oh good morning I’m Pat Ryan with the NASA public affairs office here at the Johnson Space Center in Houston we're in the International Space Station flight control room joining me is a Brian aw who is a Pluto flight controller what is a Pluto flight controller bright it's an acronym it stands for a plug-in port utilization officer and we provide plug-in services to the crew to make sure the equipment that they use on a day-to-day basis is compatible with other equipment and we've contrived a plan on where to plug that equipment in
and in addition to that we provide IT support for the crew the network support for an Operations local area network that the crew uses to get their morning messages procedures their daily plan and what they're supposed to do for the day and that's also how they contact home then we've got an IP phone that they can use through the network that they can call anybody in the world you're supporting pretty much everything that goes on on board it ation the operations the Opera we're not doing commanding of the ship just the operations support so
that's who we are and we're ready to try
to answer your questions go ahead so hi

I'm Cole Nelson from snowmans high school and I was wondering now what is
some of your favorite and least favorite parts about working for NASA the
probably the most favorite part is really it's the awesome people that
we've got working here we've got some incredibly smart folks and the team work
that goes into making spaceflight happen is just amazing the least favorite of
all my activities here is catching up
all the paperwork we have to document
what we do that's how we carry forward

44 00:01:53,219 --> 00:02:00,959
the solutions to problems we've solved

45 00:01:57,930 --> 00:02:03,180
and also carry forward the information

46 00:02:00,959 --> 00:02:06,829
for the future generations to use now

47 00:02:03,180 --> 00:02:13,310
yeah that paperwork's necessary

48 00:02:06,829 --> 00:02:15,620
go ahead next right thank you I mean

49 00:02:13,310 --> 00:02:18,319
Kingston high school uh I want to know

50 00:02:15,620 --> 00:02:23,360
if watching a rocket launch is very

51 00:02:18,319 --> 00:02:25,340
stressful no not really not no more

52 00:02:23,360 --> 00:02:28,070
stressful than let's say take in your

53 00:02:25,340 --> 00:02:31,280
driving test you first of all you have

54 00:02:28,069 --> 00:02:34,009
to learn you know about your mission and

55 00:02:31,280 --> 00:02:37,789
we study each mission each phase of that

56 00:02:34,009 --> 00:02:40,459
flight in great detail we practice it we

57 00:02:37,789 --> 00:02:44,259
go through simulation Sims as we call
them we review the results of those sims
to get better it's a kind of a Maricopa
you review afterwards and
realize what you did right what you did
wrong this way you get it right and and
then when you actually get to flying the
the mission or watching a ranji rocket
launch it's just a matter of fact
so you know that's you know when you go
to take your driver's test now you got
to show the the evaluator that you you

did a good job and learning what you
were supposed to do

more high school and my question is how
often do you face emergencies and what

are the most common types of emergencies

well thankfully we don't encounter that

many emergencies the most frequent that

we see on the space station itself are

those involving smoke detection the

smoke detectors are devices you have to

pull air through them so they can detect

the smoke particles and every once in a

while we'll get a thankfully antenna a

false alarm but when when they do sound

the alarm everybody stops what they're

doing here in Mission Control and we

help guide the crew through the
isolating where the signals is being
enunciated from which module the alarm
is going off in and we also have
information ready for the crew if to
help them work through any extinguishing
actions of any actions they have to take
to put out a fire if it were actual and
we also have information ready for the
we also have information ready for the
we also have information ready for the
cruise so that if they have to evacuate
the station they can do that safely as
you say it's it's not come to that
although occasionally fire alarms do go
off those alarms go off because some
sort of particle has come through them
and other particles that are not part of

smoke can sometimes set them off and

I'll see you don't what we see dust and

and then human skin is the real tiny

tiny flakes in microg they tend to float

there's they don't settle I floor and as

the air current pulls those through the

smoke detector they sound a false alarm

yeah okay you

hi I'm Riley Nelson from some how much

hi I'm Riley Nelson from some how much

high school and my question is in your

opinion what is the biggest challenge

fate facing the future of American

manned space flight o Reilly

unfortunately I don't think that's with
inside the space program it's we've got a political and socio-economic issue that face that the Space Administration is facing on on first of all identifying a mission for NASA and then as we go about trying to satisfy that mission it's working to inform the legislators that you know it's going to cost a little bit more than we thought because the problems are greater than we imagined so it's the the funding now the technical stuff we've got really smart engineers some of the brightest people in the world and and we also have a
knowledge Bank of universities that we pose problems to and let them work out issues so the technical stuff is actually easy it's the funding for NASA that is the the biggest problem the biggest hurdle okay hi I'm Sarah Aldridge from Lynn Roseville High School and my question is where do you see Pluto going in the future are there any changes being made to hitter Oh Sarah we're actually one of the youngest flight controller disciplines here at NASA we started just a few years ago when the we migrated a
network over that used to fly in the shuttle it was a little coax network and it was strictly contained onboard the station and we get the crew their procedures and a morning message and that was about it now the crew can dial anywhere around the world we've got a huge movie library that that is part of the network now we're looking for more and more ways to utilize the the IT resources to offload the cruise so we can actually do some of their work down here on the ground so we the Pluto's are looking forward to actually migrating to
the long-duration missions through Orion

158
00:07:36,430 --> 00:07:41,079
and the other deep space missions

159
00:07:39,119 --> 00:07:43,839
probably one of the biggest problems

160
00:07:41,079 --> 00:07:46,028
that we're faced with right now is

161
00:07:43,838 --> 00:07:48,278
increasing crew autonomy so we're

162
00:07:46,028 --> 00:07:50,860
looking at trying to enhance the

163
00:07:48,278 --> 00:07:54,338
programs that the crews use as a

164
00:07:50,860 --> 00:07:56,740
knowledge base so that they can become

165
00:07:54,338 --> 00:08:00,610
more autonomous to themselves they don't

166
00:07:56,740 --> 00:08:03,249
rely like the station guys do on Mission

167
00:08:00,610 --> 00:08:05,579
Control quite so much the more

168
00:08:03,249 --> 00:08:08,800
intelligence that they have tools that

169
00:08:05,579 --> 00:08:12,009
that are computer based to help them

170
00:08:08,800 --> 00:08:15,550
work through problems without Earth's

171
00:08:12,009 --> 00:08:17,979
call coming that's 20 minutes away to
solve their problems is one of the big

things we're studying right now yeah

what you're referring to is that on

future missions when we go to Mars for

everything it takes about 20 minutes for a

voice message to get from Earth to Mars

so if Houston called them it would take

20 minutes to get there and then when

they had an answer it would take 20 more

minutes to get back so crews can't be

have to rely on people

on the ground to do things for them

right away they have to become more

self-sufficient in the future yes yes
especially in emergencies they need answers now so we'll have tools developed to help through that problem we're also looking into different ways of helping them for their experiment problems if something is not going exactly right they can they can hit up a knowledge base that will help them resolve the issue and then get the the experiment back on track okay next question right thank you my name is Hugh question right thank you my name is Hugh dough from inglemoor high school and if my understanding of the food o is correct then I have two different
questions the first one is how is wiring

in space different from riding from a

higher rent question is what kind of

training like electrical engineering do

you need to do your job the we do have

numerous electrical engineers that are

pluto's we also have computer engineers

and then computer science majors that

are part of the pluto team and we kind

of teach each other the side that were

we're not as strong in or where our

undergrad work was not the wiring on

board the space station is it's a direct

current so it's very simple circuits

214

00:10:07,198 --> 00:10:14,198
it's no different it follows a very very
strict code to use a term that they use

in the construction industries so that
the it's done correctly and it's
verified and it's and it's very
forgiving to faults that may may occur
we try to keep it as safe as we can for
the crew the big problem that we see
with electrical current in microgravity
is its ability to spark and if you
understand a threshold of the voltage
and the current that is passing through
a wire at a certain level it will create
a spark in space that's not good because
those sparks usually contain very small
229 00:10:56.919 --> 00:11:04.120
particles of molten metal and with in

230 00:11:02.259 --> 00:11:06.939
microg that that actually could float

231 00:11:04.120 --> 00:11:10.600
and get into the crews eyes and because

232 00:11:06.940 --> 00:11:13.000
there's a lack of convection cooling the

233 00:11:10.600 --> 00:11:14.710
metal is going to stay hotter longer so

234 00:11:13.000 --> 00:11:16.240
it has a potential to burn the crew

235 00:11:14.710 --> 00:11:19.089
members so we have to understand that

236 00:11:16.240 --> 00:11:21.220
and and put in counter measures to help

237 00:11:19.089 --> 00:11:23.740
the crew stay safe for when they're

238 00:11:21.220 --> 00:11:25.570
connecting disconnecting make sure you d

239 00:11:23.740 --> 00:11:27.250
energize circuits and there's some some

240 00:11:25.570 --> 00:11:29.589
common sense stuff like that that the

241 00:11:27.250 --> 00:11:33.339
crew practices before they go and we

242 00:11:29.589 --> 00:11:34.690
also include messages inside the
procedures when they're connecting

disdisconnecting stuff to make sure that

they follow the right steps to do that

safely okay thank you

hello my name is Ben back from Newport

high school and so I'm wondering if um

will there be less astronauts in space

in the future as a wireless instrumental

instrumentation system technology grows

in the future no we've got several

projects right now that utilize the

wireless instrumentation system even to

go outside the station now we've got a

the current system is two-phase we've
have an internal section and an external section that measures vibrations through
the station we're extending that network now to include EVs when the crew actually goes outside EBA we can talk to them wireless we can see their video that comes back in wireless so actually but that's going to do is make us able to assist the crew in more ways from the ground versus have cutting down the crew the to get the crew more engaged in different projects we're using our technology to offload the crew so that they can spend more time doing the
actual science and in other actions that

00:12:57,659 --> 00:13:04,458
they need to onboard the station ok

00:13:02,009 --> 00:13:04,459
thank you

00:13:05,980 --> 00:13:11,830
hi I'm Jacob from Deer harbor high

00:13:07,990 --> 00:13:15,399
school and my questions were what is

00:13:11,830 --> 00:13:16,810
being done to standardize like data and

00:13:15,399 --> 00:13:21,009
worked or connections with the

00:13:16,809 --> 00:13:23,079
international different devices and my

00:13:21,009 --> 00:13:25,929
second question is what specific

00:13:23,080 --> 00:13:28,330
challenges do you face with earth to

00:13:25,929 --> 00:13:32,469
space communications versus long range

00:13:28,330 --> 00:13:34,660
or communications the the connectors and

00:13:32,470 --> 00:13:38,740
everything that we use actually are

00:13:34,659 --> 00:13:41,679
standard NASA has a document that

00:13:38,740 --> 00:13:43,990
controls each connector how it is used
which one is used for what purpose and

the voltage and because we're actually

running two systems we've got a 28 volt

system that operates and we have 120

volt DC system that operates so those

are well defined there's an interface

control document that's that's its title

that specify what type of connectors and

and even the manufacturers and where you

can get these to make sure that things

do connect now for the communications

question even today we have a about a

two to two and a half second delay in

the time it takes communications to
reach from here let's say at Mission Control in Houston up to the teacher satellites and then over to the space station so even with that delay it does cause problems some of the problems we encounter is Pluto's with the crew using software that may be communicating via this tedious network to the ground through the K you system that the software doesn't tolerate those delays so we've got to work through a delay tolerant network issue the network is delay tolerant we know that and that's that's the way it was developed but some
of the software that we're actually using does not tolerate that to two and a half second delay from when it sends a call for data out and it needs an answer back usually those are in milliseconds so do you have to rewrite the software we've actually rewritten software we've got a team that does that we've also created hardware that will literally and I don't want to use the term fake out but it accounts for that time delay and the software doesn't crash because of that delay so yeah we will we have both the software and
hardware solutions to those problems all

00:15:44,879 --> 00:15:54,419
right thanks a lot hi I'm Nick McGill

00:15:51,960 --> 00:15:56,280
from bellevue high school what means a

00:15:54,419 --> 00:15:59,009
propulsion are you currently considering

00:15:56,279 --> 00:16:01,199
using a manned mission to Mars well

00:15:59,009 --> 00:16:04,679
right now to get off the earth we have

00:16:01,200 --> 00:16:07,440
to use chemical rockets there's several

00:16:04,679 --> 00:16:09,839
different schools of thought on you know

00:16:07,440 --> 00:16:12,930
which rocket engine should run on

00:16:09,840 --> 00:16:15,600
kerosene or liquid hydrogen and liquid

00:16:12,929 --> 00:16:19,289
oxygen and and and others or even

00:16:15,600 --> 00:16:22,379
alcohol but we do have several different

00:16:19,289 --> 00:16:26,189
ion thrusters that folks have been

00:16:22,379 --> 00:16:29,129
working on and we just need to get

00:16:26,190 --> 00:16:33,810
funding so that we can push to get much
larger ion thrusters and they're actually large enough to propel something from let's say a high Earth orbit out to Mars and then actually back so it's the combination chemical and then ion thrusters thank you my name is Eric Peterson i am from charles wright academy and i want us to know what is the most stressful mission you've participated in Oh Eric oh let's see well in Pluto's really don't get involved and and you know the things that go boom so actually the the most stressful I'll kind of break that down
into two different ways the complexity

of the the 12 a and the 12 a dot one

mission back in and I think March of

2006 were just a ton of work for the

Pluto's the the crew was the shuttle

mission was taking up a parts of the the

truss the solar arrays and as they

reconfigured and attach the new arrays

the the power buses were actually being

reconfigured so in order to make sure

that the crew had their onboard services

literally the power that they needed to

to conduct all these activities we had

to come up with a plan to move things
from one bus to another in a different power Channel and and then we literally manage that on an e VA by EV a basis when the crew was out literally switching these connections right so we had to keep flight the flight director and appraised of what services he did have and what he didn't have the the perhaps one of the most fatiguing missions and different word there was the one JAY mission where the crew took up the Japanese Kibo module that mission was 16 days long and we had sliding shifts from launch until they landed and
we extended that mission by another couple of days because we had to put in a fourth e VA and at the end of those days with not being able to stay on the same sleep schedule I was both physically and mentally just fatigued that was a long time to spin and nine hours our shift every day coming into Mission Control and then making sure nothing went wrong so yeah that two different kind of ways but yeah it's those are my most memorable missions right now question was what are the greatest
dangers that you have based in missions

and what are the greatest dangers nasa

and now faces in regard to space travel

oh let's see for mission controllers my

greatest danger is just getting in

traffic and getting to work and driving

yes yeah the the crew unfortunately is

faced with a very hostile and an

unforgiving environment out in space

that's why they have the controllers

down here on the ground looking over

their shoulder we actually do more to

operate the space station than the crew

actually does we keep track of all of
the environmental controls the power
generation the thermal rejection the
heat that's generated by all the
electrical equipment that's used and
then all the stuff that the crew uses to
accomplish their tasks and even
monitoring some of the experiments which
could be potentially very dangerous if
if they ran unchecked or whatever and
because of that again this go back to
that crew autonomy stuff we're trying to
work on programs that will help the crew
to operate just among themselves instead
of relying so much on mcc so we're
developing a lot of those autonomy

with the crew where we simulate not

being able to talk to earth except maybe

once five minutes for every hour on

these experiment type days so it's it's

pretty neat to see and get feedback from

the crew on how things did or didn't

work so that we can tailor you know our

operations here on the ground to help

them better clearly the environment for

them there is dangerous but there are so

many systems that are built into this

vehicle along with the backup for
control that comes down here that on a
day to day basis as they go about their
jobs it's really not an issue but the
crew members are also very well trained
to respond to anything that does happen
yes they are well versed in the
emergency response to all
of the systems on board in as a matter
of fact the controllers here on the
ground most often will know when
something is going wrong before the crew
will and that's why we're here
and for every person that you see
sitting in Mission Control on the TV
screen there is usually sometimes two
three or even four people sitting in a

what we call the backroom supporting the

the lead controller in the the flight

control room here with the flight

director so there's there's definitely

multiple sets of eyes watching over the

crew and making sure that the vehicle is

safe for them okay I think do we have

time for one more no I think we're we

don't have time for one more I told

Brian thanks very much it's really

interesting information and and I hope

that you guys in Washington got the

answers that you were looking for and we
sure appreciate the questions thank you

very much thank you everybody those are

really awesome questions