71) Applicant: **California Institute of Technology**, Pasadena, CA (US)

(56) **References Cited**

(72) Inventors: **Edward H. Zhou**, Pasadena, CA (US); **Joshua Brake**, Pasadena, CA (US); **Changhui Yang**, South Pasadena, CA (US)

U.S. PATENT DOCUMENTS

2009/0273843 A1* 11/2009 Raskar G02B 27/0018 359/601

(73) Assignee: **CALIFORNIA INSTITUTE OF TECHNOLOGY**, Pasadena, CA (US)

OTHER PUBLICATIONS

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 114 days.

Zhou, Edward H., et al., "Glare suppression by coherence gated negation," vol. 3, No. 10, Oct. 2016, *Optica*, pp. 1107-1113.
Zhou, Edward H., et al., "Glare suppression by coherence gated negation: supplementary material," vol. 3, No. 10, Oct. 2016, *Optica*, pp. 1-3.
Mosk, A.P., et al., "Controlling waves in space and time for imaging and focusing in complex media," *Nature Photonics*, May 2012, pp. 283-292, vol. 6.

(21) Appl. No.: 15/332,959

(22) Filed: Oct. 24, 2016

(Continued)

(65) **Prior Publication Data**
US 2017/0118423 A1 Apr. 27, 2017

Primary Examiner — Paul M Berardesca
(74) *Attorney, Agent, or Firm* — Gates & Cooper LLP

(60) **Related U.S. Application Data**
Provisional application No. 62/245,843, filed on Oct. 23, 2015, provisional application No. 62/245,847, filed on Oct. 23, 2015.

(57) **ABSTRACT**

A method of imaging an object on one or more sensor pixels and with reduced glare. The method includes irradiating a scattering medium and the object behind the scattering medium, creating backscattered radiation and imaging radiation that are received on the one or more pixels. The method includes digitally adjusting a phase, an amplitude, or a phase and amplitude, of reference radiation transmitted onto the one or more sensor pixels, wherein the reference radiation destructively interferes with the backscattered radiation (glare) on the one or more sensor pixels while the object is imaged on the one or more sensor pixels using the imaging radiation.

(51) **Int. Cl.**
H04N 5/357 (2011.01)
G02B 27/00 (2006.01)
G02B 27/10 (2006.01)
H04N 5/225 (2006.01)
G02B 26/06 (2006.01)
(52) **U.S. Cl.**
CPC *H04N 5/357* (2013.01); *G02B 26/06* (2013.01); *G02B 27/0068* (2013.01); *G02B 27/1066* (2013.01); *H04N 5/2254* (2013.01)

20 Claims, 17 Drawing Sheets

Final Project Presentations

- 15-minute presentations (5 on Monday, 4 on Wednesday)
- Start with project overview
- In-depth discussion of a specific technical problem your team has not yet solved.

Final Project Presentations	
Items	Points
Overview	3
In-depth technical problem	3
Meaningful input from class	3
Slides and presentation	3
Wrapped up on time	1
Total	13

Summary

- Lots of cool jobs to do embedded systems work!
- Intellectual property is an important piece of doing business.
- 4 main types of IP
 - Trademarks
 - Copyrights
 - Patents
 - Trade Secrets

Lecture Feedback

- What is the most important thing you learned in class today?
- What point was most unclear from lecture today?

<https://forms.gle/Ay6MkpZ6x3xsW2Eb8>

