Toward the Army’s Science and Technology Career

Successful First Steps from the Army’s Science and Engineering Apprenticeship Program for High School Students

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How I got here – my education

• Twelve years of public-school education
• Currently a rising senior at Chantilly High School, Fairfax County, Virginia
• Applying for colleges!
• Most likely to study electrical engineering, applied physics or mechanical engineering
How I got here – spring of 2017

• Are unexplainable lab results always due to “instrumentation error?”
• Is that the real lab experience?
• Wanted to know what STEM research is like in a real lab
• AEOP’s Science and Engineering Apprenticeship Program (SEAP)
• Will they take me? I really don’t have much to offer!
A turning point – summer of 2017

- ARL and my mentor took me!
- Assignment: port Matlab-based shock-and-vibration toolbox into Python
- Mentor taught me about basics of signal processing
- Solid 8 weeks of work wrestling with Python
- At the end of summer, started working on a sound-puzzle that mystified me for more than 8 years
Many pleasant surprises – my junior year

• Won grand prize at Northern VA Science Fair → Intel ISEF finalist

• Won 1st place at Virginia State Junior Science and Humanities Symposium (JSHS)

• Won 2nd place (physics category) at National JSHS

• Army S & T Symposium invited me to share my journey of science exploration (education outreach)
Back to ARL again – summer of 2018

• Concerned about congressional budget; glad to be back
• Worked on a project developing a self-cooling chip
• Used last summer’s shock-and-vibration toolbox efforts to simplify data handling this summer
• My contribution: convergence study of heat transfer from temporal and spatial perspectives
• Have learned tremendously, again
Reflection – 16 weeks of internship at ARL

• No better way to spend the two summers
  • Sense of responsibility
  • Use of public transportation!
  • Improve my technical skills
  • Meet other like-minded high schoolers, undergraduates, and graduate students
  • Clear my doubt regarding “instrumentation error”
  • Meaningfully contributed to my mentor’s project
• Solidify my selection of an engineering career
  • Engineering physics or electrical engineering
Reflection – 16 weeks of internship at ARL

• Remove any doubt whether math and physics are essential
  • See how they are used in a real lab
  • Use of instrumentation
  • Math modeling & model comparison
  • Heat transfer and phase change materials
  • Data processing and programming
  • Use of HPC systems – HPCMP ORS

• I really like the staff at ARL
  • They treated me like I am one of them
  • Hope to come back to intern for four more summers while in college
Reflection – DoD-sponsored JSHS competitions

• Competition format encourages communication
  • Written & oral
  • Judges are college professors or experts in the judging field

• Competition categories
  • Environmental, biomedical, life, medicine, engineering, math & computer, physics, chemistry

• Great to see so many like-minded future scientists

• Speakers and panelists for the National JSHS were fantastic

• Toured many DoD facilities
Where can I go from here – back to school

• None of the above could be possible without
  • AEOP: SEAP & JSHS & ARL
  • Time and energy my mentor spent on me
  • ARL colleagues’ open arms & great projects
  • Countless people from ARL and AEOP

• 8-week is really too short
  • Getting momentum to contribute around week 6
  • Almost time to wrap up!
  • But I have not finished the assignment yet
  • May I stay a bit longer?
Extending beyond an 8-week apprenticeship

• Recalled past conversations with students who participated in science competitions
  • I explored a very simple idea of my own
  • Many other students continue investigations from larger projects originated from government or university research labs

• Is it possible to extend duration of the internship beyond summer?
  • Benefit of the mentor’s project and the apprentice
  • Guest researcher?
Parting words

- SEAP and JSHS opened my eyes to the world of STEM lab career
- ARL has changed my future prospect
- Grateful for my ARL mentor-and-colleagues’ guidance and support
- Hope to participate in 2019 DoD-JSHS competition
- Look forward to coming back to ARL for college internships:
  - DoD’s SMART Scholarship for Service Program
  - AEOP’s URAP
  - AEOP’s CQL
- I plan to be back to present a technical topic at a future Army S & T Symposium & Showcase!