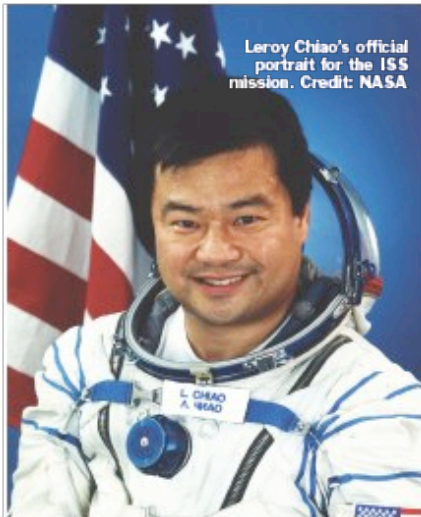


Some Childhood Prophecies Do Come True

Leroy Chiao



Leroy Chiao's official portrait for the ISS mission. Credit: NASA

You're reading a magazine called Space Lifestyle, so in all likelihood you or someone very close to you uttered the popular childhood phrase, "I'm going to be an astronaut when I grow up." Leroy Chiao is no different. Like many others, the 1969 Moon landing was a landmark event in his life, but even before that he was fascinated with airplanes and rockets and devoured books on the subject. By the time Apollo 11 touched down, that phrase was frequently coming out his mouth.

"Of course, my friends and I all said we wanted to be astronauts," said Chiao, who is the only one who actually achieved it. "We played space and pretended we were landing on the Moon. I even built a little spaceship, kind of a command module, underneath my workbench in the garage."

Perhaps, space was a bit more real to Chiao,

now 48, than others because his father worked at Lawrence Livermore National Laboratory and did some consulting work with NASA. Nowadays, all the relevant information about applying to be an astronaut is online. But it was actually a colleague of Chiao's father who helped him get the initial information back in the early 80s.

Chiao is first generation American, and his Chinese-born parents were very pragmatic and education focused. Dreams were great, but the route to them could only be accomplished by doing well in school. While excelling in school, Chiao also understood that good grades alone would not lead the way to a career in space, so even as a teenager he was doing strategic planning, such as picking the right university.

"I had already decided I wanted to study engineering," he said. His dream of going into space took a huge leap forward the year he graduated high school, when NASA selected the first group of Space Shuttle astronauts and included in that selection non-military civilians.

"I decided I would go the civilian route," Chiao said. If he went into the military and that didn't lead to space, he would be stuck with a military career he didn't really want. But if he studied engineering and was never accepted into the astronaut program, he would still have a very marketable degree and the ability to plot an interesting career.

"When I was in graduate school, I sent away for my astronaut application package and started to try and make it real," he said. "My parents didn't take that dream of mine super seriously. They knew it was something I was interested in, but they were very realistic. Not in a discouraging way, but they said, 'It's great to have a dream, but you also have to be practical about it.'"



Leroy Chiao during his first spacewalk in a Russian space suit. Credit: NASA

For undergraduate, Chiao attended UC Berkeley. For graduate school, he decided on UC Santa Barbara, "because first of all they were offering me a research assistantship, so I'd get paid while I was going to grad school," he said. "It was a nice location. It was a smaller program and still had a good reputation. It was a change of pace from Berkeley." Chiao knew NASA was looking for all kinds of technical people, so it didn't matter what specific area of engineering his Ph.D. involved.

Today, he often speaks to groups of school kids and teenagers. He tells them to pursue their dreams in a purposeful way. "You can't blindly pursue something," he noted. "You've got to always be assessing your situation and your options and

what's realistic. But you've got to go for your dreams. What would be worse than looking back at your life many years from now and saying, 'I didn't even try to do the things I wanted to do.'"

After earning his Ph.D., Chiao went to work for Hexcel, an aerospace composite material manufacturer. From there, he went to work at Lawrence Livermore National Laboratory. In February 1989, he submitted his application to NASA (by mail). That summer, he got a call from the Astronaut Selection Office asking if they could contact his current employer. Then in September, he was invited to come to Houston. In January 1990, he got a call saying he hadn't been accepted but please reapply.



Another image taken by Chiao during his stay on board the ISS, this one of the Salamat Basin in Chad.
Credit: NASA

Below: Leroy Chiao prepares for flying in the Russian Soyuz vehicle by training inside the Soyuz simulator.
Credit: NASA



"I was kind of crestfallen when I got the call," he said. At around 7 a.m. the next morning, his fates changed when he got a call saying he was being invited to join the incoming class. "I reported to work in early July."

It was four years before he'd go into space, which he said was around average at that time. The 23 people in his class came from very diverse backgrounds: military test pilots, medical doctors, physicists and other research engineers such as himself. The first year, they were together, and then were sent out to various support jobs and additional training. Once an astronaut is assigned to a mission, he or she starts mission specific training.

Over the course of 15 years, he made several trips into space, including three Space Shuttle flights.

"Professionally, from a personal level, I feel very fortunate. I got to do just about everything I could have done in my career as an astronaut," Chiao said. "I got to fly on the Space Shuttle. I got to be the commander of the International Space Station. I got to fly up and down on a Russian Soyuz spacecraft for that mission. I got to do six space walks—four of them in U.S. space suits and two of them in Russian space suits. I got to learn the

Russian language and made some lifelong friends over there.

"I flew science missions. I flew space walk missions. I helped to build the International Space Station. So from a personal professional level, I couldn't have asked for any more."

When he was selected to be an astronaut, Chiao said his intention was to stay at NASA and fly as long as he'd be allowed to fly and then move to a desk job. Early in his days at NASA he attended a going-away party and he heard someone say, "You'll know when it's time to go." He thought that realization would never come to him, but in late 2005 it did.

He said an astronaut's perspective changes over time. When you first get in the program

you're willing to accept any risk just to fulfill that dream to be in space.

"With each flight, most astronauts start thinking a little bit about the risk," he said. "People in my era, we lost friends on Space Shuttle Columbia. One guy was a neighbor and a pretty good friend. It gives you pause. It's not that we took the risk for granted, but you get a little comfortable. Then one doesn't make it."

Chiao said the nature of his job—the pressure, the moving around, the risk—made him think he'd never get married. When he turned 40 he started to realize he wanted a family. He married wife Karen the year before he flew the ISS mission, and after he retired their twins, Henry and Caroline, were born.

"It's hard for me now to imagine having toddlers and going away all the time and missing them growing up and short changing them on having their father around," he said. He came back from the ISS mission and sensed it was time to move on. He was offered another Space Shuttle mission, but turned it down.

He became an independent consultant on space issues and education issues and a highly sought after public speaker with Leading Authorities Speakers Bureau (leadingauthorities.com).

Chiao also became executive vice president for space operations and director of Excalibur Almaz Limited, a private space flight company that plans to market orbital flights for space tourists.

Knowing what great lengths and lifelong commitment and preparation it took for him to earn a seat on a spacecraft, how does he feel about space tourism?

"I have to admit, years ago when this was starting, my knee jerk reaction was 'no way,'" he said. "Then after thinking about it and getting used to the idea, in the appropriate time and place it's perfectly natural, kind of the same as the evolution of the airplane. In the beginning, the airplane was very risky, expensive and just for a few people. Eventually, the airplane evolved to what it is today, part of everyone's lives. I think space will follow the same path, but obviously it will take longer because it's a lot more difficult technically to get into space."

Part of Chiao's commitment to commercial space travel comes from what he admits are personal feelings and moments of self-discovery he achieved while in space. "I remember looking back at the Earth and how beautiful the Earth was," he recalled. "The colors were so vibrant and so much brighter than I imagined they would be."

"The Earth looks absolutely peaceful from space. Intellectually, you know that is not the case. It gave me a perspective on life and taught me to take what I call the big picture. It helps you to understand, to be more tolerant. From a somewhat esoteric point of view, the more people we can get into space to have that view and have that self-examination, the better off we'll be."

He feels to really have the impact, it requires orbital flight. Now, what about training? The five space tourists who've gone up on a Russian Soyuz have had to undergo six months of training and spent more than \$20 million a piece.

Chiao prefers the term "space



Chiao holds a picture of Roland Nedelkovic's son in front of a window on the ISS. Credit: NASA

flight participants," and he said the length of training time and expense may vary based on what future space travelers will be doing during a mission.

"They're not essential crew members, like a co-pilot. They're not throwing switches. They're not doing repair work or anything like that," he explained. "They are oftentimes participating in experimental work when they're on board. What I envision is we would have two different types of paying customers."

One type would be similar to the five who've gone so far, essentially passengers. "We're still defining our training and developing it." He said it will probably be substantially less than six months.

The other type of space flight participant could be someone, who if he or she possesses the right qualifications could perhaps co-pilot the spaceship. That training would obviously be longer.

Chiao said the hope is the cost per passenger will go down as volume of travel goes up. For that to happen, there have to be some technological breakthroughs in rocketry or a different way of propulsion and getting out of the atmosphere and up to orbital speed. There is definitely a need for researchers who can help advance these things.

There is not a specific timeline, but sometime over the next few years Excalibur Almaz hopes to have its first test launch. "We've got to be a self-policing industry," he noted. "We're very cognizant of that in our company as I hope other private space companies are as well. We've got to be a self-policing industry to make sure we don't cut corners and try to get something done faster or cheaper. Our partners in Russia are very experienced at building spacecrafts. We recognize safety's importance and we keep it as part of our culture."

As he looks forward to a decade from now and beyond, he hopes that commercial space travel will also become affordable to various research groups who desire to perform experiments in space.

"It could bring a Renaissance of space research for companies either trying to develop products or universities and other research institutes trying to understand fundamental phenomenon in microgravity and things like that," he said. "In the big picture, it's better for all of us the more people we can get into space."

56 SPACE LIFESTYLE FALL 2008

Math Is for Girls

Peggy E. Thomas

Peggy E. Thomas,
Director of
avionics and
software,
International
Space Station,
NASA Systems
at the Boeing
Company.
Courtesy of
Boeing.



When Peggy E. Thomas was growing up, computer science was just emerging and she wanted to know more about it. But it was the 60s and girls were not being encouraged to pursue such things.

"I was in the sixth grade and after recess they asked the boys to line up in one line and the girls to line up in another," she recounted. "When all of us girls wound up in a classroom, we were told we were going to be told about the facts of life. This woman stood up and she basically told us, 'Your function in life is to become a wife and mother.' I was flabbergasted. I felt my function in life was to be a little bit more than a wife and mother. Being a wife and mother is a wonderful thing. I'm not trying to discount that. But I felt like I wanted to do more than that."

High school counselors told her if she had to have a career, she should pursue teaching. Thankfully, her parents encouraged her to do whatever she wanted.

While putting her ex-husband through college, she worked for a company called Computer Sciences Corp. as a software engineer. They knew she didn't have a degree, but they saw potential in her. Management encouraged her to go to college, which after getting a divorce she did.

In time, her computer skills led her into the space program. Her work with Computer Sciences

took her to the Jet Propulsion Lab, where she wrote telemetry processing programs. From there, it was onto Ames Research Center, where she actually found the research and development work not as exhilarating. Then she moved with Computer Sciences to the Johnson Space Center, where she thrived on the deadline driven, high pressure work.

Today, she is director, avionics and software, International Space Station, NASA Systems at The Boeing Company.

"I came to work at Boeing on the Space Station program," she said. "We were developing the flight software. One of the areas had some difficulty and my boss at that time, Brewster Shaw [a former astronaut and now vice president & general manager of Boeing's space exploration division], asked me to go to California for six

months and help with the software area that was being developed there. This is software that runs all of the things on the outside of the space station. It's called the external control zone software. It does things like the mobile transporter. It's pretty complex software and my job was to get it back on track.

"My customer [NASA] and I worked together to help solve those problems." From there, after rave reviews for her performance, she moved into her current position.

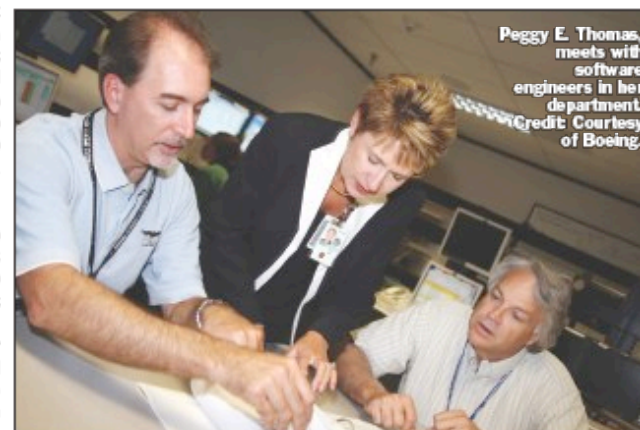
When she began working in the space industry, there were not a lot of other women in influential positions. "It's challenging for anyone in a leadership role in this particular job, because we're doing things that we've never done before," she explained. "Some of the things I bring as a woman are beneficial. I care about people. I care about helping them be successful. That helps me in many cases to address performance issues perhaps more effectively than I've seen some of

my male counterparts do."

As director she currently oversees about 600 software engineers. That number was once over 1,000, but it declines as the ISS nears completion. "We're going from developing to sustaining engineering," Thomas noted.

She's found working in the space industry a very rewarding expression of her love of math and computer science. Remarried, she loves inspiring her step-grandchildren to be interested in space, with things like posters and pins.

Her advice to those who are interested in a career in space is to be goal-oriented and persistent. Look for when new government contracts are awarded and see what jobs might become available with the contractor. For those at the beginning of their careers, every year Boeing



Peggy E. Thomas,
meets with
software
engineers in her
department.
Credit: Courtesy
of Boeing.

brings in around 30-40 interns.

Thomas is looking forward to continuing her work with Boeing into the Constellation program. Before that, she has one big thing on her "to do" list.

"I have not yet seen a launch," she said. "I've written that down as one of my goals."

