

Working for NASA is a Meaningful Life

Dr. Jonathan Fraine - July 19, 2019

As a teenager, I wanted to be an astronaut and live on Mars. In fact, I would still take that opportunity if it was offered to me. Which was more realistic than when I was 4 years old and wanted to 'work' as a ninja, or fly fast jet airplanes. Finally, when I was 15, I took a biology course with one of my favorite professors in high school (the 4 years before college). I asked him hundreds and hundreds of questions all year long, mostly about biology: about nuclei, about DNA, and about proteins in the cells. I told him that I wanted to be a biologist; and he said "no you don't, because everything you've ever asked me was actually about physics, not biology". And he was such a brilliant and supportive professor that he let me write our end-of-the-year paper (~4 pages) on space flight technology to Mars, which has nothing to do with biology. From that day forward, I wanted to work with NASA as an "Astrobiologist", which is exactly what I have been doing for the last 12 years.

So you can see that dreams are important and wonderful, and they should help to shape your approach to life, as well as what decisions you make to achieve them. More important for me was also having supportive professors and advisors that understood my dreams, my goals, my abilities, and how we can weave them into a meaningful life. That last part is the most important message that I want to give you: seek your dreams and work with supportive people to live a meaningful life.

Working for NASA is indeed 'living a meaningful life'. NASA -- and ESA, CSA, ISA, etc -- help humanity understand that we are all one people; one species. The greatest, most important image of humanity as a whole was taken from the surface of the moon, looking back at the Earth. In that image, we cannot see borders, walls, or separations that artificially keep us all apart. There was just a continuous flow of humanity across the green and blue surface of our home world. No individual person could be seen from space, nor buildings or even cities; but knowing that we are all there, on that globe, together in this one special place, helps to weave the reality that we are together as one people.

There may be 1000s habitable worlds across our galaxy; and maybe 10s that our spacecraft can get to after ~100 years of travel; but none of them are our home; and none of them are our people. We may not be able to breathe the air or drink the

'water' or crop the soil because we ourselves may be biologically incapable to adapt to those worlds. We may not be able to collaborate with the indigenous people or understand their language and customs. Of course, we should try; but, we must learn to live together here on Earth, our home, first.

Astronomy provides humanity with a glimpse into the universe; but also the knowledge that we are small. We are a spec of dust orbiting a bigger, glowing spec of dust that orbits a collection of more dust and gas, which we call the milky way. From the vantage point of another star, our entire solar system (Jupiter, Neptune, and Earth) are not even dots of light in the darkness; our star ('the sun') would only be a faint glimmer of light on an alien camera. We may not be alone in the Universe, or even the galaxy, but we are in the only place that we can call home, the only place that we know we can breathe the air, drink the water, and speak the language, and understand the people. That is why I loved working with NASA. Astronomy is the 'great perspective machine' that forces us to see the context of our humanity.

There are almost 20k people that work for NASA and another several >100k who work with NASA. Each of those people has had a unique path through life that led them to NASA. Several university professors in Lebanon have or do work with NASA (and ESA); you should contact them! Ask them about the windy paths that they walked. Moreover, the Director of the NASA Jet Propulsion Laboratory (JPL) for almost 20 years was Dr. Charles Elachi (born and raised in Lebanon); JPL runs almost all of NASA's Mars Missions. The Executive Director of the NASA Infrared Processing and Analysis Center (IPAC) is Dr. George Helou (born and raised in Lebanon).

I was a NASA contractor at the Space Telescope Science Institute -- we just called it "Space Telescope". They operate and calibrate the Hubble and James Webb Space Telescopes -- as well as working with dozens of other space missions. I was lucky because my team was full of interesting and curious people with whom I enjoyed becoming friends. Most people who work at Space Telescope are brilliant and kind, especially my team leaders.

And each of them started on a different path to find our way onto the same team. Half of my research team had PhDs; four of them had fellowships -- one of the most prestigious possible career paths. Others on the team graduated with a bachelors or masters before joining. At ST, most people are not seeking prestige and acclaim; but are generally happy to be a part of something bigger than themselves. All of the people on all of my teams worked as equals. The greatest ideas often came from

those who originally felt to shy to speak up amongst so many high-credentialed peoples. So the next piece of advice I have is to 'speak up'! In order to work together for humanity, we must hear all voices across the full spectrum of our species.

To take our species to the stars, we need you all to join us in our adventure. So if you want 'to land a job at NASA', there are hundreds of different paths you can take. (Last I checked) 70% of NASA employees worked on space technology, leaving 30% to work on pure science research and administrative duties. I mostly only knew the less than 30% that did science research. But there are many hosts of jobs to be had to work for space exploration; and many academic or career paths that can lead you there:

Computer Engineer

Mechanical Engineer

Aerospace Engineer

Software Engineer

Material Scientist

Nuclear physicist

Undergraduate Students

Graduate Students

Postdoctoral Research Scientists

Civil Servants (permanent Research Scientists)

Mission Scientists (administrative)

Project Scientists (administrative)

Data Scientists

Instrument Scientists

Administrative Assistants

Project Managers

Public outreach experts

Science Education experts

Human resource specialists

Graphic artists

Web developers

Journalists

And that is only a list of the people that I knew while working with the Hubble and James Webb Missions. There are 100s of paths that can lead you to work for space exploration. If working for NASA is your dream; then there are 100s of way to achieve your dream.

Moreover, if your dream includes working for space exploration outside the institution of NASA, then there are 1000s more paths for you to achieve your dream. As an undergraduate student at the University of Central Florida, two professors in the Department of Physics and Astronomy worked directly on the NASA Deep Impact mission. They had access to high quality, high value comet data from a space mission flyby of the comet Temple-1. There was also a professor who worked directly on the NASA Cassini Missions, which orbited Saturn for more than 13 years. He has access to unique data cataloging the density of Saturn's rings as close as was humanly possible. So if you want to work with space technology (or set yourself up for a job in the space industry), then find a professor at a university (anywhere in the world) that works or worked with NASA and space technology.

My undergraduate research did not even involve space. I worked in a magnetics laboratory for 3 years; then I spent 3 more years working on a bachelors and masters in mathematics. But working at a university, with supportive people who had contacts with NASA, led me into a PhD program as an astronomer; there I worked directly **with** NASA; and since then, I have used NASA facilities for almost my entire career.

If you want to study space, but not as a professor, or not as an astronomer, or not as scientist at all, then there are still 70% of the space industry related jobs available to you. It is a magnificently diverse community of driven, motivated people who dream big, ask impossible questions, and stay on target. Each one of them is unique; and indeed, some would say 'we were all especially weird'. If 99% of humanity spends their time looking straight head or down at the ground, then you have to be pretty weird to look up at all; and even more weird to ask "what is that?"; and even more so to ask "how do we get there?".

Out of the nearly 8 billion people on the planet, I would say that the #1 quality that makes a good NASA scientist and a good NASA engineer, is to be 'weird'! To be

curious about something that no one else even thinks about; to ask questions that no one else ever asked before; to see the world in a way that no one around you sees it; and to think about humanity in the global context -- beyond itself. Always remember that we are just a spec of dust floating through the empty void of space; that this is our home; and if we want to achieve something truly great, then we all have to work together.

The vision and mission of Smart College is well suited to prepare its students for such a meaningful life: "To empower learners to lead the changes of a global society"; and "To provide an outstanding education in a safe and caring environment." Supportive professors and driven students can work together to make positive change in our world.
