Hi, I'm Dr. Abbie Watnik from the U.S. Naval Research Laboratory. My research is focused on digital holography and active imaging. AMA!

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April 17, 2023

Abstract

Every day I work on the cutting edge of science and technology and I love it. Our team at the U.S. Naval Research Laboratory, works specifically with advanced optical imaging technologies which work to help map the ocean floor. It is my passion for the science and for mentoring others to help to navigating the maze of challenges, opportunities and achievements in the field. Have a question on the latest in active imaging research? Are you looking to make your own impact on the science community? I will be online at 1:00 pm to answer your questions – Ask Me Anything!

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DR_ABBIE_WATNIK R/SCIENCE

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CORRESPONDENCE:

DATE RECEIVED:
August 30, 2017

DOI:
10.15200/winn.150401.14707

ARCHIVED:
August 29, 2017

CITATION:
Dr_Abbie_Watnik , r/Science , Hi, I'm Dr. Abbie Watnik from the U.S. Naval Research Laboratory. My research is focused on digital holography and active imaging. AMA!, *The Winnower* 4:e150401.14707 , 2017 , DOI: 10.15200/winn.150401.14707

How come a Naval Research laboratory is doing work on holography?

Not the best of questions, but I'm curious.

iheartzigg

Here's a video of one of my colleagues at NRL explaining our holography research and its applications.

Hi Dr. Watnik! I recognized your name and dug out some business cards I got last year and realized that I have met you before (proof). I was one of the sophomores who presented the "glove controller" project at the CSU ECE meeting last spring, the same day the senior projects were shown off. I really wanted to try and talk to the intimidating engineers to make some connections during that meeting, and you made it really easy for me to sit down and ask some questions about what being an engineer in the real world means. Thank you for that!

Question: What kind of steps besides getting my bachelors in computer engineering can I take to begin working as a Navy engineer? What is the best use of my extra curricular time to try and get where I want to go? Are there any specific internships I should be thinking about applying for? Thanks!

DrKnockOut99

Glad to hear that you are working towards a bachelors in computer engineering!

NRL offers several internship programs - for high school students, undergraduates as well as graduate students. You can check out more information here.

Yay, glad to see you're doing this, what a small world. Two question,

I used to volunteer for a program called "Expanding Your Horizons" that focuses on encouraging girls in middle school to pursue the sciences and it seemed like a really good program.

1) What age were you when you first took an interest in science? When did you know that you wanted a career in science?

2) What programs (national or local to DC) do you think are strong for encouraging women in science?

Freakin_Lasers

I've always enjoyed math and science. I had the opportunity in middle school to get involved with a extra-curricular program called Science Olympiad which definitely encouraged my interest in this area.

Participating in NSF REU programs as an undergraduate student motivated me to pursue a graduate education in Optics.

What kind of education did you need for this job?

mattd873

I have a B.S. in Electrical Engineering, and M.S. and Ph.D in Optics. However, I also work with colleagues with backgrounds in mathematics, physics, applied physics, mechanical engineering, computer engineering, etc.

Hello there, Dr.!

You mentioned working with cutting edge technology. I'm curious: what was the most exciting or innovative piece of technology that you got to use on your job?

CoralineCastell

I typically use lasers, fast-framing cameras, spatial light modulators, diffractive waveplates, Shack-Hartmann wavefront sensors, etc. I think the innovative part is taking all these individual pieces of technology/equipment and figuring out how to use them in novel ways.

What is the best part of working at the U.S. Naval Research Lab?

Do you have any advice for an aspiring undergrad scientist who wants to do research for the military?

Cookthefourth

I absolutely love my job! I work with very talented individuals where we are constantly solving cutting-edge problems every day. What I do has long-term impact to the U.S. Navy and I get to contribute to that day in and day out. I love that every day is different - I spend my time setting up optics in the lab, writing computer code, dreaming up research ideas... evaluating other people's research ideas... giving technical talks, publishing papers, etc. I love the freedom to be able to create and constantly learn new things. I appreciate the technical community I am a part of. I am thankful for being able to bounce ideas off other people. It's a lot of fun!

Can you use digital holography with non-optical data? For example to reconstruct ultrasound calls from bats to see how they travel around space?

false_anemone

Here's some interesting work that was recently published where digital holograms were created using a wifi router!

Hi! I work in the field of aerial imagery (mostly LiDAR) is the technology related in any way?

millzombie

Our team at NRL is on the cutting-edge of combining lidar - which uses short laser pulses to measure range and distance - in combination with holography. We holographically record the laser return from the object. With this unique approach, we can compensate/correct/exclude for the effects of atmospheric turbulence, particle scattering, etc. that can't be done with traditional lidar methods.

Hello! I recently applied for an internship at the Naval Research Laboratory in DC, and while I was a finalist for a position, I did not get the spot. I have a few questions regarding that internship, as I plan on applying again this year and the year after. The internship program is called SEAP, btw. Even if you are not familiar with SEAP, I am sure your advice will be incredibly useful.

1) What would you look for in a prospective intern/employee? Qualities, skills, anything that would set someone out from the others.

2) What does your typical work day look like?

3) Do most people serve in the military before you begin research at a navy research lab?

Thank you so much for your time and help. It is much appreciated.

Gork862

1) Successful interns/employees: self-motivated, willing to learn new things, teachable, strong background in physics, engineering or math, a willingness to work independently

2) Typical work day: Every day is different! There is really no typical work day. I do spend a lot of time reading the latest scientific journal articles to see what other people are doing. But then it's taking those ideas and concepts and applying it to my own work and applications.

3) I am a civilian research physicist with no prior military experience. Most people at NRL do not have prior active duty military experience.

As someone looking into a potential career in military science labs, I'd love to know how you got to where you are and what your job is like!

Did you become an established scientist in non-military companies before going to work for the Navy, or did you start your career with them?

What are the pros and cons of working for the government as opposed to the private sector?

What were some favorite projects (that you can tell us about without killing us of course) that you worked on in the past?

Thank you so much for doing this AMA!

Dillo00

It's hard to narrow down my favorite projects! However, some of my previous research was on creating gigapixel holographic images. I was able to take individual holographic frames and combine them to create an effective larger aperture... a synthetic aperture. A larger synthetic aperture allows for much finer resolution than a single frame.
See: https://doi.org/10.1364/COSI.2011.CWB1 https://doi.org/10.1364/OE.19.012027

One unique thing about this work - and where a subset of imaging technology may be headed in the future - is lensless imaging. The gigapixel holographic image was created without direct imaging. No lenses required!

There are other groups in the field currently pursuing some very interesting work in lensless imaging as well: https://doi.org/10.1364/AO.56.006450 https://doi.org/10.1109/ICCPHOT.2016.7492880