REU-CAAR: You’re Here!

William Gasarch-U of MD
Credit where Credit is Due

Origin of this talk
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▶ Bill G modified this boring handbook into a fascinating 148-slide talk!
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- Bill G modified this *boring* handbook into a *fascinating* 148-slide talk!

**John Dickerson:** Why are you telling them all that?
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**John Dickerson:** Why are you telling them all that?
**Bill Gasarch:** In academia its very important to credit past work.
Purpose of This Talk

1. Who are the mentors?
2. Who are the students?
3. What are the projects?
4. What is expected of you?
5. What should you expect of us?
6. Nuts and bolts of how the program works.
7. Advice on how to get the most out of this summer!
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REU-Caar

**REU**: Research Experience for Undergradutes.

**CAAR**: Combinatorics And Algorithms for Real Problems.
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The Title Encompasses...
REU: Research Experience for Undergraduates.
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The Title Encompasses... All of Computer Science!
However We mean CS that uses Math.
But That still seems to cover all of CS.
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REU: Research Experience for Undergraduates.
CAAR: Combinatorics And Algorithms for Real Problems.

The Title Encompasses... All of Computer Science!
However We mean CS that uses Math.
But That still seems to cover all of CS.
However We mean Quantum Computing, Crypto, and ML.
REU-CAAR TEAMS

1. Simulation of Low Depth Quantum Circuits:
   Mentors: Gorjan Alagic and Matthew Coudron.
   Students: Celia, Sangheon, Shi, Suchetan.
   Either QC will be able to do cool things OR its failure to do so will lead to breakthroughs in Physics! Its a WIN-WIN!

2. Diversity in Matching Markets
   Mentor: John Dickerson.
   Students: George, Nathan, Bradon, Olufemi.
   Using ML to CORRECT bias rather than cause it!

3. Using Gen Adv Networks in Domain Adaptation
   Mentor: Soheil Feizi.
   Students: Jasmine, Sam, Sophya, Wester.
   Fighting AND creating Deep Fakes!
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1. Fast Routing Using Teleportation
   **Mentors** Aniruddha Bapat, Eddie Schoute, Alexey Gorshkov, Andrew Childs.
   **Students** Sam, Nicole, Mason

2. Understanding bias and fairness in NN via visualization
   **Mentor** Tom Goldstein
   **Students** Crystal, Emily, Keshav, Rachel, Ryan, Tiye, Zain.
   Using Visualization to DETECT bias!

3. Learning Fair Representation:
   **Mentor** Furong Huang.
   **Students** George, Zora, Ngan.
   \( (\text{Biased Data}) - (\text{Bias}) = (\text{Unbiased Data}) \).
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   Mentor: Jon Katz.
   Students: Blake.
   Jon told me about this in code. I need to factor 8,616,460,799 to find out about it.

2. Adversarial Machine Learning
   Mentor: Jon Katz.
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   How hard is the problem of un-biasing data?
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Overall Summary

This Summer's Projects are Biased Towards Dealing With Bias!
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Staff

▶ Large and In Charge
Bill Gasarch
gasarch@umd.edu

▶ Second in Command
John Dickerson
john@cs.umd.edu

▶ Your Stipend
Jodie Grey
jgray2@umd.edu

▶ Lots of Stuff
Sharron McElroy
sharron@umd.edu

▶ Activities and Talks
Bill and John

▶ Preparing your final Talks
Clyde
ckruskal@umd.edu
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- **Activities and Talks** Bill and John
- **Preparing your final Talks** Clyde ckruskal@umd.edu
Program Goals

1. **Research!** What is Research? Discuss!

- Work on problems where the answers are **not** already known.
- Expose you to a variety of career paths. Discuss! *Academia, industry, Government, hobo, other.* (Academia prob needs a PhD.)
- Build skills Discuss! *Team work, Communication, Project Management.*
- Build a network with faculty and students. Discuss! Useful for the future!
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What the Program Expects of You (I)

1. Show up every weekday. On time and sober.  
   10:00AM-4:00PM

Really? That only makes sense in non-virtual program. 

Students Meet with each other often on Skype or Zoom or Slack or Facebook or whatever-the-cool-kids-use-nowadays 

2. Mentors Meet with the students regularly and give them ACTION ITEMS. Their job is to make sure you always have things to do.

3. Students and Mentors Respond to email promptly. More important since the entire program is virtual.

4. Actively contribute to your research project and your team.
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What the Program Expects of You (II)

1. Check e-mail. Reminders, notices, requests will be emailed.
2. Monday—all meet for chat, math puzzles, or discussions.
3. Wednesday—all meet for a talk.
4. I will meet each group once every two weeks to check on how things are going.
5. I will also have groups meet with each other. This is all to be worked out.
6. Participate in assessments such as surveys.
7. Give a presentation of your work late in the summer.
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Your Mentor’s Role

1. **Role modeling:** Their experiences offer clues for your own professional success story.
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3. **Background:** Explain *why* the research is important! How it fits into other things!
4. **Connection:** Help connect you to their colleagues, graduate assistants, others. You will learn as much from them (or more!) as you do from your research tasks!
What Faculty Mentors Expect from You

1. **Enthusiasm:**

   - Be interested in the project, field, and topic.
   - Become familiar with background literature.
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1. **Enthusiasm**: Be interested in the project, field, and topic. Become familiar with background literature.

2. **Assertiveness**: Think for yourself and support your own ideas.
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1. **Enthusiasm:** Be interested in the project, field, and topic. Become familiar with background literature.

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3. **Adaptability:**

4. **Maturity:** Be reliable, and cooperative. Own your mistakes.

5. **Communication:** Be clear in verbal & written communication. Seek clarification, ask questions, provide suggestions.

6. **Responsible:** Tell team changes that affect your participation.

7. **Be Bold/Curious:** Be Bold and Curious!

8. **Respect:** Resolve issues quickly, directly, and respectfully.
What Faculty Mentors Expect from You

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8. **Respect**: Resolve issues quickly, directly, and respectfully.
What Faculty Mentors Expect from You

1. **Enthusiasm**: Be interested in the project, field, and topic. Become familiar with background literature.
2. **Assertiveness**: Think for yourself and support your own ideas.
3. **Adaptability**: Be flexible/open minded.
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7. **Be Bold/Curious:** Be Bold and Curious!

8. **Respect:** Resolve issues quickly, directly, and respect fully.
Sexual Harassment and Discrimination

(My second least favorite topic.)
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1. Ask other REU members about their perceptions of the behavior. If their perceptions are similar then next step.
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2. Speak directly to the individual in a respectful manner. This will let you immediately know if the different treatment is a misunderstanding or a major problem.

3. If you feel uncomfortable, seek advice and guidance from others. Bill Gasarch or John Dickerson can offer assistance and direct you to campus resources for help.

4. While this slide is about Sexual Harassment and Discrimination, feel free to talk to Bill Gasarch or John Dickerson about any issue, even if it is uncomfortable.

5. This program is in its 8th year and this has never been an issue.

6. This year the program is virtual so seems even less likely to be an issue.
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First Two Weeks

You should all know about each others projects:

1. Mon 12:00PM-1:00PM. THIS TALK!
2. The rest of this week, and next week: Talks by the mentors on their groups project. It is for group A to know what group B is doing. Times will be announced. The Tuesday and Wednesday talks are at 4:00PM.
3. Next week Monday- A lunch activity! 12:00PM, though no lunch is provided.
4. No Bootcamp – Our projects are too diverse.
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Most Weeks

1. Start work at 10:00AM (if different time zones you can adjust this but have a set time) and meet with your group at a point.
2. Research 10:00-4:00 with a break for lunch. CAN work longer!
3. Friendly get together on Mondays at 12:00PM.
4. Talks on Wednesdays. Time will vary.
5. I want students to e-meet at night to talk about Applying ML to Quantum Teleportation and Crypto To Combat Bias.
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My Least Favorite Topic

Discuss- what do you think is my least favorite topic?
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**Good News That You Know** You get $6000 Stipend.
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If you do not live up to your end of the deal
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Discuss- what do you think is my least favorite topic?

**Good News That You Know** You get $6000 Stipend.

If you do not live up to your end of the deal
You could be asked to leave, which will mean you get less of your stipend.
Discuss- what do you think is my least favorite topic?

**Good News That You Know** You get $6000 Stipend.

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What is ‘your end of the deal’:
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**What is ‘your end of the deal’:**
Discuss.
1. There are some HS students on some of the project.
2. There are other HS students working on other projects.
3. The HS students may join some of our activities.

HS Students
Complain SOONER Rather than Later
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Key to a good relationship:
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In any problem or dispute that arises the important thing is
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NOT fixing it and making things work out
Complain SOONER Rather than Later

Key to a good relationship:

In any problem or dispute that arises the important thing is NOT fixing it and making things work out its finding whose to Blame :-}
Most Common Complaints

Students Most Common Complaint: Mentors who do not respond to emails in a timely manner.

Mentors Most Common Complaint: Students who do not respond to emails in a timely manner.

Let me or John D know soon if this is a problem.
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Let me or John D know *soon* if this is a problem.
Who is Funding This?

1. National Science Foundation (NSF).

2. Google/An Zhu (An Zhu was an ugrad at UMCP who worked in Theory).


4. Other Schools grants.

5. The Winkler Foundation.
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5. The Winkler Foundation. What?
Irwin Winkler

Bill Gasarch’s Mother is Pearl (Nee Winkler) Gasarch
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Pearl Gasarch’s brother is Irwin Winkler
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Irwin Winkler is a producer in Hollywood.
Bill Gasarch’s Mother is Pearl (Nee Winkler) Gasarch

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Irwin Winkler is a producer in Hollywood.
https://www.imdb.com/name/nm0005563/?ref_=fn_al_nm_1
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1. Produced ~ 55 movies and Directed ~ 7 movies.
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Why am I telling you this?
Irwin Winkler has established a Charitable foundation that gives money to many worth causes AND also to our REU!
**The Winkler Foundation**

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**Adam Winkler** is Irwin’s son who administers the foundation. He’s a law prof so he gets academia. (The other 2 sons: showbiz.)
What has Adam Winkler Done?

https://www.amazon.com/s?k=Adam+Winkler&ref=nb_sb_noss_2
Virtual REU Thoughts

Last summer the program was virtual.
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- Research was **great**. Students met with each other and with the mentors and some papers were produced.
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- Research was great. Students met with each other and with the mentors and some papers were produced.
- Social aspect was terrible. We did have Monday Activities, Game Nights, and some these 5 random people get together but it didn’t really work.

This summer: Trivial Nights, Icebreakes (like asking you to tell something about yourself), Game nights, and I welcome any idea you have.
Virtual REU Thoughts: Timezones

1 students is from the Atlantic Time Zone (one hour east of EST)
15 are EST.
5 are CST.
4 are PCT.
1 is HCT in June, then PCT.
The groups should plan to meet taking timezones into account.
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Questions from You?

I welcome questions now and anytime!
Tell me something about yourself - I will call on you