



Ames Research Center



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SILICON VALLEY

LIVE



1
00:00:00,000 --> 00:00:13,940
(Music)

2
00:00:13,940 --> 00:00:15,520
Abby Tabor (Host): Hi, everybody!

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00:00:15,530 --> 00:00:18,270
Welcome to another episode of NASA in Silicon Valley Live.

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00:00:18,270 --> 00:00:22,860
I am your host Abby Tabor and I have with me here today a very special guest.

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00:00:22,860 --> 00:00:24,770
I have Dr. Eugene Tu with me.

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00:00:24,770 --> 00:00:29,140
He is the Center director for NASA's Ames Research Center.

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00:00:29,140 --> 00:00:30,140
Thank you for joining me.

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00:00:30,140 --> 00:00:31,140
Dr. Eugene Tu: Thank you.

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00:00:31,140 --> 00:00:32,140
Happy to be here.

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00:00:32,140 --> 00:00:35,950
Host: I've heard a story that when you started at Ames, you were just an intern.

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00:00:35,950 --> 00:00:36,950
Is that right?

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00:00:36,950 --> 00:00:37,950

Eugene: That is true.

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00:00:37,950 --> 00:00:38,950

That is true.

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00:00:38,950 --> 00:00:40,330

It's 33 years ago now.

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00:00:40,330 --> 00:00:41,330

Host: Wow.

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00:00:41,330 --> 00:00:47,640

Eugene: I was an undergraduate student and was between my freshman and sophomore years.

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00:00:47,640 --> 00:00:49,380

And I got an opportunity to come here and intern.

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00:00:49,380 --> 00:00:51,110

And have, pretty much, been here ever since.

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00:00:51,110 --> 00:00:52,110

Host: Wow.

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00:00:52,110 --> 00:00:53,110

No breaks?

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00:00:53,110 --> 00:00:56,290

You went from intern to recent grad getting a job?

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00:00:56,290 --> 00:01:01,899

Eugene: Yes, I was given the opportunity to be hired permanently once I finished my degree

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00:01:01,899 --> 00:01:05,410

and then NASA funded me and supported me through graduate school, as well.

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00:01:05,410 --> 00:01:08,400
Graduate studies and I've been pretty much
with NASA ever since.

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00:01:08,400 --> 00:01:13,510
I did do a short stint at NASA Headquarters
in the early 2000s, but pretty much as home

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00:01:13,510 --> 00:01:15,350
grown to Ames as possible.

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00:01:15,350 --> 00:01:16,770
Host: That's an awesome story.

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00:01:16,770 --> 00:01:19,840
Just shows where you can go, starting from
an internship.

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00:01:19,840 --> 00:01:20,970
Eugene: Yep.

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00:01:20,970 --> 00:01:26,369
Host: So we are calling today's episode Meet
NASA in Silicon Valley because we haven't

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00:01:26,369 --> 00:01:29,540
really formally introduced our center to the
Twitch audience.

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00:01:29,540 --> 00:01:34,420
So I wanted to ask Eugene to give us a little
overview of what happens here at Ames, what

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00:01:34,420 --> 00:01:35,420
we focus on.

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00:01:35,420 --> 00:01:37,150
What are some of the things we're working

on?

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00:01:37,150 --> 00:01:41,979

Eugene: So we are one of 10 NASA centers across the country.

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00:01:41,979 --> 00:01:43,119

We are a research center.

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00:01:43,119 --> 00:01:46,180

So a lot of our products are research and technology oriented.

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00:01:46,180 --> 00:01:49,780

We work in science, we work in technology and we work in engineering.

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00:01:49,780 --> 00:01:53,500

One of the interesting things about Ames is we are very cross cutting.

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00:01:53,500 --> 00:01:58,570

We work in every area that NASA has, whether it be aeronautics, technology, science or

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00:01:58,570 --> 00:01:59,659

exploration.

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00:01:59,659 --> 00:02:01,470

We have some very unique facilities here.

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00:02:01,470 --> 00:02:04,640

We have the largest wind tunnel in the world here.

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00:02:04,640 --> 00:02:07,759

The test section of this wind tunnel is 80 feet by 100 feet.

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00:02:07,759 --> 00:02:11,480

You can put a full-size commercial aeroplane inside it.

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00:02:11,480 --> 00:02:14,409

We have one of the most capable Arc-jet facilities.

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00:02:14,409 --> 00:02:18,620

This is a plasma wind tunnel which simulates entry conditions through the atmosphere when

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00:02:18,620 --> 00:02:20,250

a spacecraft comes back into the atmosphere.

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00:02:20,250 --> 00:02:21,650

There are very high heating rates.

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00:02:21,650 --> 00:02:23,939

Host: So super hot, super fast.

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00:02:23,939 --> 00:02:24,939

Eugene: Exactly.

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00:02:24,939 --> 00:02:28,860

We have one of the most powerful supercomputers in the world, where we do a lot of computational

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00:02:28,860 --> 00:02:32,730

simulations and that's my own personal background, I'm a computational fluid dynamicist.

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00:02:32,730 --> 00:02:40,949

So I studied or I started studying here in looking at modelling aerodynamics and aerothermal

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00:02:40,949 --> 00:02:42,309

dynamics.

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00:02:42,309 --> 00:02:45,950

And then we have some very unique simulation facilities - human in the loop simulation

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00:02:45,950 --> 00:02:46,950
facilities.

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00:02:46,950 --> 00:02:52,579
We have a vertical motion simulator, which, basically, is a simulator on a beam that can

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00:02:52,579 --> 00:02:54,170
go up and down six stories.

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00:02:54,170 --> 00:02:56,599
And so it really provides high fidelity motion.

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00:02:56,599 --> 00:02:59,909
All the shuttle astronauts trained on this facility.

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00:02:59,909 --> 00:03:02,260
Host: What is that simulating?

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00:03:02,260 --> 00:03:03,430
That's the spacecraft landing?

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00:03:03,430 --> 00:03:09,620
Eugene: It can simulate aircraft, it can simulate spacecraft, it could be very much a key part

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00:03:09,620 --> 00:03:15,439
of studying lunar landings, for example, which we will talk about in a little bit.

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00:03:15,439 --> 00:03:20,909
It is one of the highest fidelity facilities around in terms of simulating motion without

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00:03:20,909 --> 00:03:22,059

actually having to fly.

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00:03:22,059 --> 00:03:23,059

Host: OK.

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00:03:23,059 --> 00:03:27,699

Eugene: And then one of our other key simulation facilities is we have a 360 degree air traffic

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00:03:27,699 --> 00:03:33,510

control simulator that airports have used to look at how to place the towers or to move

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00:03:33,510 --> 00:03:36,409

their control towers and look at the sight lines of the airport.

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00:03:36,409 --> 00:03:38,030

Host: I've been in there.

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00:03:38,030 --> 00:03:39,030

It's really cool.

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00:03:39,030 --> 00:03:41,519

You feel like you're looking out the window of an aircraft control tower.

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00:03:41,519 --> 00:03:42,519

Eugene: You do.

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00:03:42,519 --> 00:03:43,870

Host: That's awesome.

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00:03:43,870 --> 00:03:50,280

I like the broad portfolio or the array of activities that we have at Ames.

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00:03:50,280 --> 00:03:52,260

There's small satellites, right?

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00:03:52,260 --> 00:03:53,260

Eugene: Yep.

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00:03:53,260 --> 00:03:57,229

And autonomy and robotics, entry systems technologies.

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00:03:57,229 --> 00:04:01,669

We're here in the heart of Silicon Valley,
and so we try to leverage our location here

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00:04:01,669 --> 00:04:05,879

and partner with many of the companies around
here to bring high technology and innovation

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00:04:05,879 --> 00:04:07,790

to NASA's missions.

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00:04:07,790 --> 00:04:12,479

Host: I know a subject that will come up later
in the show is about drones.

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00:04:12,479 --> 00:04:13,499

Eugene: Yes.

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00:04:13,499 --> 00:04:14,499

Host: That is a big -

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00:04:14,499 --> 00:04:17,079

Eugene: Well, that's a big area for aeronautics
now.

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00:04:17,079 --> 00:04:22,310

We want to figure out how to integrate drones
into the national air space, so they can fly

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00:04:22,310 --> 00:04:24,879

safely with piloted vehicles.

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00:04:24,879 --> 00:04:29,389
You can imagine the future, there will be both piloted vehicles and unpiloted vehicles,

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00:04:29,389 --> 00:04:31,310
that really take advantage of the airspace.

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00:04:31,310 --> 00:04:38,639
Whether it's transporting cargo or people or monitoring agriculture or water resources.

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00:04:38,639 --> 00:04:43,650
All the types of things that people can use drones for these days we can help with that,

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00:04:43,650 --> 00:04:47,560
if they can really be used in a less restrictive way in the airspace.

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00:04:47,560 --> 00:04:48,560
Host: Right.

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00:04:48,560 --> 00:04:50,759
And we know there are going to be millions of them -

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00:04:50,759 --> 00:04:51,759
Eugene: Oh yes

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00:04:51,759 --> 00:04:53,550
Host: coming, so we need a way to regulate the traffic.

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00:04:53,550 --> 00:04:55,470
Eugene: Yes, and do it in a safe way.

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00:04:55,470 --> 00:04:58,680
Host: So, I know that's something we work on a lot here.

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00:04:58,680 --> 00:05:01,590

Is there something about the center that you think is particularly cool?

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00:05:01,590 --> 00:05:03,550

A factoid that you love to share?

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00:05:03,550 --> 00:05:08,789

Eugene: Well, the things that's really cool about the center is the people and the diversity

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00:05:08,789 --> 00:05:12,210

of the people that we have here, coming from all different fields, whether it be science

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00:05:12,210 --> 00:05:14,330

or engineering, technology.

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00:05:14,330 --> 00:05:19,590

The business fields, the marketing fields, communications fields.

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00:05:19,590 --> 00:05:24,550

And we, I think,, here at this center being in Silicon Valley we try to bring that spirit

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00:05:24,550 --> 00:05:28,830

of innovation and entrepreneurship to the NASA mission.

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00:05:28,830 --> 00:05:32,050

And so that is really probably one of the coolest things about the center.

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00:05:32,050 --> 00:05:33,250

Host: Yeah, I think that's true.

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00:05:33,250 --> 00:05:39,090

We tend to get in early on concepts, research that nobody else has thought to do yet.

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00:05:39,090 --> 00:05:40,090

Eugene: Exactly.

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00:05:40,090 --> 00:05:42,110

Host: We like to get in there early.

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00:05:42,110 --> 00:05:43,110

Cool.

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00:05:43,110 --> 00:05:44,900

So you seem to know a fair bit about the center.

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00:05:44,900 --> 00:05:46,070

Eugene: A little bit.

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00:05:46,070 --> 00:05:48,789

Host: But I wonder if you know the answers to these questions?

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00:05:48,789 --> 00:05:49,789

Eugene: OK.

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00:05:49,789 --> 00:05:50,789

Host: It's quiz time.

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00:05:50,789 --> 00:05:54,730

Are you up for trying a true or false quiz with me?

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00:05:54,730 --> 00:05:55,730

Eugene: Absolutely.

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00:05:55,730 --> 00:06:00,580

Host: Let's learn more things about NASA in Silicon Valley and NASA in general.

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00:06:00,580 --> 00:06:02,680

True or false, Eugene?

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00:06:02,680 --> 00:06:06,060

Ames was America's second aeronautical research lab.

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00:06:06,060 --> 00:06:07,960

Eugene: That is true.

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00:06:07,960 --> 00:06:10,350

We are the second oldest NASA center.

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00:06:10,350 --> 00:06:14,169

We were actually formed in 1939 before there was a NASA.

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00:06:14,169 --> 00:06:15,259

NASA was formed in 1958.

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00:06:15,259 --> 00:06:21,159

So we are one of the original four N-A-C-A centers - that's National Advisory Committee

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00:06:21,159 --> 00:06:22,210

on Aeronautics.

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00:06:22,210 --> 00:06:24,800

And so much of our roots is back in the days of aeronautics.

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00:06:24,800 --> 00:06:26,099

Host: That's right.

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00:06:26,099 --> 00:06:29,370

I got scolded once for calling that "the knacka" before.

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00:06:29,370 --> 00:06:30,370

Eugene: No.

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00:06:30,370 --> 00:06:31,370

Host: No.

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00:06:31,370 --> 00:06:33,270

N-A-C-A, before it was NASA.

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00:06:33,270 --> 00:06:34,270

Exactly.

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00:06:34,270 --> 00:06:35,270

Cool.

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00:06:35,270 --> 00:06:36,729

So that history goes way back.

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00:06:36,729 --> 00:06:39,039

Now, more recently, true or false?

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00:06:39,039 --> 00:06:43,400

Did we once slam an object into the moon for science?

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00:06:43,400 --> 00:06:45,650

Eugene: Well, that is a technical term, right?

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00:06:45,650 --> 00:06:46,650

Host: Exactly.

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00:06:46,650 --> 00:06:47,650

Eugene: It is true.

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00:06:47,650 --> 00:06:52,689

Back in 2009, this was the LCROSS mission and it was actually a very innovative idea.

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00:06:52,689 --> 00:06:57,849

We basically flew with LRO, which is the Lunar Reconnaissance Orbiter, which is orbiting

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00:06:57,849 --> 00:06:59,719

the moon and mapping the moon.

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00:06:59,719 --> 00:07:06,499

We took the second stage of that rocket and basically slammed into it the moon, the southern

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00:07:06,499 --> 00:07:11,469

pole region near a crater and basically we're looking for the evidence of water ice.

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00:07:11,469 --> 00:07:15,199

And so what happened was, we took another spacecraft the separated from that second

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00:07:15,199 --> 00:07:21,370

stage and followed it in and basically once that first stage or that second stage hit,

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00:07:21,370 --> 00:07:26,689

it basically threw up a lot of material, the second vehicle came in and about six minutes

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00:07:26,689 --> 00:07:31,449

of taking measurements before it also hit the moon and relayed that information back

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00:07:31,449 --> 00:07:32,660

to us and to our scientists.

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00:07:32,660 --> 00:07:34,971

Host: Sent the data back just before itself crashed?

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00:07:34,971 --> 00:07:36,199

Eugene: Just before it also crashed.

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00:07:36,199 --> 00:07:37,199

Host: Wow!

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00:07:37,199 --> 00:07:38,199

Awesome.

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00:07:38,199 --> 00:07:41,379

Eugene: So, it was a way and we confirmed that there is evidence of water ice trapped

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00:07:41,379 --> 00:07:44,000

in the permanently shadowed crater regions of the moon.

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00:07:44,000 --> 00:07:45,000

Host: That is so cool.

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00:07:45,000 --> 00:07:46,150

And permanently shadowed, right?

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00:07:46,150 --> 00:07:47,150

They never see light?

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00:07:47,150 --> 00:07:48,150

Eugene: Yes.

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00:07:48,150 --> 00:07:49,150

They never see light.

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00:07:49,150 --> 00:07:50,150

Host: Neat.

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00:07:50,150 --> 00:07:51,150

Awesome.

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00:07:51,150 --> 00:07:52,150

Alright, moving on.

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00:07:52,150 --> 00:07:53,289

So far so good.

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00:07:53,289 --> 00:07:54,289

Question 3.

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00:07:54,289 --> 00:07:59,919

Our planet-hunting Kepler space telescope has identified more than 2500 planets to date.

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00:07:59,919 --> 00:08:02,629

Eugene: Well...that's partially true.

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00:08:02,629 --> 00:08:04,550

It's actually closer to 4,000 now.

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00:08:04,550 --> 00:08:05,639

Host: Is it really?

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00:08:05,639 --> 00:08:06,790

Eugene: 4,000 confirmed planets.

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00:08:06,790 --> 00:08:07,790

Host: Confirmed planets?

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00:08:07,790 --> 00:08:09,919

Not just candidates that might possibly be?

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00:08:09,919 --> 00:08:10,919

Eugene: Right.

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00:08:10,919 --> 00:08:16,249

And more interestingly, dozens of planets that might be in the habitable zone.

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00:08:16,249 --> 00:08:18,340

This is the zone where temperature...

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00:08:18,340 --> 00:08:22,949

We're looking for the Goldilocks - not too hot or cold, where liquid water could exist

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00:08:22,949 --> 00:08:24,779

in that temperature range.

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00:08:24,779 --> 00:08:28,159

And we think that's a key ingredient for the possibility of life.

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00:08:28,159 --> 00:08:29,960

So we're looking for how many planets there are.

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00:08:29,960 --> 00:08:34,900

Even though that number may seem small, 30 or so right now, confirmed, we're only looking

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00:08:34,900 --> 00:08:37,490

at a very small portion of the galaxy.

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00:08:37,490 --> 00:08:45,450

And so, if you really expand that out, there are unestimated amounts of planets out there

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00:08:45,450 --> 00:08:46,450

that could support life.

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00:08:46,450 --> 00:08:50,550

Host: And those could be targets for us to look at a little more closely some day?

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00:08:50,550 --> 00:08:51,550

Eugene: Exactly.

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00:08:51,550 --> 00:08:55,670

And with some of the telescopes including

JWST, that's going to be launched soon -

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00:08:55,670 --> 00:08:57,589

Host: The James Webb Space Telescope?

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00:08:57,589 --> 00:09:02,610

Eugene: We will be studying those planets to see what other evidence that they could

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00:09:02,610 --> 00:09:05,170

support life we might be able to detect.

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00:09:05,170 --> 00:09:06,790

Host: So cool.

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00:09:06,790 --> 00:09:13,070

I love Kepler because even if you don't understand the physics of the spacecraft or the engineering

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00:09:13,070 --> 00:09:14,610

- it's discovering new worlds!

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00:09:14,610 --> 00:09:15,610

Eugene: It is.

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00:09:15,610 --> 00:09:17,720

Host: So much possibility there.

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00:09:17,720 --> 00:09:19,290

It's exciting.

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00:09:19,290 --> 00:09:26,600

Question 4 - we have free flying Star Trek-inspired robots helping astronauts perform experiments

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00:09:26,600 --> 00:09:27,779

aboard the International Space Station?

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00:09:27,779 --> 00:09:31,440

Eugene: Well, I'm going to have to say false on that one, but only a portion of it.

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00:09:31,440 --> 00:09:32,959

We do have free flying robots...

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00:09:32,959 --> 00:09:33,959

Host: We do!

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00:09:33,959 --> 00:09:37,370

Eugene: ...and of course, Star Trek has inspired a lot of things, when you think of things

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00:09:37,370 --> 00:09:41,320

like cell phones and communicators and tricorders.

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00:09:41,320 --> 00:09:43,570

But this one was inspired by Star Wars.

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00:09:43,570 --> 00:09:44,570

Host: Yes!

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00:09:44,570 --> 00:09:50,510

Eugene: I think it was a lightsabre training drone in what's now Episode 4, it will always

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00:09:50,510 --> 00:09:55,220

be the first episode to me, because I grew up in that time.

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00:09:55,220 --> 00:10:00,530

That was the inspiration for basically a robotic assistant, that can be floating inside the

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00:10:00,530 --> 00:10:06,410

Space Station or any space craft and be moving around, be taking data, be taking video, be

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00:10:06,410 --> 00:10:09,639

helping the crew do tasks.

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00:10:09,639 --> 00:10:14,529

And also be doing other more mundane tasks like inventory control of everything that's

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00:10:14,529 --> 00:10:15,529

in it.

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00:10:15,529 --> 00:10:21,170

You'd be surprised how many things get misplaced on the Space Station when you're in zero G

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00:10:21,170 --> 00:10:22,590

or microgravity.

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00:10:22,590 --> 00:10:26,550

Things just kind of float away and into little crevices.

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00:10:26,550 --> 00:10:30,980

So being able to find those and identify those is a pretty significant task for the crew.

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00:10:30,980 --> 00:10:32,779

Host: I didn't realize that was a problem.

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00:10:32,779 --> 00:10:34,900

Is this the SPHERES robot?

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00:10:34,900 --> 00:10:40,731

Eugene: There's a SPHERES and we're doing subsequent follow-on called Astrobee, which

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00:10:40,731 --> 00:10:46,780

is going to have more smarts in it and be able to do more things as a robotic assistant.

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00:10:46,780 --> 00:10:48,529

Host: I've heard those names.

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00:10:48,529 --> 00:10:51,020

I think people can find videos on those.

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00:10:51,020 --> 00:10:52,090

Eugene: Yes.

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00:10:52,090 --> 00:10:54,350

Host: So Star Wars, not Star Trek.

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00:10:54,350 --> 00:10:55,350

Eugene: In that case.

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00:10:55,350 --> 00:10:56,839

Host: I thought I might trip you up there.

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00:10:56,839 --> 00:10:58,959

Last question.

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00:10:58,959 --> 00:11:03,050

What do the stars in the NASA insignia or, as we call it, the "meatball" represent?

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00:11:03,050 --> 00:11:06,829

Eugene: Well, first of all, it's not a true or false question.

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00:11:06,829 --> 00:11:07,829

Host: True.

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00:11:07,829 --> 00:11:10,130

Eugene: But it is - it represents space.

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00:11:10,130 --> 00:11:15,120

And the other portions of the meatball - the red symbol there represents aeronautics.

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00:11:15,120 --> 00:11:18,740

Host: Yeah, that little swooshy symbol.

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00:11:18,740 --> 00:11:21,850

Eugene: So that's what's in the meatball.

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00:11:21,850 --> 00:11:22,870

Host: Exactly.

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00:11:22,870 --> 00:11:26,770

Because it's representing space, we are America's space agency but also a lot more, with the

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00:11:26,770 --> 00:11:30,839

aeronautics components and the other science that we do.

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00:11:30,839 --> 00:11:33,320

So today was actually an important day at NASA.

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00:11:33,320 --> 00:11:34,320

Eugene: Yes.

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00:11:34,320 --> 00:11:39,870

Host: We had the State of NASA address from acting NASA Administrator Robert Lightfoot.

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00:11:39,870 --> 00:11:42,980

So could you tell us a little bit about what we learned today?

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00:11:42,980 --> 00:11:43,980

What you took away from that?

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00:11:43,980 --> 00:11:44,980

Eugene: Yes.

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00:11:44,980 --> 00:11:48,029

Today was the release of the President's budget for Fiscal Year 19.

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00:11:48,029 --> 00:11:52,920

So, as part of that, acting Administrator Lightfoot gave a briefing on the state of

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00:11:52,920 --> 00:11:58,279

NASA and also what's held in this proposed budget that the President has released.

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00:11:58,279 --> 00:11:59,899

It's a good budget for NASA.

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00:11:59,899 --> 00:12:04,720

It increases NASA's budget over the current year by about \$400 million.

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00:12:04,720 --> 00:12:10,680

There's a significant focus on lunar exploration, including eventually returning humans to the

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00:12:10,680 --> 00:12:14,290

moon but starting out with robotic exploration.

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00:12:14,290 --> 00:12:17,010

Quite a bit of emphasis on doing this in partnership.

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00:12:17,010 --> 00:12:20,430

Partnership with other international entities, but also partnership with the commercial and

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00:12:20,430 --> 00:12:21,850

the private sector.

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00:12:21,850 --> 00:12:25,389

So, it's a very, very exciting time for us.

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00:12:25,389 --> 00:12:28,690

Here at Ames we have a lot that we can contribute to this area.

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00:12:28,690 --> 00:12:32,130

We have lunar science capabilities here.

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00:12:32,130 --> 00:12:36,769

We run one of the virtual institutes within the Agency that focuses on planetary science,

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00:12:36,769 --> 00:12:37,769

including lunar science.

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00:12:37,769 --> 00:12:43,270

Also, we also have small missions that we have been proposing and looking at, three

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00:12:43,270 --> 00:12:46,310

of the last five missions to the moon from the US were Ames-run.

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00:12:46,310 --> 00:12:47,329

Host: That's really impressive.

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00:12:47,329 --> 00:12:51,770

Eugene: And we have another one coming up called Resource Prospector that we're proposing.

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00:12:51,770 --> 00:12:55,870

And then the third area is the commercial and partnership areas that we focus on here

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00:12:55,870 --> 00:12:58,050

and so we have a lot to contribute here.

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00:12:58,050 --> 00:12:59,720

We're very excited about this budget.

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00:12:59,720 --> 00:13:00,720

Host: Great!

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00:13:00,720 --> 00:13:03,029

So we're well suited for this budget.

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00:13:03,029 --> 00:13:04,120

Eugene: Absolutely.

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00:13:04,120 --> 00:13:05,759

Host: Awesome, cool!

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00:13:05,759 --> 00:13:07,060

So that was a good start to the day.

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00:13:07,060 --> 00:13:11,899

And then this is also a special day here because we had 12 special visitors.

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00:13:11,899 --> 00:13:15,250

We had a dozen social media followers of NASA

-

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00:13:15,250 --> 00:13:18,370

(Offscreen sounds of party horns blowing)

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00:13:18,370 --> 00:13:19,370

(Laughter)

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00:13:19,370 --> 00:13:25,380

Host: And they're here in the studio and we're going to be bringing them up to talk to us

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00:13:25,380 --> 00:13:28,240

about what they got to see and do today.

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00:13:28,240 --> 00:13:30,700

Let's run through the activities that they got to see.

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00:13:30,700 --> 00:13:31,700

Eugene: OK.

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00:13:31,700 --> 00:13:33,230

Host: To tell our audience what's coming up.

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00:13:33,230 --> 00:13:34,230

Eugene: OK.

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00:13:34,230 --> 00:13:40,190

Host: So we have some videos to show while we describe what they got to see.

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00:13:40,190 --> 00:13:43,860

So why don't you tell us - there was a talk about the lunar rover mission.

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00:13:43,860 --> 00:13:49,310

Eugene: We talked about LCROSS earlier which basically identified the existence of water

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00:13:49,310 --> 00:13:50,790

ice on the moon.

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00:13:50,790 --> 00:13:53,020

We now are interested in how much.

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00:13:53,020 --> 00:13:57,089

Because whether or not we can actually get to that water ice and turn it into resources

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00:13:57,089 --> 00:13:58,089

is a big question.

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00:13:58,089 --> 00:13:59,680

So that's Resource Prospector.

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00:13:59,680 --> 00:14:05,540

Then we have the lunar landing facility or lunar surface lab facility where they got

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00:14:05,540 --> 00:14:07,640

a look at how we could test rovers out.

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00:14:07,640 --> 00:14:12,730

I think we have over eight tons of simulated lunar dirt in there.

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00:14:12,730 --> 00:14:17,970

So they have the ability to see how the rovers might function in such an environment.

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00:14:17,970 --> 00:14:18,970

Host: Right.

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00:14:18,970 --> 00:14:19,970

Exactly.

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00:14:19,970 --> 00:14:23,490

Because the lighting is different and the manoeuvring of the robot on the surface is

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00:14:23,490 --> 00:14:26,120

going to depend on that.

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00:14:26,120 --> 00:14:30,740

So those were their first two stops of the day and they did some hands-on activities

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00:14:30,740 --> 00:14:31,879

with our experts here.

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00:14:31,879 --> 00:14:34,000

Could you tell us about those four?

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00:14:34,000 --> 00:14:43,480

Eugene: Yes, we have a Fruit Fly Lab, where we basically fly fruit flies on Station to

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00:14:43,480 --> 00:14:47,990

test their reaction and their response to microgravity environments.

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00:14:47,990 --> 00:14:53,440

So they had an opportunity, I believe, to count fruit flies, male and female fruit flies.

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00:14:53,440 --> 00:14:58,699

Then we had the Airspace Operations Lab, where they had the ability to look at how we test

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00:14:58,699 --> 00:15:00,340

unmanned aerial vehicles, or UAS's.

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00:15:00,340 --> 00:15:05,870

Drones, if you will, in the various test sites.

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00:15:05,870 --> 00:15:09,899

And then, we also had a Fatigue Countermeasures Lab that they took a look at.

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00:15:09,899 --> 00:15:13,959

This really started with aviation, when we were looking at pilots and long haul flights

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00:15:13,959 --> 00:15:19,170

and their fatigue issues, but it's a big issue for space flight, too.

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00:15:19,170 --> 00:15:21,410

So that was that activity.

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00:15:21,410 --> 00:15:27,120

And then I think what we're looking at here is the Human Vibration Lab, where they looked

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00:15:27,120 --> 00:15:32,200

at, basically during a launch environment,
could you read the displays under high vibration

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00:15:32,200 --> 00:15:37,959

and we've figured out that you can synchronise
the displays so they can read it.

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00:15:37,959 --> 00:15:42,560

And then, finally, the Vertical Motion Simulator
which I talked about earlier, a six-story-tall

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00:15:42,560 --> 00:15:47,529

facility, that can basically, can simulate
aircraft, rotorcraft or helicopters, and also,

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00:15:47,529 --> 00:15:48,649

lunar landers, for example.

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00:15:48,649 --> 00:15:50,120

Host: So cool.

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00:15:50,120 --> 00:15:51,120

Wow.

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00:15:51,120 --> 00:15:54,279

That's an awesome overview of the center and
the fact they got to go and do these things

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00:15:54,279 --> 00:15:55,800

themselves, I'm pretty jealous.

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00:15:55,800 --> 00:15:57,029

I only got to go on one.

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00:15:57,029 --> 00:16:00,180

Eugene: Well, maybe next time we'll get you
on all of them.

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00:16:00,180 --> 00:16:03,190

Host: Thank you so much for giving this overview of the center.

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00:16:03,190 --> 00:16:04,190

Eugene: My pleasure.

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00:16:04,190 --> 00:16:05,449

Host: And giving us a little time.

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00:16:05,449 --> 00:16:07,620

We look forward to having you back some day to tell us more.

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00:16:07,620 --> 00:16:08,620

Eugene: I look forward to it.

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00:16:08,620 --> 00:16:09,990

Host: Thank you for being here.

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00:16:09,990 --> 00:16:11,500

(Offscreen sounds of party horns blowing)

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00:16:11,500 --> 00:16:12,500

Host: They're coming.

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00:16:12,500 --> 00:16:15,069

We're going to bring out our NASA social guests.

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00:16:15,069 --> 00:16:17,959

So I'll ask you to switch places with them.

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00:16:17,959 --> 00:16:18,959

Eugene: Alright.

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00:16:18,959 --> 00:16:24,829

Host: And in the meantime, if you're just joining us, this is another episode of NASA

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00:16:24,829 --> 00:16:29,649

in Silicon Valley Live and today we're talking about our NASA social event.

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00:16:29,649 --> 00:16:33,350

If you have any comments to make about what you're seeing, that these guys got to try

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00:16:33,350 --> 00:16:36,870

out today or if you have any questions about their experience, leave them in the Twitch

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00:16:36,870 --> 00:16:40,700

chat and we will see if we can squeeze in some of those.

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00:16:40,700 --> 00:16:41,889

And here they come.

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00:16:41,889 --> 00:16:45,519

(Offscreen sounds of party horns blowing)

344

00:16:45,519 --> 00:16:48,779

>> Come on out, Team Fruit Fly.

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00:16:48,779 --> 00:16:49,779

Welcome.

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00:16:49,779 --> 00:16:50,780

Jerome: Thank you.

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00:16:50,780 --> 00:16:52,350

Host: This is my team.

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00:16:52,350 --> 00:16:56,430

I got to go on the fruit fly lab experience today.

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00:16:56,430 --> 00:16:58,899

So thanks for coming out here, guys.

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00:16:58,899 --> 00:17:00,830

And let's do a quick little intro.

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00:17:00,830 --> 00:17:07,210

Could you tell me your first name and if you had to choose - moonwalk or spacewalk?

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00:17:07,210 --> 00:17:14,000

Jerome: I'm Jerome and if I had to pick I think I would go with the moonwalk because

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00:17:14,000 --> 00:17:18,940

who else gets to do that but astronauts and that's a pretty limited number of people that

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00:17:18,940 --> 00:17:19,940

had that kind of opportunity.

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00:17:19,940 --> 00:17:21,040

That would be pretty cool.

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00:17:21,040 --> 00:17:24,980

Not that anyone's done spacewalks here in this room, either, but -

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00:17:24,980 --> 00:17:29,500

Host: One might argue the same for spacewalks but I could also go with moonwalk.

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00:17:29,500 --> 00:17:30,980

Jerome: It would be fun.

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00:17:30,980 --> 00:17:32,310

Host: It would be fun.

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00:17:32,310 --> 00:17:33,600

Moving down the line -

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00:17:33,600 --> 00:17:34,600

Gaby: Hi.

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00:17:34,600 --> 00:17:35,870

I'm Gaby, I would also, I think, do a moonwalk.

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00:17:35,870 --> 00:17:36,870

I don't have a reason.

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00:17:36,870 --> 00:17:38,510

I don't think I need one.

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00:17:38,510 --> 00:17:40,790

It's a moonwalk.

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00:17:40,790 --> 00:17:43,120

Host: It's kind of self-explanatory.

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00:17:43,120 --> 00:17:44,120

Nice.

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00:17:44,120 --> 00:17:45,140

Anda: Hi.

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00:17:45,140 --> 00:17:49,890

I'm Anda and I'd also go with moonwalk because it is less scary.

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00:17:49,890 --> 00:17:51,310

Host: Less scary?

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00:17:51,310 --> 00:17:52,710

Anda: Yeah.

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00:17:52,710 --> 00:17:54,110

Spacewalk is -

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00:17:54,110 --> 00:17:56,250

Host: You might float off into oblivion?

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00:17:56,250 --> 00:17:57,250

Anda: Exactly.

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00:17:57,250 --> 00:18:00,570

Host: I want to run on the moon because the gravity is lower.

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00:18:00,570 --> 00:18:01,570

Jerome: Big jumps.

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00:18:01,570 --> 00:18:02,570

Host: Big bouncing jumps.

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00:18:02,570 --> 00:18:04,270

Anda: Just for some exercise.

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00:18:04,270 --> 00:18:06,730

Host: That's my reason.

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00:18:06,730 --> 00:18:11,590

So you guys got to visit the fruit fly lab and I think we're going to roll that video

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00:18:11,590 --> 00:18:17,020

again and I'll give a little background on why NASA does fruit fly experiments.

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00:18:17,020 --> 00:18:20,730

These are experiments we do on the International Space Station that teach us something about

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00:18:20,730 --> 00:18:25,010

the biological effects of space flight on humans, on the human body.

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00:18:25,010 --> 00:18:29,680

So, in the activity, our guests performed the actual steps that scientists here do for

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00:18:29,680 --> 00:18:35,030

preparing experimental fruit fly samples for launch to the Space Station and then they

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00:18:35,030 --> 00:18:39,400

practiced some of the post-flight tests that the scientists perform on those samples when

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00:18:39,400 --> 00:18:41,240

they come back to Earth.

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00:18:41,240 --> 00:18:43,110

So, tell us more.

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00:18:43,110 --> 00:18:44,580

What did you do today?

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00:18:44,580 --> 00:18:50,190

Jerome: So one of the neat opportunities that we have as social media guests here during

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00:18:50,190 --> 00:18:54,460

this event, the State of NASA, is we that were exposed so many different processes and

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00:18:54,460 --> 00:19:00,480

people that do fantastic work, and fascinating work, in many different disciplines from their

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00:19:00,480 --> 00:19:02,510

fields.

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00:19:02,510 --> 00:19:08,020

Part of the biology testing and the fruit

fly experiments that are done on the Space

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00:19:08,020 --> 00:19:14,140

Station involves a lot of simulation that can be done on fruit flies that live five

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00:19:14,140 --> 00:19:21,350

to eight weeks but have very similar genetic make-up of humans and can be very useful in

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00:19:21,350 --> 00:19:27,960

determining various behaviours or disease-fighting techniques or how they cope with bacteria,

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00:19:27,960 --> 00:19:29,780

infections and things like that.

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00:19:29,780 --> 00:19:34,430

It's fascinating to see how all of the team works on that.

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00:19:34,430 --> 00:19:39,770

The scientists and the technicians and the process that goes into that and putting them

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00:19:39,770 --> 00:19:45,920

on various flights that go up to the Space Station and the handling and all of that logic

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00:19:45,920 --> 00:19:50,310

is - and strategy and all of that is fascinating to see.

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00:19:50,310 --> 00:19:53,720

And the people are so excited about working on those projects, it's really interesting

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00:19:53,720 --> 00:19:57,180

Host: You can see that and it's a complex endeavor for sure.

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00:19:57,180 --> 00:19:58,180

Jerome: It really is.

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00:19:58,180 --> 00:20:01,510

Host: All those people involved in getting things from here to Kennedy Space Center.

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00:20:01,510 --> 00:20:02,820

Launched to the Space station.

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00:20:02,820 --> 00:20:03,840

It's fascinating.

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00:20:03,840 --> 00:20:06,870

Jerome: And they're very tiny and difficult to manipulate.

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00:20:06,870 --> 00:20:07,870

Host: Yes.

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00:20:07,870 --> 00:20:09,630

Did you have that experience yourself?

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00:20:09,630 --> 00:20:10,630

You were sorting flies, weren't you?

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00:20:10,630 --> 00:20:11,630

Gaby: Yeah, we like sorted between male and female.

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00:20:11,630 --> 00:20:18,890

They have discerning features and we learned about that.

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00:20:18,890 --> 00:20:21,010

Just something that I've never thought about.

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00:20:21,010 --> 00:20:22,010

Host: Right.

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00:20:22,010 --> 00:20:27,300

Gaby: So it was fascinating to learn about something you really have never given much

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00:20:27,300 --> 00:20:28,300

thought to.

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00:20:28,300 --> 00:20:29,300

Host: Yeah.

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00:20:29,300 --> 00:20:30,300

Exactly.

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00:20:30,300 --> 00:20:35,700

I think we have some photos that we could throw up soon here of you guys sorting flies

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00:20:35,700 --> 00:20:38,050

and performing some of these tests.

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00:20:38,050 --> 00:20:43,590

And while they call that up, how did you find sorting flies or the fly climbing test that

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00:20:43,590 --> 00:20:44,590

we did?

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00:20:44,590 --> 00:20:46,610

Anda: Sorting flies is quite difficult.

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00:20:46,610 --> 00:20:52,620

I mean, your eyes are really hurting after a while looking through the microscope.

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00:20:52,620 --> 00:20:56,990

Host: Here is a vial of flies we're seeing

right now.

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00:20:56,990 --> 00:20:58,390

Was this a video one of you took?

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00:20:58,390 --> 00:20:59,570

Jerome: I think it is.

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00:20:59,570 --> 00:21:00,750

Host: Is that you, Jerome?

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00:21:00,750 --> 00:21:01,750

I think so.

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00:21:01,750 --> 00:21:03,440

So you can see the little flies crawling around in there.

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00:21:03,440 --> 00:21:07,470

Jerome: And what's fascinating is that we only dealt with a dozen flies at one time

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00:21:07,470 --> 00:21:11,880

and what we were seeing were vials that had, I don't know, thousands of flies.

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00:21:11,880 --> 00:21:17,260

It was a sheer effort for sure that those technicians to go through to separate and

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00:21:17,260 --> 00:21:22,930

coordinate the payloads and if there's a delay in one of the launches, they were explaining

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00:21:22,930 --> 00:21:31,390

to us how they would have to substitute in various, I don't know, boxes of vials and

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00:21:31,390 --> 00:21:37,430

it was just a real interesting breakdown of the strategy and the effort of support staff

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00:21:37,430 --> 00:21:43,430

and all of it that goes into putting these experiments up on the Space Station.

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00:21:43,430 --> 00:21:44,510

It's fascinating.

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00:21:44,510 --> 00:21:47,850

Host: OK, here you are, Gaby.

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00:21:47,850 --> 00:21:48,940

Gaby: That's how I felt.

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00:21:48,940 --> 00:21:50,580

It was like so amazing.

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00:21:50,580 --> 00:21:53,360

Host: You look happy there to be working with flies.

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00:21:53,360 --> 00:21:57,330

Gaby: I never thought I would have that big of a smile on my face.

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00:21:57,330 --> 00:21:59,370

Host: Looking at fruit flies.

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00:21:59,370 --> 00:22:03,020

Can you describe a little while when they were running around in the vial.

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00:22:03,020 --> 00:22:04,020

There were so many of them.

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00:22:04,020 --> 00:22:10,030

Gaby: What's incredible is we did these tests

that compared different age groups so old

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00:22:10,030 --> 00:22:14,120

flies versus new flies and you would slam them down on the counter so they could all

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00:22:14,120 --> 00:22:19,390

start on the bottom level and we would time how fast it took for them to rise above, I

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00:22:19,390 --> 00:22:22,580

think it was 5 centimeters.

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00:22:22,580 --> 00:22:28,520

And there was a difference or there's supposed to be a difference between the old and the

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00:22:28,520 --> 00:22:29,520

new.

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00:22:29,520 --> 00:22:30,840

Jerome: Activity behavior.

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00:22:30,840 --> 00:22:37,230

Gaby: And they're also testing that when they get back from space, if that's altered at

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00:22:37,230 --> 00:22:38,230

all.

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00:22:38,230 --> 00:22:44,430

If the time it takes for them to get to the top of the vial is slower in any way.

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00:22:44,430 --> 00:22:51,040

Host: Do you remember the fun fact they wanted us to take away about the number of genes

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00:22:51,040 --> 00:22:54,310

involved in diseases that flies share with humans?

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00:22:54,310 --> 00:22:55,670

Group: Isn't it 75%?

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00:22:55,670 --> 00:22:56,670

Host: Yeah.

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00:22:56,670 --> 00:22:57,670

Gaby: It's incredible

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00:22:57,670 --> 00:23:03,200

Host: That's why we're doing all of this research because we can find out much faster with flies

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00:23:03,200 --> 00:23:04,200

in space.

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00:23:04,200 --> 00:23:06,440

Anda: And actually the heartbeat, which is the same.

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00:23:06,440 --> 00:23:09,390

Host: The heartbeat, yeah, right, exactly.

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00:23:09,390 --> 00:23:10,730

It is the same.

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00:23:10,730 --> 00:23:14,860

Did they say it was about 60 beats per minute for flies as well as humans, right?

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00:23:14,860 --> 00:23:16,270

Anda: Yeah, 60 to 80.

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00:23:16,270 --> 00:23:18,400

Something like that.

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00:23:18,400 --> 00:23:21,240

Just like the humans anyway.

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00:23:21,240 --> 00:23:26,640

Host: So the flies are good stand-ins for humans and because they have a shorter life

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00:23:26,640 --> 00:23:30,890

span we can see aging and the effects of a long time in space faster, right?

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00:23:30,890 --> 00:23:31,890

Anda: Yeah.

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00:23:31,890 --> 00:23:38,510

Jermoe: One of the fascinating elements is the generations that are created are two weeks

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00:23:38,510 --> 00:23:39,510

in duration.

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00:23:39,510 --> 00:23:43,980

So that's perfect because, SpaceX Dragon is up there for 30 days and so they can do this

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00:23:43,980 --> 00:23:49,130

experiment, have multiple generations take place during the experiments and bring it

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00:23:49,130 --> 00:23:52,070

back for a lot of the analysis there in the lab.

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00:23:52,070 --> 00:23:53,661

It was just very cool.

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00:23:53,661 --> 00:23:59,960

And because they share so many features that are similar to our human genome make-up, it's

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00:23:59,960 --> 00:24:09,520

truly a masterful, you know, component to learning about how humans work in our physiology

484

00:24:09,520 --> 00:24:10,590

and all of that.

485

00:24:10,590 --> 00:24:13,250

Fruit flies are truly remarkable.

486

00:24:13,250 --> 00:24:19,340

As well as mice are also an incredible device to use, if you will, for learning about what

487

00:24:19,340 --> 00:24:20,570

we do and how we behave.

488

00:24:20,570 --> 00:24:22,360

(Offscreen sounds of party horns blowing)

489

00:24:22,360 --> 00:24:23,360

Host: Incredible.

490

00:24:23,360 --> 00:24:27,590

I think we're being told that the next group is excited to come up here.

491

00:24:27,590 --> 00:24:34,650

So I will ask you to return to the peanut gallery and we will see you later.

492

00:24:34,650 --> 00:24:36,970

And we're going to bring up Team Drone.

493

00:24:36,970 --> 00:24:41,220

Thanks for sharing your experience.

494

00:24:41,220 --> 00:24:44,620

[Whistles blow, horns sound.

495

00:24:44,620 --> 00:24:45,620

Whoo-whoo!]

496

00:24:45,620 --> 00:24:48,800

Host: I wanted to check in with the Twitch chat.

497

00:24:48,800 --> 00:24:53,210

If you are just joining us, this is NASA in Silicon Valley Live and we're talking about

498

00:24:53,210 --> 00:24:56,000

the NASA social that we're hosting here at Ames.

499

00:24:56,000 --> 00:24:58,260

And before Team Drone joins us...

500

00:24:58,260 --> 00:25:00,830

(Offscreen sounds of party horns blowing)

501

00:25:00,830 --> 00:25:05,770

Host: ...I just want to share a couple of comments from the Twitch chat.

502

00:25:05,770 --> 00:25:07,480

There was a vote for the moonwalk.

503

00:25:07,480 --> 00:25:09,920

We were debating moonwalk or spacewalk.

504

00:25:09,920 --> 00:25:10,990

We all went for moonwalk.

505

00:25:10,990 --> 00:25:12,780

So did somebody from the chat.

506
00:25:12,780 --> 00:25:17,730
We also have a comment - how weird sharing
that time flies like an arrow and fruit flies

507
00:25:17,730 --> 00:25:20,030
like a banana.

508
00:25:20,030 --> 00:25:21,050
Very appropriate.

509
00:25:21,050 --> 00:25:25,620
And The Suspicious Pixel wants to know if
there are any fly handler jobs available.

510
00:25:25,620 --> 00:25:33,190
You can look for jobs on USA Jobs and intern.NASA.gov
to look for NASA jobs.

511
00:25:33,190 --> 00:25:36,800
But we did ask the scientists how they got
into working on fruit flies for space and

512
00:25:36,800 --> 00:25:40,460
they all came from biology backgrounds and
happen to be space nerds.

513
00:25:40,460 --> 00:25:44,230
So , when they found a chance to use their
science for space, they took it.

514
00:25:44,230 --> 00:25:45,890
Welcome, guys.

515
00:25:45,890 --> 00:25:48,680
You guys are Team Drone.

516
00:25:48,680 --> 00:25:49,700
Tell us more.

517

00:25:49,700 --> 00:25:53,290

Well, first of all, let's do a quick round of introductions.

518

00:25:53,290 --> 00:25:55,860

I don't know your names, we didn't get a chance to meet earlier.

519

00:25:55,860 --> 00:25:59,290

So tell us your name and your favorite planet.

520

00:25:59,290 --> 00:26:06,770

James: James and, oh, I will get in so much trouble if I say Pluto.

521

00:26:06,770 --> 00:26:07,770

Probably Mars.

522

00:26:07,770 --> 00:26:08,770

Host: Mars.

523

00:26:08,770 --> 00:26:09,770

Okay.

524

00:26:09,770 --> 00:26:10,770

All right.

525

00:26:10,770 --> 00:26:15,070

Jason: I'm Jason and I am going to put in a word for a planet that doesn't get enough

526

00:26:15,070 --> 00:26:16,090

love, Venus.

527

00:26:16,090 --> 00:26:18,140

Host: Venus, interesting choice.

528

00:26:18,140 --> 00:26:19,450

Is there a specific reason?

529

00:26:19,450 --> 00:26:23,300

Jason: I really like some of the concepts that are coming out for Venus exploration

530

00:26:23,300 --> 00:26:27,760

and I know there's a lot of work going into finding computers that can last for more than

531

00:26:27,760 --> 00:26:30,830

five seconds on the surface of Venus right now at NASA.

532

00:26:30,830 --> 00:26:35,800

I think it would be great to go back to Venus with some probes in the future.

533

00:26:35,800 --> 00:26:37,260

There's a lot to learn there.

534

00:26:37,260 --> 00:26:38,620

Host: Nice vote for Venus.

535

00:26:38,620 --> 00:26:40,220

What's your name?

536

00:26:40,220 --> 00:26:41,290

Casey: Hi.

537

00:26:41,290 --> 00:26:42,360

I'm Casey.

538

00:26:42,360 --> 00:26:44,520

Favorite planet is going to have to be Earth, we kind of live here.

539

00:26:44,520 --> 00:26:46,230

We have to show Earth some love.

540

00:26:46,230 --> 00:26:51,760

Host: I was hoping someone would vote for Earth.

541

00:26:51,760 --> 00:26:52,760

Nice.

542

00:26:52,760 --> 00:26:57,380

So to get into the subject of where you guys spent your afternoon, we have the footage

543

00:26:57,380 --> 00:27:00,960

to roll again from the Airspace Operations Lab.

544

00:27:00,960 --> 00:27:05,450

So NASA is helping to develop an air traffic management system for drones that will make

545

00:27:05,450 --> 00:27:10,290

sure that they can operate safely, these unmanned vehicles, in low altitude airspace.

546

00:27:10,290 --> 00:27:16,170

So, in this activity, our guests operated virtual drones in a simulated environment

547

00:27:16,170 --> 00:27:20,760

and they learned about the advanced technologies and software tools being tested by researchers

548

00:27:20,760 --> 00:27:21,760

today.

549

00:27:21,760 --> 00:27:23,150

So tell us about this.

550

00:27:23,150 --> 00:27:25,230

You mentioned earlier you're a pilot in training.

551

00:27:25,230 --> 00:27:26,230

James: Yeah.

552

00:27:26,230 --> 00:27:30,620

I'm actually first year at San Jose State
and I'm working on my private pilot's license

553

00:27:30,620 --> 00:27:31,620

right now.

554

00:27:31,620 --> 00:27:36,370

So it's actually kind of interesting to see
because I'm from a family of pilots or I guess

555

00:27:36,370 --> 00:27:40,140

we all have an aviation background.

556

00:27:40,140 --> 00:27:46,250

We've always had, like, not a fear but, you
know, how dangerous bird strikes are - just

557

00:27:46,250 --> 00:27:51,230

a couple pound bird, imagine an 8-pound piece
of metal getting sucked into an engine, so

558

00:27:51,230 --> 00:27:56,770

it's really cool to see the people here working
on a system to prevent accidents like that

559

00:27:56,770 --> 00:27:59,500

and setting the standards for the future of
drones.

560

00:27:59,500 --> 00:28:00,660

Host: Awesome.

561

00:28:00,660 --> 00:28:01,820

Well said.

562

00:28:01,820 --> 00:28:05,870

Do you have an interest in aviation that brought you here today?

563

00:28:05,870 --> 00:28:08,640

Jason: I thought we were randomly selected.

564

00:28:08,640 --> 00:28:10,960

My dad was actually a private pilot.

565

00:28:10,960 --> 00:28:16,030

I was really interested in it from the tech side, how they're building the system rather

566

00:28:16,030 --> 00:28:22,200

than having sort of a single database run by the FAA that would be the central place

567

00:28:22,200 --> 00:28:23,400

for everything.

568

00:28:23,400 --> 00:28:27,430

They're working with industry, they're working with different companies that have expressed

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00:28:27,430 --> 00:28:32,330

interest in parts of this, whether it's running a service or building drones themselves or

570

00:28:32,330 --> 00:28:37,150

providing data to it and then having them all talk to each other.

571

00:28:37,150 --> 00:28:41,260

Which is an interesting technical problem, sort of setting the standard and how do you

572

00:28:41,260 --> 00:28:45,910

put up your hand as a drone operator and say
"I would like to fly here please" and what

573

00:28:45,910 --> 00:28:47,100

happens after that?

574

00:28:47,100 --> 00:28:48,510

Like, what's the space?

575

00:28:48,510 --> 00:28:49,510

What's the altitude?

576

00:28:49,510 --> 00:28:52,270

How long does it last so that nothing crashes
into you.

577

00:28:52,270 --> 00:28:54,400

Host: It's super complicated, like everything.

578

00:28:54,400 --> 00:28:58,000

Jason: Don't crash your drone into other drones
- it's very important.

579

00:28:58,000 --> 00:28:59,690

Host: That is to be avoided.

580

00:28:59,690 --> 00:29:04,690

But it will take NASA and industry and the
FAA working together and creating new software

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00:29:04,690 --> 00:29:06,540

to make all that happen, right?

582

00:29:06,540 --> 00:29:08,160

There's just too much going on.

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00:29:08,160 --> 00:29:11,940

Jason: If they have them all sorted out by flying their drones around until they crash

584

00:29:11,940 --> 00:29:14,530

into each other seems like a bad idea, perhaps.

585

00:29:14,530 --> 00:29:18,890

Lay some groundwork there, so that the drone... and all the people involved in this, they

586

00:29:18,890 --> 00:29:19,890

want to do this too.

587

00:29:19,890 --> 00:29:24,900

And so it sounds like NASA and the FAA are working together to create that shared space

588

00:29:24,900 --> 00:29:28,820

for all these groups to get together and figure out a system that makes sense.

589

00:29:28,820 --> 00:29:30,960

James: That's true.

590

00:29:30,960 --> 00:29:35,590

They were talking about how companies are basically signing on to this idea of having

591

00:29:35,590 --> 00:29:38,140

their own network to communicate with these drones.

592

00:29:38,140 --> 00:29:43,630

So it's not that you're putting on the headset and talking to an air traffic controller.

593

00:29:43,630 --> 00:29:49,350

It's that these companies have designated areas that they've selected, a time and space

594

00:29:49,350 --> 00:29:54,110

they will be operating their drones in and
that they are all on the system and agreeing

595

00:29:54,110 --> 00:29:57,990

and picking out, OK, you can have this space
but I'm going to take this space.

596

00:29:57,990 --> 00:29:58,990

Host: Okay.

597

00:29:58,990 --> 00:29:59,990

Working it out.

598

00:29:59,990 --> 00:30:00,990

Casey, can you tell us what you did?

599

00:30:00,990 --> 00:30:03,600

What did you get to try out in this activity?

600

00:30:03,600 --> 00:30:09,010

Casey: We actually got to use the system called
Max and we were able to set up our own drone

601

00:30:09,010 --> 00:30:10,010

flight paths.

602

00:30:10,010 --> 00:30:11,010

Host: Cool.

603

00:30:11,010 --> 00:30:12,780

Casey: So we all got a different situation.

604

00:30:12,780 --> 00:30:19,320

There was one where we're simulating a drop
of supplies to somebody who was attacked by

605

00:30:19,320 --> 00:30:20,780

an alligator in Florida.

606

00:30:20,780 --> 00:30:22,680

Host: (Laughing) That could happen!

607

00:30:22,680 --> 00:30:23,680

Casey: Exactly.

608

00:30:23,680 --> 00:30:24,680

You never know.

609

00:30:24,680 --> 00:30:31,570

Another one was checking a boat dock for any type of activity or barnacles or just anything

610

00:30:31,570 --> 00:30:34,350

that can happen on the dock.

611

00:30:34,350 --> 00:30:40,630

So it's understanding what this technology can do for industry, not just for private

612

00:30:40,630 --> 00:30:47,970

industry but for public industry, such as analysing areas where there is crime and taking

613

00:30:47,970 --> 00:30:53,321

pictures or going to an area where there's a fire and being able to determine, OK, what's

614

00:30:53,321 --> 00:30:55,960

the best way to attack this fire to put it out.

615

00:30:55,960 --> 00:30:56,960

Host: Right.

616

00:30:56,960 --> 00:31:00,240

Maybe in buildings or maybe like wildfires

that have been happening all over California.

617

00:31:00,240 --> 00:31:01,240

Casey: Exactly.

618

00:31:01,240 --> 00:31:04,070

Jason: And being able to block out people you don't want in.

619

00:31:04,070 --> 00:31:07,660

Like, if the fire department needs to rush to a fire, that they can actually override,

620

00:31:07,660 --> 00:31:11,140

in an area and say "We need you, if you're a drone, you need to get out of this area

621

00:31:11,140 --> 00:31:13,480

now while we fly over there."

622

00:31:13,480 --> 00:31:14,480

Host: Right.

623

00:31:14,480 --> 00:31:15,810

That's an interesting point.

624

00:31:15,810 --> 00:31:20,970

I think we have some social posts, if they are ready to be brought up.

625

00:31:20,970 --> 00:31:22,390

Jason: That's us.

626

00:31:22,390 --> 00:31:24,920

Host: So, this is you guys?

627

00:31:24,920 --> 00:31:27,290

So this is the Airspace Operations Lab?

628

00:31:27,290 --> 00:31:29,691

Can you tell me what you got to see there on the screens there?

629

00:31:29,691 --> 00:31:31,200

What's behind there?

630

00:31:31,200 --> 00:31:38,400

James: So basically there were three kind of large monitors.

631

00:31:38,400 --> 00:31:44,940

They both showed different areas in which the drones kind of give a visual map of, like,

632

00:31:44,940 --> 00:31:46,960

an airspace that was being taken up.

633

00:31:46,960 --> 00:31:53,090

So ,they filed basically a flight plan for this drone and then it appears on the map at

634

00:31:53,090 --> 00:31:59,150

the time, the altitude and it basically made a four-dimensional square with the three dimensions

635

00:31:59,150 --> 00:32:00,560

and also time.

636

00:32:00,560 --> 00:32:04,670

And then that was allocated for that specific drone.

637

00:32:04,670 --> 00:32:08,470

Jason: You didn't have to be the ultimate drone flying experts.

638

00:32:08,470 --> 00:32:14,140

They actually have a system, there I am, inputting

for my barnacle search.

639

00:32:14,140 --> 00:32:20,210

They're actually using Google Earth to provide the data and we build a KML file, so a standard

640

00:32:20,210 --> 00:32:24,870

Google Earth data file, with way points where we wanted to fly the drones and that gets

641

00:32:24,870 --> 00:32:30,520

submitted to the Max system, which does a little massaging to say "We're going to take

642

00:32:30,520 --> 00:32:31,520

off from here.

643

00:32:31,520 --> 00:32:33,710

We're going to fly at this altitude, around this path.

644

00:32:33,710 --> 00:32:34,900

And then we're going to land again."

645

00:32:34,900 --> 00:32:36,580

and it reserves that space.

646

00:32:36,580 --> 00:32:43,290

You can see in Google Earth the virtual space that's this shape that you're reserving temporarily

647

00:32:43,290 --> 00:32:44,680

for your drone flight.

648

00:32:44,680 --> 00:32:48,610

Host: Is it like you put in a request and it says, "Well, not exactly that but here

649

00:32:48,610 --> 00:32:50,180

is a similar flight path?"

650

00:32:50,180 --> 00:32:55,100

Jason: It sounds like if you get rejected,
ideally you would have software on your end

651

00:32:55,100 --> 00:32:56,850

to say, "What about this instead?"

652

00:32:56,850 --> 00:32:58,160

That's one of the things that...

653

00:32:58,160 --> 00:33:02,980

This system, it's not a centralized system
so it's not going to say I'm assigning you

654

00:33:02,980 --> 00:33:06,600

this path, it more just goint to say "Somebody
is already flying in there."

655

00:33:06,600 --> 00:33:09,830

and your system would say, "OK, here is an
alternative."

656

00:33:09,830 --> 00:33:11,150

until you get one that works.

657

00:33:11,150 --> 00:33:12,250

Host: I see.

658

00:33:12,250 --> 00:33:13,250

Is that you, Casey.

659

00:33:13,250 --> 00:33:14,250

Casey: That is.

660

00:33:14,250 --> 00:33:20,150

I am making a route for the drone to overlook
a cruise ship.

661

00:33:20,150 --> 00:33:23,400

Host: A cruise ship?

662

00:33:23,400 --> 00:33:25,670

Did you hear the context of why?

663

00:33:25,670 --> 00:33:26,670

Casey: No.

664

00:33:26,670 --> 00:33:31,790

We kind of get to set up our own situation,
which is how the ridiculousness of the alligator

665

00:33:31,790 --> 00:33:32,790

attack came about.

666

00:33:32,790 --> 00:33:38,110

Jason: Maybe the cruise line is selling you
a Blu Ray of the cruise ship, with you standing

667

00:33:38,110 --> 00:33:41,850

out on the deck and they use a drone to do
that.

668

00:33:41,850 --> 00:33:43,470

There are lots of applications for drones.

669

00:33:43,470 --> 00:33:46,030

I mean, just all of the different things they
were talking about.

670

00:33:46,030 --> 00:33:50,680

In some of their tests, they've done things
like dropping a emergency survival kit into

671

00:33:50,680 --> 00:33:53,230

the desert in Nevada.

672

00:33:53,230 --> 00:33:54,940

That's an entirely plausible thing.

673

00:33:54,940 --> 00:33:59,750

You might be able to get to somebody before night falls, but can send a drone out.

674

00:33:59,750 --> 00:34:04,550

Casey: That was one of the interest parts of this whole simulation, is understanding

675

00:34:04,550 --> 00:34:10,069

that what NASA is doing is prescribing certain types of standard operating procedures and

676

00:34:10,069 --> 00:34:16,059

policies and then once they prescribe that, industry can take off with it and advance

677

00:34:16,059 --> 00:34:20,769

it in whatever ways they see fit for industry and wherever technology leads us.

678

00:34:20,769 --> 00:34:28,090

James: They're kind of laying the ground work for, essentially, a future that is autonomous.

679

00:34:28,090 --> 00:34:29,329

Host: We see that future coming.

680

00:34:29,329 --> 00:34:33,919

Someone has to do that early work to lay the groundwork.

681

00:34:33,919 --> 00:34:34,919

Awesome.

682

00:34:34,919 --> 00:34:37,580

So, did you guys learn anything that surprised

you?

683

00:34:37,580 --> 00:34:39,929

Was all of this surprising for you, that NASA's working on this?

684

00:34:39,929 --> 00:34:44,609

Or did you already have a sense that drones were in our wheelhouse here?

685

00:34:44,609 --> 00:34:49,069

Jason: I was here a couple of years ago and they were talking about this but it was more

686

00:34:49,069 --> 00:34:53,359

abstract, it was, obviously two years earlier in the research.

687

00:34:53,359 --> 00:34:57,369

And it was - I think it sounds like they were still kind of working through what some of

688

00:34:57,369 --> 00:34:58,369

the concepts would be.

689

00:34:58,369 --> 00:35:02,309

So it's very simple, almost like fill out your flight plan and press a web form, press

690

00:35:02,309 --> 00:35:05,160

submit and get a yes or no back.

691

00:35:05,160 --> 00:35:07,710

And now obviously this is far more sophisticated.

692

00:35:07,710 --> 00:35:10,710

They have four levels of flight from the most basic.

693

00:35:10,710 --> 00:35:17,410

Sort of like, very simple, not crowded air space at all, all the way up to level 4 where

694

00:35:17,410 --> 00:35:19,430

you're flying through a major city.

695

00:35:19,430 --> 00:35:25,190

They've tested, I think, phases 1 and 2 and they're moving on to 3 and then they will

696

00:35:25,190 --> 00:35:27,359

reach phase 4.

697

00:35:27,359 --> 00:35:32,039

From two years ago where I came, you can see that they've really gotten a lot closer to

698

00:35:32,039 --> 00:35:34,010

what they're trying to get as their end goal.

699

00:35:34,010 --> 00:35:39,300

Host: That is awesome that you got to see the before and after, two years apart.

700

00:35:39,300 --> 00:35:42,680

(Offscreen sounds of party horns blowing)

701

00:35:42,680 --> 00:35:44,369

Host: Perfect timing.

702

00:35:44,369 --> 00:35:46,210

Well, you know what that sounds means.

703

00:35:46,210 --> 00:35:50,170

That means it's time for you to make way for Team Sleep.

704

00:35:50,170 --> 00:35:54,000

But thank you for being up here and we will see you in a bit.

705

00:35:54,000 --> 00:35:55,000

(Whistles blow.

706

00:35:55,000 --> 00:35:56,000

Off-screen applause.)

707

00:35:56,000 --> 00:35:58,500

Host: Yay, Team Drone.

708

00:35:58,500 --> 00:36:04,000

While we wait for Team Sleep to join us, a quick reminder you're watching NASA in Silicon

709

00:36:04,000 --> 00:36:08,819

Valley Live and we're talking about the NASA social that took place here today with 12 visitors.

710

00:36:08,819 --> 00:36:09,819

(Whistles blow.

711

00:36:09,819 --> 00:36:10,819

Off-screen applause.)

712

00:36:10,819 --> 00:36:12,880

Host: Here comes three more.

713

00:36:12,880 --> 00:36:13,880

Team Sleep.

714

00:36:13,880 --> 00:36:14,880

Welcome.

715

00:36:14,880 --> 00:36:15,880

Brian: Thank you.

716

00:36:15,880 --> 00:36:16,930

Megan: Thank you.

717

00:36:16,930 --> 00:36:21,610

Host: So this is an exciting one that I'm looking forward to hearing more about but

718

00:36:21,610 --> 00:36:23,329

let's, first of all, meet you guys.

719

00:36:23,329 --> 00:36:27,130

What are your names and tell me: Earth or Mars?

720

00:36:27,130 --> 00:36:28,309

Vote: Earth or Mars?

721

00:36:28,309 --> 00:36:31,369

Brian: I'm Brian and definitely Mars.

722

00:36:31,369 --> 00:36:33,450

Host: You're abandoning Earth, just wholesale?

723

00:36:33,450 --> 00:36:36,509

Brian: Yeah, it's going to happen eventually, so -

724

00:36:36,509 --> 00:36:37,509

Host: Interesting.

725

00:36:37,509 --> 00:36:40,769

Megan: And I am Megan and I will go ahead vote for Earth.

726

00:36:40,769 --> 00:36:41,819

Host: Thank you.

727

00:36:41,819 --> 00:36:43,270

Somebody had to.

728

00:36:43,270 --> 00:36:46,109

It's balanced that way.

729

00:36:46,109 --> 00:36:50,549

So what on Earth are we talking about regarding sleep?

730

00:36:50,549 --> 00:36:54,890

You guys went to the Fatigue Countermeasures Lab, which basically means they're working

731

00:36:54,890 --> 00:36:58,770

on solutions to fight problems associated with fatigue.

732

00:36:58,770 --> 00:37:01,970

When we can't think clearly and can't operate smoothly, right?

733

00:37:01,970 --> 00:37:06,549

So we will roll again that little clip we saw earlier.

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00:37:06,549 --> 00:37:13,140

So the idea here is that an astronaut's ability to remain focused is critical for mission

735

00:37:13,140 --> 00:37:14,940

success, that makes sense.

736

00:37:14,940 --> 00:37:20,099

And in this activity, participants can perform tests to study the effects of sleep deprivation

737

00:37:20,099 --> 00:37:25,980

on the human body and then, I think, how you're able to perform under those conditions, right?

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00:37:25,980 --> 00:37:26,980

Brian: Yeah.

739

00:37:26,980 --> 00:37:30,650

Host: So, I don't know what that means you guys got to do today, so tell us more.

740

00:37:30,650 --> 00:37:31,650

What happened?

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00:37:31,650 --> 00:37:37,380

Brian: Well, we first started at the NASA sleep countermeasures division and we kind

742

00:37:37,380 --> 00:37:40,590

of went to three substations within that.

743

00:37:40,590 --> 00:37:42,640

The first was a driving simulator.

744

00:37:42,640 --> 00:37:44,279

Host: We saw that in the video.

745

00:37:44,279 --> 00:37:48,339

Brian: And it's mostly meant for people who are sleep deprived for 30 hours and then seeing

746

00:37:48,339 --> 00:37:53,259

what the effects of sleep deprivation would be on the driving reaction times.

747

00:37:53,259 --> 00:37:56,039

Do you want to do the next one?

748

00:37:56,039 --> 00:38:02,599

Megan: The first one that I did was the room that they keep the test subjects awake in

749

00:38:02,599 --> 00:38:04,299

for up to 30 hours, they said.

750

00:38:04,299 --> 00:38:05,359

Host: How do they keep them awake?

751

00:38:05,359 --> 00:38:07,670

Megan: So you're in a bed.

752

00:38:07,670 --> 00:38:10,700

You're not lying all the way down, you're kind of reclined a little bit.

753

00:38:10,700 --> 00:38:14,349

And you're wearing one of those, they didn't show it in the video but it's like a full

754

00:38:14,349 --> 00:38:17,210

cap with all the electrodes on it.

755

00:38:17,210 --> 00:38:20,079

You just recline there for 30 hours.

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00:38:20,079 --> 00:38:21,550

They give you little sandwiches.

757

00:38:21,550 --> 00:38:24,579

Host: Is that someone wearing electrodes?

758

00:38:24,579 --> 00:38:25,920

Megan: Yes.

759

00:38:25,920 --> 00:38:28,099

That is the last member of Team sleep.

760

00:38:28,099 --> 00:38:29,390

Or Team No Sleep!

761

00:38:29,390 --> 00:38:31,660

Host: As it should be called.

762

00:38:31,660 --> 00:38:35,020

Megan: So you wear that little cap and lay that in that bed for 30 hours.

763

00:38:35,020 --> 00:38:40,770

They keep you awake and feed you just enough so you're at your basal metabolic rate.

764

00:38:40,770 --> 00:38:43,630

Host: Does that mean, are you hungry at that level?

765

00:38:43,630 --> 00:38:45,789

Megan: Just barely enough to get by.

766

00:38:45,789 --> 00:38:51,789

And then, every so often, you go out and do tests like the driving one that he mentioned.

767

00:38:51,789 --> 00:38:58,509

And in addition to the driving one, there was also the high stakes claw machine they

768

00:38:58,509 --> 00:39:00,040

called it.

769

00:39:00,040 --> 00:39:06,480

Where you are attempting to grab the capsule that is coming by the space station with food.

770

00:39:06,480 --> 00:39:08,700

Host: To resupply the space station, right?

771

00:39:08,700 --> 00:39:09,700

Megan: Yes.

772

00:39:09,700 --> 00:39:11,849

Which is difficult even when you're awake.

773

00:39:11,849 --> 00:39:15,779

Host: So sleep deprived, how did that go?

774

00:39:15,779 --> 00:39:16,779

Did you guys try that?

775

00:39:16,779 --> 00:39:17,779

Brian: We did.

776

00:39:17,779 --> 00:39:18,779

Yeah.

777

00:39:18,779 --> 00:39:19,779

Host: So tell us what that's like.

778

00:39:19,779 --> 00:39:20,779

How hard was it?

779

00:39:20,779 --> 00:39:21,779

Brian: It was pretty hard.

780

00:39:21,779 --> 00:39:28,670

You have this one knob on your left hand and you have to use it to push in the arm towards

781

00:39:28,670 --> 00:39:30,180

the resupply capsule.

782

00:39:30,180 --> 00:39:34,920

You have to grab it but there's a very narrow margin of error.

783

00:39:34,920 --> 00:39:41,702

Host: Is it like one of those things in the mall or the supermarket where you have a claw

784

00:39:41,702 --> 00:39:43,839
to control to grab the teddy bear?

785
00:39:43,839 --> 00:39:45,109
Was it something like that?

786
00:39:45,109 --> 00:39:46,109
Megan: Yeah.

787
00:39:46,109 --> 00:39:47,109
Host: Okay.

788
00:39:47,109 --> 00:39:48,109
So, it's not easy.

789
00:39:48,109 --> 00:39:49,270
Brian: Definitely not easy.

790
00:39:49,270 --> 00:39:56,130
Host: Well, I understand that you two were
graded on your abilities and I am pleased

791
00:39:56,130 --> 00:39:58,520
to announce the winner is Megan.

792
00:39:58,520 --> 00:39:59,579
Megan: Yay!

793
00:39:59,579 --> 00:40:00,640
Brian: Nice!

794
00:40:00,640 --> 00:40:07,099
Host: You are the prize winner of controlling
the robot to resupply the space station.

795
00:40:07,099 --> 00:40:08,099
Thank you.

796

00:40:08,099 --> 00:40:11,900

Megan: I do have to say, though, they give you a score out of 10 and the first attempt

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00:40:11,900 --> 00:40:16,309

that I gave, I got a 0.6 out of 10.

798

00:40:16,309 --> 00:40:17,900

Host: Out of 10?

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00:40:17,900 --> 00:40:18,900

Megan: Yes.

800

00:40:18,900 --> 00:40:21,420

But by the third time it was up to about 7.

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00:40:21,420 --> 00:40:23,520

Host: Astronauts have training so that's OK.

802

00:40:23,520 --> 00:40:24,520

That's reasonable.

803

00:40:24,520 --> 00:40:28,690

Megan: I can imagine they'll get very good at it after a while.

804

00:40:28,690 --> 00:40:35,119

Brian: One of the coolest things about that is they said that's the exact simulation that

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00:40:35,119 --> 00:40:37,660

the astronauts run for when they're training on the Canadarm.

806

00:40:37,660 --> 00:40:40,000

Host: It's the same test that they give them?

807

00:40:40,000 --> 00:40:41,000

Awesome.

808

00:40:41,000 --> 00:40:42,000

How cool.

809

00:40:42,000 --> 00:40:45,509

Did you guys expect to be doing that when you came to NASA?

810

00:40:45,509 --> 00:40:46,829

Brian: Definitely not.

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00:40:46,829 --> 00:40:49,019

Host: (Laughing) Update your resume.

812

00:40:49,019 --> 00:40:50,779

Megan: Astronaut in training.

813

00:40:50,779 --> 00:40:54,210

Host: You have to work that in somehow.

814

00:40:54,210 --> 00:40:59,240

I have a comment from the chat here - 30 hours, which was the sleep deprivation that volunteers

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00:40:59,240 --> 00:41:00,240

undergo.

816

00:41:00,240 --> 00:41:01,240

30 hours?

817

00:41:01,240 --> 00:41:04,400

A basic gamer's weekend.

818

00:41:04,400 --> 00:41:09,069

I was in there recently and I saw they have board games and books and things so they keep

819

00:41:09,069 --> 00:41:11,220

people entertained to keep them awake.

820

00:41:11,220 --> 00:41:16,249

Megan: It's a dim red lighting as well.

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00:41:16,249 --> 00:41:20,400

You can't have it be bright with blue light especially because that will keep you awake.

822

00:41:20,400 --> 00:41:22,400

Host: That sounds like torture to me.

823

00:41:22,400 --> 00:41:26,460

You're almost lying down in a dim room and they won't fall asleep.

824

00:41:26,460 --> 00:41:28,720

Megan: I think the people sign up for it.

825

00:41:28,720 --> 00:41:30,450

They made that choice.

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00:41:30,450 --> 00:41:35,460

Host: In the name of helping science, they submit to that.

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00:41:35,460 --> 00:41:39,049

So was this your first time here for you guys or have you been to a NASA social before?

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00:41:39,049 --> 00:41:41,940

Megan: I have not been to a NASA social before.

829

00:41:41,940 --> 00:41:42,940

Brian: Same.

830

00:41:42,940 --> 00:41:44,050

Host: Same for you?

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00:41:44,050 --> 00:41:45,050

Brian: Yeah.

832

00:41:45,050 --> 00:41:47,259

Host: Did you find any surprises here today?

833

00:41:47,259 --> 00:41:53,589

Did you know that Ames works on all kinds of things like drones and sleep studies and

834

00:41:53,589 --> 00:41:54,619

fruit flies?

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00:41:54,619 --> 00:42:00,109

Brian: I didn't really have a full idea of the scope of what Ames works on.

836

00:42:00,109 --> 00:42:04,829

It's really cool to see all the different facets of what NASA is working on.

837

00:42:04,829 --> 00:42:05,829

Host: Awesome.

838

00:42:05,829 --> 00:42:12,619

Megan: For me, I am a PhD student in planetary science, so my day in and day out is the science

839

00:42:12,619 --> 00:42:17,589

side of things and all the sleep experiments are on the human side.

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00:42:17,589 --> 00:42:21,390

Which was really interesting interesting to see how broad of a scope is covered here.

841

00:42:21,390 --> 00:42:23,390

Host: And how it all comes together, right?

842

00:42:23,390 --> 00:42:27,730

Like how the sleep studies will help astronauts who are going to go to Mars, which is what

843

00:42:27,730 --> 00:42:29,089

your studying potentially, right?

844

00:42:29,089 --> 00:42:30,089

Megan: Yeah.

845

00:42:30,089 --> 00:42:34,710

So everything comes together, which is really neat.

846

00:42:34,710 --> 00:42:36,890

Host: I love seeing that here.

847

00:42:36,890 --> 00:42:37,890

Awesome.

848

00:42:37,890 --> 00:42:40,809

Were there any points you would like to add about your sleep study experience?

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00:42:40,809 --> 00:42:44,400

Megan: No, it did make me feel tired.

850

00:42:44,400 --> 00:42:46,150

Brian: Totally.

851

00:42:46,150 --> 00:42:50,170

Right after lunch, I was ready for a nap!

852

00:42:50,170 --> 00:42:51,329

Host: Awesome.

853

00:42:51,329 --> 00:42:52,690

Alright then.

854

00:42:52,690 --> 00:42:55,170

I will see you guys in a little bit.

855

00:42:55,170 --> 00:42:58,510

And I will invite up Team VMS.

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00:42:58,510 --> 00:42:59,750

(Whistles blow.

857

00:42:59,750 --> 00:43:00,990

Off-screen applause.)

858

00:43:00,990 --> 00:43:03,480

Host: Thanks for coming.

859

00:43:03,480 --> 00:43:09,470

So while Team VMS joins us, a quick reminder that you're watching NASA in Silicon Valley

860

00:43:09,470 --> 00:43:14,630

life and we're hearing from the participants in today's NASA social.

861

00:43:14,630 --> 00:43:15,809

Yay!

862

00:43:15,809 --> 00:43:18,160

(Whistles blow)

863

00:43:18,160 --> 00:43:20,519

Host: Welcome!

864

00:43:20,519 --> 00:43:21,700

Hello.

865

00:43:21,700 --> 00:43:22,859

Welcome all.

866

00:43:22,859 --> 00:43:24,660

Team VMS.

867

00:43:24,660 --> 00:43:31,359

Can we go down the line, introduce yourselves and tell me your favorite NASA memory.

868

00:43:31,359 --> 00:43:33,529

If you have one, a favorite moment from NASA.

869

00:43:33,529 --> 00:43:37,279

John: My name is John and I was four years old when man landed on the moon.

870

00:43:37,279 --> 00:43:41,960

My father woke me up and said, "You must see this."

871

00:43:41,960 --> 00:43:43,650

So it's etched.

872

00:43:43,650 --> 00:43:46,521

Host: I am glad you remember that.

873

00:43:46,521 --> 00:43:47,521

I'm glad that you remember that.

874

00:43:47,521 --> 00:43:49,529

John: It might be a false memory.

875

00:43:49,529 --> 00:43:50,529

(Laughter)

876

00:43:50,529 --> 00:43:51,529

Host: Even so.

877

00:43:51,529 --> 00:43:52,680

John: It might be all made up.

878

00:43:52,680 --> 00:43:54,529

I might have made that up.

879

00:43:54,529 --> 00:43:55,759

Host: It's OK.

880

00:43:55,759 --> 00:43:56,759

John: Still -

881

00:43:56,759 --> 00:43:59,019

Host: It's still a good one.

882

00:43:59,019 --> 00:44:03,049

Kane: My name is Kane and the moment that stands out for me is the last space shuttle

883

00:44:03,049 --> 00:44:08,270

launch because it kind of heralded a new era of new technologies and new systems to be

884

00:44:08,270 --> 00:44:09,800

developed here at Ames.

885

00:44:09,800 --> 00:44:10,800

Host: Awesome.

886

00:44:10,800 --> 00:44:11,800

Cool.

887

00:44:11,800 --> 00:44:12,800

Good one.

888

00:44:12,800 --> 00:44:16,279

Karen: My name is Karen and I have to say the last shuttle launch too because I went

889

00:44:16,279 --> 00:44:20,630

to it at Cape Canaveral and it was really surreal.

890

00:44:20,630 --> 00:44:28,490

I went for the NASA tweetup and I didn't expect to be overwhelmed with emotions and cry when

891

00:44:28,490 --> 00:44:29,490

the shuttle launched.

892

00:44:29,490 --> 00:44:30,490

It was really beautiful.

893

00:44:30,490 --> 00:44:31,490

Host: Wow.

894

00:44:31,490 --> 00:44:32,920

What an awesome memory.

895

00:44:32,920 --> 00:44:35,780

And I heard a gasp from the studio audience.

896

00:44:35,780 --> 00:44:37,579

Someone out there is impressed.

897

00:44:37,579 --> 00:44:42,589

I just want to check with Eric in the audio studio, can you hear everybody OK because

898

00:44:42,589 --> 00:44:45,319

we're not as close to the table as we were?

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00:44:45,319 --> 00:44:46,319

Thank you.

900

00:44:46,319 --> 00:44:47,319

Eric: I can hear you.

901
00:44:47,319 --> 00:44:49,249
The closer the better, though.

902
00:44:49,249 --> 00:44:50,440
Host: All right.

903
00:44:50,440 --> 00:44:51,440
We're good now.

904
00:44:51,440 --> 00:44:56,799
OK, so you guys went to the VMS, which stands
for the Vertical Motion Simulator, which sounds

905
00:44:56,799 --> 00:44:57,799
pretty awesome.

906
00:44:57,799 --> 00:44:59,280
I have never seen it in action.

907
00:44:59,280 --> 00:45:03,579
So we're going to roll that footage again.

908
00:45:03,579 --> 00:45:07,789
This is a facility here at NASA in Silicon
Valley, which is the nation's largest flight

909
00:45:07,789 --> 00:45:08,789
simulator.

910
00:45:08,789 --> 00:45:14,220
And in this activity our guests learned to
pilot a UH-60 Black Hawk helicopter because

911
00:45:14,220 --> 00:45:21,460
the facility can be outfitted to represent
any kind of space craft that needs testing.

912
00:45:21,460 --> 00:45:22,980

They practice flying the shuttle in there.

913

00:45:22,980 --> 00:45:24,799

They can set it up to be the lunar lander.

914

00:45:24,799 --> 00:45:29,359

So you guys worked with helicopters today.

915

00:45:29,359 --> 00:45:30,359

Tell us about that.

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00:45:30,359 --> 00:45:31,359

What's that like?

917

00:45:31,359 --> 00:45:33,880

Kane: We went in basically zero preparation.

918

00:45:33,880 --> 00:45:36,210

So there were a lot of simulated crashes.

919

00:45:36,210 --> 00:45:38,630

Karen: Mostly by me -

920

00:45:38,630 --> 00:45:41,070

Host: (Laughing) That's bound to happen.

921

00:45:41,070 --> 00:45:44,750

Kane: But watching the professionals go after was really humbling.

922

00:45:44,750 --> 00:45:46,660

The sophistication of it.

923

00:45:46,660 --> 00:45:52,829

Host: So that makes me think it's very realistic, if there can be that difference in skill level,

924

00:45:52,829 --> 00:45:53,829

right?

925

00:45:53,829 --> 00:45:57,049

Kane: I don't have a bench mark but I am taking your word for it.

926

00:45:57,049 --> 00:45:58,309

John: It feels like flying.

927

00:45:58,309 --> 00:46:01,029

It feels like you are actually in the air.

928

00:46:01,029 --> 00:46:02,470

Host: Oh, really?

929

00:46:02,470 --> 00:46:03,470

John: Yeah.

930

00:46:03,470 --> 00:46:11,140

And the vibrations, the motion, the sound and your head is in the game.

931

00:46:11,140 --> 00:46:16,180

You're like, OK, I'm rotating, I'm forward on this, whichever motion it is.

932

00:46:16,180 --> 00:46:22,670

Host: So you're standing in this cab kind of thing, a box thing, but you feel you're

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00:46:22,670 --> 00:46:23,710

in a helicopter flying.

934

00:46:23,710 --> 00:46:24,710

John: Yes.

935

00:46:24,710 --> 00:46:25,710

Host: That is so amazing.

936

00:46:25,710 --> 00:46:26,900

John: It could be anything.

937

00:46:26,900 --> 00:46:34,640

And the thing with this particular machine is it could be a lander, it could be a jet,

938

00:46:34,640 --> 00:46:37,140

it could be whatever it needs to be.

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00:46:37,140 --> 00:46:44,660

And flight tests, when it's real is expensive and dangerous, so this takes that danger and

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00:46:44,660 --> 00:46:47,190

expense out of it and if it needs to be reset

-

941

00:46:47,190 --> 00:46:48,190

Host: Boop!

942

00:46:48,190 --> 00:46:49,190

It's reset.

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00:46:49,190 --> 00:46:52,249

It's like you were saying, beginners were crashing left and right and we can't do that

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00:46:52,249 --> 00:46:55,230

with real people and real helicopters.

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00:46:55,230 --> 00:47:00,640

Karen: The thing that I found most fascinating is how customizable all the different cockpits

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00:47:00,640 --> 00:47:03,710

could be, depending on what project they wanted to research.

947

00:47:03,710 --> 00:47:09,869

And how they would test them out in a fixed spaced and take that to the Vertical Motion

948

00:47:09,869 --> 00:47:12,289

Simulator and that was really awesome to watch.

949

00:47:12,289 --> 00:47:17,839

John: The VMS is not just a box flying up and down, it's a whole building.

950

00:47:17,839 --> 00:47:23,380

There's a laboratory where they can configure these cockpits.

951

00:47:23,380 --> 00:47:32,890

There's a whole, I would say, lockers full of things, instruments, controllers geared

952

00:47:32,890 --> 00:47:38,539

to make these - to make whatever thing that we need to simulate, right there.

953

00:47:38,539 --> 00:47:43,150

So, you know, it's just - it's the whole facility.

954

00:47:43,150 --> 00:47:44,869

It's not just the up-down.

955

00:47:44,869 --> 00:47:46,070

Host: Yeah.

956

00:47:46,070 --> 00:47:49,579

The before, during and after research side of it.

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00:47:49,579 --> 00:47:50,579

I think.

958

00:47:50,579 --> 00:47:52,450

What did you feel flying it?

959

00:47:52,450 --> 00:47:53,450

Did it feel real?

960

00:47:53,450 --> 00:47:59,309

Karen: Actually, it felt more disorienting than being - because when we did the simulation

961

00:47:59,309 --> 00:48:04,279

at first, there wasn't motion for us when we were actually flying it but then afterwards

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00:48:04,279 --> 00:48:08,670

when they turned on the motion, it actually felt better for me.

963

00:48:08,670 --> 00:48:14,050

I get slight motion sickness and I felt more motion sickness just not moving but seeing

964

00:48:14,050 --> 00:48:19,160

the screen move which was really interesting to me.

965

00:48:19,160 --> 00:48:23,220

Like John was saying, every little vibration and movement felt really real.

966

00:48:23,220 --> 00:48:24,220

And it was really fun.

967

00:48:24,220 --> 00:48:29,799

Host: I have never tried the VMS but I was in the 747 flight simulator that we have here.

968

00:48:29,799 --> 00:48:33,829

And I can say they did not put on the motion

and we were convinced we were moving, just

969

00:48:33,829 --> 00:48:34,829

from the visuals.

970

00:48:34,829 --> 00:48:38,880

They were that realistic and your brain plays tricks on you.

971

00:48:38,880 --> 00:48:40,210

Interesting.

972

00:48:40,210 --> 00:48:44,040

Did you guys know that NASA did this kind of thing or that that kind of facility existed?

973

00:48:44,040 --> 00:48:47,789

Kane: I didn't realize how mechanical it would be.

974

00:48:47,789 --> 00:48:54,009

They had these great archival photographs in the hallway leading up to it and one of

975

00:48:54,009 --> 00:48:59,089

the really cool ones was, in the old days, they literally built model cities and ports

976

00:48:59,089 --> 00:49:04,119

and so the pilot in the simulator was looking at this giant model through a view port and

977

00:49:04,119 --> 00:49:05,369

now it's all computers.

978

00:49:05,369 --> 00:49:09,410

Host: So the visuals were an actual model of wood or something.

979

00:49:09,410 --> 00:49:13,760

Kane: Yeah, and they said the simulator pilots could crash the cameras into the models and

980

00:49:13,760 --> 00:49:15,279

they would have to rebuild the models.

981

00:49:15,279 --> 00:49:16,680

Host: Wow.

982

00:49:16,680 --> 00:49:20,849

The early days of flight simulation.

983

00:49:20,849 --> 00:49:24,150

Do we have some visuals that we can share with from this experience?

984

00:49:24,150 --> 00:49:26,319

I think we have some posts.

985

00:49:26,319 --> 00:49:27,319

Nice.

986

00:49:27,319 --> 00:49:28,319

Was this -

987

00:49:28,319 --> 00:49:33,960

John: So that is the cab - that is - that module can be replaced with different configurations.

988

00:49:33,960 --> 00:49:39,480

So that can be a helicopter, or a spacecraft or an airplane.

989

00:49:39,480 --> 00:49:44,670

While they all look the same inside, it will be specific to the task.

990

00:49:44,670 --> 00:49:45,910

Whatever needs to be tested.

991

00:49:45,910 --> 00:49:48,819

Host: I think I remember, they change out the cockpit, right?

992

00:49:48,819 --> 00:49:52,310

So it will be different seats for whichever craft they're testing, right?

993

00:49:52,310 --> 00:49:57,930

John: So according to the tour, it takes about four hours to flip one thing to another and

994

00:49:57,930 --> 00:50:04,039

then about twice as long to make sure that it's functioning correctly with the systems

995

00:50:04,039 --> 00:50:05,690

that are gathering the data.

996

00:50:05,690 --> 00:50:06,890

Host: Cool.

997

00:50:06,890 --> 00:50:10,609

John: So this is the room itself.

998

00:50:10,609 --> 00:50:12,480

You can see it's quite tall.

999

00:50:12,480 --> 00:50:18,700

Six stories tall and, basically, it doesn't need to be bigger than this, although it could

1000

00:50:18,700 --> 00:50:19,700

be.

1001

00:50:19,700 --> 00:50:25,279

You get the motion you need to from this - from

this much space.

1002

00:50:25,279 --> 00:50:30,499

Keep in mind that we're testing normal flight conditions, not adverse flight conditions.

1003

00:50:30,499 --> 00:50:34,430

So you don't need to be inverted and you don't need to be able to do major drops.

1004

00:50:34,430 --> 00:50:35,430

Host: Oh, okay.

1005

00:50:35,430 --> 00:50:36,770

It doesn't need to flip you upside down?

1006

00:50:36,770 --> 00:50:38,109

Testing rolls or something?

1007

00:50:38,109 --> 00:50:45,290

John: So, this is me trying to not crash the helicopter and actually, at first, I overcontrolled

1008

00:50:45,290 --> 00:50:51,250

because I wasn't familiar with it and then it just feels like another aircraft.

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00:50:51,250 --> 00:50:52,329

Host: OK.

1010

00:50:52,329 --> 00:50:53,380

Do you have some flying experience?

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00:50:53,380 --> 00:50:54,989

John: I have 200 hours of flight.

1012

00:50:54,989 --> 00:50:57,710

So gliders, twin engine, single engine.

1013

00:50:57,710 --> 00:50:59,029

Host: And it felt like that to you?

1014

00:50:59,029 --> 00:51:00,029

John: Yeah.

1015

00:51:00,029 --> 00:51:04,650

I felt like it was a real aeroplane or in
this case a helicopter or heck-a-copter because

1016

00:51:04,650 --> 00:51:05,650

we're not allowed to swear!

1017

00:51:05,650 --> 00:51:06,650

Host: Yes.

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00:51:06,650 --> 00:51:07,789

Would you please watch your language?

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00:51:07,789 --> 00:51:08,789

John: Okay.

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00:51:08,789 --> 00:51:09,789

I did.

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00:51:09,789 --> 00:51:10,789

(Laughter)

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00:51:10,789 --> 00:51:13,269

Host: Do either of you have flight experience?

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00:51:13,269 --> 00:51:14,269

I don't.

1024

00:51:14,269 --> 00:51:17,330

When I tried the 747 I just didn't know what
to do.

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00:51:17,330 --> 00:51:19,839

John: 747's are complicated.

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00:51:19,839 --> 00:51:25,520

Kane: I was in a small plane, where my friend was the pilot and he was deathly allergic

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00:51:25,520 --> 00:51:27,710

to bees and there was a bee in the cockpit.

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00:51:27,710 --> 00:51:32,720

So he gave us emergency instructions, just in case he got stung.

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00:51:32,720 --> 00:51:37,299

And that was a very stressful flight, but he landed it and there was no problems.

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00:51:37,299 --> 00:51:38,299

Host: Wow!

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00:51:38,299 --> 00:51:39,299

That's quite a story.

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00:51:39,299 --> 00:51:40,299

John: Flying with a bee.

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00:51:40,299 --> 00:51:41,829

I don't have a bee story.

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00:51:41,829 --> 00:51:43,140

Host: A bee story.

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00:51:43,140 --> 00:51:45,109

That would be hard to top.

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00:51:45,109 --> 00:51:48,890

I have a couple of comments from the chat

here – Oh, UH-60.

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00:51:48,890 --> 00:51:49,890

That's awesome.

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00:51:49,890 --> 00:51:51,079

I used to work on them.

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00:51:51,079 --> 00:51:53,059

So that's cool.

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00:51:53,059 --> 00:51:57,619

John: So he would be right at home in the way it felt and moved.

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00:51:57,619 --> 00:51:59,480

Host: That's fascinating.

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00:51:59,480 --> 00:52:05,480

Did you learn this fact today - the person is asking what is the maximum or minimum G-force

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00:52:05,480 --> 00:52:07,019

you can experience in the VMS?

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00:52:07,019 --> 00:52:08,570

Did they tell you that?

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00:52:08,570 --> 00:52:10,829

John: I don't know.

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00:52:10,829 --> 00:52:14,290

I think it's more about the motion you will feel rather than the Gs.

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00:52:14,290 --> 00:52:19,880

Kane: I think the specific unit we were in was optimised so it can independently control

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00:52:19,880 --> 00:52:21,680

all six axes.

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00:52:21,680 --> 00:52:23,789

Host: Six degrees of motion, right?

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00:52:23,789 --> 00:52:28,690

Kane: They were more excited about the fact it could do all the axes independently for

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00:52:28,690 --> 00:52:29,690

that one.

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00:52:29,690 --> 00:52:31,920

So I'm not sure about the specific G force is.

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00:52:31,920 --> 00:52:34,839

Host: Does it feel smooth when it's moving around like that?

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00:52:34,839 --> 00:52:38,130

We can see the tracks in that photo, going up six stories.

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00:52:38,130 --> 00:52:42,650

Karen: Honestly, when you're in there, it feels so smooth.

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00:52:42,650 --> 00:52:47,030

When you step outside and watch it move, it doesn't feel like it's moving that much.

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00:52:47,030 --> 00:52:48,030

I was actually surprised.

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00:52:48,030 --> 00:52:49,259

It was like "Oh, wow!"

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00:52:49,259 --> 00:52:50,849

It just, like, zips around.

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00:52:50,849 --> 00:52:52,240

But it doesn't feel like that.

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00:52:52,240 --> 00:52:55,880

It just feels like you would in like a plane.

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00:52:55,880 --> 00:52:56,950

Host: Awesome.

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00:52:56,950 --> 00:52:59,079

I'm amazed by how realistic these things are.

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00:52:59,079 --> 00:53:04,739

People actually train on these and learn to fly in that little building down the road,

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00:53:04,739 --> 00:53:06,140

you know.

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00:53:06,140 --> 00:53:07,140

Awesome.

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00:53:07,140 --> 00:53:08,760

Tell me what else surprised you?

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00:53:08,760 --> 00:53:13,480

Were there any highlights you would like to share before we move on from the VMS?

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00:53:13,480 --> 00:53:18,750

Karen: I feel like all of us are really intrigued by all the old grips and gauges that were

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00:53:18,750 --> 00:53:25,829

in the - they showed so much of old parts

from previous cockpits and it was like stepping

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00:53:25,829 --> 00:53:28,329

into a time capsule and seeing all the different things.

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00:53:28,329 --> 00:53:30,030

Host: What kind of cockpits were those from?

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00:53:30,030 --> 00:53:32,369

Like from the Apollo era?

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00:53:32,369 --> 00:53:34,329

Just really old stuff?

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00:53:34,329 --> 00:53:37,450

Kane: ...having it full of different joysticks from different eras.

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00:53:37,450 --> 00:53:39,180

Host: I see.

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00:53:39,180 --> 00:53:45,900

Kane: The interesting thing was the old lander simulator was being refit as a Coast Guard

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00:53:45,900 --> 00:53:50,369

simulator, so they showed us the process of changing the cockpit around.

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00:53:50,369 --> 00:53:51,480

Host: Cool.

1080

00:53:51,480 --> 00:53:56,400

And that tells us that they do all kinds of tests in there, it's not just helicopters

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00:53:56,400 --> 00:53:57,500

and spacecraft landing.

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00:53:57,500 --> 00:53:59,210

John: Infinitely reconfigurable.

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00:53:59,210 --> 00:54:01,599

Host: That's so cool.

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00:54:01,599 --> 00:54:03,270

And are you guys gamers?

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00:54:03,270 --> 00:54:06,119

Because I wanted to ask - does it feel like a video game?

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00:54:06,119 --> 00:54:08,330

John: Flying feels like a video game.

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00:54:08,330 --> 00:54:09,330

Host: Just in general?

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00:54:09,330 --> 00:54:13,049

John: Just in general, because there are systems you have to learn, just like a video game.

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00:54:13,049 --> 00:54:17,780

Once you know this, this, this, you're that much better at doing it.

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00:54:17,780 --> 00:54:22,880

So when you play Cessna 152, there's those similar systems.

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00:54:22,880 --> 00:54:23,880

Host: OK.

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00:54:23,880 --> 00:54:24,880

That's a good answer.

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00:54:24,880 --> 00:54:26,150
(Offscreen sounds of party horns blowing)

1094
00:54:26,150 --> 00:54:27,150
Host: Oh oh.

1095
00:54:27,150 --> 00:54:28,150
It's almost time.

1096
00:54:28,150 --> 00:54:31,080
One more question I am going to ask you this question because of what you told us - did

1097
00:54:31,080 --> 00:54:32,450
they give you air sickness bags?

1098
00:54:32,450 --> 00:54:33,580
Karen: They did have them.

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00:54:33,580 --> 00:54:34,580
Host: They did?!?

1100
00:54:34,580 --> 00:54:37,359
Karen: I didn't need them but they did have them there for us.

1101
00:54:37,359 --> 00:54:39,880
Host: So that tells us somebody must need them.

1102
00:54:39,880 --> 00:54:45,770
Kane: They told us to try to puke on the walkway because it's very expensive to puke inside.

1103
00:54:45,770 --> 00:54:50,579
Host: You actually got instructions on where to puke on your visit to NASA!

1104
00:54:50,579 --> 00:54:51,579

Outstanding.

1105

00:54:51,579 --> 00:54:54,869

Well, it's almost time to say goodbye.

1106

00:54:54,869 --> 00:54:59,640

So you guys stay right here because I'm going to invite everybody else to come back out

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00:54:59,640 --> 00:55:00,700

and say goodbye.

1108

00:55:00,700 --> 00:55:03,839

(Whistles blow and people cheering)

1109

00:55:03,839 --> 00:55:09,799

Host: Come on back Team Sleep, Team Drone, Team Fruit Fly.

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00:55:09,799 --> 00:55:13,739

We want to thank you for joining us today.

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00:55:13,739 --> 00:55:16,249

It was so awesome having you and it sounds like you learned a lot.

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00:55:16,249 --> 00:55:21,319

So, thank you for your participation and then thank you for everybody watching.

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00:55:21,319 --> 00:55:25,180

We'll be back in the future, so we will see you next time.

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00:55:25,180 --> 00:55:27,500

So everybody say goodbye.

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00:55:27,500 --> 00:55:30,700

Crowd: See you later.

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00:55:30,700 --> 00:55:31,760

Yay!