Pre-Submitted Questions

Some of your questions have been answered by more than one of our experts, so be sure to scroll down to see different perspectives.

Shannon McConnell

Shannon took some time to jot down some answers to the questions below, which were submitted by you at registration.

Question	Shannon's answer
How do space suits actually keep you safe? How do they actually calculate how much fuel is required for a mission?	Figuring out the amount of fuel needed for a mission takes a lot of planning. And math! You need to know the weight of the vehicle, how many rocket burns you will need to get to your destination, and how many burns you plan once you get there. Propulsion engineers spend careers planning and calculating fuel consumption on missions. Each mission has 1-2 people who do this full time. Space suits are self-contained life support systems with their own oxygen, heating system, etc. Check out his website for more information: https://www.nasa.gov/audience/forstudents/nasaandyou/home/spacesuits_bkgd_en.html
What advice do you have for a mature aged professional interested in starting in the space sector? Is it ever too late to start?	Never give up. Find a job within a space company/agency that suits your skills and background. You do NOT need to be an engineer or rocket scientist.
How much do they get paid? Can you die easily in a rocket or in space?	Any exploration is risky. The early explorers faced dangers in storms at sea, being killed by local people (James Cook), dying from disease. Space travel is exploration and there are inherent risks. Other examples of terrestrial exploration include mountain climbers on Everest, undersea divers, people who test the limits with experimental planes.
Can you give more details on your involvement with Cassini? What was the mood in the control room like when she finally went down after 9 years of bonus science?	Radar Science team, Spacecraft Assembly and Test, Launch, Mission Planning, Deep Space Network scheduling, Outreach. I was in Canberra for the end of mission, so I don't know what it was like in Mission Control.
Can you describe an ideal path towards being an astronaut/space scientist for a 5-year-old girl who is interested now?	Study STEM, learn to work with your hands. Astronauts need to be handy at times. Get involved in public speaking, drama, debate, anything that helps you think on your feet and makes you comfortable in front of an audience.

Question(s) to Shannon McConnell- **With experience in mission planning and design, I'd love to know about what you would recommend for a student (possibly) interested in a career in the same area. At the postgraduate level would you recommend studying Space Systems Engineering to get a broad overview of the field, or do you think there is more worth in studying a more specific engineering area and letting the broader knowledge of the different facets of mission design come in later on/"on the job"?** **I'm curious to know what your experience has been and your personal pathway into mission planning and design, having come into it with degrees in Astronomy and Environmental Engineering. How much did you have to learn?**	Space Systems Engineering wasn't offered when I was in school. My degrees are in Astronomy and Environmental Engineering. Personally, I always suggest studying something a bit broader. If you study Space Systems Engineering, you will have trouble moving out of space exploration should you want to work in a different field. If you have a degree in aerospace engineering you can transfer that knowledge to airline industry, commercial satellite research, etc. I had to learn a bunch on the job. My first job was on a radar mapping mission of Venus. I had taken zero classes in radar imagery and 2 field classes on geology (both on earthquakes so somewhat useless for Venus). So I immediately had 2 complete fields to learn about. But the scientists I worked with were fantastic teachers!
Which steps do you suggest to follow to an early graduate Space Engineering in order to work in associations as NASA? **Can you provide some tips to standout among all the hiring requests that NASA receives?** **Thank you.**	Get good grades and learn to work with your hands are my top comments for success. To standout, you need to do something that makes you noticeable. Join the drama club at school, or the debate team. Everyone in engineering is a top student with great grades. Most are involved in STEM-related school clubs. So be the student who is in marching band, or plays lacrosse, or donates time at a local hospital. Those are the types of things that employment representatives will remember. To stand out, you don't have to be STEM focused. In fact, it helps if you are more diverse in your interest.
What's the one thing I can do as a male teacher to inspire young women into STEM fields?	Be supportive – that's true of your male and female students. Too many teachers unwittingly put barriers up to their students. Be keenly aware that even a student who receives a C in a math class sometime can still achieve their dream of a career in space. Remind your students that not everyone gets straight As in STEM all the way through. I got a C in High School Chemistry and my teacher told me I wouldn't be a NASA employee because I clearly wasn't good in Chemistry. I honestly don't think he meant that comment with malice. I think it was his way of "setting realistic expectations." While it didn't deter me, it could easily derail a student who is struggling with their self-confidence in STEM. The great thing about 2020 is that students can really achieve almost any career goals they can imagine. The amount of knowledge available via the internet is overwhelming but that can be used to foster an interest in

	a particular field. It's also a time when, in most developed countries, girls are not pigeonholed into specific career fields. That's not 100% true anywhere. There are cultural barriers, religious barriers, and sometimes financial barriers for some young girls (and boys). But if you as their teacher can support their interests, that's the best recipe for success you can give them.
What are some words of inspiration for a young girl hoping to pursue a career in space and science?	Follow your passion. Don't let anyone tell you can't achieve your goal. That is especially true of friends and family. Sometimes our closest relatives and friends are the most negative towards our goals. Just learn to have a "tough shell" and let those comments slide.
Apart from study and networking, where/what would you recommend starting to get involved in the field of space?	Do something that you enjoy that will make you stand out in a job application. Chances are, when you apply for a job, there will be hundreds of other equally skilled applicants. It's hard as a hiring manager to keep them all straight. But they can remember the student who spent their summers hiking Australia's famous trails, or who participates in the school orchestra, or is a member of a local community theatre.
What would you say is the best way to start a career in the space industry after graduating from university?	I worked with a woman who had the most unique career plan I'd ever heard. Her plan was three ten-year careers. She explained it thusly: My first 10 years I wanted to work somewhere "cool" – she spent those years at JPL/NASA. My second 10 years I wanted to work somewhere where I could earn a good amount of money – she spent 10 years at Microsoft. My last 10 years I wanted to work somewhere I could give back to the community. I've since lost track of her so I don't know what her 3rd career is, but I thought that was amazing. My recommendation is to find a job in Space or a space-related field. Take whatever comes your way. Once you get a year or two under your belt, look for the next step in your career. 1. Never stop looking for the next great job 2. Don't pass up an amazing opportunity 3. Don't be afraid of trying something new
How did you all overcome stereotypes in education to pursue your ambitions? What advice would you have for parents of young children interested in pursuing a career amongst the stars? What things did your parents do that facilitated your career choices?	Honestly, I just stuck to my plan. When I graduated High School back in the 1980's (yes, I'm ancient!), my college counsellor suggested I go into the medical field. Why? Because I got good grades in math and I was a girl. But my least favorite class in school was Biology. I really hated it. Why on Earth would I subject myself to that for a career? So I just went my merry way and majored in Astronomy. My grandmother was very influential to me. She was a film editor for a major Hollywood film studio. She constantly told me I needed to find a "real job." I wanted to go into music and she would point out all the people she worked with who had wanted to go into music careers and ended up working behind the scenes at the studio. That really impressed upon me to find something that would be a stable career. And yes, singing and music is still a passionate hobby for me.

	Parents need to be supportive of their children regardless of their career choice. For most parents, a career in Space is something they have zero idea how to achieve. As a parent know that your child has a calling. Take them to science lectures. Go to the local planetarium or observatory. Attend a star party. Mostly, encourage them to find things online that fuel their passion. My younger son is studying Architectural Engineering. He wants to build sustainable housing in places devoid of resources – the High Arctic and impoverished countries. Talk about a field I know zero about! Well, YouTube was our friend growing up. And every time we would go on a trip we would give him a day to explore some large structure he wanted to see. La Sagrada Familia in Barcelona, the Statue of Liberty in New York, and the Sydney Harbor Bridge have all been full day events for us! When you go somewhere try to find something space-related for your child to explore.
How do you tame your inner critique; especially when you know your achievements could possibly affect others?	This is a huge problem for most of us, not just women in STEM fields. I guess the way I deal with it is to keep pressing forward. Know that you have valuable skills and you can achieve anything.
What kind of intelligence and character traits are needed to succeed in these space careers?	The ability to persevere regardless of the odds is hugely important in this field. Projects are long and the risks are high. I worked on Cassini for 17 years and I didn't even see the mission to its end in 2017. 17 years is a long time to work on a project. You also have to be able to work under stressful circumstances with looming deadlines and sometimes in an emergency environment (such as your spacecraft is "missing" and your team needs to locate it and get commands to it as soon as possible). Being a good listener and having the ability to assess different, sometimes competing, ideas is important also. Let's go back to that example of the lost spacecraft. You have a team of 4 people who have all voiced their ideas on how to locate and communicate with your spacecraft. But all 4 of those ideas cannot be done. Your job is to quickly assess those options and choose the one (or elements of all 4) that have the highest chance of success.
How can a parent create opportunities for their children to motivate, influence & inspire them?	I think I mostly answered this in the question about stereotypes. I do want to add: As a parent, your job is to assist your child in achieving their goal. Contact your local college Physics or Engineering Department. See if one of their professors would talk to your child about their career choice. Not all universities will do this so don't give up. You might have to call several universities. Have your child take an intro to astronomy or geology or space science class at your local community college. In the US most community colleges will allow younger students to take a class for no credit (no grade). Take the class with your child. It shows your interest in their success. Who knows? It might be the best class you ever took!

Sally Tindall

Sally got a few answers down ahead of the live lecture. Some of you will have had your questions answered live, as well as here in writing.

Question	Sally's answer
I am a mentor for women in STEM. Given the long timeframes of projects for space and the strong competition, what is your best advice on developing resilience to stay in the sector?	Don't give up, don't leave! If you already have your foot in the door then you are in front.
What is the greatest hurdle that you have encountered in your career to date, ad how did you overcome it?	NOW!! COVID has me in banking! And yet I'm enjoying it!
How do you find out about opportunities as a private Australian individual to train as a commercial astronaut?	Networking. Support others including the men! And opportunities find you.
I'm a medical student and an aspiring flight surgeon. I'm really inspired by your story. What are your top tips for Aussies who want to have the best chance of becoming an astronaut?	Extreme medicine seminars, analogue missions and networking.
When asked by adults 'what do you want to be when you grow up?', there's quite a few of us that would have said 'I want to be an astronaut!'. But so few of us hang onto that dream. And only a tiny proportion get to where you are in the process of becoming one. How do you stay so focused on your goal? What is about 'Sally' that makes you so determined?	Never grow up! Everyone in my flight class who didn't give up achieved their goal. So don't give up, set goals along the way, be proud of every step.
As an Australian with a commercial pilot's license and a degree in aviation, what is the next step to going to space? Much of space is about research — is becoming a test pilot enough, or should I be a researcher too and do another degree?	You don't need to be a test pilot anymore. You need to be able to sell yourself and what you can do. I'll be doing someone else's experiments – not my experiments, because I stayed the course.
What is the pathway to becoming an astronaut after graduating from tertiary studies? What are the best steps I can take to make myself an ideal candidate? (Specifically, I am studying engineering and geography – but this could apply to scientists, medicine students or pilots too.)	Ahhh geography!!!!! Yawn!! Kidding!! You seem to be doing the right things, stay multi skilled and network xx
One of the blogs stated that you cannot become an astronaut because the only countries who are equipped to do it have already got candidates for another two decades. Is it true? Is the success rate so low?	Follow AdvancingX – they are proving to industry that they can select the best teams regardless of nationality.

What are the requirements to be an astronaut?	Fitness, tertiary qualification, stubborn, determined and a day dreamer!! This is my theory anyway!
Can anyone with an average high school score or someone with average IQ work in the space industry?	YES!!!
The following questions have been raised by my 8 and 6 year-old daughters: **1. What made you decide to pursue a career in space science?** **2. How do you manage the pressure and nerves associated with your jobs?** **3. Do you think there are aliens out there?** **4. What kind of food do astronauts eat while in space?**	1. I arrogantly thought that if I was in charge that the Challenger would not have blown up! 2. I remember it's what I love to do. 3. YES 4. We get to choose food based on our own tastes.
What is the moon made of?	Rock called regolith, basalt and ice hopefully.
What are some words of inspiration for a young girl hoping to pursue a career in space and science?	Don't give up on your dreams.
How do you tame your inner critique; especially when you know your achievements could possibly affect others?	Praise in public and critique in private. That involves self-critique also. Don't get down on yourself publicly. People are looking up to you so always display the best version of yourself.
What kind of intelligence and character traits are needed to succeed in these space careers?	All Kinds. Space has room for everyone.

Alice Gorman

Alice has taken on your archaeology specific questions that she answered live during the webinar. For her input on a few other topics, she has penned in a couple of answers below.

Question	Answer
What's the one thing I can do as a male teacher to inspire young women into STEM fields?	One of the obstacles for young women in STEM fields is young men in STEM fields, who have to unlearn a culture in which women are seen as second class. So I would say teaching young men how sexism works so that they can identify it in themselves and their environment, and try to change it, is one of the most valuable things you could do.
How did you all overcome stereotypes in education to pursue your ambitions? What advice would you have for parents of young children interested in pursuing a career amongst the stars? What things did your parents do that facilitated your career choices?	So many messages are fed to young children from media and the world around them, that space is for boys and not for girls. Just look at how space-themed toys and clothes are marketed! It's really tough to swim against this stream. My advice is to make a conscious effort to introduce your daughters to space, being guided by what they express interest in. If you do nothing, then the stereotypes become the default.
How can a parent create opportunities for their children to motivate, influence & inspire them?	I grew up on a farm far away from urban centres. There weren't many opportunities to get involved in STEM outside of school. For me, books were incredibly important, both fiction and non-fiction. Science fiction was a great inspiration!