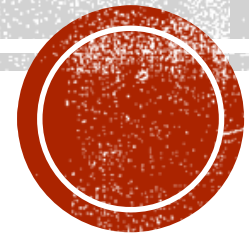# UNIVERSITY LIFE

FROM ENGINEERING STUDENTS TO ENGINEERS AND MORE

Thong Nguyen
BS 2013, Advanced Program, HCMUT, Vietnam

thong@emlab.illinois.edu

Phuc Nguyen
Asc. Professor, ECE, HCMUT, Vietnam

nhphuc123@yahoo.com

1/2/2017

OUTLINE

❑ My background

❑ Technology big picture – where are we?

❑ University life as an undergraduate: Professor – Graduate students – Undergraduate students

❑ University life as a graduate: Professor – Industry – University – Students
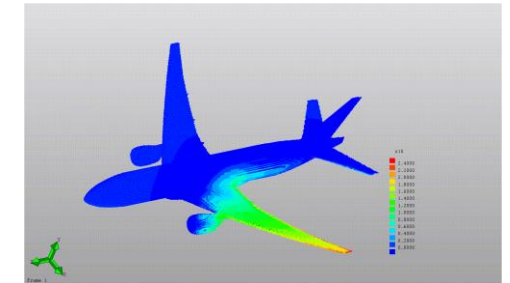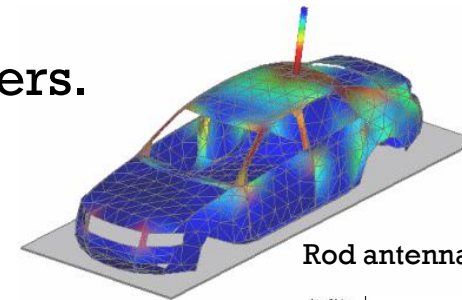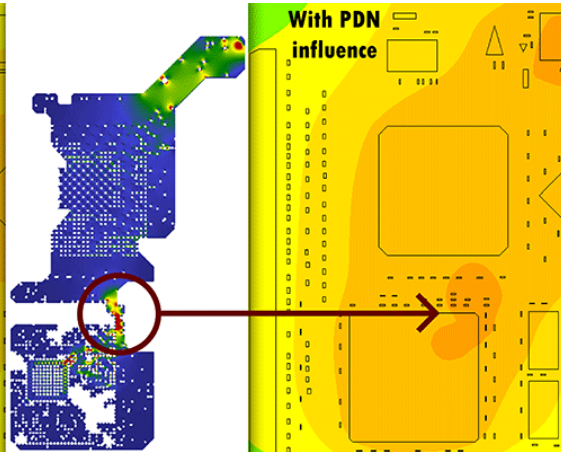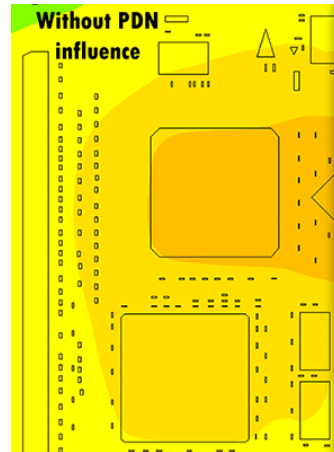
BACKGROUND

❑ Advanced program (Chương trình tiên tiến), Intake 2008.

❑ Major: Power System

❑ B.S. Thesis: "Stability of the distribution network with wind DGs" – Advisor: Asc. Prof. Phan Thị Thanh Bình. (Spring 2013)

❑ Teaching Assistant:
  ➢ PHYS212 – Electromagnetics Physics (Asc. Prof. Nguyễn Hữu Phúc)
  ➢ ECE210 – Analog signal processing (Prof. Timothy Trick, Juan Alvarez)
  ➢ ECE350 – Lines, fields and waves II (Prof. Jose Schutt-Aine)
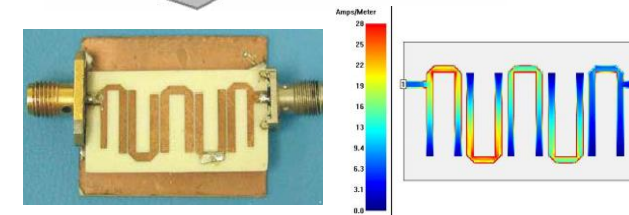 ➢ ECE342 – Electronics circuit (Prof. Jose Schutt-Aine)

WHAT I AM DOING

❑ MS/PhD student at UIUC. Advisor: Professor Jose Schutt-Aine

❑ RF/microwave system, Fast simulation algorithm, Electromagnetics/Circuit solvers, Multi-physics solvers.
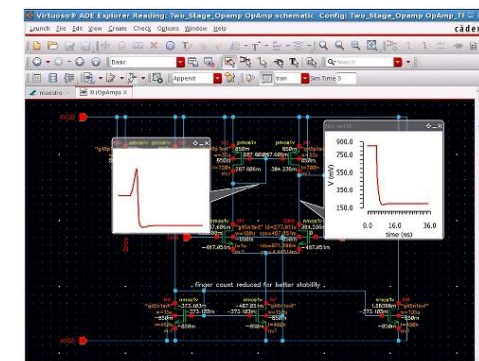

2002 – Intel Pentium 4
2.4GHz – 0.13μ
55B components
4 km interconnects

Without PDN influence

With PDN influence

Surface current density on Boeing 777

Rod antenna

Hairpin filter

Proven Technology   Emerging Technology

Stacked die   Pkg on Pkg (PoP)   3D-IC with TSV

PCB

vertical heat-sink

Cadence - Virtuoso

Aurora

4

thong@emlab.illinois.edu
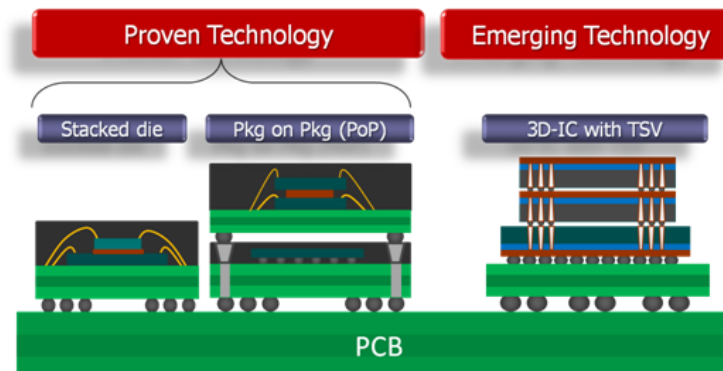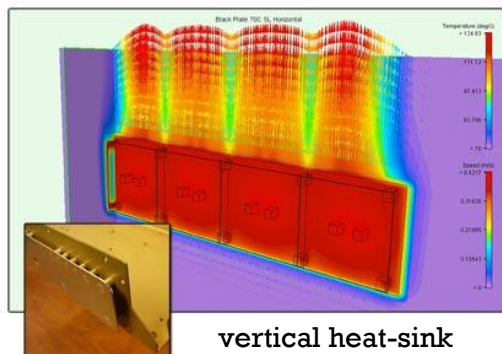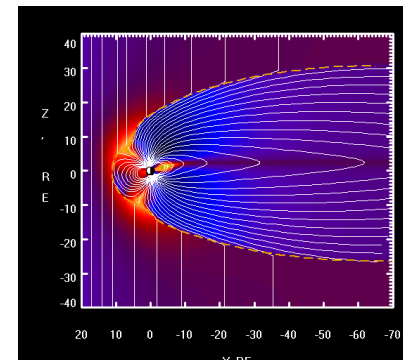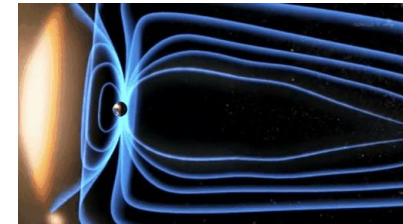
WHAT I AM DOING

❑ I'm currently in charge of the High-speed measurement lab (research lab), RF/microwave communication lab (instructional lab).

❑ I'm currently a core member of CAEML – Center for Advanced Electronics through Machine Learning – an NFS/Industry co-sponsored research center.

thong@emlab.illinois.edu
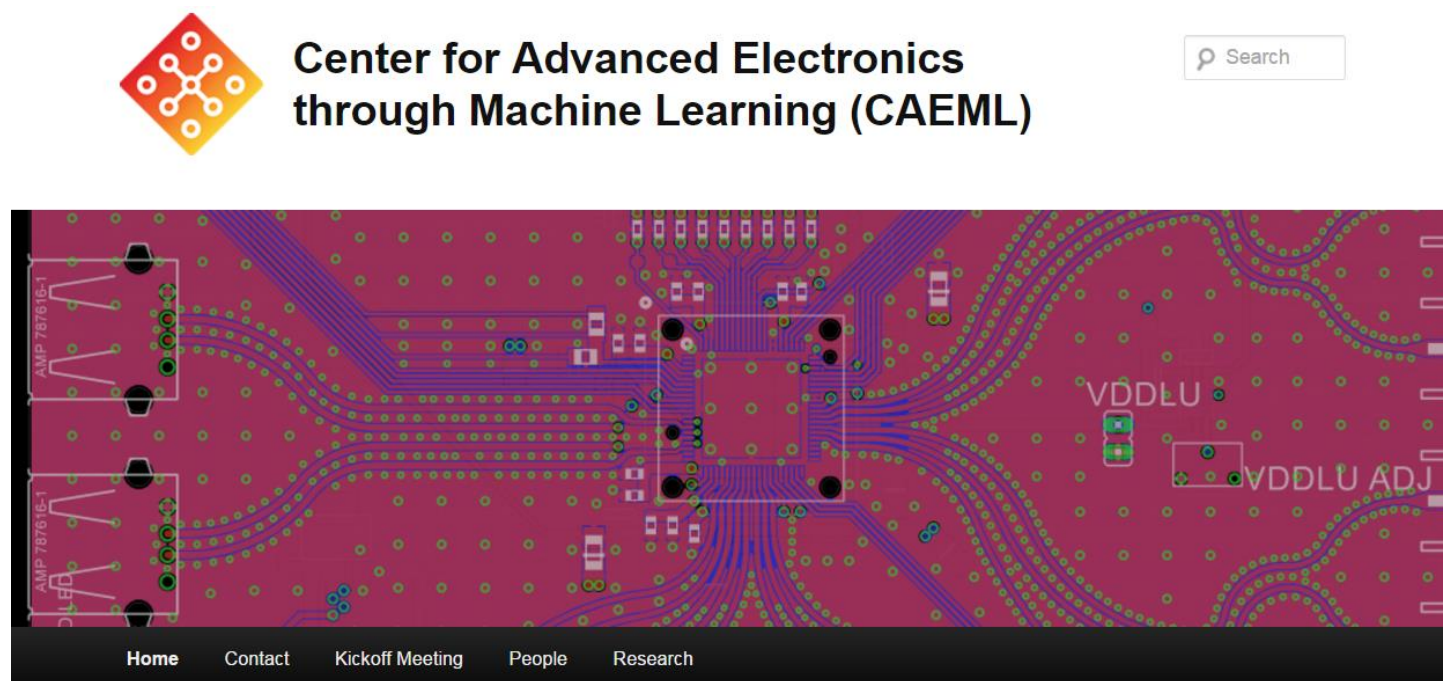
UIUC FACILITIES – GRAINGER ENGR. LIBRARY

thong@emlab.illinois.edu

UIUC FACILITIES – ECE BUILDING

UIUC FACILITIES — ECE BUILDING

ECEB viewed from CSL

Clean room

ECEB Lobby

UIUC FACILITIES — HIGH-SPEED CIRCUIT LAB

HP8510C VNA
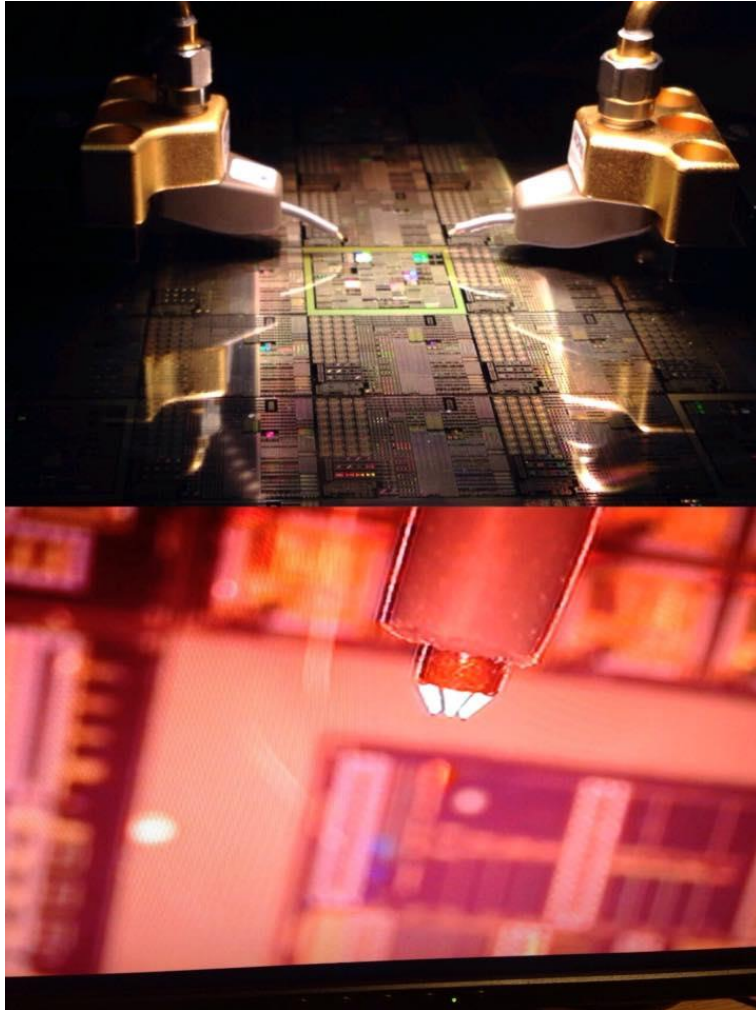
LEVERAGE FROM MY UNDERGRAD YEARS

❑ My undergrad years with Advanced Program:
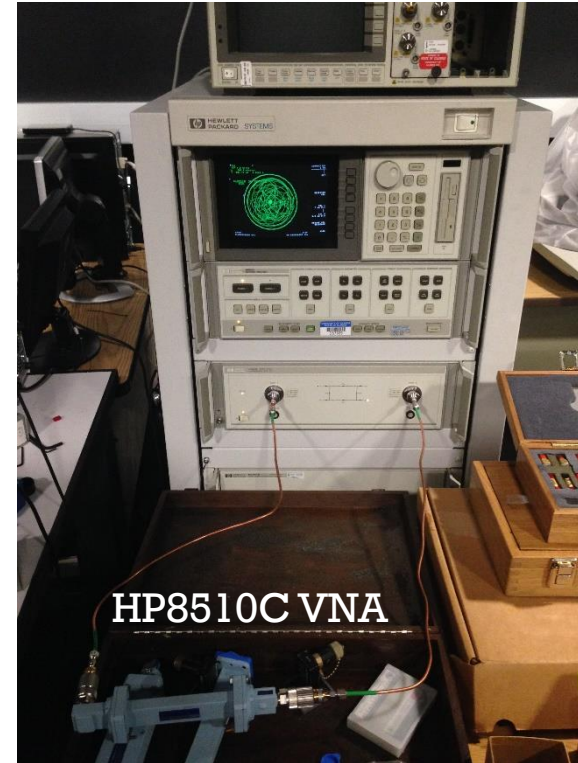 ➢ Enhance my English skills
    ▪ Listening, speaking, **reading**.
    ▪ Get used to learning in English
  ➢ Knowledge
    ▪ Strong foundation due to learning from classical textbooks.
    ▪ Approaching the problems with critical thinking.
    ▪ Look at a concept from a different perspective.
  ➢ Tools
    ▪ Matlab (Numerical method)
    ▪ SPICE (Electronics circuit)
    ▪ PowerWorld (Power System analysis)
    ▪ etc.

thong@emlab.illinois.edu
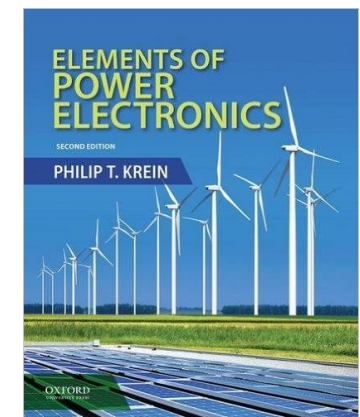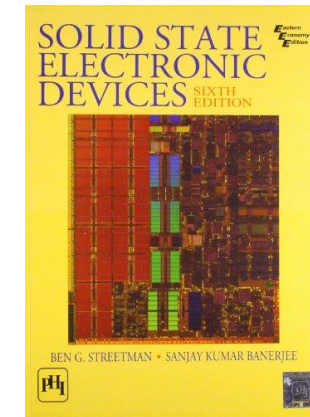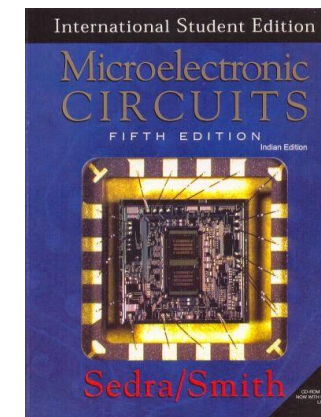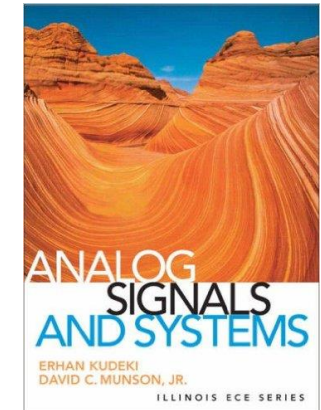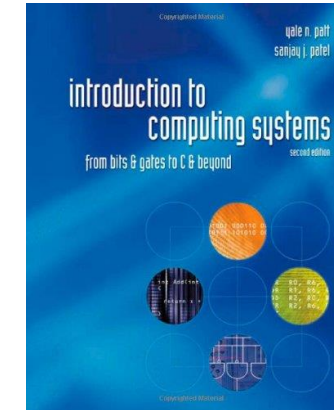
THE JOURNEY TO WHERE I AM NOW

❑ Strong foundation knowledge (how? Later!!)

❑ Opportunity to be a TA, specifically, for ECE342 – Electronics circuit

❑ Had been turned down
  ➢ by asking wrong persons (retired Professors, lecturers: no funding)
  ➢ by asking right persons but wrong timing (no available funding, no available project at then)

❑ Meeting with my advisor is a combination of
  ➢ Good timing:
    ▪ My advisor was in need of PhD students.
    ▪ My advisor has a project no one had picked up for 5 years.
  ➢ Capability:
    ▪ Strong engineering math: Linear algebra, Differential equation, Signal processing, Control system theory.
    ▪ Strong foundation: Electronics circuit, Electromagnetics.
    ▪ Independent work

thong@emlab.illinois.edu

THE JOURNEY TO WHERE I AM NOW

❑ "Research" team with classmates

  ➢ We had 5 members, sharing the bill to fund ourselves.

  ➢ We work on simple projects we think of.

  ➢ What we learnt:

    ▪ How to collaborate with the irresponsible (LOL). How to allocate work load efficiently.

    ▪ How to manage limited resources (workspace, funding, instruments etc.)

    ▪ Technical knowledge:

      – Fabricate a (simple) PCB from scratch.

      – Sensor and automation circuit.

      – Proficient use of VOM, handheld oscilloscope.

  ➢ The other 4, now (2016): 1 doing PhD in Ireland, 1 finished Master in France, 2 with the industry

thong@emlab.illinois.edu
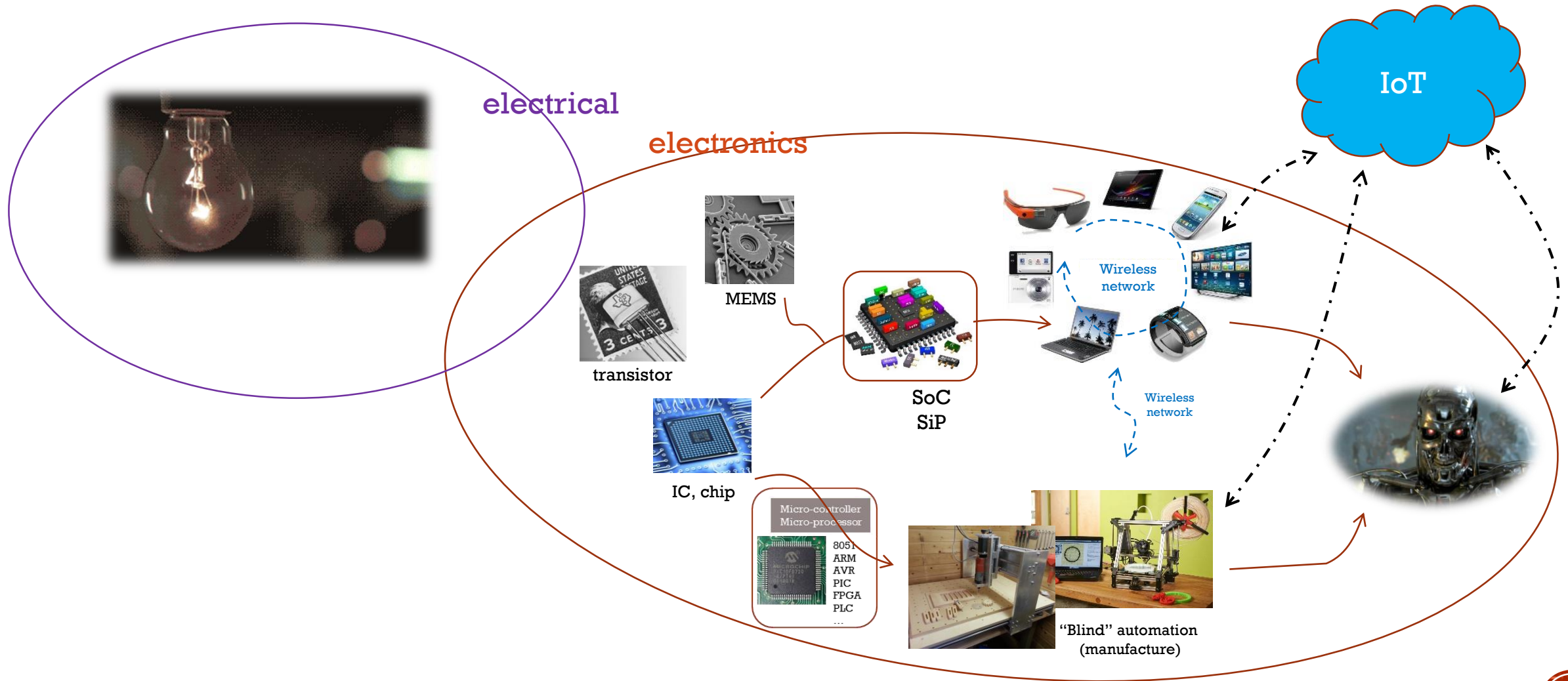
THE JOURNEY TO WHERE I AM NOW

- ❑ How I have been learning:
  - ➢ Classes, lab, TA.
  - ➢ Online courses: MIT, Stanford, NPTEL, etc. (now we have even many more).
  - ➢ Materials from courses with similar syllabus

ECE 144 - Electromagnetic Fields and Waves	EECS 210 - Applied Electromagnetic Theory
ECE 201B - Electromagnetic Theory II	EEE3055F - Electromagnetic Field Theory
ECE 201C - Antenna Theory	Electrodynamics
ECE 3313 Electromagnetics I	Electromagnetic Energy - From Motors to Lasers
ECE 3323 Electromagnetics II	Electromagnetic Engineering
ECE 4990 - Antennas	ELEG 648
ECE 6310 - Advanced Electromagnetics	EM notes
ECE 6323-4323 Electromagnetic Compatibility	EM-IEE 473 Course
ECE303 Electromagnetic Fields and Waves	ETEN05 Electromagr
ECE3317 - uh.edu	misc
EE 141 - Electromagnetic Field Theory	PHY 182 - Electricity
EE340 Electromagnetic Theory	PHY 712 Electrodyna
EE710 - Advanced EM Theory - HFSS Projects	PHY217
EE729 - Antenna Theory	Physics 232 Physics
EE-5425 - Advanced Electromagnetic	

3F2 - Systems and Control	EE363 - Linear Dynamical Systems
4F2 - Nonlinear systems and control	EE670 - CONTROL SYSTEMS
416 Control System Design	ELEC 302 - INTRODUCTION TO LINEAR S...
505 Control Theory I - Spring 2007	Engr207a - Linear Control Systems 1
506 Control Theory II	Engr210a - Robust Control Analysis and S...
520.454 Control Systems Design	ESE 502 Linear Systems
813 - Robust Control Systems - 2007	FEL3500 Introduction to Model Order Re...
CME 345 - Model Reduction	Function Space Methods in System Theory
Dynamic of Nonlinear System	HCMUT_517_NonlinearControl
ECE 320 Linear Control Systems	Jan Maciejowski - Linear and Nonlinear C...
ECE 851-Linear Systems and Controls, Fal...	Lecture Notes on Linear System Theory - ...
ECE425 - Introduction to Mobile Robotic ...	Linear Control Theory
ECE553 - Optimal Control	MAE 280A - Linear Control System
ECE7360 - Optimal and Robust Control	MAE 280B - Linear Control Design
ECSE 6460 Multivariable Control (Fall 2006)	Mathematical Models of Systems, fall 2014
EE 60555 Multivariable Control	ME 350-450 - Nonlinear Systems and Co...
EE221 - Linear System Theory	ME 433 - STATE SPACE CONTROL
EE222 Nonlinear Systems - Analysis, Stabi...	ME8281 – Advanced Control System Desi...

13

WHERE WE ARE – A BIG PICTURE

electrical

electronics

IoT

transistor

MEMS

SoC
SiP

IC, chip

Micro-controller
Micro-processor

8051
ARM
AVR
PIC
FPGA
PLC
…

Wireless network

Wireless network

"Blind" automation
(manufacture)

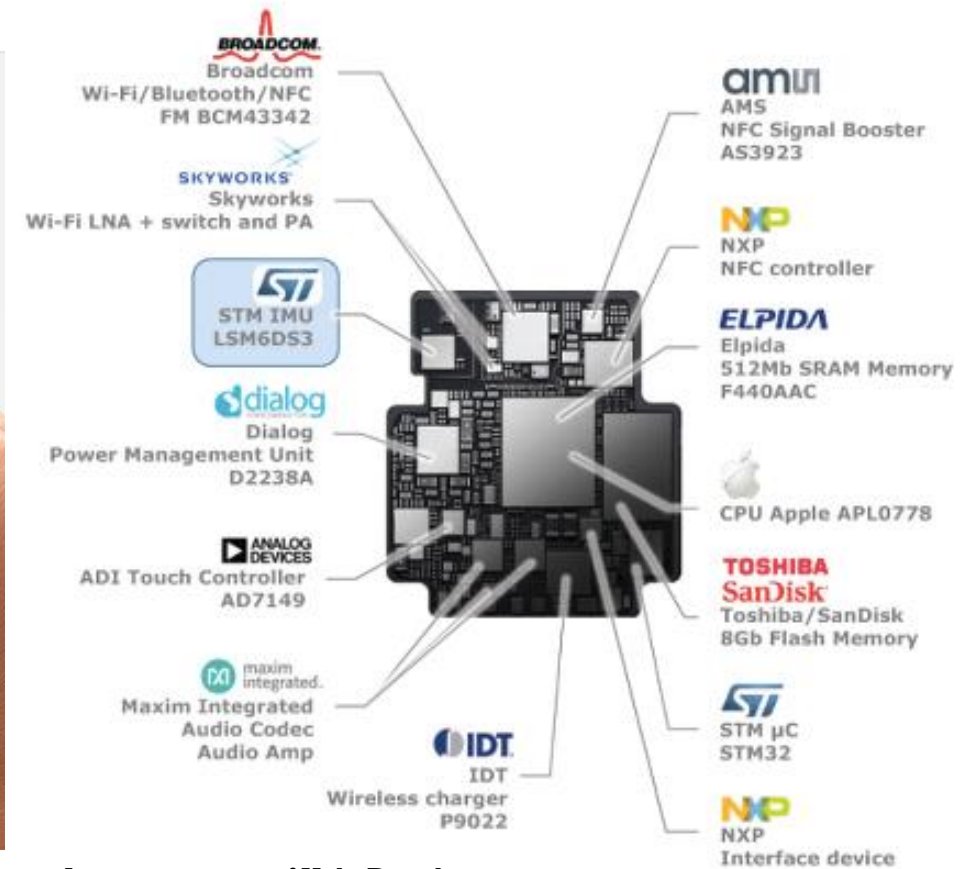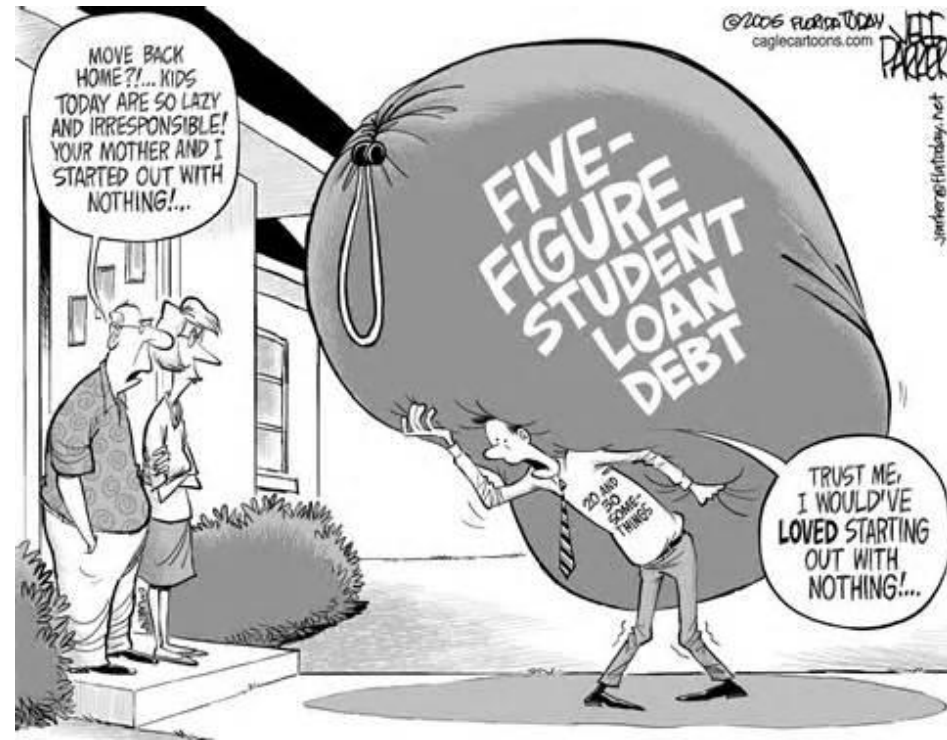# S.I.P. (SYSTEM IN PACKAGE) – EXAMPLE

From www.apple.com

Image courtesy of Yole Developement

STUDYING PHILOSOPHY

❑ Social philosophy decides how the whole educational system curves.

❑ People choose going to college, bachelor, post-bachelor etc. degrees due to their social responsibilities as well as financial health.

FINANCIAL AID – HCMUT

❑ Scholarship every semesters.

❑ 2+2 program between HCMUT and US universities.

❑ etc.

FINANCIAL AID FOR INT'L STUDENTS – US UNIVERSITIES

- ❑ Fellowships (most applicable: Grads)
  - ➢ Funds in honor of someone (e.g: Raj Mittra – my advisor's advisor).
  - ➢ Funds from companies (e.g: IBM, Intel, Samsung, Google, Facebook, Amazon etc.)
  - ➢ Funds to encourage specific purposes (e.g: Future faculty member, Women in STEM)

- ❑ Undergrad hourly: grader, lab assistant (applicable: Undergrads)
  - ➢ Help from experienced (previous course taken) undergrads is required. Lots of work!!!!!

- ❑ Assistantship (applicable: Grads, rarely applicable to Undergrads)
  - ➢ Teaching assistant
  - ➢ Research assistant

- ❑ Summer internship (applicable: both)
  - ➢ Spring and Fall career fair on campus.

- ❑ Summer jobs (applicable: both)

UNIVERSITY LIFE AS AN UNDERGRAD

- ❑ Acquire knowledge (classes)
- ❑ Taken in by grads as *they want mentoring experience*.
- ❑ Most likely work for free
- ❑ Some funding might be available.
- ❑ Gain (in exchange for free work/labor):
  - ➤ Research experience
  - ➤ Facility access (tools, instruments…)
  - ➤ Trained
  - ➤ Networking

http://www.ece.illinois.edu/academics/ugrad/curriculum
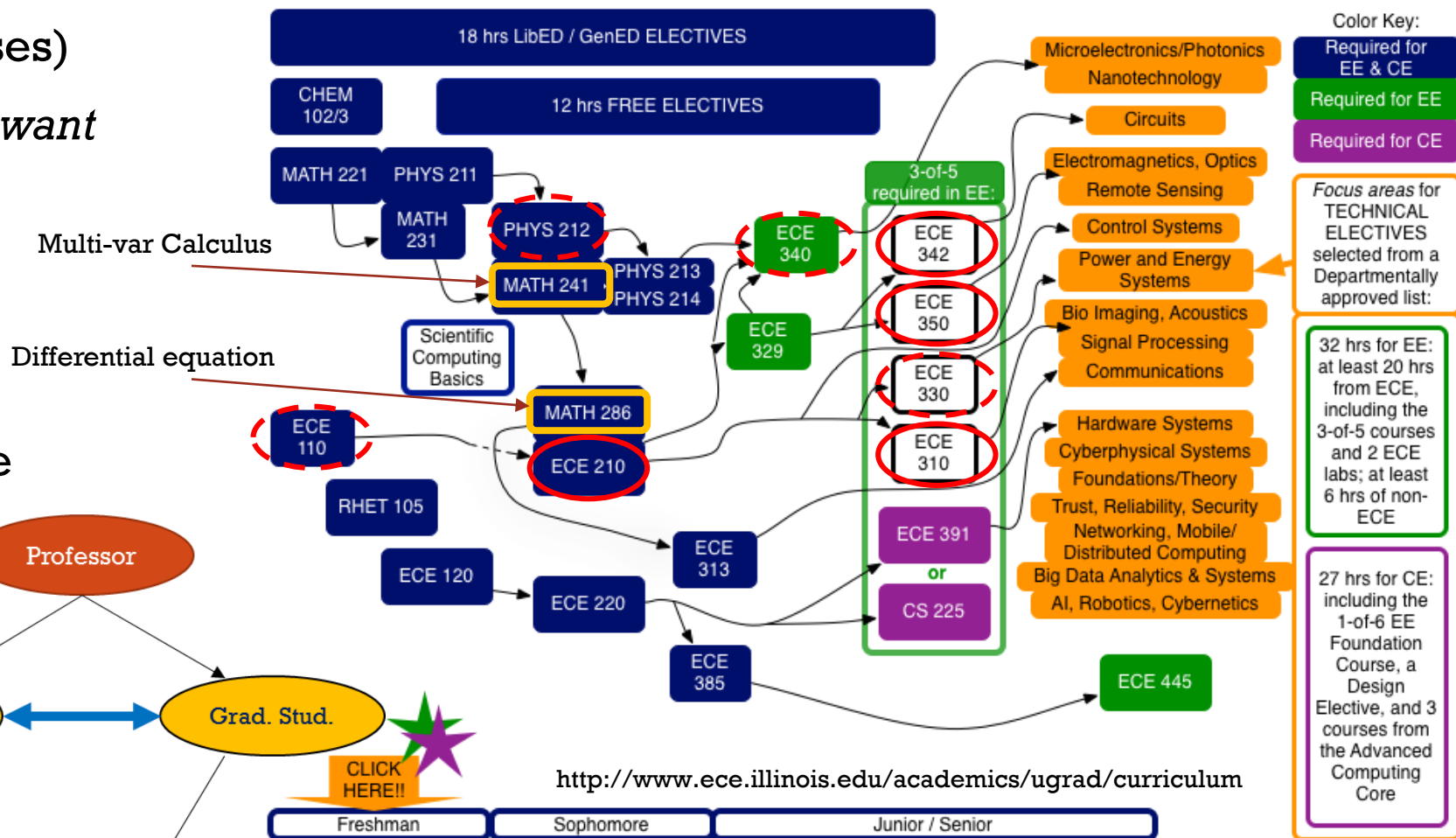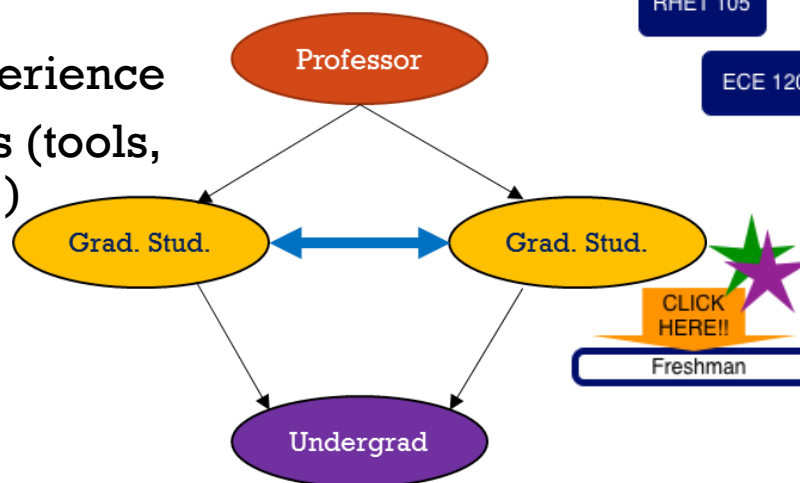
UNIVERSITY LIFE AS ... WAIT, I'M GRADUATING

❑ Looking for jobs after graduation
  ➢ **Past intern positions** and **network** while doing undergrad research would help.
  ➢ Start doing so when you're **01** semester away from graduation at latest.

❑ Go to grad-school
  ➢ Consider an MS degree:
    ▪ In Vietnam: well,…
    ▪ In US: student loan decides.
  ➢ Heading to a PhD:
    ▪ In Vietnam: well, …
    ▪ In US: you're **serious about your scientific career**. Your advisor needs to know if you plan to go for it

Salary by Education Level — ©2014 Cyrus Shepard

Education Level	Salary
Professional degree	$53,764.04
Doctoral degree	$119,919.35
Master's degree	$68,431.76
4-year college	$67,614.39
2-year college / A.A.	$55,377.55
Some college	$64,716.05
High school/GED	$52,889.22
Less than high school	$93,625.00

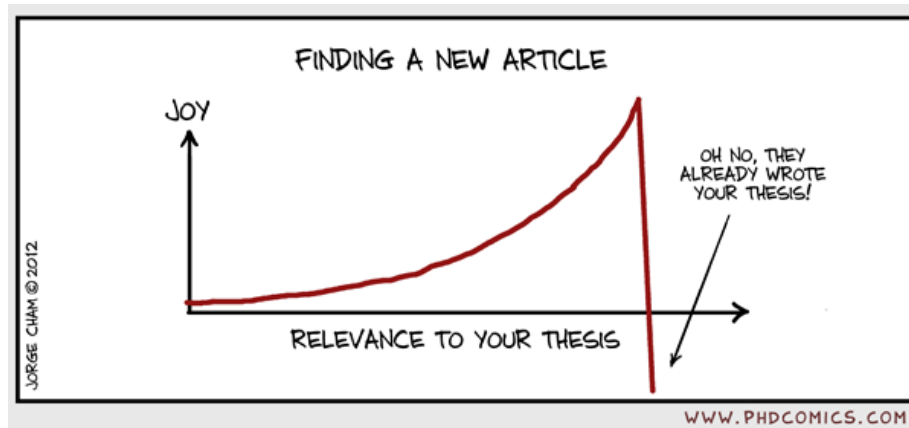MOZ

thong@emlab.illinois.edu

UNIVERSITY LIFE AS A GRAD

❑ Acquire knowledge (classes) (yes, you still have to!!!!)
  E.g: UIUC requires 32 credit hours for M.S., 24 credit hours for Ph.D.

❑ Define your interests: **Do research!**

❑ Collaboration with other grads

❑ Publishing
  ➢ **Fact:** As a PhD, you're more *valuable* to your advisor.
  ➢ **Fact:** Assistant Professor needs a lot of PhD students.

❑ Conference & Networking
  ➢ People talk! You want people to love you as much as possible.
  ➢ But beware of **the line** (personal vs professional).
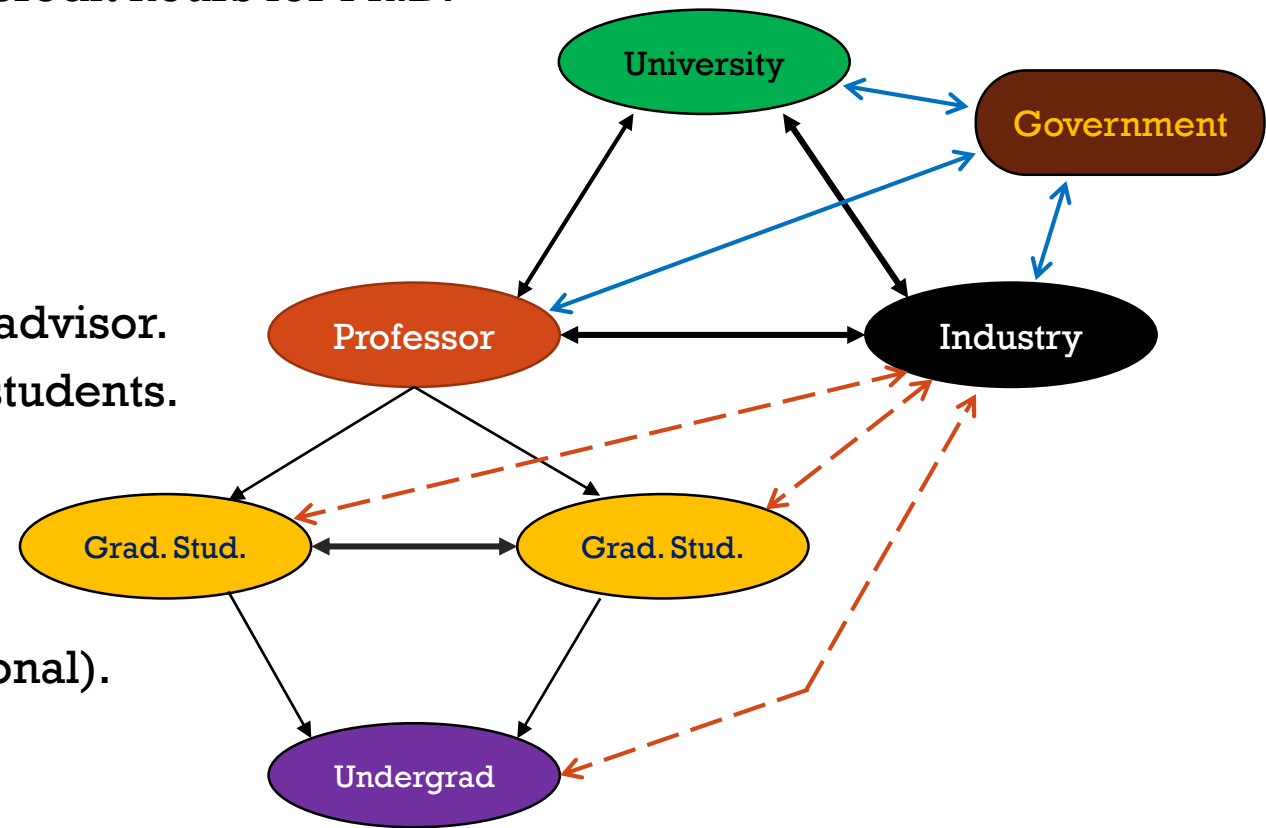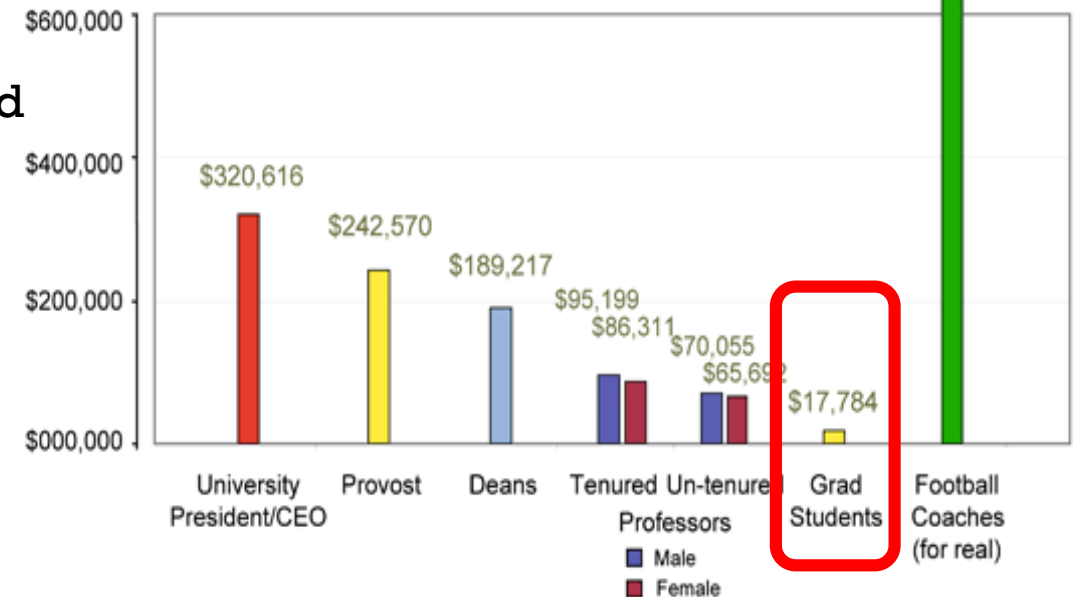
UNIVERSITY LIFE AS A GRAD

❑ Ugly truths:
  ➢ Master students are not *the apple of Professors' eyes*.
  ➢ Friends are also competitors.
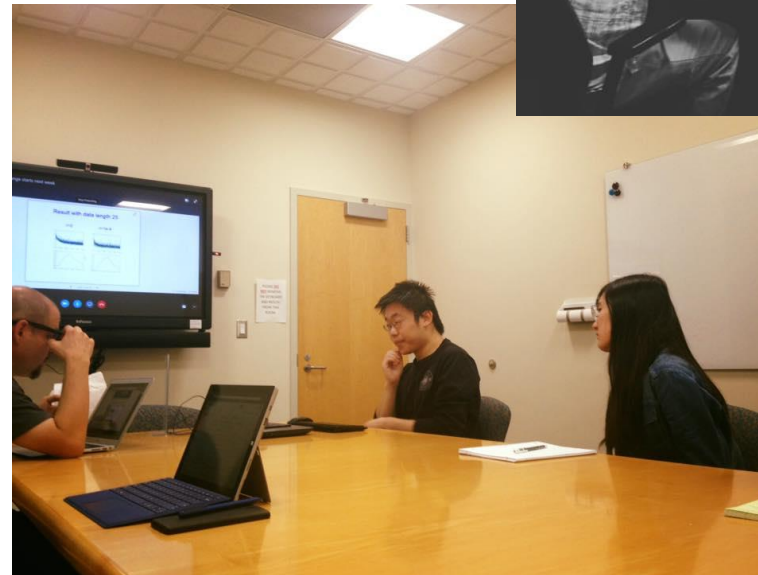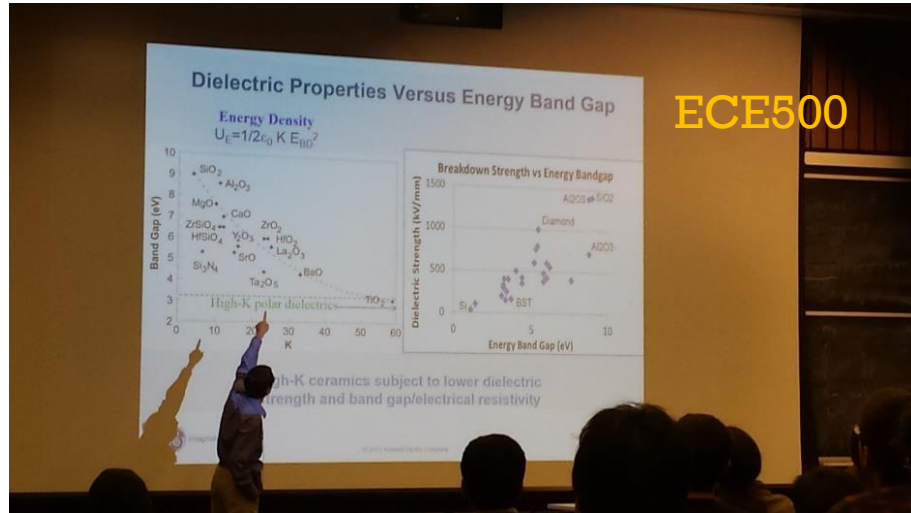 ➢ Work on your advisor's projects and your interested ones at the same time.

FINDING A NEW ARTICLE

JOY

OH NO, THEY ALREADY WROTE YOUR THESIS!

RELEVANCE TO YOUR THESIS

JORGE CHAM © 2012

WWW.PHDCOMICS.COM

$1,057,305

"Academic" Salaries

Actual average and median salaries at U.S. Doctoral-granting Universities

$600,000

$400,000

$320,616

$242,570

$200,000

$189,217

$95,199

$86,311

$70,055

$65,692

$17,784

$000,000

University President/CEO

Provost

Deans

Tenured Un-tenured Professors

■ Male
■ Female

Grad Students

Football Coaches (for real)

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.

JORGE CHAM © 2008

WWW.PHDCOMICS.COM

thong@emlab.illinois.edu

UNIVERSITY LIFE AS A GRAD

ECE500

THANK YOU!
Questions?

24

thong@emlab.illinois.edu