

Dream Jobs: Flight systems engineer

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Tracy Drain enjoys a visit from Star Wars droid BB-8 in the Spacecraft Assembly Facility at NASA's Jet Propulsion Laboratory in Pasadena, California. Photo: NASA.gov

Tracy Drain is a flight systems engineer at NASA, the U.S. space agency.

Where are you from?

I was born and raised in Louisville, Kentucky.

Describe the first time you made a personal connection with outer space.

The first time I was fascinated by space was when I read about how the solar system formed. It was formed from a giant cloud of gas and dust spit out by supernovas, and it all came together under gravity and made the sun and all the planets. I thought it was bananas that scientists could figure all that out based on what they can see today. I remember thinking, "That's really cool that we can know that about space."

How did you end up working in the space program?

When I started thinking in high school about what I wanted to do, math, science and space seemed like things that could keep me interested.

There were people from NASA's Jet Propulsion Laboratory (JPL) at a career fair when I was in graduate school at the Georgia Institute of Technology. Embarrassingly, I had never heard of JPL. Once I realized that JPL did Voyager, Pathfinder and so many other amazing space missions, I practically jumped. I went for an interview, and they offered me a job.

Who inspired you?

My mom was always very excited about airplanes and spacecraft and anything to do with space, whether it was real or fiction. She was always pointing out airplanes overhead and letting us watch space shuttle launches on TV.

She was always very supportive of anything I wanted to do or try and was never a person to say, "You can't do that" or "You shouldn't do that." It was always, "OK! What are we going to do to make that happen?"

I also had some really cool teachers through middle school and high school. My ninth-grade math teacher told us that you should go explore things that you want to do. It reminded me to take opportunities and be an exploring person, because why not?

What does your job involve?

Spacecrafts have many different parts that are necessary to make them work. There are engineers who focus on making each of those specific systems. But a flight systems engineer is responsible for making sure they come together in a design that will accomplish the goals of the mission.

Early on in a mission, we work with people to develop the mission rules and regulations, and then we test them.

After launch, you are flying the spacecraft. It's all about monitoring the information that's coming down from the spacecraft, making sure it is doing what it's supposed to. If things go wrong, I need to understand what went wrong and help the team get back on track.

It makes for a very exciting, never dull, kind of job.

Tell us about a favorite moment so far in your career.

The Mars Reconnaissance Orbiter was my first launch.

The orbiter blasted off from Cape Canaveral in August 2005 on a search for evidence that water had once been on the surface of Mars for a long period of time.

On the day of launch, I was there listening to the countdown. It was scary but it was also so exciting! I could see that everything was clocking out, that it was a picture-perfect launch.

What are you looking forward to in your career?

I'm looking forward to all the awesome science that's going to come out of the Juno mission to Jupiter.

One of the next missions I'm interested in would be Europa, one of the moons of Jupiter. That mission is near and dear to my heart because of all the possibilities that exist there on that moon that has a thick shell of ice and maybe water underneath.

A spacecraft is set to be launched to Jupiter in the 2020s and will take several years to reach the distant planet's orbit. The spacecraft would orbit Jupiter every two weeks and be able to do close flybys of Europa to gather information.

What advice would you give someone who wants to take the same career path as you?

I really wish someone had told me what you need to be a scientist or an engineer. You need to think critically, learning how to be creative and learn problem-solving. You also need to learn how to learn so that you can attack new problems you have never seen before.

When I was in middle school and high school, the way the school system seemed to work was to make you focus on getting a grade — "How do I get my 'A'?" You're drowning in so much homework, and that is not the best way to really learn the material deeply and be able to think critically.

What do you do for fun?

I read a lot, and it used to be 100 percent science fiction and fantasy, but a few years ago I discovered the world of nonfiction. I just wander through the stacks of the library and pick up whatever catches my attention. I feel like I've learned so much! I also watch documentaries on Netflix. There is so much great stuff to learn out there.

Quiz

- 1 Which paragraph in the section "What are you looking forward to in your career?" supports the idea that planning space missions takes a long time?
- 2 Which section highlights Drain's belief that it's exciting to learn new things, even when it's not part of a job?
 - (A) "How did you end up working in the space program?"
 - (B) "What does your job involve?"
 - (C) "What advice would you give someone who wants to take the same career path as you?"
 - (D) "What do you do for fun?"

- 3 How does the following selection from the third section contribute to the article?

The first time I was fascinated by space was when I read about how the solar system formed. It was formed from a giant cloud of gas and dust spit out by supernovas, and it all came together under gravity and made the sun and all the planets. I thought it was bananas that scientists could figure all that out based on what they can see today.

- (A) It shows where Drain first learned about space.
 - (B) It explains at what age Drain first came to learn about space.
 - (C) It explains how Drain developed an interest in space.
 - (D) It explains who made Drain interested in learning about space.
- 4 Which of the following excerpts BEST develops the idea that problem-solving is an important part of Drain's career?
 - (A) Spacecrafts have many different parts that are necessary to make them work.
 - (B) But a flight systems engineer is responsible for making sure they come together in a design that will accomplish the goals of the mission.
 - (C) It's all about monitoring the information that's coming down from the spacecraft, making sure it is doing what it's supposed to.
 - (D) If things go wrong, I need to understand what went wrong and help the team get back on track.

Answer Key

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Paragraph 17:

A spacecraft is set to be launched to Jupiter in the 2020s and will take several years to reach the distant planet's orbit. The spacecraft would orbit Jupiter every two weeks and be able to do close flybys of Europa to gather information.

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- (B) "What does your job involve?"
- (C) "What advice would you give someone who wants to take the same career path as you?"
- (D) "What do you do for fun?"**

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 - (D) **If things go wrong, I need to understand what went wrong and help the team get back on track.**