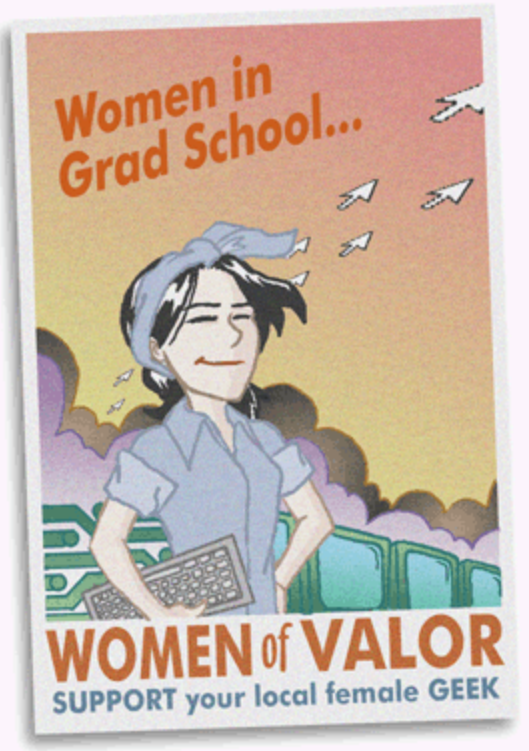
From Rosie the Riveter
To Rosie the Researcher

Dana Vantrease
Computer Science Grad Student



Overview

- How did I get here?
- What is grad school like?
- What do I spend all of my time doing?
- Lessons I've learned

Destined to be an Engineer

From Engineering to Computer Science (Engineering)

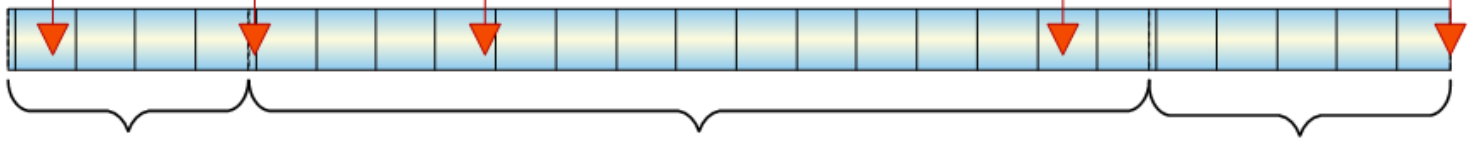
Mechanical Engineering
(I like to read "How Things Work")

Computer Science – Theory
(I like studying the complexity of problems)

Chemical Engineering
(I like AP Chem)

Computer Science Engineering
(I like C++ more than AutoCad)

Computer Science – Architecture
(Complexity is too hard,
I'd like to try Architecture)



Last Year of High School

College

First Year of Graduate School

My First Career Choice

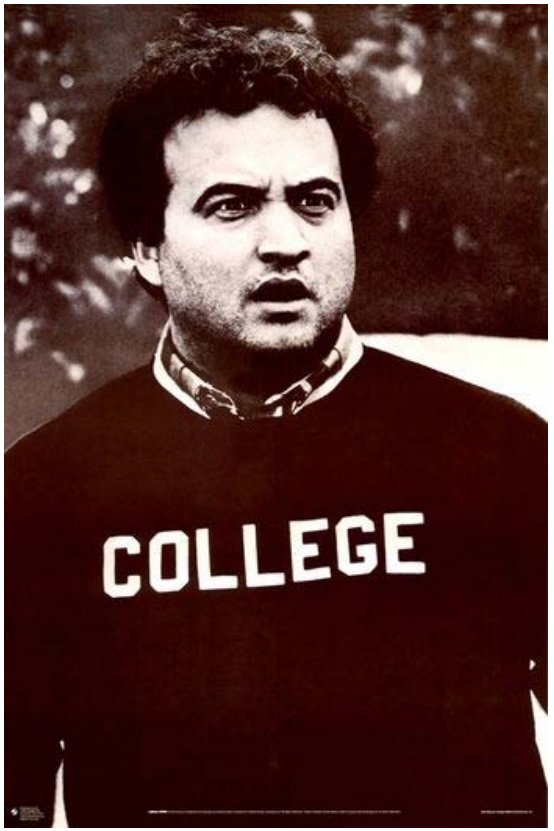
Red Vest?

Blue Vest?

My Second Career Choice

Industry?

More College?



Why Go To Grad School?

Money

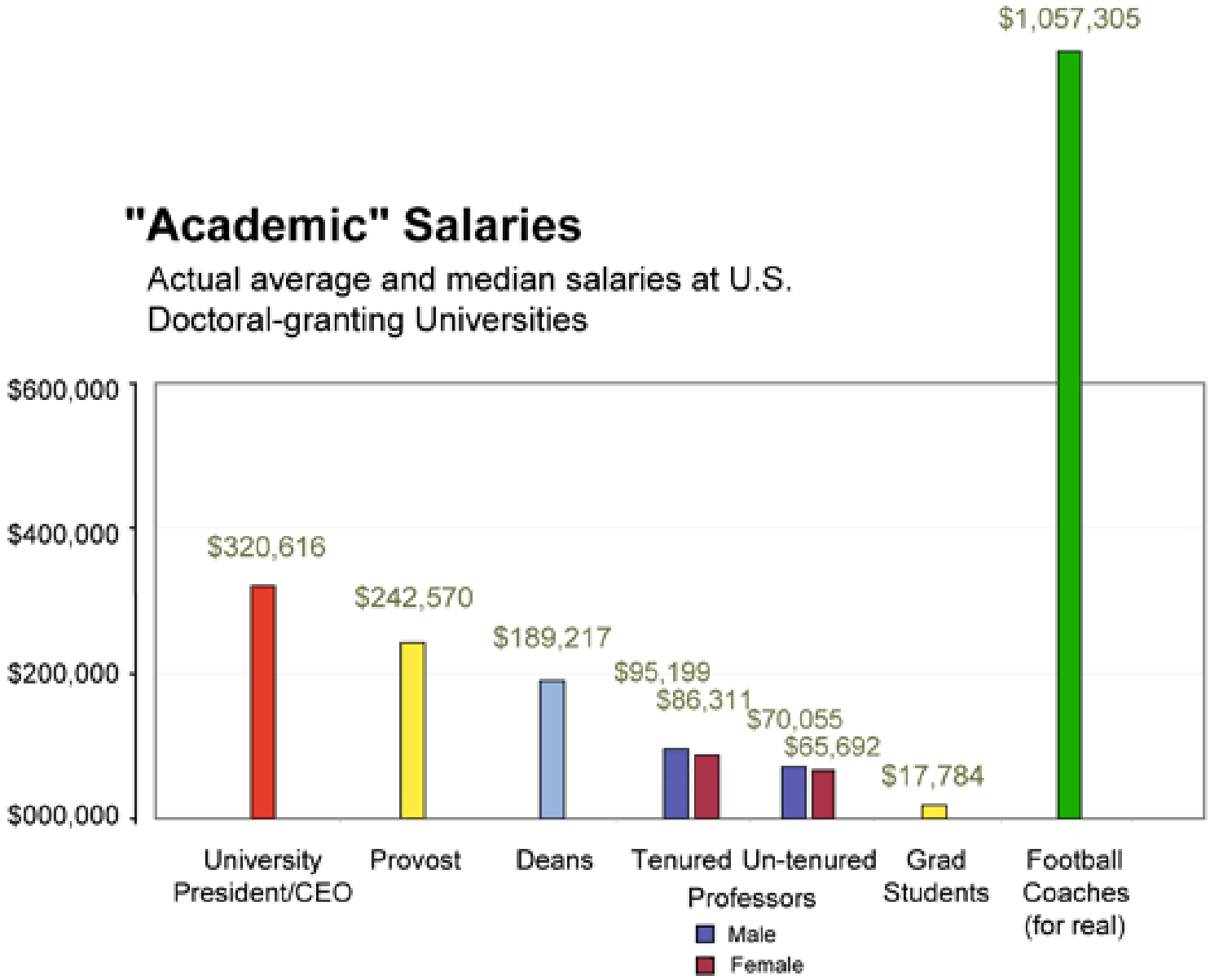
Professor

Scientist

Expert

Economy is Bad
Your Parent Has a PhD
Uncertainty (my reason)

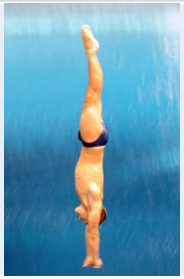
More Interesting Starting Job



Notes: Administrator figures are medians salaries, the rest are averages. All figures in 2008 dollars. Sources: College and University Professional Association for Human Resources 2005 Survey; American Association of University Professors 2007 Survey; The Chronicle of Higher Education 2001 Survey of Graduate Assistants; USA Today Survey of Div. I-A College Football Coaches Compensation 2007.

WWW.PHDCOMICS.COM

Deciding Between Masters & PhD

		Years	Success Measure	Paid For	Job
	Masters of Science (MS)	~ 2	Class Grades	Sometimes	More Advanced Industry Job
	Doctorate of Philosophy (PhD)	4-8	Research Papers	Usually*	Research Lab, Start-Up Company, University

Teaching Assistantship (TA)
Research Assistantship (RA)
Fellowship (Fellow)

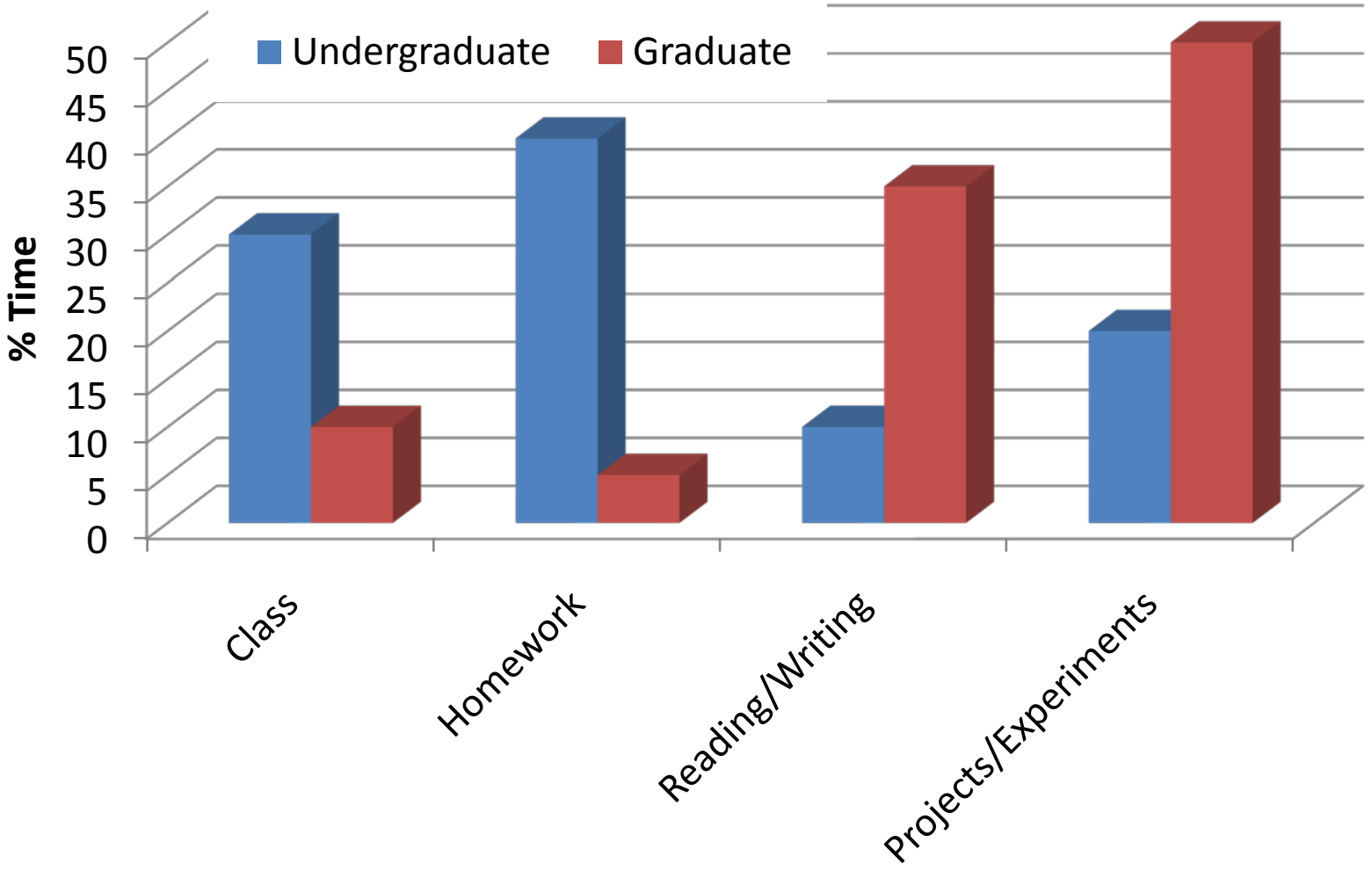
Really Getting Wet

Interested

Committed

Fully Committed

Grad School Vs Undergrad



What I Did Know About Grad School

- Carry-overs from Undergraduate Experience
  - Application Process
    - Christmas-time deadlines
    - GRE
    - Essays
    - Recommendations
  - How to find “good” schools
- “Research”
- “Academic Inbreeding”

Not Knowing What I Was Getting Into

- Not just a matter of being smart and putting in your time
- Publications, publications, publications

The Anatomy of a Large-Scale Hypertextual Web Search Engine

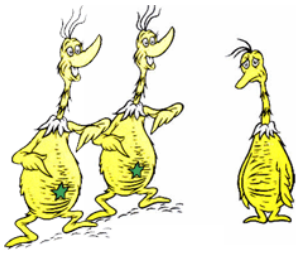
Sergey Brin and Lawrence Page

Computer Science Department,
Stanford University, Stanford, CA 94305, USA
sergey@cs.stanford.edu and page@cs.stanford.edu

Abstract

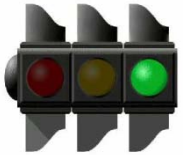
In this paper, we present Google, a prototype of a large-scale search engine which makes heavy use of the structure present in hypertext. Google is designed to crawl and index the Web efficiently and produce much more satisfying search results than existing systems. The prototype with a full text and hyperlink database of at least 24 million pages is available at http://google.stanford.edu/
To engineer a search engine is a challenging task. Search engines index tens to hundreds of millions of web pages involving a comparable number of distinct terms. They answer tens of millions of queries every day. Despite the importance of large-scale search engines on the web,

Steps Towards a PhD

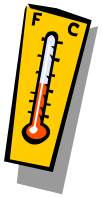


~ Year 2: Qualifying Exam
- Test Knowledge of Area

~ Year 3: Finish Classes



~ Year 4: Preliminary Exam
- Propose Thesis Topic

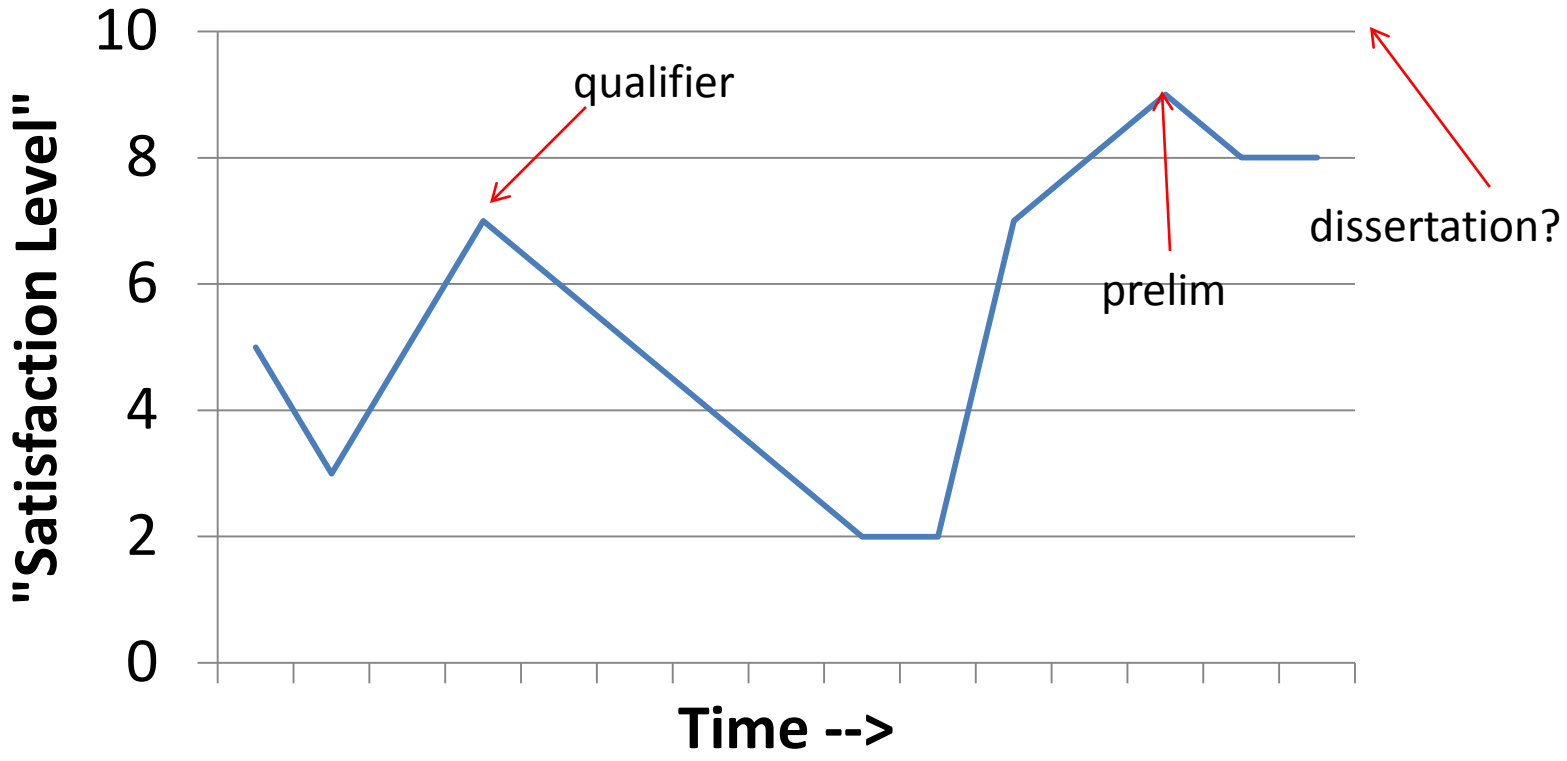


~ Year 1-6: Papers (unofficial measure)
- Publish Results in Conferences, Journals, etc

~ Year 6: Dissertation

- Written: 200+ page summary of research
- Oral: Defense in front of faculty committee

My Steps to a PhD



Day in my shoes

- Wake up
- Drink Coffee
- Do Any Combination of the Following:

Read New Research

Write About My Research

Discuss ideas

Design Experiments

+

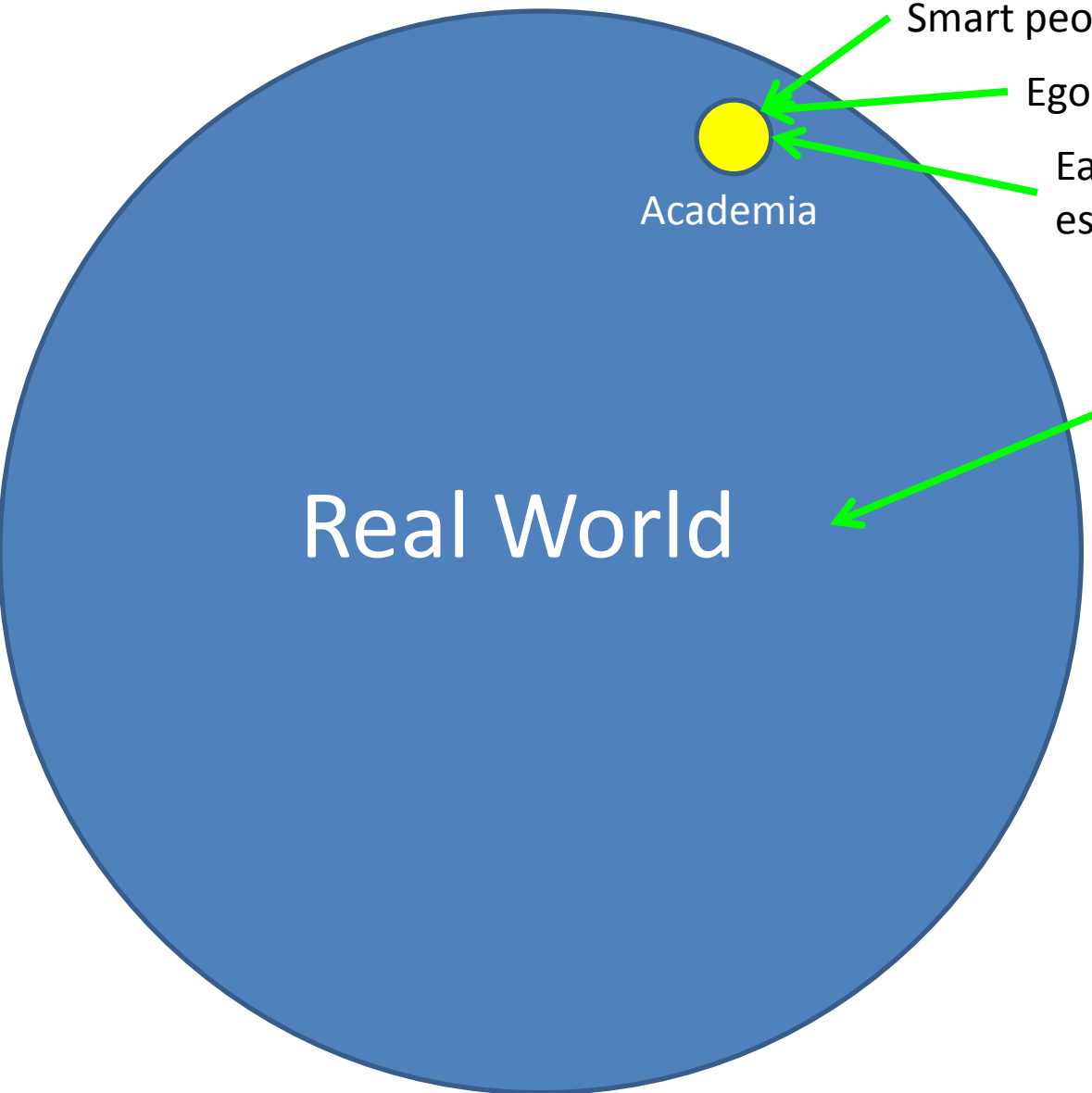
=


14667
PROOF


HOW TO BUILD A ROBOT


30ROCK

Keeping Perspective



Smart people are everywhere!

Egos

Easy to feel inferior, lose self-esteem/confidence.

Stay in touch with activities outside of the university (volunteering, etc)

Intellectual Balance

- Study something besides your thesis topic!
- Go to talks in other areas
- UW PhD Minor Requirement
  - (Folklore was my minor)
  - (I studied “foodways”)

PhD in Computer Architecture

- Making computers (especially their processors) “better”
  - Faster
  - Lower Power
  - New Functionality

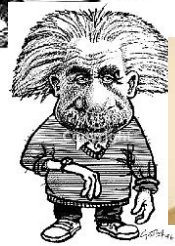
Construction

Architecture

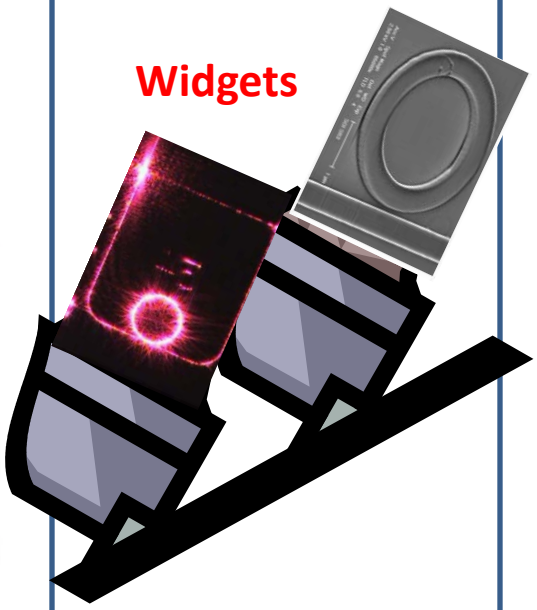
PhD in Computer ~~Architecture~~ Engineering

Physics Lab

Science



Widgets

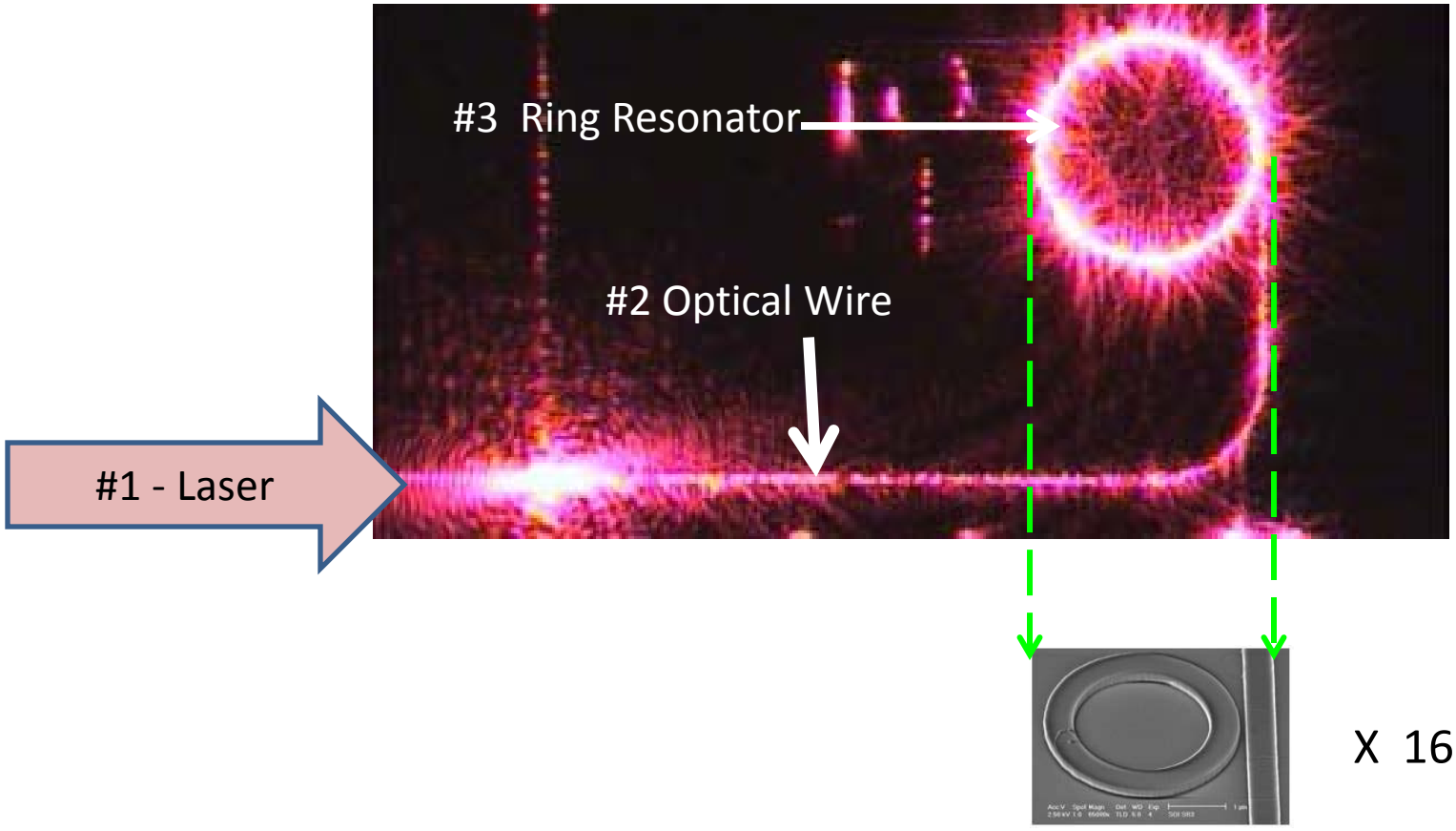


Engineers Lab

Applications

My Job: Find a Use for New Optical Widgets

- 3 widgets:



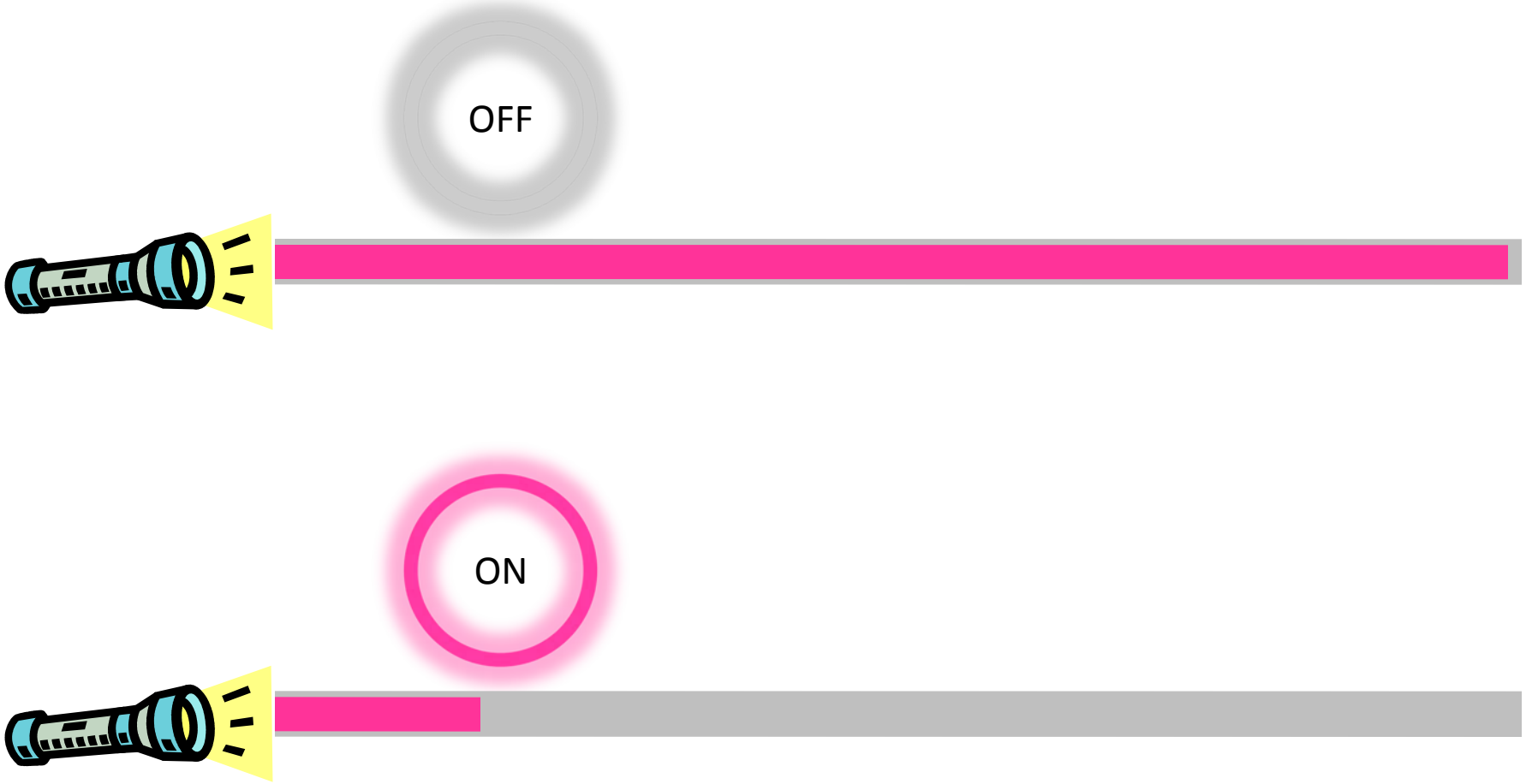
X 16 = 1 Human Hair

How Ring Resonators Work

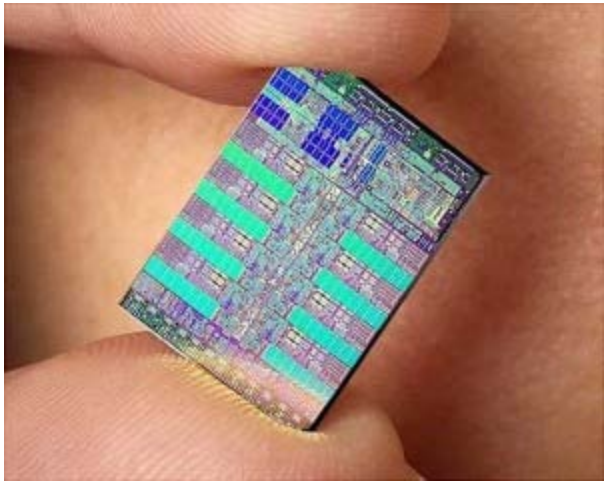
How Ring Resonators Work

How Ring Resonators Work

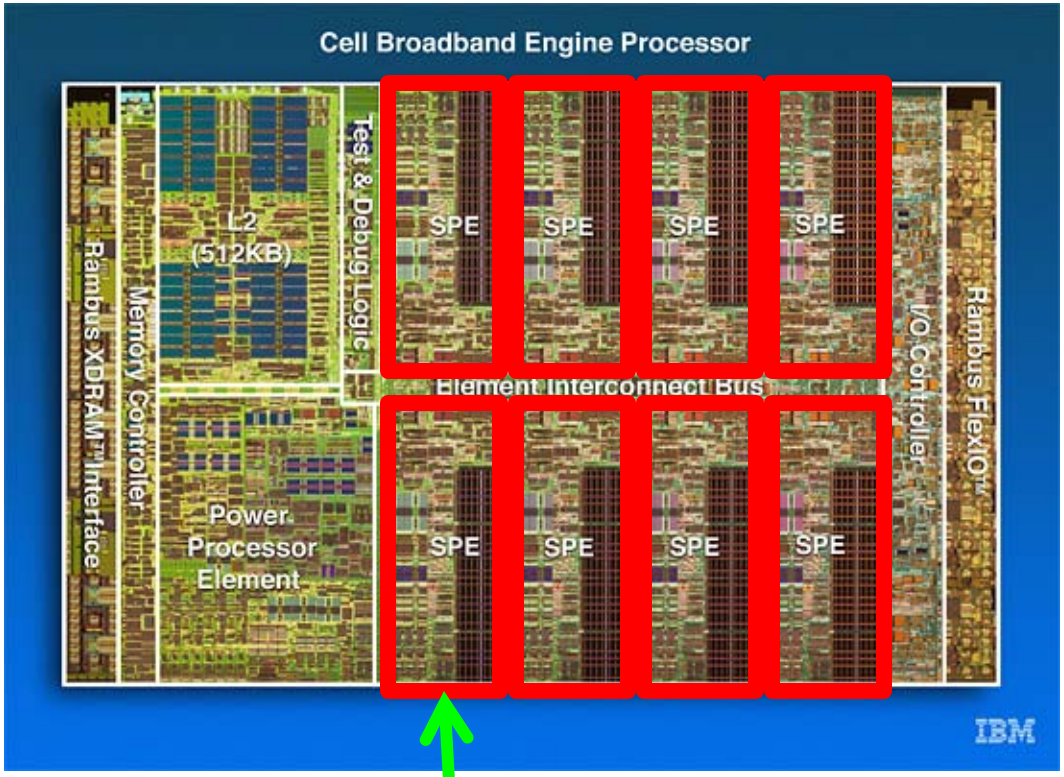
Now What?



Multi-Core Processor



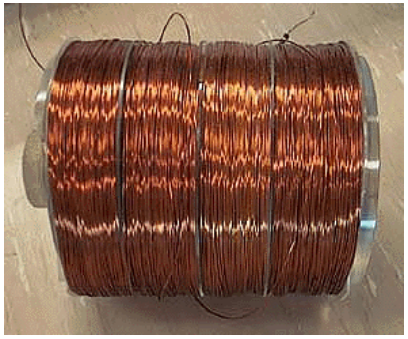
IBM Cell Chip
(Sony's PlayStation 3)

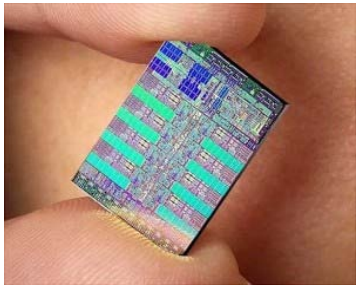


8 Cores that-
Read/Write Data
Crunch Data
Communicate Data

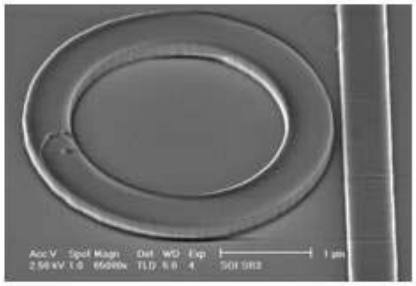
Idea -- Communicate!

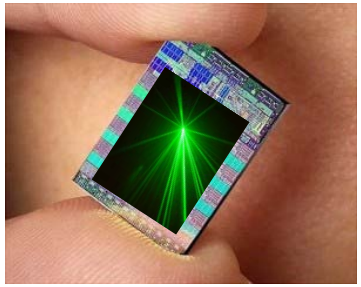
- Today:





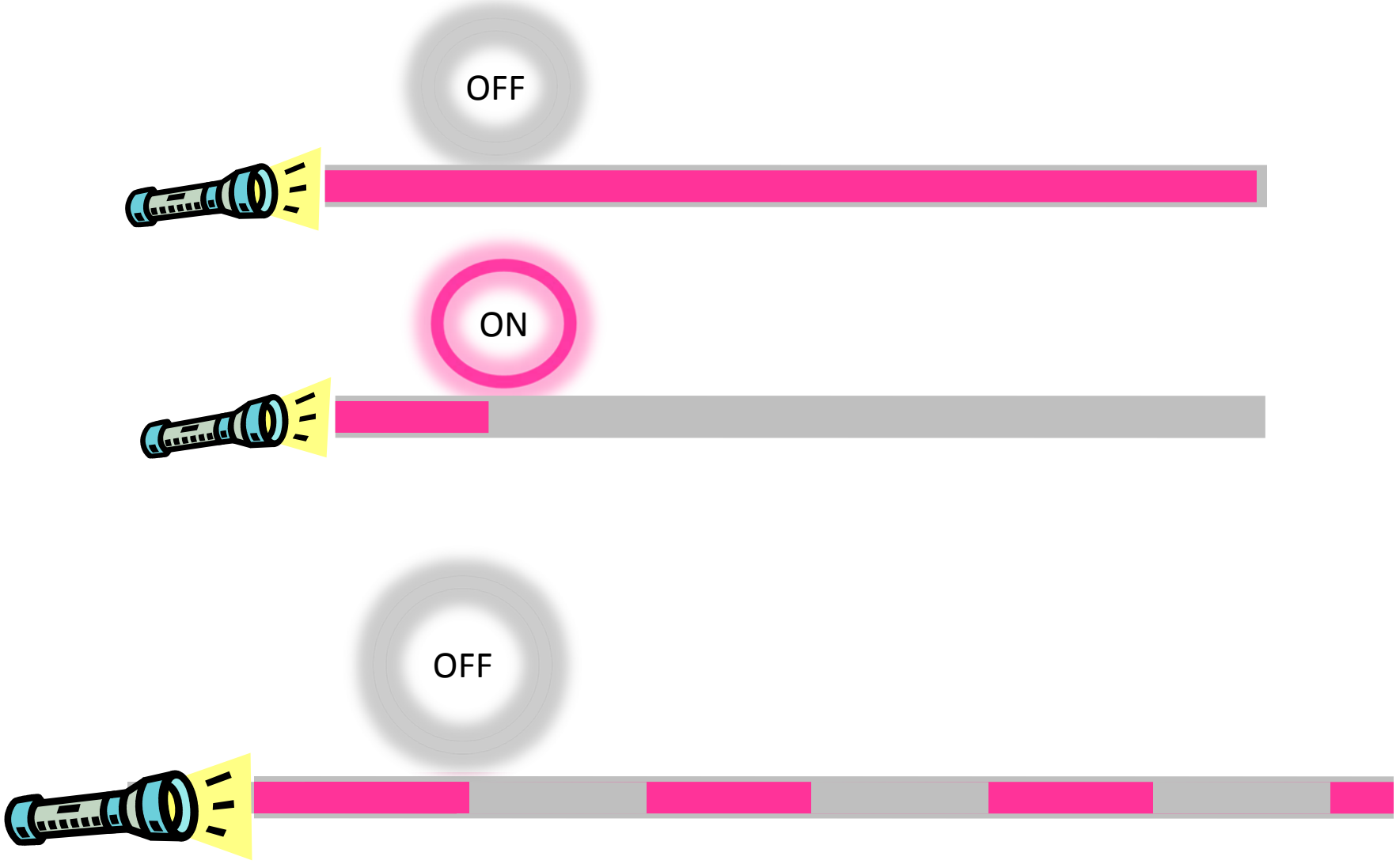
- Tomorrow (2017?):



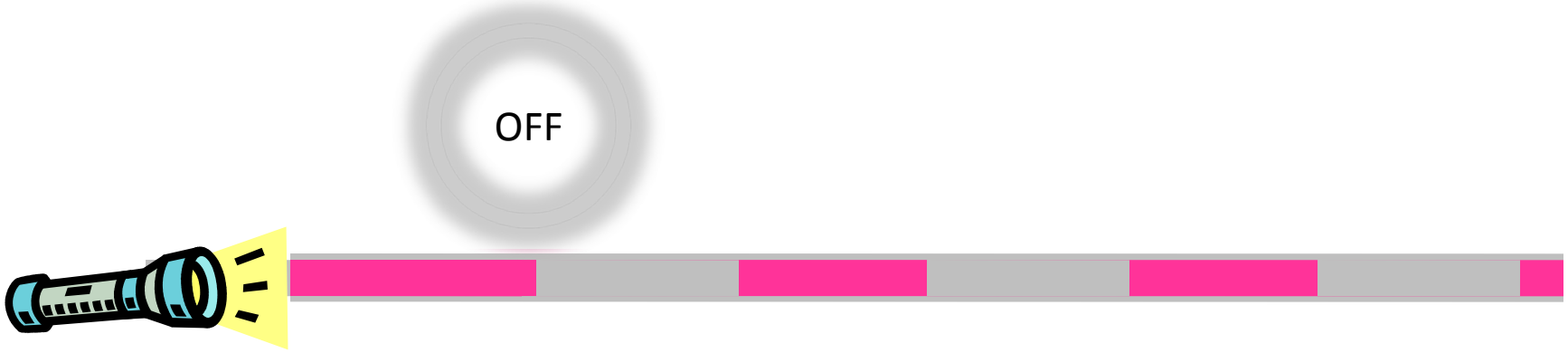


High bandwidth
Lower power
Speed of Light

How to Communicate



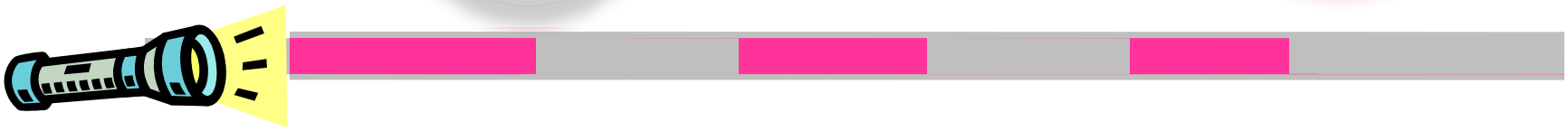
How Ring Resonators Work



How Ring Resonators Work

OFF

ON



Dreaming up uses for our widgets

- ***Communicating Data (yes!)***
- Other possibilities (?) – Research In Progress
  - Synchronization
  - Arbitration
  - Enforcing Coherency/Consistency
  - Optical Computing
  - …!!!…???…!!!…

Thinking About Grad School?

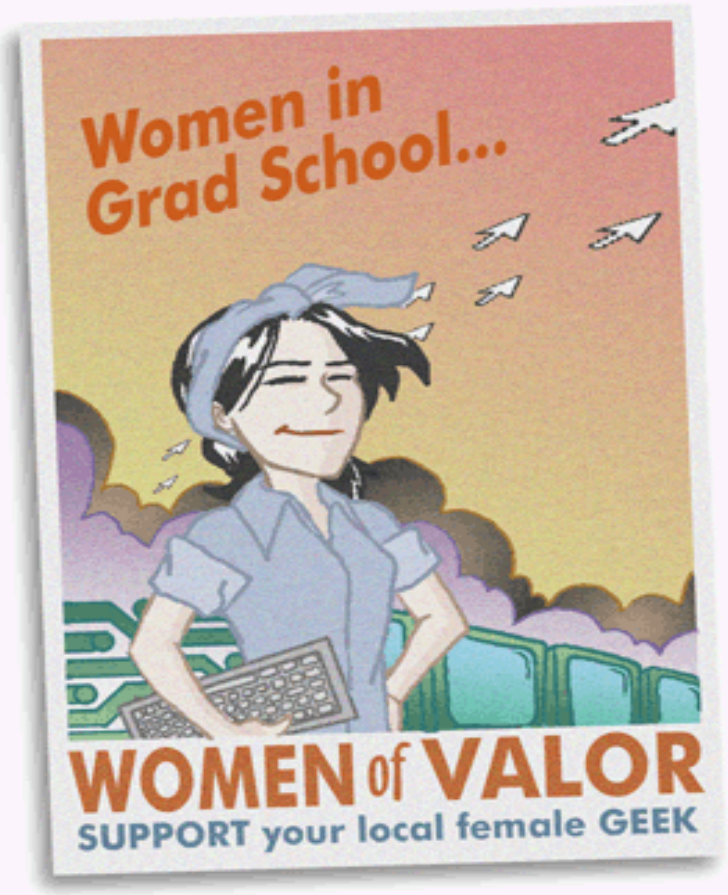
- Talk to your professors
- Intern in industry
- Perform undergraduate research
- Applying:
  - If uncertain about your area-choice, attend a school that is strong in many areas
  - Choosing an advisor is very important

Thinking About a Major?

- Choosing A Major:
  - Browse the Registrar's Course Guide
  - Talk to people in the Major
  - Don't give up if you don't like XX101
- Don't make your hobby your job

THANKS


We Can Do It!
POST FEB. 15 TO FEB. 28
WAR PRODUCTION CO-ORDINATING COMMITTEE


Women in Grad School...
WOMEN of VALOR
SUPPORT your local female GEEK