Research as a Career

Jie Gao, Stony Brook
Ayanna Howard, Georgia Tech

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Stony Brook University

Jie Gao

- Professor @ Stony Brook
- BS'99 USTC China
- Ph.D'04 CS Stanford
- 04-05 Postdoc at Caltech
- Research: Algorithms, Computational Geometry, Wireless and Sensor Networks, Social Networks

Ayanna Howard

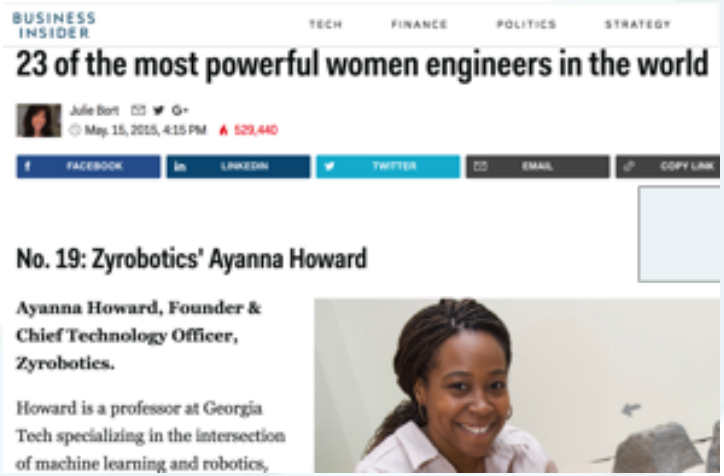
- Chair, School of Interactive Computing (IC)
- Linda J. and Mark C. Smith Endowed Professor
- CTO/Founder, Zyrobotics
- Previous: NASA Robotics Researcher
- Research: Human-Robot Interaction and AI

College of Computing Selects Ayanna Howard to Lead School of Interactive Computing

DECEMBER 4, 2017 - ATLANTA, GA

Following a national search, the Georgia Tech College of Computing has selected **Ayanna Howard**, professor and Linda J. and Mark C. Smith Chair in the School of Electrical and Computer Engineering (ECE) to chair its School of Interactive Computing.

Howard, who is also associate chair for faculty development in ECE, will succeed Professor **Annie Antón**, who served in the role from 2012-17. Antón finished her five-year term in June 2017 and remains a professor within the school. Professor **Amy Bruckman**



BUSINESS INSIDER TECH FINANCE POLITICS STRATEGY

23 of the most powerful women engineers in the world

Julie Bort May. 15, 2015, 4:15 PM 529,440

FACEBOOK LINKEDIN TWITTER EMAIL COPY LINK

No. 19: Zyrobotics' Ayanna Howard

Ayanna Howard, Founder & Chief Technology Officer, Zyrobotics.

Howard is a professor at Georgia Tech specializing in the intersection of machine learning and robotics,

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@robotsmarts

Research Related Goals

- Stay informed about advances in your research area
- Stay published in your field
- Stay connected to members in your community
- Stay excited about doing research
- Develop your research “elevator pitch”

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Specific Strategy 0: Research Elevator Pitch

- Three sentence description
  - Problem you are interested in
  - Why it is important
  - Approaches you are exploring
- Remember: the elevator ride is short !

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Exercise – Research Elevator Pitch

- Find a group/partner (2-3) [15 seconds]
- Think of/Write down your research elevator pitch [1 minute]
- Share with your group [3 minutes]

Specific Strategy 1: Read and Reflect

- Read a paper/chapter/blog/article every week
- Reflect on that paper with you in mind
  - Do they use a new technique that I can use?
  - Did they present their work in a way I can adopt?
  - Did they expose a particular insight or result that supports my work?
- Reflect on your learnings every few weeks (take notes if necessary)

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Specific Strategy 2: Get Out in the World

- Attend one major conference a year
  - Reconnect with existing friends
  - Use weekly reading to meet new people
  - Talk about **your** work
- Serve on a PC or grant review panel
  - Ask your friends/advisor/mentors to suggest you
  - Go in person
- Have students present research posters
  - Create students people want

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Specific Strategy 3: Collaborate with at Least 1 Peer*

- Someone who does research in a related area
- Someone whose primary research is outside of your area but who is *physically local*

Don't let your ego or pride get in the way

***Students are not your peers**

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Creating a pro-research environment

Schedule Time Daily for Research

- Every week
  - Create a list of small research tasks (for you, for your students, …)
- Every weekday
  - Schedule 30-60 minutes for research (research-based writing counts!)

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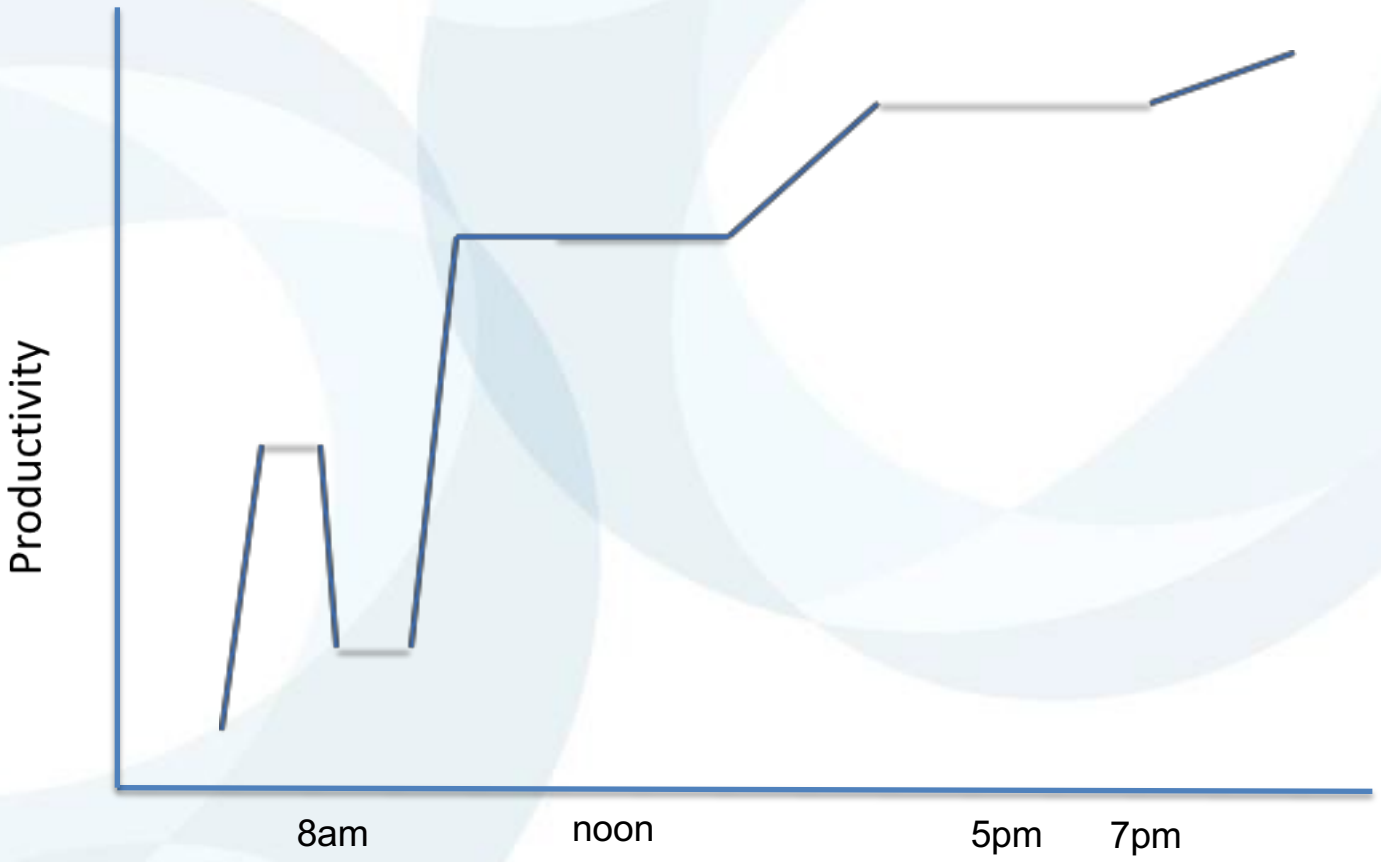
My Productivity



Create a Support System

- Collaborators and Peers can be great motivators!
- Create research accountability group
  - Track research progress
  - Provide encouragement
- Create a system of people for feedback
  - Less intimidating people get work in early stages
  - Ask more established folks for feedback on work closer to being finished

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Exercise – Reflect (5-10 minutes)

- What time of day are you most productive on research?
  - Strategize together - What could you do during that time?

- Strategize – What type of individuals might you include in a support group?
  - In private – Write down specific names.

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Funding your research

Some Practical Suggestions

- Find out about university funding
  - Travel and research grants
- Ask your colleagues how they got funding and how much
- Go to your grants office
- Call program officers and ask questions
- Ask people for successful proposals
- Ask successful researchers to comment on a draft of your proposal

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Funding Opportunities

- NSF
  - Career
  - REU
  - RUI
  - ROA
- DARPA
- DOE
- HHMI
- NIH
- Sloan Foundation
- CRA-W
  - DREU and CREU
- Microsoft New Faculty Fellowship
- Packard Foundation
- Google Research Awards

Managing Research Projects

Determining Your Research Scope

- Choice of a research project
  - Your current expertise/skills
  - New skills you would like to learn
  - Available resources (physical, human)
  - Resource you try to get
  - Long term vision, short-term goals.
  - Think about impact and practicality

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Quantifying Your Available Human Capital

- How will you spend your time?
  - Doing actual research (reading, thinking)
  - Managing / interacting with participants
  - Academic year vs. summer
- How much time and effort will your collaborators give?
  - Other faculty may have limited time
  - Industry researchers give and demand lots of effort
  - Students may require training

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How Do You Make Collaboration Succeed?

- Workshops during which people work together on open problems (theory).
- Have a student work on the project
- Communicate on regular schedule
- Set concrete goals
- Work with people with complementary expertise.
- Work with people you like

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Before Tenure

Establish yourself.

- Try to differ from Ph.D work.
- Quality better than quantity.
- Stay focused.
- Choose projects that are not too risky.
- Publish papers with your own students (not always with senior faculty/Ph.D advisors).

After Tenure

More freedom to branch out to new areas

- Choose a good entry problem (expertise, flavor, resources).
- It takes a few years to really enter a field.
- But this is sometimes necessary.
- Always learn new things.
- Keep a few high risk/high rewards projects and some “safer” projects.
- Consider leading large projects.
- Think about impact.

Working With Students

Recruiting Students: Getting the Word Out

- Talk about research at admit day sessions and research colloquia
- Post research on door and web page
- Ask colleagues teaching introductory classes for names of good students and approach those students
- Teach courses that reach out to new graduate students.

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Be Very Selective

- Trial run to evaluate
  - Personality
  - Initiative and passion
  - Interest
  - Diligence
- Ways to get started
  - Credit during semester
  - Paid research during semester
  - Summer research

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Tips for Working With Students

- Be positive!
- Break research projects down into small, semester length tasks
  - Plan for each task to be done by a different student
- Create organization
  - Create contract specifying expectations
  - Communicate and meet on set schedule

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Tips for Working With Students

- Supervise students
  - Develop general skills (communication, analytical, writing, critical thinking)
  - Develop research specific skills
  - Teach them about the research process
- You want students to succeed.
  - Measure progress not just by # papers published, but also how much have the students grown.

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Manage a Research Group

- Encourage collaboration among students.
- Each student is given a project to lead.
- Give fair credits.

My Personal Habit

- Spend one semester to brainstorm/read papers/converge on a research topic.
- At least 1 hour one-to-one meeting per week.
- Correct their writing on paper.
- At the beginning and end of each semester we summarize the student's progress, check where he/she stands and set expectations/milestones.
- Encourage student to do an internship in industry to make better decisions on their career paths.

Breakout Group Exercise (Groups of 3-4)

The CRA-WPrize is a new international competition designed to encourage the next-best research ideas. The prize is an award of $5M that can be used to further the research and development efforts needed to make this idea a reality.

Your group's task

- Based on research projects within your group – discuss a concept to propose. This can either be a collaboration of ideas or a single idea (but must be based on research that is already being done by 1 to N members of your group).
  - What is the idea?
  - How can it be used in or by society?
  - How many years of research will it take to develop?
- Identify a spokesperson. Present your next-best research idea to the rest of the participants.

Q&A

Reflections & Summary