just past the two-minute mark in the
countdown
t-minus one minute 54 seconds and
counting our status board indicates that
the oxidizer tanks in the second and
third stages now have pressurized we
continue to build up pressure in all
three stages here at the last minute to
prepare it for with time t minus 1
minute 35 seconds on the Apollo mission
flight to land the first men on the moon
all indications are coming in to the
control center at this time indicator
earth Row 1 minute 25 seconds and
counting

my status board indicates the third stage completely pressurized 87 mark has now been passed those on full internal power at the 52nd month in the compound thousand systems open in Phillips 17 seconds living up to the ignition sequence at 8.9 second the approaching the 60-second mark on the Apollo 11 mission t-minus 50 seconds and counting the past P minus 50 55 seconds and counting Neil Armstrong district quarterback that's been a real smooth compound we
passed the 52nd month our transfer is complete on internal power with the launch vehicle at the time. 40 seconds away on the Apollo 11 40 seconds and counting t-minus 15 seconds guidance is internal 12 11 10 9 ignition sequence hi I'm Mike Collins 50 years ago Neil Armstrong Buzz Aldrin and I suited up in this very room at that time we were on our way to make history with Apollo 11
the first lunar landing

44
00:02:31,669 --> 00:02:48,549
[Music]

45
00:02:44,680 --> 00:02:51,500
and there they are the men of Apollo 11

46
00:02:48,550 --> 00:02:54,410
immortalized in bronze a seven-foot-tall

47
00:02:51,500 --> 00:02:56,050
statue outside the Saturn 5 Center at

48
00:02:54,409 --> 00:02:59,210
the Kennedy Space Center in Florida

49
00:02:56,050 --> 00:03:01,490
meanwhile inside the Saturn 5 Center we

50
00:02:59,210 --> 00:03:04,099
welcome you to our show about NASA's

51
00:03:01,490 --> 00:03:06,469
giant leaps past and present hello

52
00:03:04,099 --> 00:03:08,419
everyone I’m Darryl nail and I’m Murray

53
00:03:06,469 --> 00:03:10,759
Lewis and we are sitting underneath the

54
00:03:08,419 --> 00:03:13,639
Saturn 5 rocket just behind us it’s the

55
00:03:10,759 --> 00:03:16,849
most powerful ever flown the Saturn 5

56
00:03:13,639 --> 00:03:19,399
7.6 million pounds of thrust propelled

57
00:03:16,849 --> 00:03:21,590
Apollo 11 and a total of 24 American
astronauts to the moon and America's next giant leap to the moon will blast off from right here in Florida and we have teams of Broadcasters astronauts and other guests across the country to help us honor history and you see him there it will also help us project the future we'll take you to the Johnson Space Center in Houston the US Space and Rocket Center in Huntsville Alabama to Neil Armstrong's hometown of Wapakoneta Ohio to the Museum of Flight in Seattle and to some special guests hey is that Adam Savage there yeah from
Mythbusters oh I see him there and they are on the National Mall in Washington DC and I'm Karen Fox from NASA just a few minutes we'll be talking live with Apollo 11 astronauts Buzz Aldrin and Michael Collins hi Danielle Dallas Russa and I'm beyond thrilled to be here at the Kennedy Space Center to be celebrating the Apollo 11 anniversary where we're gonna be celebrating and taking your questions and comments on social media we're even gonna be interviewing people live at this Center if we don't get around to your questions
or comments on this show don't worry we have a team on standby ready to respond to you all you have to do is remember to the hashtag Apollo 50th alright thanks Danielle the 50th anniversary of Apollo 11 is of course why we're here today we begin with our first look at the remarkable historic achievement that the whole world is celebrating that giant leap changed history and helped create the world we live in today.

okay retro Go Go Go patrol go Telkom go jinsei no he can't go
Sergent go I'm time work Topher
arrived at the moon on Saturday July 19

when we did get close and we rolled out

and saw it for the first time it was it

was a revelation it was gigantic it

filled our entire window

the next day Sunday July 20th was

landing and a lot of anticipation we

finally come to the day the moment that

this is about to commence landing on the

moon was absolutely the most difficult

piece of any Apollo mission okay think

about it as a controlled fall out of

lunar orbit the problem is in this

controlled fall out of orbit you only
have enough fuel for one fry the

trajectory had been wrong with they were

targeted into this inhospitable place

then it had to fly over this area at a

high forward velocity then pitch up to

slow down so they killed at forward

velocity and then start down like a

helicopter so now we're critical fuel

state and that's why the call was given

and in the landing to me was a great

celebration the nation was almost

euphoric Apollo 11 command or Neil

Armstrong is forever known as the first

man he passed away in 2012 but his small
step on the lunar surface continues to inspire

our knowledge of the universe around us has increased a thousandfold and more

this is the new ocean and we must sail upon it and we must be a leader on it

and that caught people's imagination and later will speak to some Apollo astronauts live and we'll also hear from Neil Armstrong son mark Darrell look forward to that Neil Armstrong son looks just like it to Danny I love listening
to him great guy we've got our own astronauts here too three talk to Stan love in just a little bit even as we celebrate the historic milestone of Apollo 11 we're working hard to return humans to the moon in the next five years as we plot an eventual course to Mars we call it the Artemis program a 21st century successor to Apollo Artemis was Apollo's twin sister and goddess of the moon in Greek mythology we'll carry that name with us to the moon again landing astronauts by 2024 and establishing sustainable lunar
exploration by 2028 to get there we're

building a powerful rocket the Space

Launch System to send astronauts aboard

our new Orion spacecraft to the gateway

in lunar orbit from the Gateway we'll be

able to land astronauts in places we've

never been before including the lunar

South Pole

we'll have a human Lander system staged

at the gateway but before then we'll

already be back on the moon with robotic

commercial Landers carrying science

instruments and technology

demonstrations to the moon beginning in

September of next year and will need a
new generation of spacesuits as we send

the first woman and the next man to the

as we do this we gain more scientific

knowledge about the solar system in

which we live and American companies

large and small are developing advanced

technologies to realize these space

eexploration dreams for NASA and as with

Apollo many of these technologies will

later grow that everyday parts of life

here on earth and stay tuned to the end

of our show we'll have a fun reveal

about Artemis now joining us live is

astronaut Stan Love who flew on space
shuttle mission STS 122 to the International Space Station and he's currently working on the development of future human spacecraft Stan 12 astronauts walked on the moon between 1969 and 1972 did Neil Armstrong inspire you in any way at any level well absolutely I think anybody my age was interested in science or technology or exploration held the Apollo 11 astronauts as heroes I remember when I was in grade school six years old my little tin lunchbox had the astronauts in the Apollo spacecraft so I had that
in there from the beginning and I

remember coming to work on my very first
day as an astronaut driving in the gate

at Johnson Space Center and thinking oh

my goodness this is where it happened

this is where we landed people on the

moon for the very first time it was sort

of the sense of awe and an incredible

sense of honor to be able to join that

effort especially as a crew member and

then some trepidation really hope and I

was up to the task and indeed we got

some video of you launching in the Space

Shuttle with a camera that had like an
inside view it doesn't exciting right oh

00:11:29.590 --> 00:11:32.860
yeah absolutely when they launch are

00:11:31.299 --> 00:11:34.179
like those solid rocket motors on the

00:11:32.860 --> 00:11:36.100
shuttle you know you're going somewhere

00:11:34.179 --> 00:11:37.719
in a big hurry it's like two strong guys

00:11:36.100 --> 00:11:40.420
shaking their your chair as hard as they

00:11:37.720 --> 00:11:42.730
can and it's it's pretty amazing now

00:11:40.419 --> 00:11:44.709
you're working on future human

00:11:42.730 --> 00:11:46.750
spacecraft tell me a little bit about

00:11:44.710 --> 00:11:49.300
that involvement so I'm working on the

00:11:46.750 --> 00:11:50.740
cockpit for the Orion spacecraft that is

00:11:49.299 --> 00:11:53.049
going to be the backbone the main

00:11:50.740 --> 00:11:55.419
transportation device to get people off

00:11:53.049 --> 00:11:57.129
to the moon to lunar vicinity and then

00:11:55.419 --> 00:11:59.319
bring them back safely to earth and I'm
working on the displays and the controls

that the crew are going to use to see

how their systems are doing guide that

vehicle and fly it so it's up to me and

the folks I work with to make

sure that the crew is getting all the

information they need and that the

commands they send out go correctly to

the vehicle well that is exciting work

and Stan thank you so much for joining

us

all right send it back over to you

Murray all right thanks Darryl and Stan

and thank you we'll be hearing more from
current and former astronauts throughout this program including Buzz Aldrin and Michael Collins from Apollo 11 and other Apollo astronauts as well now let's head over to Houston and Apollo's famous Mission Control from the historic Mission Control Center NASA conducted some of its most legendary space missions the first u.s. spacewalk the Apollo moon landings and even the dawn of the Space Shuttle era of exploration in this room from 1965 until 1992 flight controllers monitored every aspect of the mission power navigation
communications and even the health of the astronauts with all that happened here it's no wonder this flight control room was designated a national historic landmark but after years of inactivity the historic room fell into disrepair until a new mission was launched to save it a restoration effort set out to bring back every detail of the room as it would have been during the time of the Apollo moon landings this is kind of the crowning achievement that happened during in 1969 and so for us to recreate that and get that feel and to honor that
time and that success that was really

00:13:38,929 --> 00:13:42,799
important to us finding the original

00:13:41,089 --> 00:13:44,630
wallpaper and then recreating that

00:13:42,799 --> 00:13:47,088
finding the original carpet and

00:13:44,629 --> 00:13:49,458
recreating out and then just getting the

00:13:47,089 --> 00:13:50,839
seats restored and put back together and

00:13:49,458 --> 00:13:52,818
then just all the little details you

00:13:50,839 --> 00:13:54,780
know what was on the consoles what was

00:13:52,818 --> 00:13:57,089
particular to that flight controller so

00:13:54,779 --> 00:13:59,459
it's very personalized so it's very

00:13:57,090 --> 00:14:02,070
historically accurate the work has

00:13:59,460 --> 00:14:04,440
brought the room back to life capturing

00:14:02,070 --> 00:14:06,570
a moment in time for flight director

00:14:04,440 --> 00:14:09,950
Gene Kranz the effort goes beyond

00:14:06,570 --> 00:14:13,140
switches and monitors this room has a
has a horror to the people have worked

here they've lived there they made the
decisions there each one of these
controllers basically left a legacy here

in the restoration I think that
recognizes the work done in Mission

Control by the teams of Mission Control

I'm Gary Jordan in that historic Mission

Control and with me is Gene Kranz one of
the flight directors of Apollo 11 who
you just heard he's at the very same
console he was at 50 years ago when

Eagle landed on the moon we also have

Charlie Duke the Capcom the capsule
communicator coming right from his console when Apollo 11 landed he was the voice between the teams here in the room and the astronauts of the historic mission later walked on the moon himself during Apollo 16 gentlemen it's pleasure to have you both here thank you very cool Charlie your famous words back to Neil I believe part of that quote was you got a bunch of guys about the term blue or green yeah so this was coming right after Neil Armstrong confirmed that the eagle has landed how did it feel to hear those words from
the moon well very exciting very close

we were almost out of gas and so The
Heretic
contact engine stopped we did was a
great relief tension was really high
that's right that gene that conversation
followed one of the tensest parts of the
tense mission really the powered
descent of Eagle down to the surface of
the Moon the flight control was here
seems so calm how did they stay that way
and so focused during that tense time
that's a process of training room
discipline the basically these are
consummate professionals of the very early age they learn the discipline necessary to accomplish difficult tasks that's right there's not a lot of celebrating in this room right after they landed right so Charlie why not well first off we had to make sure that the lunar module was secure if you sprung a leak when you touchdown or battery dropped off or a lot of things could happen you had to be ready to lift off so we stayed gene got us all back to attention after a few little smiles and said we go 41 and so we had a set time t1 t2 t3 and I don't
remember exactly how long those were but

we were focused on making sure this

lunar module was safe and secure and

ready to go if we had to liftoff that's

right gene the flight controllers in

this room were

not much older than myself I'm about 27

which i think is that about the average

age of flight controllers tell me about

the level of trust that was needed in

the team to make that mission a reality

basically it's trust that exists between

myself and the team between my team and

their stock we got and with the program
office I think Trust is the essential commodity for a successful manned spaceflight and I think one of the things that Charlie mentioned here was the t3 stay no stay. Yeah we had to wait two hours to join the celebration but the rest of the world we were on the console doing our job two hours after landing we could celebrate all right now charlie when those those first steps of Neil Armstrong on the moon and those famous words he said for all mankind did you get to celebrate or immediately or when...
it when it actually hit you the

significance of the accomplishment well

after we we were off duty after t3 and

we went to a press conference if I remember we went and celebrated with a few beers at that point and then I went home and was with my family watching it on TV as he stepped took those first steps out and then it hit me about we were on the moon well I hope we get to have that feeling once again do we have just a c'mere here joining us now she's an astronaut set to launch to the International Space Station here in just
a few short months she was selected as an astronaut in 2013 and Jessica you're going through some training right now for a long-duration stay aboard the International Space Station just about six months that's actually more time than all the Apollo missions combined it's tell me what you're gonna be doing on the International Space Station how is that going to help us for our future missions going back to the moon and on to Mars so I'll be up there for six-month mission as you mentioned and really the space station is a world-class laboratory right now it's a
US National Lab and of course we are working with all of our international partners as well the Russian space agency the Canadian Japanese and European Space Agency's so we are conducting all kinds of sentai scientific investigations and technology demonstrations that are really critical toward our path for future exploration so just to name a few for example of course we need to understand how space flight and the microgravity environment affect us and our human bodies and our physiology
so we have decades of research now from all of this scientific research that we've been conducting on the space station and then the programs before we know a lot how to maintain our muscle mass and maintain our bone density we have a few hot topics right now really the the vision our vision and the health of our eyes also what's happening to our blood vessels looking at our carotid arteries and some changes that we're actually seeing in astronauts that are very similar to the process of aging so we need to really better understand what
is happening here to make sure that we
can get astronauts safely to their
destination and make sure of course that
we can bring them safely back there and
you'll get to do that firsthand as an
astronaut now as I know it actually
Charlie Duke here actually inspired you
to become an astronaut in the first
place yeah he actually was the very
first estimate I ever met so it is
pretty amazing it's really an incredible
experience to be standing in this room
with these two people when I was in high
school Charlie was speaking at the
neighboring town I grew up in a really
small town in northern Maine and we did
not have a lot of astronauts coming
through I’d never met anybody that
worked at NASA or an astronaut so I went
to hear him talk and I’m sure he doesn't
remember this but he I did talk to him
afterward he gave me his card I told him
that my dream was to become an astronaut
like him and I wrote him a letter and I
thought you know he's so busy I'm sure
he gets lots of these but he did
actually write back to me and this is
the actual letter I found it when I
moved a couple years ago this is the
letter that you wrote to me back in 1996 when I was a freshman in college so maybe that'll jog your memory but thank you so much for doing that it really was inspiring and it does make a difference thank you yes always things good things pow somebody inspire somebody thank you what typewritten I love that all right now a gene when we're thinking about our future missions you use the phrase tough and competent thinking about inspiring those next generations do you think those same values will apply to the
folks that are gonna carry us today well

because toughen confident really address

the accountability of a Mission Control

team basically to take the actions

necessary to protect the crew and

accomplish the mission tough meetings

that you're forever accountable for what

you do and this was done after the

Apollo 1 what we

fails to do confident when that written

never again take anything for granted

will never stop learning from now that

teams and Mission Control will be

perfect no Charlie what can astronauts
today like Jessica do to inspire the

next generation well I think what she

said just her performance and what she's

doing and being out there being able to

before the public and and just telling

her story writing a letter so all right

well thanks to all three of you for

taking the time to be with us here today

in the historic Apollo Mission Control

in Houston

NASA's giant leaps continues at

Wapakoneta Ohio the hometown of Neil

Armstrong we'll go there in a moment but

first some thoughts about explorers from
a different kind of Rocket Man

00:21:58.200 --> 00:22:02.350
they want adventure and I really admire

00:22:00.519 --> 00:22:05.079
those kind of people they they're so

00:22:02.349 --> 00:22:06.279
brave and intrepid that pioneers and you

00:22:05.079 --> 00:22:09.069
know without Christopher Columbus

00:22:06.279 --> 00:22:10.629
Magellan Marco Polo we wouldn't you know

00:22:09.069 --> 00:22:13.450
Sir Francis Drake all those kind of

00:22:10.630 --> 00:22:23.320
people the world wouldn't be what it is

00:22:13.450 --> 00:22:25.930
today and welcome to Wapakoneta Ohio

00:22:23.319 --> 00:22:29.200
which is proud to be the hometown of

00:22:25.930 --> 00:22:32.289
Neil Armstrong I'm Ty Bateman an anchor

00:22:29.200 --> 00:22:34.809
with hometown stations in Lima Ohio and

00:22:32.289 --> 00:22:36.730
we are located at the Armstrong Air and

00:22:34.809 --> 00:22:40.539
Space Museum which is about an hour

00:22:36.730 --> 00:22:43.210
north of Dayton Ohio now that of course
is the home of the Wright brothers who invented power flight more than 115 years ago. Now Ohio is also the home of NASA's Glenn Research Center named for another space pioneer John Glenn. We are in the midst of the summer moon festival which is an annual celebration of the Apollo moon landing. And right now we actually have one of our 25 astronauts who hail from Ohio and is also a native of Cleveland and a veteran of four Space Shuttle missions, Don Thomas. Thank you so much for being with us. Hi, it's great to be here today.
let's get right into it Don

you of course have been inspired by so many astronauts but how did Neil Armstrong and the other Apollo astronauts inspire you you know was the first astronauts launching in 1961 that first inspired me to be an astronaut I watched their launch on a small TV and I just said I want to do that and so all the early astronauts John Glenn Ed White who did the first spacewalk and then Neil Armstrong they were huge influences on my career well done that's awesome so you watched
the Apollo 11 launch on TV and I understand that you also invited Neil Armstrong to watch one of your launches. I did you know we're allowed to invite a few VIPs to our launches and I wrote Neil Armstrong a letter said I was one of the Ohio astronauts I told him he was one of my heroes as a young boy and I invited him to come to the launch he wrote back said I'll be there and I was like wow Neil Armstrong's coming to my launch I was so excited and it was the day before launch I got a call from NASA management down at the Kennedy Space
Center and they said Mr. Armstrong wanted to meet with me so my wife and I

Neil Armstrong and his wife Carol we got to spend about an hour together in the crew quarters just talking and I'm showing him around and at the end of our hour I had a great moment I was shaking his hand saying thank you for being here I really appreciate you coming to the launch and I asked him how long are you gonna be in Florida for and he looked me right back in the eye he said how long are you in town for meeting I'm gonna stay here until you launch and we...
launch right on time the next day and it was the thrill of my life to have him there for the launch incredible Don thank you for those memories well let's take a look back at Neil Armstrong the man Neil Armstrong was born in his grandparents farm house on the outskirts of La Moneda we sat down with Neil's brother and sister and asked them to share some personal memories of their famous brother he was very good at telling jokes and accent in the accent a Scottish Scottish accent right and a little bit of German sometimes also but
depending on what story was telling but he was good at it because he tells the story and he has this you know just a little bit of smile on his face and everybody laughs and he laughed he laughed because he thought it was funny too the legacy hasn't yet been determined in science the doors are still so wide open and I really feel like that it helped inspire the technical aspect of this country you know we had many big technical breakthroughs with the program NASA programming and now you can see
that continuing I think my dad would be

very pleased with where we are now

because we are on the cusp of another

age of exploration taking those next

steps going back to the moon because

that's the place where we can learn the

things that we need when we go beyond if

we can remind everyone of how the world

was uplifted by the Apollo program and

by these endeavors I think that we have

a good chance of staying the course and

continuing that exploration forward

being an astronaut was our father's way

of life that was dad's job and and we
were all supportive and excited the

614
00:26:58,450 --> 00:27:01,900
astronauts the guys when they were up

615
00:26:59,679 --> 00:27:04,090
there they they the last thing they

616
00:27:01,900 --> 00:27:06,730
wanted to do was to worry about what was

617
00:27:04,089 --> 00:27:09,189
happening at home I think the wives just

618
00:27:06,730 --> 00:27:10,509
tried to make sure that the family

619
00:27:09,190 --> 00:27:13,840
wasn't one of those things that they

620
00:27:10,509 --> 00:27:16,259
they had in their checklist of of things

621
00:27:13,839 --> 00:27:18,889
to be concerned about the Apollo program

622
00:27:16,259 --> 00:27:22,069
inspired a generation

623
00:27:18,890 --> 00:27:26,600
you want to be better to want to work

624
00:27:22,069 --> 00:27:29,089
hard apply themselves and pursue their

625
00:27:26,599 --> 00:27:31,730
dreams because Apollo made it clear that

626
00:27:29,089 --> 00:27:35,389
dreams were possible and I think that

627
00:27:31,730 --> 00:27:37,220
made the world a better place now as you
drive through town or stroll down the sidewalks you'll see just how over the moon everyone is in Wapakoneta more than a dozen restaurants are offering special moon themed items such as cinnamon pancakes and a Buckeye on the moon. Sunday it seems every shop is selling first on the moon merchandise souvenirs and memorabilia and history is all around us it's a part of history that I want to be able to say that I helped to preserve well it's not so much you know what was it like when he lived here for me personally but to be able to preserve
part of history and keep it intact for future generations and with me now is Dante Centauri with the Armstrong Museum.

Dante welcome so let's get straight into it tell me a little bit about what people can experience if they were to visit the museum sure well the Armstrong Air and Space Museum opened three years to the day after Apollo 11 landed in 1972 we have artifacts from Neil Armstrong's early life and career the airplane he learned to fly in right next to the Gemini 8 capsule and he flew his first spaceflight in as well as the...
Apollo backup suit from Apollo 11 and an actual suit that was part of his mission and to top it all off we also have a moon rock collected from Apollo 11 collected by Neil Armstrong himself on that mission awesome now how does it feel for you to be entrusted with preserving the legacy of an American hero well it's very humbling but the best part here is there's a tremendous team there's staff the the board everyone supports in the community is such a wonderful support for the museum and and Neil Armstrong's legacy right
here in Wapakoneta right Dante thank you

00:29:25,759 --> 00:29:30,319
so much thank you and now I would like

00:29:27,650 --> 00:29:32,690
to welcome Sonny Williams another Ohio

00:29:30,319 --> 00:29:35,240
astronaut she is a native

00:29:32,690 --> 00:29:37,759
Euclid and a veteran of two Space

00:29:35,240 --> 00:29:40,160
Station missions including seven

00:29:37,759 --> 00:29:41,599
spacewalks welcome sunny hi ty it's

00:29:40,160 --> 00:29:44,000
great to be here in my pack Aneta yes

00:29:41,599 --> 00:29:45,789
it's awesome here so how does research

00:29:44,000 --> 00:29:49,039
aboard the International Space Station

00:29:45,789 --> 00:29:51,559
help us expand exploration not only on

00:29:49,039 --> 00:29:54,319
the moon but also later getting to Mars

00:29:51,559 --> 00:29:55,909
right so I've had the luxury of being on

00:29:54,319 --> 00:29:57,470
the space station two times and I've

00:29:55,910 --> 00:29:59,410
seen we were doing all sorts of
experiments on propulsion systems
life-support systems even spacesuit systems that will help us on our next
endeavors back to the moon and even
further out of low Earth orbit beyond
into Mars well you're also set to return
to space on one of NASA's upcoming
Commercial Crew missions tell me more
about that
yeah I'm scheduled to be on one of the
first Boeing Starliner flights to go to
the International Space Station
along with SpaceX's great dragon to which
we'll take some of our colleagues up to
the space station and this contract to
allow these other companies to be able
to take people up will allow NASA to
refocus on getting out of low Earth
orbit back to the moon and potentially
on to Mars for the next generation so
all of the work that's going on the
International Space Station including
these commercial companies will help us
enable us to go further so are you
scheduled to conduct any more spacewalks
any well you know the space station is
about 20 years old it's like an old
house and things need to be fixed and
we're doing new things to add on to it

so that's it's pretty probable and I

would be looking forward to doing that

all right sunny thank you for that and

thanks from here in Wapakoneta let's

head to DC thanks ty NASA and the

Smithsonian National Air and Space
Museum are hosting this celebration of

the 50th anniversary of the first man on

the moon we have a lot going on here

right here on the mall there are tents

highlighting both the Apollo program and

today's moon to Mars plans Lego has an

incredible Apollo 11 display that took
days to build and Snoopy is here of

00:31:34.519 --> 00:31:38.599
course Snoopy was the name of the lunar

00:31:36.140 --> 00:31:39.240
module on Apollo 10 the dress rehearsal

00:31:38.599 --> 00:31:42.240
for the

00:31:39.240 --> 00:31:44.190
moon-landing and as you've probably seen

00:31:42.240 --> 00:31:46.500
people in the National Mall have been

00:31:44.190 --> 00:31:48.808
wowed this week by a high def projection

00:31:46.500 --> 00:31:51.329
of the Saturn 5 rocket on the Washington

00:31:48.808 --> 00:31:53.490
Monument we'll actually be able to see a

00:31:51.329 --> 00:31:56.428
recreation of a launch here tonight and

00:31:53.490 --> 00:31:58.649
tomorrow night it really just gives you

00:31:56.429 --> 00:32:02.490
a sense of the scale of that massive

00:31:58.648 --> 00:32:04.739
rocket Apollo 11 was the culmination of

00:32:02.490 --> 00:32:06.750
an incredible national effort but

00:32:04.740 --> 00:32:09.990
started with a promise from President
John F Kennedy to go to the moon within the decade the direction of the President of the United States it is the stated policy of this administration and the United States of America to return American astronauts to the moon within the next five years so now NASA is facing another bold challenge and this time the ultimate goal isn't just the F K's goal of land on the moon and return safely to earth but establishing a sustainable presence on the moon and eventually heading off to Mars so we are gonna be doing some
interesting science when we're there and that's one of the really exciting things for example we will be able to look in the giant craters these deep craters in the southern pole region of the Moon their places down there that never gets sunlight and we think there's water there so we're gonna be going and checking that out now let's go to Adam Savage with astronaut Randy Bresnik inside the Air & Space Museum ah brandy you've flown the shuttle you've flown on the shuttle and spent time on the International Space Station
I’m curious the first time you open the hatch to get on the ISS given all the training you had already had him till that point what surprised you and what felt exactly like you expected it surprised me the most was the fact that there were some crew members on the space station I hadn't met yet I hadn't trained with you know they were up there doing the long-duration mission and so it turns out I have a callsign come from the Marine Corps being a fighter pilot it's common and so it was interesting we found the space station you know these
Russian crew members so I had man who had been you know adversary of my f-18

Rika they they hear my critical hey comrade come over here will shocked me

when they heard you know there's somebody who's that in such a normal term home for my crew members but what was neat about it was even though these were folks are heading it yeah we flowed across the hatch and it was big bear hugs as if we were like long-lost family

members who hadn't seen each other you know in a few weeks and we're just catching up and we struck me in because I only had you know two and a half days
three days on orbit at that point that

here we are now the crew from Atlantis

the crew is on station 12 human beings

in this magnificent orbiting laboratory

250 miles above the earth going 17,000 miles an hour and we worked that was it

that was all of humanity in all of it

right we were there doing the shared mission and and just how that made us all just part of this one they didn't

matter what language we spoke or where

we came from there we were just one family all of it doing the work amazing

I know you you've we were talking before
and you said you spent 32 hours in space during spacewalks um what do you get used to and what always surprises you about getting into and going outside the spacecraft we'll start with that part first because I don't think it's your first your fifth or you know I'm like Mike LA your generosity on your 9th or 10th when you open that hatch which Anna Space Station opens yeah right you know you open it up you're inside steel mill cocoon the whole time that's some safety in that you open the hatch and it is 250 miles or 400
kilometres straight down and so for

anybody you know has a fear of heights

you know it's daunting but for

anybody who doesn't have a fear of heights if you look the edge of a tall building and you stay on the edge in put your toes on lean over your body tells you get back yeah I mean that you have it intense really intense feeling except it intense really intense feeling except type times a thousand okay no I'm not gonna fall I'm gonna float even though I mean this massive you know my own personal space suit going out the door I know that if I go out there let go I'm
not gonna fall but your brain your whole

842 00:36:15,329 --> 00:36:18,329
life has told you that you it yeah you

843 00:36:17,159 --> 00:36:20,399
go out there and just like we practiced

844 00:36:18,329 --> 00:36:22,529
in the neutral buoyancy laboratory or

845 00:36:20,400 --> 00:36:24,930
swimming pool down in Houston we have a

846 00:36:22,530 --> 00:36:26,130
space station do you train you reach out

847 00:36:24,929 --> 00:36:27,210
you put your hand on the handrails you

848 00:36:26,130 --> 00:36:27,900
don't you turn your body the way you

849 00:36:27,210 --> 00:36:29,460
normally do

850 00:36:27,900 --> 00:36:31,740
you put out your waste tether you put

851 00:36:29,460 --> 00:36:34,050
out your you know of your strength

852 00:36:31,739 --> 00:36:35,819
tether and you go ahead and you know do

853 00:36:34,050 --> 00:36:38,340
what you trained for it's just a view

854 00:36:35,820 --> 00:36:39,480
instead of being you know concrete 40

855 00:36:38,340 --> 00:36:41,670
feet below you in the bottom of the pool
you know how the earth going by at five miles a second to distract you while
you're out the bonus I'm curious about your thoughts about how apollo-era
technology led to the technology that got you into space well there was a basis for everything I mean that it's I am in awe just like you and everybody
else especially today it takes time to remember and commemorate this amazing you know historic achievement I mean we had not ever had but 15 minutes in space
when the President Kennedy challenged us to go to the moon and within a decade we
had young Neil Buzz and Mike Collins

there on Apollo 9 I'm sorry Apollo 11

that is astounding and everything we've done since then has been based on those amazing investments in technology and the capabilities to live and work in space and the suit on space o'clock

is the grandson of the suit that was on Apollo on a lunar surface

well famously a Buzz Aldrin was not able to be here but we do have a buzz tribute video which we can run let's run this

and see a little bit about Buzz
885
00:38:14,480 --> 00:38:17,690
ready are you excited about the future

886
00:38:27,500 --> 00:38:32,489
of space travel absolutely in the 15

887
00:38:30,298 --> 00:38:33,630
years I've been a so there's never been

888
00:38:32,489 --> 00:38:35,669
know two commercial vehicles they're

889
00:38:33,630 --> 00:38:37,260
a more exciting time we have got you

890
00:38:35,670 --> 00:38:38,430
know two commercial vehicles they're

891
00:38:37,260 --> 00:38:39,960
getting ready to launch up and put

892
00:38:39,960 --> 00:38:41,818
people on the space station we've had 19

893
00:38:41,818 --> 00:38:46,079
years of continuous presence on the

894
00:38:44,818 --> 00:38:47,308
space station

895
00:38:46,079 --> 00:38:48,778
we've got you know Artemis getting set

896
00:38:47,308 --> 00:38:50,700
up where we've got the Orion space

897
00:38:48,778 --> 00:38:50,700
people aboard the world's largest rock

898
at the SLS and then we're gonna start

900
00:38:48,778 --> 00:38:52,019
launching humans on in two years

901
00:38:50,699 --> 00:38:54,149
amazing you know around the moon again

902
00:38:52,019 --> 00:38:55,798
and it never been a better time for it

903
00:38:54,150 --> 00:38:58,910
Brandi thank you so much for joining us

904
00:39:05,860 --> 00:39:09,460
Neil Armstrong and Buzz Aldrin were

905
00:39:07,809 --> 00:39:12,190
almost stuck on the surface of the Moon

906
00:39:09,460 --> 00:39:13,690
as the crew was coming back in they had

907
00:39:12,190 --> 00:39:15,550
to take off their looks large space

908
00:39:13,690 --> 00:39:17,590
suits and they were pretty big and the

909
00:39:15,550 --> 00:39:19,480
lunar module is pretty small in the

910
00:39:17,590 --> 00:39:21,460
process of doing it was bumped up

911
00:39:19,480 --> 00:39:23,409
against the engine arm switch the switch

912
00:39:21,460 --> 00:39:25,059
that was critical to turning on the
rocket motor that wouldn't allow them to launch off the surface of the Moon, the switch broke off and so when the time came to flip that switch to get ready to launch off the surface of the Moon, there was no switch there to flip. Buzz was thinking fast; he pulled out a felt-tip pen and jams it in to that spot and is able to use the felt tip pen as a pseudo switch and they successfully get off the surface of the moon and come home.

[Music]

my grandfather President Kennedy
challenged Americans to send a man to

the moon not because it would be easy

but because it would be so hard

NASA and our entire nation answered his
call to action and made that dream a

reality today we salute the men and

women of the Apollo generation and look

forward to the future and the new

frontiers yet to be discovered and

looking now over the water we're coming

up on launch complex 39 here at Kennedy

Space Center the two pads that you see

in the distance there Pat B is where

we're going to launch the first woman to
the moon and the next man to the moon

right there actually pad 8 which is SpaceX's pad which is currently of course launching their rockets the heavy and the Falcon but it's a beautiful shot as we fly over the Banana River and into that launch complex they are 39a where of course many historic launch happened here and we continue to celebrate as well yeah absolutely beautiful and the mood here is just euphoric I mean so many people in awe of this nation's amazing achievement 50 years ago indeed and it's a warm day here in Florida you
can see the clouds bubbling up over 39a

00:41:19,719 --> 00:41:24,939
on the crew access arm that extends out

00:41:21,880 --> 00:41:26,289
from that pad it's not quite as hot as

00:41:24,940 --> 00:41:29,318
the rest of the country though because

00:41:26,289 --> 00:41:31,058
there's a heat wave it's currently got

00:41:29,318 --> 00:41:33,039
the grip of the nation most of the

00:41:31,059 --> 00:41:35,048
nation but we're still pretty toasty

00:41:33,039 --> 00:41:37,750
here in Florida and in fact Murray we're

00:41:35,048 --> 00:41:39,969
celebrating moon fest at this time a

00:41:37,750 --> 00:41:42,630
celebration of course of the 50th

00:41:39,969 --> 00:41:47,108
anniversary of Apollo where our own

00:41:42,630 --> 00:41:49,960
employees got to go out and to the

00:41:47,108 --> 00:41:52,358
gantry eat moon pies and dress up in

00:41:49,960 --> 00:41:53,769
1960s attire yeah I think they're

00:41:52,358 --> 00:41:55,779
already out of the moon pies so we
didn't I don't know if anybody saved any for us but I they did they gave him away for free that was uh that was a nice gesture yes on this historic day yes absolutely and as we continue to celebrate the historic achievement of 1969 we look ahead to traveling back to the moon and on to Mars just as in the Apollo era we need many elements to get there from rockets and spacecraft to astronaut life support and more all in support of science and exploration on the surface there's a lot of work already being done
to make that happen with our Artemis

program we're preparing to launch our

new Space Launch System rocket and the

Orion which is an entirely new space

capsule we're also developing a gateway

at the moon will have new robotic and

human Landers and new spacesuits all

this is happening while advances in

science and technology will expand our

knowledge and enrich life back here on

earth

and there's that list there those items

I was just telling you about and we'll

be telling you more about each of those
elements you see there on your screen throughout the show today and it's important each one of those elements as they come together to form this program of the future Artemis is a very complex program but we want to go back to the moon sustainably and printable and permanently - in order to test our technology to go onto Mars so it's all very key absolutely and we're going to see coming up after this show today starting at 3 o'clock we've got a show called our stem show that's going to show you how students are breaking down
a mission to the moon it's gonna be a great show make sure you stay tuned for that at 3 o'clock right here on NASA TV forward to the moon our STEM show it's going to be a good one did you know that one of the most valuable samples brought back from the moon by Neil Armstrong and Buzz Aldrin almost didn't happen neela buzz had a series of containers that they put their lunar samples in and they mostly went around and picked up rocks but right near the end of their walk on the moon as Neil was preparing the boxes that shipped back up to the
lunar module for returned back to earth

Neil looked into one of the boxes and realized that there wasn't a whole lot in there he thought that's not right we should be bringing more back so he took the box and scooped it along the surface and pulled a whole bunch of dirt from the surface of the moon into the box it turns out that that dirt the lunar regolith was really important to helping us understand the solar wind and other properties of the Moon and that was information that we didn't get from rocks so that impromptu sample
collection is actually one of the most valuable samples that we brought back from the moon on the bottom.

Welcome to the U.S. May know that the Apollo guidance computer I'm the Karla friend and this is the official visitor.

Center now Marshall has been designing and building the rockets that send astronauts into space since 1960 in fact.

This machine here is an authentic F1 engine that powered the Saturn 5 the vehicle they launched the Apollo.
missions the Saturn fives chief architect was Marshalls first director

Wernher von Braun and throughout the 1950s von Braun promoted space travel he also helped spur much of the technology that first took Americans into space and now America is ready for the next wave of human exploration NASA's Artemis mission which will take Americans to the moon and will set the stage for putting humans on Mars Marshall is again working on the rocket to get them there the Space Launch System or SLS and Marshall we are proud
of our heritage of fire and smoke here's

1070
00:46:00,349 --> 00:46:02,680
a look

1071
00:46:05,409 --> 00:46:20,779
[Music]

1072
00:46:27,199 --> 00:46:47,938
[Music]

1073
00:46:52,340 --> 00:46:58,380
joining me now is astronaut Rex Walheim

1074
00:46:55,679 --> 00:47:00,389
now he flew three different space

1075
00:46:58,380 --> 00:47:03,990
shuttle missions including the very last

1076
00:47:00,389 --> 00:47:06,179
one sts-135 hi Rex how are you Carl it's

1077
00:47:03,989 --> 00:47:08,549
great to be here now you didn't get a

1078
00:47:06,179 --> 00:47:10,859
chance to ride on a Saturn 5 but tell us

1079
00:47:08,550 --> 00:47:13,200
what it's like as an astronaut to be in

1080
00:47:10,860 --> 00:47:14,670
a rocket at liftoff well probably the

1081
00:47:13,199 --> 00:47:16,169
most member one is your first time and

1082
00:47:14,670 --> 00:47:17,579
you're loaded into the rocket about a

1083
00:47:16,170 --> 00:47:18,570
couple hours of for launch and you're
strapped in and it feels like you're
sitting in this very high-rise building
solid as a rock then about 6 seconds
before launch the main engine start up
and even though you're still bolted the
pad it shakes like it's coming apart
it's really amazing and then if the
engines out fit great for 6 seconds and
the solid rocket boosters light and then
you feel that joke and you lift off and
it's an incredible ride from zero to
17,500 miles an hour and eight and a
half minutes that sounds incredible now
as we look back on Apollo 11
what are your thoughts as an astronaut about re-establishing a human presence beyond Earth orbit well I think it's so important because the Apollo program they went to the frontier to the moon farther than any humans has ever traveled in history and we need to get back there so we can learn how to do that again because it's very difficult to get there we haven't done it in decades we want to go there and go to Mars now we actually have a social media question one managed on
Twitter asks what is NASA's plan for future astronaut programs.

Well first future astronaut going to be similar to the ones today will select the best and the brightest the folks from all across the country the most diverse backgrounds we can get the people who've shown that they can excel in various different types of functions and we'll bring them all down the Johnson Space Center try to interview to who's gonna work the best it'll be very similar than all except there's gonna be a different dimension with the...
autonomy that we're gonna need in the
expeditionary behavior where where
people are going farther than we've ever
gone before and they'll be far from so
far from Earth that will take minutes
and minutes for just Communications to
go back and forth so we have to become
four operating by themselves but for the
most part would be very similar to the
way we pick astronauts today thanks Rex
you know today thousands of NASA
employees contractors and suppliers are
working in all 50 states to turn our
plans into reality the Apollo program
also
was a nationwide effort on a giant scale

with so many unsung heroes behind the famous names and faces and many Apollo era veterans are right here in Huntsville let's hear from a few of them about that era most of us were just out of college didn't have much of a experience but here's what challenge we're gonna do something in ten months it's never been done before I mean you never went home with your desk cleaned off it was just so much to do we were just all heads down trying to get ready and you know it didn't matter that I was
a co-op it didn't matter that I was 19 years old
didn't mind working 80 bucks eight hours a week because when you were gonna do something different you didn't go home until you finished her work that was pretty standard in those days late to bed early to rise work like hell and advertise and we were committed to make it happen

the thing about the moon that I thought was peculiar was when the Sun was almost overhead and it was noon down below the
moon appeared to be a warm in a friendly place near dawn or dusk place looked distinctly unfriendly

[Music]

what a great tribute to Apollo 11 command module pilot Mike Collins who joins me now live along with astronaut candidate Zena Cartman welcome

Thank You Karin Thank You senior yeah I'm looking forward to hearing from both of you

yes likewise it's good to have you here now Mike uh people may not know that after your NASA career you were the
first director of this very Smithsonian

Air and Space Museum taking charge while

the building was under construction and

then being here when the doors first

opened in 1976 it's been one of the most

visited tourist sites in Washington ever

since so director Collins welcome back

thank you it's so nice to be back the

Smithsonian has always been one of my

most favorite buildings anywhere in the

world and I used to go to the Museum of

Natural History and when I was perhaps

10 years old I would watch snails

now they had these were not live snails

they were snail shells but they had like
37 of them all in a row and I used to
for some reason I was totally fascinated
by that display I used to count them and
figure out why they were big and little
and what colors they were and all of
those things so that's my upbringing his
Smithsonian and Aaron's face of course
came much later and I had a lot of help
with people like Barry Goldwater who was
a senator on the right committees who
helped me get money to get the 40
million dollars a mass that we needed to
dig the hole and bring the building up
it was
well it's a wonderful place to be now

let's take us back in time a little bit

you were up orbiting the moon during that Apollo 11 you went around some 30 times alone over about 24 hours take us there tell us what you were feeling and

you know I was amazed I was always asked weren't you the loneliest person in the whole lonely universe when you were in that lonely command module all by your lonely self going around the lonely but she's lonely

no no happy I was at home this was my a
little place that Columbia the command module was I had hot coffee I had music

if I want her dead if I had some problem or question I just got on the radio with Mission Control and they were always very helpful they even tried to talk to me when I was by myself behind the moon but haha couldn't get Jimmy in that situation so down on the ground was Neil Armstrong who obviously is a larger-than-life historic figure tell us what you'd like people to remember about him as a crew me about the crew made no personal Neil he was he was an
all-American person in many ways Neil

was very intelligent he had interests

in science on both sides of the kind of

work that NASA does he was modest he didn't like the spotlight on

him but when he was caught in its glare

he knew exactly what to say after the

flight of Apollo 11 we were very fortunate to have an around

world trip that Neil was our spokesperson and he just did a masterful job he had done his homework everywhere

we went he knew the background of the country he knew what to say to the local people by the time he finished one of
his short five ten minute speeches half

of the audience was ready to climb on

board Columbia and go with us he was

just masterful and all right we are we

have some people hoping to ask questions

to Xena and to Michael Colin social

media though I just realized we may not

have the access to the social media

questions so I am instead going to turn

to a question to Xena who I’d wanted to

ask a question of as well obviously

Michael when you qualified an astronaut

you were a pilot and Xena had took a

very different path into this so tell us
a little bit about your path here my background is actually in microbiology I studied biology in college my thesis was in poetry believe it or not and then I did research in marine microbiology for my master's degree but to me one of the most exciting parts of being in the space program now is just how different a background everyone's come from we are test pilots we're also microbiologists we are geologists we're submarine errs it's a really interesting and diverse group to get to work with and so we are still taking social media questions or
sorry we can't answer them right here

and now but certainly will continue to take them throughout throughout the show

Tina give us your perspective on Apollo

what what is the legacy Impala van

action I'll toss that to both of you
tell us about your perspective on the legacy of Apollo 11 sure it's it's a part of the world that I grew up and I

you know I I never knew a world before

men had left this planet and so I have to ask the people who lived through that

to themselves what that means to them and
they can tell me where they were when

1298
00:56:16,679 --> 00:56:20,099
they saw that happen they can tell me

1299
00:56:18,239 --> 00:56:22,799
the exact chair they were sitting in it

1300
00:56:20,099 --> 00:56:25,619
was just this monumental pivotal moment

1301
00:56:22,800 --> 00:56:28,950
in human history and so to me that's

1302
00:56:25,619 --> 00:56:30,569
just it's so touching to know that

1303
00:56:28,949 --> 00:56:33,329
that's part of the world that I'm in now

1304
00:56:30,570 --> 00:56:35,190
and it's this hugely inspiring challenge

1305
00:56:33,329 --> 00:56:36,719
to my generation what would be our

1306
00:56:35,190 --> 00:56:39,450
Apollo what will be this thing that

1307
00:56:36,719 --> 00:56:45,750
people around the world will feel a part

1308
00:56:39,449 --> 00:56:49,289
of a little bit about the legacy I I'm

1309
00:56:45,750 --> 00:56:51,449
not big on legacies I'm not sure I think

1310
00:56:49,289 --> 00:56:54,300
maybe 50 years is not enough time to

1311
00:56:51,449 --> 00:56:57,809
give it a proper spacing for it
but I was really taken by something Dina

said with her minor is in poetry I love

that idea it's great I go to MIT from
time to time and talk to the students up

there and of course the great push in

this country today and rightfully so is

science technology engineering math stem

and I say now that's not a complete

education poetry in there we are going
to now toss back to the mall to Adam

Savage who has a message not about

poetry but for those people who still

thinks Karen amazingly there are still

people who choose not to believe that we
went to the moon
even though to perpetrate such a hoax
would have taken far more energy than
actually just going to the moon and on
Mythbusters early in our tenure my co-hosts Janey Kari grant and Tory and I busted this conspiracy theory in pretty much every way we could have possibly tested it we built miniature models we rode the vomit comet we wore spacesuits we tried everything and in fact our episode is used by moon-landing deniers to bolster their argument they thought that our miniature model of the moon
scape looked so good it helped convince them that the moon landing might have been faked by Stanley Kubrick at some secret soundstage in the desert which is total Buncombe and when I am confronted with that sort of willful ignorance well I don't have any answer but apparently Tahira has a question from the crowd out on the mall to hear oh hi I'm Tahira and I'm out here on National Mall in Washington DC it is a beautiful day out here to celebrate the fiftieth anniversary of the Apollo 11 moon landing right now I'm following the
conversation on social media and Twitter

00:58:49,579 --> 00:58:53,630
user David says it would have been

00:58:51,768 --> 00:58:55,459
harder to fake it than to do it in

00:58:53,630 --> 00:58:57,858
regards to the Apollo 11 moon landing

00:58:55,460 --> 00:59:01,039
Adam you broke it down on Mythbusters

00:58:57,858 --> 00:59:03,500
what do you think Oh without a doubt

00:59:01,039 --> 00:59:05,839
one of the great pleasures of my life to

00:59:03,500 --> 00:59:07,699
here is that I get to talk to people at

00:59:05,838 --> 00:59:09,139
NASA and meet astronauts and come to

00:59:07,699 --> 00:59:11,899
places like the Smithsonian Air and

00:59:09,139 --> 00:59:14,028
Space Museum the fact is is the pride

00:59:11,900 --> 00:59:16,160
that all of the incredible men and women

00:59:14,028 --> 00:59:18,018
and engineers and scientists who

00:59:16,159 --> 00:59:20,538
executed this incredible feat and

00:59:18,018 --> 00:59:23,239
continue to execute it on a daily basis
that pride is based in reality not in

fantasy and it is my honor to be able to

meet and talk to these folks when NASA's
giant leap continues it'll be with fire

and smoke from Alabama

[Music]

[Music]

welcome back to Wapakoneta and the

Armstrong Air and Space Museum I'm Ty

Bateman an anchor with hometown stations

and Lima Ohio and I'm here with a team

from the Glenn Research Center that not

only developed liquid hydrogen as rocket

fuel but also developed electric
propulsion and the team is also working on a new generation electric propulsion system that will power our gateway and outpost for astronauts in lunar orbit. Joining me now from the Glenn Research Center is Mike Barrett. Hello, Mike.

Hi, and how does electric propulsion work and how is it different from chemical rockets? Well, traditional chemical propulsion burns a fuel and that generates a high temperature gas that gets pushed out of the spacecraft in one direction and that propels the...
spacecraft in the opposite direction

electric propulsion instead of burning

of fuel uses electricity to charge or

ionize a gas and then that excel is

accelerated out of the spacecraft and

that provides that propulsive push now

where does the power come from well for

solar electric propulsion the power

comes from the Sun we use solar panels

to convert sunlight into electricity and

then that electricity is used to power

both the spacecraft and the electric

propulsion system so how we roll solar

electric propulsion helped NASA get to
the moon and eventually to Mars

well since solar electric propulsion doesn't have to take all that fuel with it and it uses the sunlight for energy then that spacecraft instead of having to take all that fuel can take things like oxygen water communications equipment science experiments anything else the astronauts need to complete the mission that makes the build and design of that spacecraft a lot easier and the efficiency of the electric propulsion helps us make the mission more achievable Mike very exciting thank you so much thank you and NASA's giant leaps
continue down at Space Center Houston

but first as you see from our show today

NASA really is everywhere with technological and economic impacts all across the country in a
tation for exploration has an impact on our daily lives just as it did in the Apollo era

[Music]

[Music]

all engine running

[Music]

Nathan extraordinary elevator

[Music]
this nation should commit itself to achieving the goal of landing returning him safely to the year

I think landing on the moon changed the sky from a barrier into a doorway it turned the sort of this the backdrop of all of human history the sky into an invitation I would give anything to remember that moment my mom promises I saw it but I don't remember a thing it might be one of the reasons where I'm a little obsessed with the moon landing I have have the special New York Times
edition when they were on their way to the moon July 17th

the models of the moon that's where are we that's that there it is that's Sea of Tranquility that's that's where they landed right there can I bring my family with me yes yes I would go to Mars they got water there and everything and methane what more do you want

hi we're at Johnson Space Center's official visitor center joined by president and CEO of Space Center

Houston William Harris thanks Brandi

...
welcome to Space Center Houston we're a dynamic learning destination where we share what NASA is doing every day where we inspire people of all ages through the wonders of space exploration.

thanks William for hosting this segment.

for us and we are joined here today by Apollo 7 astronaut walk Cunningham.

Walter was on the first manned at a command F the man's mission of Apollo and I gave us the first live views of astronauts from space as well as performing some critical checkouts.

of the command module thanks for joining us Walt it was really a pleasure to be
with you people here after all of these years we appreciate it was like living and working on that command module for 11 days well in retrospect that that 11 days was probably the best 11 days of my life we had worked actually I had worked five years to get up to that there was three different scheduled flights and overcoming various obstacles and to this day that's still a longest most ambitious most successful first test flight of any new flying machine ever so I feel very fortunate to have been there we're fortunate to have you here
with us having had the longest most successful flight test of a new spacecraft do you have any advice for the astronauts you're going to be going up on those first missions for Orion and Artemis well I probably would have some advice but I don't believe that the astronauts have as much authority in preparing for these things today as we did 50 years ago that means a lot a lot of things have been perfected at the same time the Society has changed and the astronauts are not driving everything like we used to get away with
as you can see there's a lot of excitement here about the about the follow anniversary that's what you're hearing in the background but also here with Walt and I we have Laura Kearney who is one of the people in charge of some of the new technology were developing to send people to the moon Laura is the deputy program manager of Gateway so that is what a key part of getting astronauts to the moon will be in lunar orbit so tell us a little bit about what that is Laura sure the Gateway is gonna be an orbiting platform
basically the circles the moon it will

provide basically an aggregation point

where lunar landers can go from the earth to the gateway and they can

aggregate there and will be able to fly

missions to and from the moon the great thing about the Gateway is it's going to give us access to the entire surface of the Moon how will it be different from the International Space Station it will be different in a few ways for one thing it's going to be much smaller than the International Space Station the space station is it's basically the size of a football field roughly the gateways
going to be much smaller maybe a tenth of the size so just a fraction we also where the space station is inhabited 24/7 365 the gateway will only have people on it when Orion is visiting so one to start out it'll be about once a year maybe 30 days at a time so our spacecraft is gonna have to be a lot more autonomous than today's space station and then of course the obvious we're gonna be much farther away and this is a pretty new program for us so where are we in the development of gateway you know we are really making a
lot of progress really fast the first elements that make up what we're calling phase one of the Gateway should all be in place in order for us to make and support that 2024 boots on the moon mandate that we have so our first element is the parent propulsion module and it should launch in 2022 we just announced the contractor that's going to help us to build that module max our technologies so they are well on their way the second module that we put up will be a habitation module it will dock with that power
and we are very very close to getting

that modulo in contract and on its way

here in probably the next month or two

and then the third element that will be

part of that first 2024 phase one is our

logistics module and we ought to have it

on contract by the end of this calendar

year so a lot of progress is happening

really fast yeah lots of balls moving

now well is there anything that you know

hearing about gateway you wish you had

on Apollo 7 or that having had 11 days

in space on Apollo 7 that you would

recommend having on the Gateway

...
personally I find it very difficult to compare things today and what they were then 50 years ago it's because the organization's become more organized many of the problems we have been I won't say solved but are like 98 99 percent compared to 50 percent but I do see a difference in attitude in exploring space today for what it was back 50 years ago when everybody was a fighter pilot test pilot and we saw it basically as an opportunity to stick our necks out a little to do it and what's amazing for me when I look at that is here we are 50 years later and I never
in my life could have projected this amount of interest and Association was what we were doing back then and also at the same time since it's a civilian operation wasn't military if we had all military trained fighter pilots but what's going to happen is a hundred years from now two hundred five hundred years from now there's only going to be probably one thing they remember about the 20th century and that's a man went to the moon and Neil Armstrong he's going to be going down in history appreciate your role in
helping us get to where we are today and we're thankful that you're celebrating with us well I feel very fortunate I feel more fortunate today because what I was taking for granted back on Apollo 7 which to this day is still the longest most ambitious most successful first s fight back in those days it was a challenging job to do we were committed to it we've got to do whatever was necessary to make that a success and now 50 years later I look at it in perspective with our overall accomplishment Apollo and frankly I am
proud to have played one small step in that

with Apollo 7 thank you so much we are looking forward to also having some big milestones to celebrate in the upcoming years the good part of that and getting people that come to the moon is going to be gateway it's gonna be cutting edge technology and that's saying something since we had cutting edge technology 50 years ago you probably know that the spacecraft to get us to the moon was incredibly complicated but do you realize that there were 6.1 million parts in the saturn v launch vehicle in
the apollo spacecraft that had to be
 assembled and it all had to work

correctly for us to get to the moon in
July in 1969

and welcome back to the Saturn 5 Center

at the Kennedy Space Center in Florida a

look at the lunar module that was

supposed to be for Apollo 15 but

actually never flew once they decided

they were gonna take moon Rovers up to

the moon but they say it works and it

could have gone to the moon

yeah and it's it's one thing to see

it you know the pictures of it are

magnificent on camera but when you're up
close and personal right next to it you

really see you know all those little
details and it's just amazing that we

what we were able to accomplish together

as a nation you're absolutely right and

back here at the Kennedy Space Center if

you're just joining us we are of course

celebrating the 50th anniversary of

Apollo and looking forward to our plans

for the next giant leap to the moon and

on tomorrow and a reminder that we're

taking your questions online using the

hashtag Apollo 50th and that will have a

fun reveal coming up a little later
about our Artemis program at the end of the show a fun reveal yeah you tell me now well know then it wouldn't be a reveal show you got away all right I'm gonna wait well if you want to follow us you can just join us right now online and explore our subscription right there at nasa.gov forward slash subscribe and we'll keep you updated with our newsletter for weekly updates as we go forward to the moon and on to Mars subscribe again at nasa.gov forward slash subscribe now keep in mind we didn't just develop technology in the
Apollo years you're looking at the gantry right now at launch complex 39.

where folks like to gather to watch the launches from pad a and be there and we've got a special live guest out there one of the last two people to walk on the moon and we've got someone out there to talk to him Amanda Griffin Amanda I don't know if your if you're out there I'm not sure which level are you on out there the tippy-top it's a beautiful day but it is breezy up here so hopefully you can get us loud and clear here so behind us is pad 39a currently it is
being used for missions to the space

01:14:46,590 --> 01:14:50,940
station and beyond by commercial

01:14:48,329 --> 01:14:52,380
entities but 50 years ago the first men

01:14:50,939 --> 01:14:55,079
to walk on the moon launched from there

01:14:52,380 --> 01:14:56,520
just a few years later Apollo 17

01:14:55,079 --> 01:14:58,559
launched the last man who walked on the

01:14:56,520 --> 01:15:00,570
moon and one of them was dr. Harrison

01:14:58,560 --> 01:15:02,220
Schmitt dr. Smith thanks so much for

01:15:00,569 --> 01:15:04,229
being with us today it's great to be

01:15:02,220 --> 01:15:05,250
with you I sort of miss seen a Saturn 5

01:15:04,229 --> 01:15:06,750
out there l

01:15:05,250 --> 01:15:10,319
but hopefully soon you'll see an essa

01:15:06,750 --> 01:15:12,449
lasted over Kennedy Space Center's doing

01:15:10,319 --> 01:15:14,729
a remarkable job getting ready for that

01:15:12,449 --> 01:15:17,699
we're excited so can you tell us you
were NASA's first astronaut scientist

why was it so important that you were on that mission on Apollo 17 well by the time Neil Armstrong had completed his activities along with Buzz and Mike.

Holland it became clear that we had the capability to explore in fact it was clear even before that if we were successful in Apollo 11 we would be able to explore and so the last missions and particularly my mission were designed to be exploration missions and so we all know that on Apollo 11 they collected maybe 40 pounds of moon rocks but I
understand you kind of beat them how

much did you collect well we did set the

record at 240 pounds but the total of

six landings brought back 850 pounds of

lunar rocks and those rocks are really

the Apollo mission that continues

because the lunar scientists and

planetary scientists continue to work on

those and almost certainly will

indefinitely yeah and I understand that

earlier this month

you and an astronaut candidate what was

her name Jessica Watkins I had a great

time in the rock lab Johnson Space
Center the old man spacecraft Center and we were narrating a great deal of activity there about the samples for NASA yeah let's take a look real quick so all of these samples are very different and of course the we just talked about the sampling strategy from Neil Armstrong on call 11 but by 17 the sampling strategy was a little bit different can you talk about kind of what the what went into your sampling strategy and how you chose which samples to burn well the whole background for Apollo 17
western since we knew it was going to be

the final Apollo mission right was to

fill in as many of the gaps as we could

both in the sample collection and in the

kinds of features

so there are all sorts of stories that

come out of these rocks about the

evolution of particular materials

particular rocks on the moon Jessica

they have what I consider one of the 100

not the most important sample Armstrong

collecting when he thought the rock box

look and so he just filled it up with

this material is the numbers 1008 for
all of us nerds but what it gave us was

our first real definitive look at what

the resources at the surface of the Moon

might be for either owner basis or their

settlements Mars exploration that's

going to need resources radiation

protection these water and you can heat

this material up and make water anywhere

on the moon you don't have to call the

polos make water from ice you can make

it you have heated up to about six 700

degrees 50 years ago

sample came still giving it is they all

are it's as if the Apollo program never
ended right because there are hundreds

have been thousands now people who have

worked on the samples and still work on

those samples the advance of analytical technology means that you can go back to

an old sample I guess right dr. Schmidt

I love that these samples that we took fifty years ago are still benefiting us

today and in our future endeavors thank you so much for all that you've done for NASA and for the world and thanks for joining us here today well it's been my privilege and thank you for the opportunity to talk to you absolutely
we're gonna send it back inside we're
gonna hear more about what we still have
to learn from the moon all right thanks
to both of you it's so incredible to
hear about these moon rocks they brought
back you know fifty years ago and
they're still teaching us things today
the astronaut from Apollo teaching the
up-and-coming geologists to me it's what
a great story that yes it's really
awesome and unlocking those scientific
mysteries is one of the main reasons we
explore whether it's at the moon or our
home planet or even the farthest reaches
of our solar system yeah Kelsey young a

1811
01:19:19,550 --> 01:19:23,750
scientist from our Goddard Space Flight

1812
01:19:21,289 --> 01:19:25,579
Center in Maryland has more on what we

1813
01:19:23,750 --> 01:19:30,710
already know and what we hope to learn

1814
01:19:25,579 --> 01:19:32,359
about our closest celestial neighbor the

1815
01:19:30,710 --> 01:19:33,889
six Apollo lunar surface missions were

1816
01:19:32,359 --> 01:19:35,569
able to collect an incredible amount of

1817
01:19:33,889 --> 01:19:37,340
samples that are continuing to yield

1818
01:19:35,569 --> 01:19:39,289
exciting scientific discoveries even

1819
01:19:37,340 --> 01:19:40,489
today through analyzing these samples

1820
01:19:39,289 --> 01:19:42,139
and through missions like the Lunar

1821
01:19:40,488 --> 01:19:43,879
Reconnaissance Orbiter and the L cross

1822
01:19:42,139 --> 01:19:45,980
mission we're actually able to discover

1823
01:19:43,880 --> 01:19:47,420
that there's water on the moon but we

1824
01:19:45,979 --> 01:19:49,129
haven't been able to determine just how
much water is there we know it's there

in quantities great enough that we can

actually start thinking about what to do

with it through Institute resource

utilization we'll be able to turn this

water into usable products like drinking

water or fuel which will enable us to

establish a long-term sustainable

presence on the lunar surface it's

absolutely critical that future human

and robotic missions to the moon will

help quantify just how much water is

there as well as to just continue

answering they're really exciting and
important science questions we have left about the moon.

education has always been a part of the NASA mission stay with us on NASA TV at 3:00 Eastern for our next show called stem forward to the moon we visited students across the country taking the science behind a mission to the moon and breaking it down into activities you can do at home stay with us for that coming up at 3 and next up we want to go to Danielle Russa she's been mingling with some interesting folks thanks Green 11
01:20:45,909 --> 01:20:49,359
it's personal to a lot of people whether

01:20:47,680 --> 01:20:51,460
that be actually watching the launch

01:20:49,359 --> 01:20:53,529
reading about it or just being an

01:20:51,460 --> 01:20:56,319
overall space enthusiasts but for me

01:20:53,529 --> 01:20:58,630
it's about family my grandfather was the

01:20:56,319 --> 01:21:01,179
commend module pilot on Apollo 14 and

01:20:58,630 --> 01:21:03,340
his capsule is actually here at Kennedy

01:21:01,180 --> 01:21:05,800
Space Center to be in the same place

01:21:03,340 --> 01:21:08,050
capsule is truly inspiring and I'm

01:21:05,800 --> 01:21:11,079
beyond grateful to be here but today I

01:21:08,050 --> 01:21:12,970
have a very special guest

01:21:09,460 --> 01:21:12,970
Keenen why don't you come in here he's

01:21:11,079 --> 01:21:15,670
10 years old he's visiting Kennedy Space

01:21:12,970 --> 01:21:18,159
Center so what is the longest car ride

01:21:15,670 --> 01:21:21,010
you've been on honey about six hours six

1868
01:21:18,159 --> 01:21:23,050
hours Wow okay imagine being in a

1869
01:21:21,010 --> 01:21:25,750
capsule with two other people squished

1870
01:21:23,050 --> 01:21:29,020
together for nine days how does that

1871
01:21:25,750 --> 01:21:30,369
sound aah and squished over heated and

1872
01:21:29,020 --> 01:21:33,360
squished and there's probably not any

1873
01:21:30,369 --> 01:21:34,539
Wi-Fi okay and what is your favorite

1874
01:21:33,359 --> 01:21:37,059
planet

1875
01:21:34,539 --> 01:21:39,670
what is the maintenance like cheese the

1876
01:21:37,060 --> 01:21:41,200
moon because it looks like cheese great

1877
and are you enjoying your day here at

1878
01:21:41,199 --> 01:21:45,369
Kennedy Space Center yes alright great

1879
01:21:43,779 --> 01:21:48,460
well that's all I have right now and

1880
01:21:45,369 --> 01:21:49,899
we'll be circling back soon all right

1881
01:21:48,460 --> 01:21:52,600
thanks Danielle it's great to see those
young kids being so excited about seeing
how we went to the moon and you know
they're dreaming about being the next
generation to go up there and there's so
many of them here inside the Saturn 5 7
you can hear them in the background yeah
just fill in this place up which is
great well now the Apollo 11 command
module is on tour and right now it's out
in Seattle that's the one that was a
piloted by the Apollo 11 astronauts and
it's out with Natalie's with Natalie
Joseph of NASA out in Seattle Natalie
hi we're at the Museum of Flight in
Seattle the largest independently owned nonprofit air museum in the world it's also the temporary home to Apollo 11 command module Columbia the only part of the spacecraft to return back to earth and more than 55,000 people have already been here to see it in Seattle and the festivities continue as more visitors roll in to celebrate the Apollo 50th anniversary one thing that visitors can't easily see though is an interesting piece of graffiti inside Columbia after splashdown command module pilot Mike Collins scribbled a quick
tribute inside the lower equipment Bay

praising Columbia as the best ship to

come down the line now NASA has a new

ship coming down the line Orion a new

capsule that will send humans farther

than ever before

astronaut Randy Bresnik compares Orion

to Apollo

Oh Ryan is the vehicle that's gonna take

and put the next man and the first woman

on the moon by 2024 it's the vehicle it

has to take us out of Earth's atmosphere

safely across the expanse of 250,000

miles to the moon put us in a lunar

...
orbit it's a gateway Space Station and

1925
01:23:38,750 --> 01:23:42,079
then sit there and wait while the

1926
01:23:40,819 --> 01:23:44,299
astronauts go down to the lunar surface

1927
01:23:42,079 --> 01:23:45,739
for the first time since 1972

1928
01:23:44,300 --> 01:23:47,420
then the master ice trying to come back

1929
01:23:45,739 --> 01:23:49,399
up the Gateway get on a ride come back

1930
01:23:47,420 --> 01:23:51,020
home reenter verse atmosphere no rise to

1931
01:23:49,399 --> 01:23:53,569
be the ones to go get us back safely on

1932
01:23:51,020 --> 01:23:55,490
the ground now the laws of physics still

1933
01:23:53,569 --> 01:23:58,309
apply the same as they did back in the

1934
01:23:55,489 --> 01:24:01,369
1960s we had to come back from lunar

1935
01:23:58,310 --> 01:24:02,990
return velocities on 32 and dissipate

1936
01:24:01,369 --> 01:24:04,849
all that energy so that shape of the

1937
01:24:02,989 --> 01:24:06,380
capsule you see behind us is pretty much

1938
01:24:04,850 --> 01:24:08,090
the same we got a heat shield underneath
that allows us to get out of the atmosphere the big thing is when you get inside it's 30% larger Orion can carry four crew for 21 days where Apollo was three crew for 14 days now it's also taking a lot of advantage of technology developments where now we've got the last cockpit we've got digital displays to control all the systems and able to give that to us in a digital format pull up our electronic procedures and emergency function it also has a lot of better computing power and comparison to Apollo 4,000 times faster than the
Apollo computer is because Apollo computers less computing power than we have in our watches these days a lot more safety redundancies it also has composite materials were able to make it lighter we're also be able to use 3d printing to make things that we couldn't make before so it's really really gonna be on the next generation vehicle that says allow us to have that returned to the moon in 2024 and then keep going back every year after that and make that sustained
presence on that south pole it'll house
it do all the things we need to to be
able to be ready to go from the moon to
Mars shortly thereafter I'm joined by
NASA astronaut and physician dr. Michael
Barrett hey Mike how does it feel to be
back in your home state well it's great
to be back in the great state of
Washington and here at the Museum of
Flight and one special thing for me is I
launched on the Soyuz which is across
the street right over here the last time
I had seen it was smoking for every
entry in the desert of Kazakhstan and
entry in the desert of Kazakhstan and
now it's here so it's great that is

1982
01:25:34,849 --> 01:25:38,900
awesome so you mentioned you've launched

1983
01:25:36,679 --> 01:25:41,690
on a Soyuz but you've also launched on a

1984
01:25:38,899 --> 01:25:45,138
shuttle and so how would you feel about

1985
01:25:41,689 --> 01:25:47,149
taking a ride in Orion well I think the

1986
01:25:45,139 --> 01:25:48,349
Soyuz in the shuttle had been fabulous

1987
01:25:47,149 --> 01:25:50,388
spacecraft and they have done their job

1988
01:25:48,349 --> 01:25:51,020
in getting people to low Earth orbit for

1989
01:25:50,389 --> 01:25:53,328
years and they've done that

1990
01:25:51,020 --> 01:25:54,920
magnificently but the Orion is a very

1991
01:25:53,328 --> 01:25:56,658
different beast it is designed to take

1992
01:25:54,920 --> 01:25:58,399
us away from low-earth orbit and out

1993
01:25:56,658 --> 01:26:00,710
into missions of exploration of the moon

1994
01:25:58,399 --> 01:26:02,689
and beyond all of us would love that and

1995
01:26:00,710 --> 01:26:04,250
there's something more in that we've all
1996
01:26:02,689 --> 01:26:06,319
had a hand in the astronaut office in

1997
01:26:04,250 --> 01:26:08,988
designing and building the Orion we have

1998
01:26:06,319 --> 01:26:10,609
a berth connection if you will that we

1999
01:26:08,988 --> 01:26:11,779
really haven't seen between crew members

2000
01:26:10,609 --> 01:26:13,789
and their spaceships for a couple of

2001
01:26:11,779 --> 01:26:15,859
decades so how would I fly it I'd fly it

2002
01:26:13,789 --> 01:26:17,238
like I'm going somewhere awesome and I'd

2003
01:26:15,859 --> 01:26:20,179
fly it like it belongs to all of us

2004
01:26:17,238 --> 01:26:23,689
that's awesome and so one of Orion's

2005
01:26:20,179 --> 01:26:25,368
jobs is also to sustain the crew so what

2006
01:26:23,689 --> 01:26:27,348
are some human factors issues that

2007
01:26:25,368 --> 01:26:29,299
humans in space may face during

2008
01:26:27,349 --> 01:26:31,789
long-duration flights and as we get

2009
01:26:29,300 --> 01:26:33,020
closer to sending humans to Mars yeah
that's a great question we're pretty good at flying for six months in weightlessness and the human has shown just an incredible capacity to adapt to that but when you break orbit and you head to Mars and you may be gone for three years the earth gets smaller and you can't evacuate to earth if something medical happens so you have to be totally autonomous and self cab and then we're looking at the effects of months and years of weightlessness or the fractional gravity on Mars and there's a little bit more
radiation there's nutritional aspects of

it all now we have shown tremendous
capacity to adapt and we will see that

we just have to approach this I would
say methodically and thoughtfully and
document as we go but there's no
question that we'll meet these
challenges that will be great explorers

well thank you Mike and happy Apollo

50th thanks and now we're joined by some
visitors of the museum come on
come join me what is your name what are
your names and where are you from my
name is Jeremiah Jones and I am from
Tacoma Washington I'm Dan Miller I'm

from Federal Way Washington awesome so

you guys saw Columbia right it's amazing

to see it on the ground but to remember

seeing it when it landed and when it

launched it's just an amazing thing to

see and how was it for you Jeremiah it

was great I really loved it it was um

the first time I actually like I really

got to experience something like this

and I really loved it I really would

recommend for anyone to come and see it

alright well thank you so much and thank

you for joining us here in Seattle back

to the Saturn 5 Center all right thank
you very much Natalie all the way from Seattle Washington to here in Florida

3,000 miles away you’re looking live at pad 39b here in Florida the future of Orion where it will launch back into space aboard an SLS rocket once complete

the most powerful rocket in the world

well we've been looking at Apollo 11 now we celebrate Apollo

11 forever just hours ago in this gallery the US Postal Service issued a 50th anniversary commemorative stamp to forever stamps in fact one stamp featuring Armstrong’s iconic photograph
of Aldrin in his spacesuit on the surface of the Moon.

the other stamp that you see there on the right a photograph of the moon showing the landing site of the lunar module eagle in the Sea of Tranquility a nice moment right here in the Saturn 5 Center now it was in that spot that 50 years ago today Neil Armstrong took the first steps by any human onto another world and those moments help people transfixed in front of the television sets around the world.

[Music]
we can see it as it was happening we could watch on live television and the fact that 600 million people around the world we're either watching or listening on radio and TV as it happened is a measure of the impact that this thing had on the world's consciousness the surface as we said what was fine-grained with lots of rocks and it took footprints very well and the footprints stayed in place the lamb was in good shape and exhibited no damage from the landing or
the descent this picture of the ladder

2096
01:30:21,069 --> 01:30:42,759
with the well known after the the flight

2097
01:30:39,430 --> 01:30:46,869
of Apollo 11 Neil Armstrong Buzz Aldrin

2098
01:30:42,760 --> 01:30:48,070
I had an around-the-world tour and every

2099
01:30:46,869 --> 01:30:51,430
place we went

2100
01:30:48,069 --> 01:30:53,380
I thought they in some places have the

2101
01:30:51,430 --> 01:30:56,500
attitude of oh well you Americans

2102
01:30:53,380 --> 01:30:59,319
finally did this not at all an attitude

2103
01:30:56,500 --> 01:31:02,800
every country regardless of their

2104
01:30:59,319 --> 01:31:06,460
internal politics they all said we did

2105
01:31:02,800 --> 01:31:09,909
it we humans everything before July 20th

2106
01:31:06,460 --> 01:31:12,909
1969 humans only had experience on one

2107
01:31:09,909 --> 01:31:15,309
planetary body from that moment on we

2108
01:31:12,909 --> 01:31:17,859
were at least in some measure a

2109
01:31:15,310 --> 01:31:20,680
multiplanetary species when Neil and
Buzz walked on the moon they did it of course without weapons the only thing I brought was cameras so it was a very peaceful enterprise and one that was applauded worldwide of course before we explore the lunar surface we have to get to the surface and for decades NASA has shown how robotic and human exploration can work together to understand this distant world and our future plans are no different as we look back on crude robotic observers open our eyes to new frontiers cameras and instruments.
prepare the way for future human explorers robotic satellites test missions and landing craft paved the way to human piloted missions

to human piloted missions

[Music]
today NASA and our international partners watch our neighbor from above as we prepare commercial Landers for new science missions to the moon it's been said choosing to go to the moon as part and we've done that now we're going back sustainably and on to Mars early Landers laid the groundwork for putting us on the moon now the director of NASA's...
human lunar exploration programs

explains what's next for Landers of the artemis generation i'm standing in front of the power lunar module although this one never flew it's exactly the same size and scale as the one Neil and Buzz used to fly to the surface of the Moon.

50 years ago the power lunar module is actually two vehicles together as one the crew boarded the vehicle in orbit and they landed on the surface of the moon once they landed and completed their mission the top part of the vehicle would then leave and go back to
orbit where they would board the command

01:33:40,279 --> 01:33:43,729
module to return home to earth the

01:33:42,078 --> 01:33:45,408
Artemis human landing system will work

01:33:43,729 --> 01:33:47,509
very similar to the Apollo will have a

01:33:45,408 --> 01:33:49,339
SN and decent stage that will land on

01:33:47,510 --> 01:33:51,050
the surface of the moon however it's

01:33:49,340 --> 01:33:52,788
going to be updated to 21st century

01:33:51,050 --> 01:33:54,469
technology we're going to have advanced

01:33:52,788 --> 01:33:56,658
flight computers we will have lighter

01:33:54,469 --> 01:33:58,189
components and systems and most

01:33:56,658 --> 01:34:00,469
importantly we'll be able to carry up to

01:33:58,189 --> 01:34:02,268
four astronauts and it will allow us to

01:34:00,469 --> 01:34:03,590
land the first woman in the next man on

01:34:02,269 --> 01:34:06,140
the surface of the Moon

01:34:03,590 --> 01:34:07,819
the Gateway is a place where the landing
system and the Orion crew that's delivered by the Orion will come together and the crew will actually board the human the Artemis human landing system will go to the surface of the Moon when the mission is complete that will return to the Gateway the Gateway actually allows us to go anywhere on the surface of the Moon and we really want to go to the South Pole because we believe there's water there and we can use water to learn how to live and operate on other planets the systems we're developing to take us to
the moon or actually the systems we're going to use to go to Mars and beyond taking humans further and farther than we've ever been before and rejoining us now is an astronaut who's done two spacewalks at the International Space Station Stanley welcome back thank you so you flew in a glider the shuttle when it landed if you ever thought about what would be like to be on a spacecraft landing on the moon or possibly even Mars yep so it would be a different kind of landing of course you know the shuttle landed like an
airplane but of course it landed as a glider you got exactly one chance to put it on the concrete rather than in the swamp with the alligators so it's important to get things right and that will go for landing on rockets on another planet as well the Moon and Mars don't have an atmosphere you can't use wings for to land on the thrust of a rocket engine this brings up an interesting difference between landing on the moon and landing on Mars we go again we're probably gonna have a two-part spacecraft part with the
crew in it and then part with engines

and legs for landing and you'll be

burning that little engine on your way

down and however the part that you're in

as the crew has its own propulsion to

take you back up away from the moon and

into orbit which means that if something

bad happens on the way down that engine

quits or you land and a leg collapses

and you're bout to tip over

you can just pop off and go back up to

orbit and sort out what you're going to

do next but you are in your own ascent

module already the whole way down on

Mars however Mars is a planet it's hard
to get off planets that's why Ganic

rockets to get us off of Earth Mars a

lot bigger than the moon not as big as

the earth

bigger than the moon so that a scent

vehicle is too big for a descent module

to carry and so you are in your descent

module and you'll probably land and walk

over to your a scent module and

launching that when it's time to go home

but that means you don't have that

backup spacecraft with you when you're

doing your landing so you absolutely

have to get it right on the first time
you can't hit a boulder the engine can't quit the landing leg can't collapse so that's another reason why the moon is great to practice before we're ready to go on good proving ground indeed yep thank you so much standing I know there's a lot of young people looking up to you today so thank you so much for being with us thanks alright as we continue our coverage we want to take you to a video from Lancaster Pennsylvania showing a corn maze there if you look closely on the left side of your screen you can see
the outline of an astronaut Stan is that

you over there yeah and there right

there is the world's largest moon pie

that made an appearance at the visitor

center over at the Marshall Space Flight

Center in Alabama and some of our

employees not those here at Kennedy but

over at Marshall got to sample it looks

like they enjoyed it over there and now

we want to send it back over to Danielle

Russa she's at the Apollo Saturn Saturn

Center just upstairs Danielle how are

some folks out here celebrating the 50th

anniversary well I'm back here at
Kennedy Space Center and I am reading 2267
01:37:43,960 --> 01:37:47,439 some of the social media comments that 2268
01:37:45,760 --> 01:37:51,010 you guys have sent to us using hashtag
2269
01:37:47,439 --> 01:37:53,500 Apollo 50th one of which is Twitter user
2270
01:37:51,010 --> 01:37:56,050 Adi observes that 50 years ago NASA's
2271
01:37:53,500 --> 01:37:58,180 Apollo 11 mission changed our world and
2272
01:37:56,050 --> 01:38:00,039 ideas of what is possible by
2273
01:37:58,180 --> 01:38:01,990 successfully landing humans on the
2274
01:38:00,039 --> 01:38:04,689 moon's surface and bringing them home
2275
01:38:01,989 --> 01:38:06,760 safely for the first time in history if
2276
01:38:04,689 --> 01:38:08,469 you truly think about how many things
2277
01:38:06,760 --> 01:38:10,330 had to have gone right for us to
2278
01:38:08,470 --> 01:38:13,090 successfully land on the moon it is
2279
01:38:10,300 --> 01:38:15,130 truly mind-blowing three-box
2280
01:38:13,090 --> 01:38:17,500 on twitter writes the Apollo 11 mission
was an immense feat of engineering and completely changed our understanding of the solar system couldn't be more true. Look at the Apollo 8 earth rise image. The way that we saw the earth totally transformed in that one photo. All right well thanks so much we look forward to hearing more of your social media comments send them over hashtag up Paulo 50th all right sounds good thanks Danielle now let's go back over to Washington DC for a look at spacesuits. [Music] Man I am so obsessed with spacesuits.
love seeing all those pictures of spacesuits over the years of course

inside the National Air and Space Museum

right now the og original spacesuit that Neil Armstrong wore on as when the Eagle landed back in 1969 has been restored and went on display this week restoration was funded by the public through a Kickstarter campaign and museum goers can now see it for the first time in 13 years I am here with NASA spacesuit engineer Lindsay Aitchison and astronaut Randy Bresnik Lindsay what are the key differences
between the legacy suits that you guys are currently using the so called the Aces the EMU and the new generation of suits one of our biggest changes for the EBA suits is we're trying to make them an evolvable architecture so you have one single core architecture that meets every destination from low-earth orbit and ISS all the way to the surface of Mars oh really so not separate suits for each stage exactly so if you think about our life support system it's kind of like the motherboard on your computer is you get new technologies you just pluck
out the old bit and plug in a new piece

so that's really a great way to keep

going so we do a new suit for every

mission Randy you are actually testing

these new generations of suits for

Artemis is that correct it's great we've
gone testing on how we're gonna actually

have a suit fit where do we need the

mobility are we able to use things like

suit ports and be able to leave the suit

outside and be able to come inside

through a little hatch way in the back

of the suit that's my favorite new thing

how are you testing that in giant vacuum

chambers in fact we are we have giant
vacuum chamber at the Johnson Space Center a couple years ago we took one of the prototype suits called Z1 and we actually had it inside the vacuum chamber and so this is the Chamber's add vacuum inside I mean get ready to hop in it you know with like 10.2 psi and so the suits all stiff like it's on a spacewalk and you got to crawl inside the back of the suit get your arms and legs into it they close up the back of the suit and then we close the hatch and they actually detach the suit and vacuum and did a bunch of mobility translations
around the area

what can we reach like we touch but then

the key point to the sea port testing

was actually backing up getting back in

because obviously you need to get hooked

back up to go get inside the doorway and

so we worked on the different ways to

see or be able to feel or or make little

look guides to guide you back in to be

able okay back up and crawl back out !

know to here has a question from a fan

out on the mall to hero what what have

we got

hi its to hear again from the National
Mall right now I just got done checking out some of these amazing exhibits that are here celebrating the 50th anniversary of Apollo but also showcasing some of our future plans for our Artemis missions to return to the moon and eventually go farther beyond to Mars joining us right now are Carly and some of her friends from Maryland and they have a question for Randy and Lindsey so what does it mean for the u.s. space program to be able to go back to the moon Randy the question is what does it mean for the u.s. space program
to go back to the moon well we're going

forward to the moon I mean the moon is a

stepping stone you know the way the

lights the path to Mars but it's the

important part because we need to test

out all the Rovers all these suits all

the hatches and make sure that

everything can work because we go to

Mars we're not three days away from

Earth and just can come on back if we

need to we are literally over a year

away I mean it's the transit time and

the fact that the way to Mars gets

closer to Earth to be able to come back

and so we have to make sure everything
and all the risk is bought down on the hardware the moon is where we test that out and that's just one of the many reasons that we go back to the moon there's a scientific aspect there's the energy aspect I mean the moons it's just a great treasure trove of scientific and energy types of opportunities for us to go explore and learn more because the last time we were there fifty years ago it was just for a few days at a time we're going there to stay now thank you guys so much Karen Fox is inside the National Air and
Space Museum right now with another special guest I am here with General Tom Stafford he was commander of Apollo 10 that mission was a dress rehearsal for Apollo 11 the crew orbited the moon it just had close to the surface but without actually landing general Stafford tell us a little bit about the legacy of the Apollo program for today well the legacy of Apollo was we started with nearly the impossible and we did it in such an impossible short period of time and so successfully the lessons learned if we think we can do something
new innovative water I don’t think we could probably get much better as far as management how we did that program you know President Kennedy on May the 25th 1961 so we’ll go to the moon and safely return which is great and but the question is how do we go through it was until 12 months later that it was decided how we’ll go to the moon which is a lunar orbit rendezvous and if we had two major decisions all the maidens leaders and NASA had different ideas that was floating around like you have different ideas today what you can do
but it came out to a senior engineer at

Langley John Huebel and his team said he

proved to dr. Stevens a great deputy

administrator former dean of Aero and

Astro at MIT that the lunar orbit

rendezvous to do it in a way that to be

a smaller vehicle to be to do a faster

far less cost and it would be safer and

so that was so Steven stuck and not the

other people's head CEOs and this is the

way we're going to go and then I was

fortunate I came on board the program

with a second group of astronauts

two months later thank you so much you

were also the commander of the
apollo-soyuz test project in 1975 when American astronauts and Soviet cosmonauts met in space for the first time we are going to have an example of a real time international space partnership tomorrow on the 50th anniversary of Apollo 11's landing NASA astronaut drew Morgan and European Space Agency astronaut Luca Parmitano will launch alongside Russian cosmonaut Alexander Skvortsov on a Soyuz rocket to the International Space Station. I think that it's a huge honor for both my crew my Soyuz crew as well as the
entire crew of expedition 60 that will be joining the Apollo program proved that if humans put their ingenuity to a scope then really anything is possible we want to explore we want to improve our technology and improve our science and this is gonna enable us to go further into the solar system and the moon is a stepping point along the way as we go deeper and we head to Mars and we look to see a program that takes us to the moon for science for more technological advance my mission up to the ISS is a stepping-stone in that
direction and I'm very very excited and honored to be serving this way and our current station crew members Nick Hague and Christina Cook also shared their thoughts about Apollo's legacy you know growing up in a generation such as we did post Apollo we never knew a world where people had not walked on the moon when we looked at the moon at night it didn't seem as distant as it may have seemed to the generation prior to the Apollo mission these spacesuits take their heritage from the Apollo program and the equipment the technology
that was proven out then we continue to refine as we get ready to embark on our journey back to the moon so going back to the moon in so many ways is going to inspire this next generation one of the reasons it's so important on a generational level is to demonstrate that as humans as a country or as an international partnership when we come together to achieve something great we can be successful it's going to take international partners it's going to take commercial partners it's going to bring us together the goal of landing
the first woman on the moon means so very much to me it's wonderful to be participating in the space program especially as an astronaut but as any person participating at a time when we are harnessing all of the talents skills ideas and innovation from everyone who wants to participate not just to select few the Apollo astronauts they're the ones that set everything in motion to get us back to today and it may seem like we've come to the moon a second time or we've returned to the moon but really our space program has
been moving forward from day one and and

the the next crew that steps on the moon

is just another step in that long line

of the program moving things forward

we're in the Stone Age but I think

there's so much we don't know so much

but you've got to keep exploring I'm you

I have to advocate the greatest thing a

human mind can do is explore whether

it's reading creating painting or you

know and these guys are pioneers and

they're exploring for the benefit or of

our knowledge and with thirst the thirst

for knowledge is the most important
thing in the world welcome back to Kennedy Space Center's launch complex 39

joining us now is Regina Spellman pad B's senior project manager who's overseeing all the modernization of pad

Regina it's good to be here both of these pads were built for Apollo 50 years ago how are they holding up they're doing a great these these pads were built with some of the best engineering back in the 60s and they have withstood now to hold programs of space flight and they're ready for the
third that pad a pad B has gotten a complete makeover

we have modernized her and refurbished her and she is ready for Space Flight

what are some of the things you've been doing out there to modernize pad B so for SLS and Orion we're going to a clean pad architecture so one of the first things that we did was to get rid of some of the old shuttle infrastructure and go to a clean pad so we have minimal permanent infrastructure out the pad we have over the last 10 years gone in and modernized every system out there I can't think of a single system out there
that we haven't touched in some way or another everything has been updated and modernized taking out old Apollo era some shuttle era and putting in new technologies taking what was old and was useful and really good and building upon it and I love it I love that we're taking these pads pad that was built to go to the moon and we're now gonna go to the moon again I saw I love it's coming full circle to be really exciting thanks so much for being us Regina happen we're gonna head it back to Danielle hey guys were right behind the Saturn 5 here we
have two very exciting KSC guests we have

Zev and Akash so what inspired this trip

well when I was six I remember watching the moon landing on TV and it would it was such an awe-inspiring event I wanted to bring the family here amazing so is this your first time yes it is

to bring the family here amazing so is this your first time yes it is

well what exhibit are you looking forward to saying or have already seen

well I'm really looking forward to seeing the take off tomorrow to celebrate the 50th anniversary that would be great yeah I take off so do you
want to go to space all right now so you got your next astronaut right here all right back to you guys thank you so much
Danielle well it's been great being with you for the Saturn 5 Center here where we hosted our NASA show a look ahead and look behind it Apollo 11 now just ahead our stem she'll forward to the moon is coming up and we'll have a fun reveal about the Artemis program so make sure you stay tuned for that yes that's right but first the final word today on Apollo 11 is from the commander Neil Armstrong
at this time I might introduce the
Apollo 11 crew astronauts Neil Armstrong
Michael Collins Evan all it was the
ultimate peaceful competition USA versus
USSR
I'll not assert that it was a diversion
which prevented a war nonetheless it was
a diversion it was intense and it did
allowed to both sides to take the high
road with the objectives of science of
learning and exploration eventually
provided a mechanism for
engendering cooperation between former
adversaries in that sense among others
it was an exceptional national
investment for both sides welcome back

to DC I am here with NASA Administrator

Jim bridenstine it has been so inspiring

to be here with you all Jim tell us

about the next giant leap absolutely

you've heard a lot today about the incredible accomplishments of Apollo

there are now several generations of Americans who have dreamed about returning to the moon and going beyond it many were born well after the Apollo program ended now we're charged with sending humans to Mars and first we'll prepare for that journey at the moon we
call this that we call this program

Artemis and today I'm proud to share

with you for the very first time the Artemis logo

this is the image of exploration that will carry us as we once again sent humans beyond Earth orbit we invite all of you to join us and follow the story at nasa.gov slash artemis there is much work to be done and many great stories to tell along the way stories of perseverance exploration and discovery stories of humanity once again pressing outward into the unknown we are going
and as we go I hope that women and men of all ages and all backgrounds will consider themselves part of this the Artemis generation fifty years ago we went to the moon we called it Apollo. Well many people don't know is that Apollo had a twin she was a woman named Artemis goddess of the moon. We are returning to the men as a new generation of explorers this time to stay and to prepare to achieve humanity's next Charlie of sending the first human missions to Mars we believe our course will redefine what is
possible that we would discover life

01:54:11,630 --> 01:54:15,680
saving earth changing science and but

01:54:14,270 --> 01:54:19,969
the challenges ahead will inspire

01:54:15,680 --> 01:54:23,900
generations this is our manifest for all

01:54:19,969 --> 01:54:26,340
who wondered if we could return from the

01:54:23,899 --> 01:54:29,058
dream just pressing beyond

01:54:26,340 --> 01:54:32,168
this is your calling

01:54:29,059 --> 01:54:33,929
we go for all of America

01:54:32,168 --> 01:54:36,939
we go

01:54:33,929 --> 01:54:38,980
we go as the Artemis generation

01:54:36,939 --> 01:54:40,229
[Music]

01:54:38,979 --> 01:54:44,309
we go

01:54:40,229 --> 01:54:44,309
[Music]

01:55:10,770 --> 01:55:13,859
[Music]

[Music]
02:05:11,260 --> 02:05:20,659
we've been there before we're going again this time to stay visionaries and
dreamers imagine the future engineers
and scientists build in using math and
science as forms of art creating
technologies transforming societies now
we take civilization to the Stars on a journey to explore and build a gateway

an outpost

[Music]

good afternoon and welcome to our show stem forge the moon we're live from the Apollo Saturn 5 Center at NASA's Kennedy Space Center in Florida where we just wrapped up a two hour celebration commemorating the 50th anniversary of the first ever walk on the surface of the Moon we turn now to the future of space exploration to you the students and educators thanks for joining us and
welcome to our show

I'm Stephanie Martin from NASA's Office of Communications and I'm here with my co-host and friend Nila Firangi from NASA's office of STEM engagement. We are part of the Artemis generation of explorers. We're going back to the moon and this time to stay. We just saw the new Artemis branding which is truly a nod to the Apollo missions. What many people don't know is Apollo had a twin. She was a woman named Artemis, goddess of the moon. As the Artemis generation, we need to develop the skills to get us to the moon and beyond.
moon and beyond NASA's office of stem

2723
02:06:49,600 --> 02:06:55,090
engagement works with educators schools

2724
02:06:52,029 --> 02:06:56,949
and other organizations like museums to

2725
02:06:55,090 --> 02:06:59,140
immerse students in NASA's work and

2726
02:06:59,140 --> 02:07:02,439
enhance literacy in science technology

2727
02:07:02,439 --> 02:07:07,839
either engineering and math generally we're

2728
02:07:07,839 --> 02:07:09,609
inspire the next generation to

2729
02:07:09,609 --> 02:07:09,609
explore coming up we'll see an Artemis

2730
02:07:09,609 --> 02:07:13,899
mission through the eyes of middle

2731
02:07:13,899 --> 02:07:19,899
school students from museums across the

2732
02:07:19,899 --> 02:07:19,899
country we'll also see those same

2733
02:07:19,899 --> 02:07:19,899
students perform experiments that show

2734
02:07:19,899 --> 02:07:23,710
how you can recreate them from your home

2735
02:07:21,369 --> 02:07:21,369
using things that you can find around

2736
02:07:21,369 --> 02:07:25,539
the house later in the show we'll also
have a message from a special celebrity

guest we want everyone to join the

forward to the moon conversation using

the hashtag NASA stem on Twitter my team

is standing by to answer your questions

on social media I hope you join our

conversation online let's get started as

Stephanie mentioned I caught up with

middle school students across the

country this summer who use their

imagination to see what it would what it

would be like if they took over an

artemis moon mission they simulated a

launch arrived at the lunar gateway took
their first steps on the moon and even collected samples on the lunar surface.

First up we'll take you inside Mission Control for the Cosmosphere in Kansas, welcome to the space launch our mystery crew you'll have been training many months for the greatest adventure of your whole life. I know you're a little bit nervous but that is normal you'll be exploring our source system beginning with the moon and eventually on to Mars when you hear the words go for launch all systems will be a go t-minus three minutes and...
Counting I think it's important for NASA to send people to the moon and to Mars because they can do experiments to help people back on earth what excites me about Artemis is that it's gonna have the first woman on the moon and there hasn't been one before and that's really cool our list or you are going to watch main engine start ten nine eight seven six five four three two one solid rocket booster ignition and liftoff Artemis is cleared the tower welcome to the source assist of Artemis you just passed the International...
Space Station and should see the Glitter

02:09:10,500 --> 02:09:15,119
gateway and Moon in this thing soon

02:09:12,510 --> 02:09:17,880
navigator fire rockets on a little bit

02:09:15,119 --> 02:09:20,039
insertion now Thank You Capcom we will

02:09:17,880 --> 02:09:22,440
check in as we neared Gateway and are

02:09:20,039 --> 02:09:24,779
getting ready to duck ad astra this is

02:09:22,439 --> 02:09:27,439
one step closer to a future where better

02:09:24,779 --> 02:09:27,439
things can happen

02:09:34,998 --> 02:09:40,998
so here at Kennedy Space Center we have

02:09:37,279 --> 02:09:43,309
launch complex 39 that is where pad 39a

02:09:40,998 --> 02:09:45,109
and 39b were used for the Apollo

02:09:43,309 --> 02:09:47,979
missions and our key to the future

02:09:45,109 --> 02:09:51,259
exploration of human spaceflight

02:09:47,979 --> 02:09:52,639
pad 39a is where SpaceX will launch our

02:09:51,260 --> 02:09:54,619
astronauts in the future to the
International Space Station and you can see that on the left-hand side of your screen pad 39b is on the right and that is where our heavy lift rocket known as the Space Launch System will carry the Orion spacecraft for Artemis missions to the moon and on to Mars we've been hearing a lot about Artemis today. Stephanie can you tell us a little more to really simplify it our Apollo missions were focused on getting astronauts safely to and from the moon for Artemis we're going to send our astronauts back to the moon and
there they will explore and they will utilize that experience to prepare us to take the next giant leap to send our astronauts to Mars and Artemis will require a heavy lift vehicle the Space Launch System the students we met at the Cosmosphere also conducted an experiment using balloons as air powered rockets to launch the largest payload possible this science activity teaches students what it takes to launch a payload into orbit and even how slight variations in weight can affect performance let's take a look here with me behalf Alyssa from the
cosmos here at Hutchinson Kansas and

she's going to talk to us about next time with you these guys are doing it I

started doing the NASA activity heavy lifting it is a payload activity to test the amount of payload they can evenly distribute and how to distribute it onto their rocket ship.

each paperclip is equal to two grams of weight and their challengers to get as many paper clips on to the rocket as possible and be able to reach the ceilings you just need an elongated balloon some paper clips and a
clothespin to stop the airflow and some

2837
02:11:36,449 --> 02:11:39,659
masking tape all right so why don't we

2838
02:11:38,100 --> 02:11:41,880
check out what we have going on on this

2839
02:11:39,659 --> 02:11:43,529
side it looks like Drew and I'm over

2840
02:11:41,880 --> 02:11:47,039
here have some of their activity you've

2841
02:11:43,529 --> 02:11:49,679
started yes drew drew has a strategy

2842
02:11:47,039 --> 02:11:52,189
where he's going to convince up his

2843
02:11:49,680 --> 02:11:54,630
payload into a into a baggie and

2844
02:11:52,189 --> 02:11:57,059
distributed onto the rocket and

2845
02:11:54,630 --> 02:11:59,720
experiment with the best location to put

2846
02:11:57,060 --> 02:12:02,910
his payload for the maximum height and

2847
02:11:59,720 --> 02:12:06,600
Emma it has a different strategy where

2848
02:12:02,909 --> 02:12:09,059
she is chaining the paperclips and will

2849
02:12:06,600 --> 02:12:12,210
evenly distribute them onto and tape

2850
02:12:09,060 --> 02:12:14,880
them on to her rocket to maximize her
payload and the height of her rocket

right and then the idea is to test the different payloads to see what happens or which one launches exactly so they're gonna start with a very light payload and though I increase their test each time by a few grams until they maximize their payload excellent so why don't we see what it looks like to launch this thing so it looks like Madelyn and David have finished their products yes and we have a couple different design ideas one is to keep the payload up together and at the bottom and then the other
design is to change the payload and distribute the weight all the way down the length of the rocket okay very nice so are you able to watch one of these get launched sure all right let's try it out okay so we're gonna launch ready is everyone counting three [Music] so why don't we try this with another payload all right so Madeline and our partner have put an additional paper clip on to this balloon I'm really excited to see what happens with this one are you guys
excited let's countdown ready three

so for those of you who would like to try this activity at home please feel free to visit the website at the bottom of the screen and you're more than welcome to partake in this really awesome exercise the heavy lift experiment and many others are in our stem forage of the Moon activity guide parents educators and students can go to the website and download the book there is a ton of really fun kitchen science in there I had a lot of fun with them myself
in fact the water filtration activity

02:14:01,569 --> 02:14:05,559
you will see coming up was my favorite

02:14:03,220 --> 02:14:07,960
and Stephanie all of these activities

02:14:05,560 --> 02:14:10,480
can be done at home using the activity

02:14:07,960 --> 02:14:13,840
guide from launching to living on the

02:14:10,479 --> 02:14:15,699
moon there's a lot to learn museums

02:14:13,840 --> 02:14:17,409
across the country are hosting watch

02:14:15,699 --> 02:14:19,179
parties just like the one that is in

02:14:17,409 --> 02:14:20,349
national in the National Mall in

02:14:19,180 --> 02:14:22,630
Washington DC

02:14:20,350 --> 02:14:24,910
it was coordinated by NASA and the

02:14:22,630 --> 02:14:26,710
Smithsonian's Air and Space Museum here

02:14:24,909 --> 02:14:28,300
you can see the monument in the

02:14:26,710 --> 02:14:31,149
background with all of the exhibits

02:14:28,300 --> 02:14:32,920
along both sides many of them have big
events that are being hosted even

tomorrow to commemorate the big Apollo

11 mission and each night this week an

image of a Saturn 5 rocket was being

projected onto the side of the

Washington Monument and starting tonight

in tomorrow a 17 minute animated show

will tell the story of the launch in

landing of Apollo 11 that's happening at

the National Mall in Washington DC if

you're in the nation's capitol this week

it sounds like something really worth

seeing it really does as you can see

with that rocket on the pad as its
displayed on the monument it's just
amazing I wish I was in DC if I wasn't
actually able to be here with all of you
today exactly and despite the heat index
it would have been a great adventure it
sure would have so a few moments ago we
saw a mission simulation at the
Cosmosphere where we had students
actually in a mission simulator I'm
amazed how interactive these museums are
right and it's so great to have these
experiences available to the students
nasa partnerships are crucial in
engaging students in nasa's mission not
only do they provide learning opportunities for students they also enhance the capabilities of educational institutions and support educators to better engage the students at the Columbia Memorial Space Center in California for example student can return to the moon or voyage to Mars and their interactive space mission simulator there a Challenger Learning Center where students can experience the journey of exploration and teamwork exactly and students there took their imagination to new heights as they
thought through what it might be like to

be aboard the lunar gateway the station

that will orbit the moon and become a

rest stop as we travel further to Mars

someday I was there with our camera crew

as these middle schoolers prepared to

land on the moon they had a lot of fun

let's watch Gateway tracking your orbit

how do you read for landing

Mission Control orbit established for

landing on the moon south pole I think

it's important to send people to the

moon and on to Mars because discovery is

a big thing and the more you explore the

more you know initiating system checks
on lunar lander power systems power

I've always wanted to go to the moon. I wanted to be one of the first women on the moon. I wanted to be first so that could be like a dream come true that we're going back during my time.

The most important experiment to do on the moon would most likely be seeing if we could find some way to make people able to live on there. It's gonna be the first woman to go on and it's showing just how much things have changed since...
the first landing element flight systems

flight systems go

Lander system is responding with green

across the board

confirm Houston confirmed gateway lander

systems green proceed with descent

operations

Roger Mission Control proceeding with

the sent operations what excites me the

most about going forward to the moon

it's like creating a whole new life and

being able to discover more than we

thought

you know expedition suits a secured
expedition team moving to lander what

to the moon is the learning opportunity

I think it's amazing that during my

at this age I'll be able to experience

something like this expedition team has

entered the Lander hatch is secured

course you check on Lander fresh you're

good holding nominal in the shading

release seals released plan they're

backing away two meters four meters six

meters

you are clear expedition Lander Godspeed
Chloe in Lenora safe travels expedition

and don't forget our souvenirs the lunar gateway that these young women just shared with us it is such a different approach from what we had during Apollo that's right Stephanie it's a huge innovation gateway gives us the opportunity to land anywhere on the surface of the Moon it will also be a rest stop and staging area as we continue to go on to Mars now a journey to the moon takes about three days each way and a great way to pass the time is with music Stephanie music has actually been part of trot space travel from the
beginning right it really has there were

pre-launch songs

shuttle crew wake up songs and some

astronauts he's even played instruments

on the international space station to

bring a part of home to this base

station with them with NASA returning to

the moon by 2024 we asked people what

you can listen on third rock radio or

use the hashtag NASA moon tunes to learn

more one of the tunes that made the

playlist is the song moon in the water
by DAWs but for our astronauts when they travels the moon one important aspect is going to be making sure they have clean water on the moon no avert you've recently worked with students on a water filtration X mm that's right I did this activity gets students thinking about some of the necessities of survival when it comes to living and working in space in this case we looked at some of the science behind cleaning water and in creating a water filtration system let's go back to the Columbia Memorial Space Center and see
how it went

we're with Breanna at the Columbia Memorial Space Center and today we're gonna be doing a cleaning water activity.

Yeah so cleaning water is so important right so I thought you know we can make a water filter activity and just really get the importance of water and why we need exactly and as the astronauts stay on the International Space Station tomorrow's coffee was yesterday's coffee.

got to recycle everything we can exactly and so right here I have some necessary materials that we do for the filter.
great I have some beans two different

kind of beans some aquarium gravel

because it's very colorful I have some peas and also rice and our favorite cotton balls excellent also just to organize some things I have you know a filter to filter it through some goggles safety first

exactly and also I got some pH papers so we can actually see if our water is filtered awesome so we have Jackie and navei continuing the activity yeah so it looks like they've already started this all turned beans green peas aquarium gravel and it looks like they're gonna
add their final step which is cotton balls it looks like oh XP and for our dirty water that we made we actually used Italian dressing I think is really fun especially awesome so you know what you did was you mixed water with the Italian dressing it's that easy Wow okay how three times I like to just go outside and grab some dirt that's even more fun I love it I love playing with dirt and it gives a real feel it's real dirty water and then I get to test it out and see if it's gonna be clean and when astronauts are on the lunar
gateway they're going to neat systems

like this to be even more efficient

heavy-duty systems it looks like we have

a completed activity here yeah so it

looks like everything is ready to go

great and the goggles are on so safety

first I'm glad what they're ready for

so now all they need to do is just add

the dirty water excellent and that water

doesn't look too dirty to me I think we

need to give it a stir

oh there we go look at that dirty water

he's mixing the Italian dressing and

water so now I would probably say it's
good to try out so we're gonna try this

out now yeah let's do it I'm hoping it works I hope so too

fingers crossed oh wow

starting to go through it's going through all the layers that's faster

than I would expect totally and I'm actually really surprised it looks very clean it looks very clean for those of you interested

in participating in this activity and many others feel free to visit the website at the bottom of our screen and take part in this important initiative
Nayla for the water looks a little cleaner when it comes out of the filtration system on the International Space Station.

That is true Stephanie our system includes a couple of technologies that you don't normally have at home which is why we suggest students don't drink the water you filter absolutely not now we want stem discoveries and experiments to be exciting for everyone we do and even celebrities are getting excited about NASA stem activities actress and singer Keke Palmer recently had the opportunity to learn more about our initiatives and...
3136 02:23:28,988 --> 02:23:33,118
she shared this message about stem and

3137 02:23:31,059 --> 02:23:36,068
NASA's Artemis missions

3138 02:23:33,119 --> 02:23:37,930
hey Kiki Palmer here and when I'm not on

3139 02:23:36,068 --> 02:23:39,818
set or in the recording studio one of my

3140 02:23:37,930 --> 02:23:41,828
favorite things to do is to learn more

3141 02:23:39,818 --> 02:23:43,328
about organizations like NASA and what

3142 02:23:41,828 --> 02:23:45,189
they're doing to push the boundaries of

3143 02:23:43,328 --> 02:23:47,318
how we understand the world around us in

3144 02:23:45,189 --> 02:23:49,658
addition tons of new inventors are on

3145 02:23:47,318 --> 02:23:51,278
the horizon including Artemis NASA's

3146 02:23:49,658 --> 02:23:53,559
mission tool and the first woman and

3147 02:23:51,279 --> 02:23:55,479
next man on the moon there's never been

3148 02:23:53,559 --> 02:23:58,359
a better time to get involved in science

3149 02:23:55,478 --> 02:24:00,458
technology engineering or math visit
nasa.gov/ stem to learn more about how to help NASA get to the moon Mars and beyond.

the landing of Apollo 11 is what we are commemorating today and for the first time when we land our first sorry when we land the first art in this mission everyone around the world is going to be celebrating and it's really gonna be something we can all look forward to now.

ila fir you've recently had a trip to the st. Louis Science Center I did we went to the st. Louis Science Center and talked to several students there we
asked them what they thought it would be like to land on the moon and showed us what they imagined the big event would be would be like they were really excited they got really into it and I could see our future astronaut class in training Artemis this is Houston Mission Control here you have 30 seconds to feel remaining we are close drifting forward a little shutdown okay we copy you down Artemis engine is off South Pole here Artemis has landed Roger we copy you on the ground welcome to the moon Artemis you're looking good I would get my class
mates excited about Artemis by telling

02:25:11,799 --> 02:25:15,639
them how we're gonna go to the moon and

02:25:13,750 --> 02:25:17,770
I just think that's really cool it's

02:25:15,639 --> 02:25:20,109
very important for NASA to send people

02:25:17,770 --> 02:25:23,560
to the Moon and Mars so that we can

02:25:20,110 --> 02:25:27,220
learn more about our planets in our

02:25:23,559 --> 02:25:29,920
solar system and we can have new people

02:25:27,219 --> 02:25:31,898
go and experience that we see you

02:25:29,920 --> 02:25:34,119
opening up the hatch getting ready to

02:25:31,898 --> 02:25:36,459
take your first steps

02:25:34,119 --> 02:25:39,100
the most important experiment to do on

02:25:36,459 --> 02:25:43,000
the moon in my opinion would definitely

02:25:39,100 --> 02:25:44,590
be look at ice on the moon and see if

02:25:43,000 --> 02:25:47,260
there are any signs of anything ever

02:25:44,590 --> 02:25:49,898
living there Artemus welcome to the moon
as we establish a permanent presence we

are closer to sending the next generation of explorers to Mars this is

Houston out the Museum of Flight in Seattle is celebrating their landing of Apollo 11 mission with a lunar block party for all museum guests this weekend the Museum of Flight also hosts the Apollo 11 command module known as Columbia which is on display for the guests you see gathered when living in space shelter is vital for survival conducting experiments and to have a place to rest when surrounded by harsh
conditions of space and death the seat

Lewis Science Center students explored what it would take to build a habitat that could be sustainable for astronauts to stay in but also practical enough to live in let's take a look we're here today at the St. Louis Science Center and I'm here with Aaron who's going to be showing us a little bit about a habitat activity Aaron that's right our astronauts have just gotten back from the moon and they're already designing their next lunar habitats they are busy at work
drawing a what they think would be helpful and a habitat to live if they were on the moon

I can't wait to see what a habitat looks like so we've got Evan and Nikki here and they are working on actually building a 3d version of their habitat it looks like they've scrounged around the house and found everything in the recycling good they have everything here has been recycled or reused anybody could do this at home or school anywhere habitats are so important because we need astronauts to have clean drinking
water and clean air to breathe yes

there's all kinds of different issues in

space what you said gravity is an issue

and Nikki over here in the laboratory

how amazing is this mad scientist Space

Lab so he came up with a lot of ways to

bring those experiments safely back all

right I want to see you completed

habitat Aaron let's do it

ice Amaya can you tell us a little bit

about what you felt for us today yes

I built the bedroom and so in the

bedroom when you come in there's a

button or on and off button so if you

want the gravity on you press the green
button and if you want to off you press

the red button and then there's a bed

like a rollout bed with a dresser Wow

so what do we got going on done well I

built the kitchen of the habitat and

there is a table right here with chairs

that you can push under the tables so

that way it saves more space and then

it's just the basic stuff like the sink

but then there's a hot water tank inside

of the refrigerator to keep more water

inside the habitat and there's a pantry

on the side of everything baby what are

you got going on hi
built the living room and the gym I thought when you come home from outer space you would want to relax so we have a TV and couch and a little bookcase with some chairs you can sit in and you have a treadmill you also have some oxygen and nitrogen and a computer and what's in the middle of your living room because I really like this it's a gravity button that you can push on and off if you want gravity you can push it if you don't you can push it again this I think we've given people at home are really great yeah your imagination and
what you find in your own house is the

limit I can't wait to do this at home

myself yeah so for those of you

interested in participating in this

activity and many others feel free to

visit the website at the bottom of the

screen so we've covered launch gateway

and landing the next mission on the moon

but there's another important step to

what you've asked students to imagine

that's right as important as all of

those other aspects of the mission are

we are going to explore so we asked

students at the Arizona Science Center

...
to envision a lunar sample mission at

the moon South Pole

this is what their imagination delivered

[Music]

Houston Mission Control here you're at

the optimal lunar South Pole location to

begin drilling for a core sample of

water ice are you ready to start sample

collection and analysis Houston this is

artemis 3 we're go for water ice sample

collection the core drill is in position

and rover analytic lab is ready

proceed with collection and analysis

drilling has started and is proceeding

smoothly I'm really excited for the
first woman to be on the moon because it's a really good achievement for America and the whole world I like to think of it as basically a gas station on the way to Mars because from the earth to Mars it's pretty far away so if we're able to go to the moon and split the like hydrogen atoms inside the ice that's hopefully there and create rocket fuel out of that I feel like that would be pretty cool I think it's important to have activities that really help students understand just how important this step is in
possible solar system colonization stop

drilling we are at the 20 inch mark lock

drill to begin collecting sample

collection complete anchor the drill for

core extraction the drill is anchored

begin extraction sample ready for

analysis

open rover sample container the

container is open and ready begin

analysis

I think it's important because it really

is the first step in understanding space

travel in general and a long time

especially for Mars just be able to see
whether or not there's possible

biological life in the ice of Mars is

just amazing they could really signal

that perhaps there is a greater chance

of life in our universe I feel like

there's not any experiment that's more

important than any other because any

experiments any experiment they're all

equally important analysis complete

Houston great news we have 72 percent

water ice and 28 percent regolith are a

mystery that has great news this number

suggests that this is an excellent

location for a long-duration lunar
habitat this is an important step in helping to ensure this generation will be taking the first steps on the surface of Mars great work Houston out I feel like we can learn a lot about how the moon was formed and when we learn more about that we can learn more about how the earth was formed and learn more on from there I think just being able to say you're there first really making the mark for the 21st century is just absolutely amazing man I tell you these kids are great I love hearing how how excited they are for our lunar missions and to see them as they
walk through these simulations and put
this themselves in the role of flight
controller and astronaut
it's just inspirational and I can see
how interactive these simulations are it
starts really great conversations in the
classroom and at home that's exactly
what we aim to do with the activity
guide encourage families to do these
activities at home and talk about them
that's really what science is all about
asking the questions getting an answer
and then asking the next question from
what you learned and it was so much fun
working with the kids at the different locations I want to send a big thank you to the Cosmosphere the Columbia Memorial Space Center the St. Louis Science Center and the Arizona Science Center for all their help in making this show possible it's great to work with such great organizations who have the same goals as NASA exactly there are great museums schools and other informal education organizations around the country doing amazing work to teach teach and encourage kids about STEM we are going
forward to the moon and to get us there

and on to Mars we need you the Artemis generation to be the next scientists
teachnologists engineers and mathematicians to take us further than we have ever gone before to learn more

you can go to our website at WWF and you can join our online conversation using the hashtag NASA stem on Facebook and Twitter we will leave you now with a song from NASA's collection of moon tunes thanks for watching and have a great weekend

[Music]