

If I Could Only Tell You These Few Things

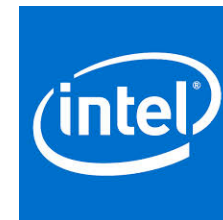
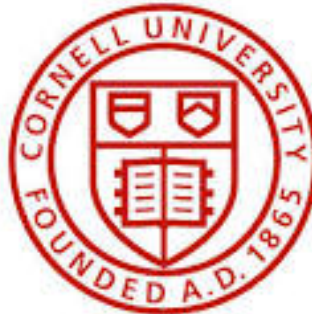
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Research Academy for Women Candidates
pursuing PhD in Computer Science fields in
Engineering Education Institutions

IUCEE Workshop, C R Rao Institute, Hyderabad



My Career Path

- ❑ Ph.D., UC Berkeley, 1994-1999
- ❑ Associate professor at Clarkson, small PhD granting university in upstate NY
- ❑ Assistant professor at Cornell for 2 years
- ❑ Sabbatical at VMware, Collaborations with Intel
- ❑ Work with ACM - SIGOPS treasurer and chair, editor of OSR, conference chair, US-ACM, etc.



- ❑ Be proud of all you are accomplishing!
 - Many of you teaching 3-4 courses at a time
 - Doing all your own grading and mentoring of your students
 - And working on your PhD - in many cases without close local guidance
 - That is really hard! My students, everyone I went to grad school, anyone would find that hard

- ❑ Today I am going to share with you the best concrete advice I can in 45 minutes
 - Not going to talk about my research
- ❑ Treat you like my students for 45 minutes
 - Lessons I share with my grad students regularly
 - How to pick a research topic
 - How to find venues to follow
 - How to find papers to model your work after
 - How to recognize good work and how to criticize work

- ❑ Picking a problem or research topic is hard!
- ❑ Important part of what it means to be a researcher
- ❑ May be first time you are not given a specific assignment - not only do have to solve the problem, first you have to find the problem

Lesson 1: How to pick a research topic

- ❑ If you have a good local mentor who is actively publishing, then choosing a topic in their area can get you the best advice
- ❑ Pick a topic that resonates intuitively with you
- ❑ Find a particular publication venue that you aspire to and where you really like the choice of topics
- ❑ Pick a topic where you really enjoy reading the papers in that field

Read, read, read

- ❑ You are going to be doing a lot of reading of research papers
 - This is a huge part of what it means to be a researcher!
 - Its how you know whether something is new and that is what it means to be research
 - Its how you know where to publish your ideas
- ❑ How do you become a good writer? Just writing? No! reading great writing!
- ❑ How do you become a good researcher? Just doing research? No! reading great research!

Lesson 2: How to find venues to follow

- ❑ Being a researcher means joining a community and teaching that community something they don't already know!
- ❑ Example of good targeted question to ask a remote mentor!
- ❑ But you can also find good venues yourself

Some examples

- ❑ One example, for cloud computing here are some suggestions
 - HotCloud: <https://www.usenix.org/conference/hotcloud12/tech-schedule/workshop-program>
 - SOCC: <https://sites.google.com/site/acm2012socc/>
 - There are many others!
- ❑ Look on www.wikicfp.com
 - 331 Cloud venues!
- ❑ Who sponsors the conference? ACM? IEEE? USENIX? Who is on the program committee?

Regional venues

- ❑ Don't overlook regional venues
- ❑ APSys
 - 2010 was in New Delhi, 2013 will be in Singapore
- ❑ Consider organizing one of your own
 - Ask IUCEE and DST and others for help

Benefits of "venue selection"

- Yes! Choosing venues to follow is a fair amount of work
 - But its worth it
 - Read titles of papers, sessions, look at program committee
- Allow yourself to be instructed by successful publishing authors in your choice of topic
 - What are people currently publishing!
 - What has already been done
- Much better than looking for a topic without such guidance!

Lesson 3: How to find papers to model your work after

- ❑ Now that you've chosen some venues, lets choose some papers
- ❑ Read every paper in those venues for the last 5 years
 - Every one? Yes!
 - Every word in every one? No!!
- ❑ Being a researcher means being familiar with the literature in your subject
 - No substitute for reading lots of papers
 - Never stops

Keys to reading papers well

- Learn how to read papers
 - Increasing levels of depth - just the abstract vs. all the related work
 - Find some paper worth reading very very deeply
 - One more level of reading deeply - repeated research
 - See pamphlet - "Efficient Reading of Papers in Science and Technology"
- Read with a purpose
 - Take focused notes - a topic I might consider, future work I could do, methods I can learn from
 - Write down questions, criticisms, ideas

Form a reading group

- ❑ Others to help cover space - which papers worth reading more deeply
- ❑ Vet your ideas with others
- ❑ Choose similar research topics
- ❑ Support each other
- ❑ Excellence grows up together

More on repeated research model

- ❑ Puts you in perfect position for follow-on work
- ❑ Learn so much by examining each graph and asking do I understand how this was generated and what "gotchas" might be hiding
- ❑ Big fan of repeated research for MS and then build on that work for PhD

Lesson 4: How to recognize good work/ how to criticize work

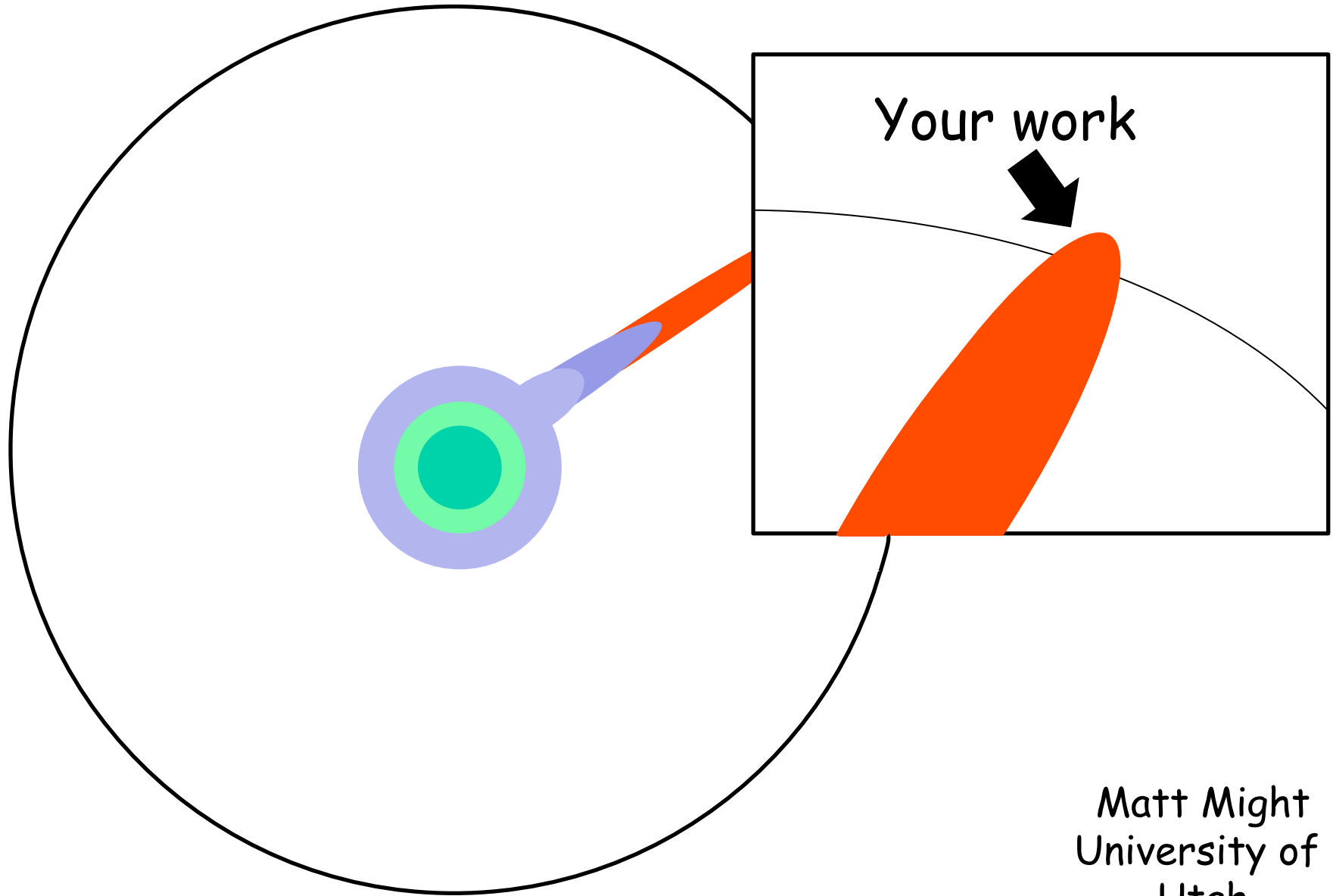
- ❑ I have my students read “An Evaluation of the 9th SOSF Submissions”
 - http://static.usenix.org/publications/library/proceedings/dsl97/good_paper.html
- ❑ I have my students practice criticizing work they read
 - Often start with more superficial criticisms
 - Pointing out things undone
 - Suggesting future work
- ❑ You can't become a researcher until you can teach a community something = must be able to see what is missing

- Find a great paper you like, that you think you could have done, that inspires you, a paper for which you can see work undone
- Allow yourself to be instructed by particular papers in the art of doing research!

❑ YOU MUST BE ABLE TO ARTICULATE:

- The specific problem that you're solving
- Why that problem is important
- Why previous solutions are insufficient
- Why your approach has the potential to succeed where others failed

What Is Research?



Matt Might
University of
Utah

Research is hard

- ❑ Know venues and researches in your field
- ❑ Read all the papers!
- ❑ Learn to criticize and suggest new directions
- ❑ Remember if we knew the answers it wouldn't be research
 - Searching a dark space ..reporting what you find
- ❑ We can't make it easy but we can help you work smart...make the time you have to spend count

A few more lessons

- ❑ You know when you are making a difference, when you have “traction” - if you don't, then find something you can do
 - Measure, trace, document, simulate
 - Don't exhaust yourself staring at something - say what can I do that is productive
- ❑ Do something concrete and hands-on as early as you can
 - Look for open source software you can build on
 - Small groups (and smart groups) look to add targeted changes to open source systems
 - Benefits as teacher, researcher and citizen

❑ Make what you do count

- Insist on concrete deliverables; finish things
- Be willing to define your contributions more broadly
- Document efforts such as form reading group, specific papers read
- Write a research blog

❑ Chose a topic that inspires you

- More willing to do what it takes to read related work...more likely you recognize good solution when you see it
- At least you will be satisfied at the end of the day

Good examples of things to ask a remote mentor

- ❑ Can you suggest a few publication venues related to my topic/ interests?
- ❑ Is my 3-5 sentence problem definition sufficiently focused?
- ❑ I am trying to choose between these three topics - can you comment on them?
- ❑ Ask "meta-questions" - how did you learn that? What tools do you use? What venues do you like?
- ❑ Can you suggest 3-5 recent papers you loved?
- ❑ Can you suggest courses, books etc related to my topic?
- ❑ Can you suggest a few researchers you respect in my area?