1
00:00:09,730 --> 00:00:03,050
discovery ISS this is Houston are you

2
00:00:13,160 --> 00:00:09,740
ready for the event already else

3
00:00:15,709 --> 00:00:13,170
NASA educational technology services

4
00:00:20,090 --> 00:00:15,719
this is Houston please call discovery

5
00:00:22,189 --> 00:00:20,100
ISS for a voice check discovery ISS this

6
00:00:26,779 --> 00:00:22,199
is NASA educational technology services

7
00:00:28,700 --> 00:00:26,789
how do you hear me we hear you loud and

8
00:00:31,759 --> 00:00:28,710
clear welcome aboard the International

9
00:00:33,290 --> 00:00:31,769
Space Station good morning from inside

10
00:00:34,370 --> 00:00:33,300
the payload Operations Center at the

11
00:00:36,139 --> 00:00:34,380
Marshall Space Flight Center

12
00:00:38,750 --> 00:00:36,149
I'm Heather Smith writer of the NASA

13
00:00:40,369 --> 00:00:38,760

education taking up space blog we are

14
00:00:42,080 --> 00:00:40,379
excited to ask you questions chosen by

15
00:00:43,660 --> 00:00:42,090
our blog readers today the first

16
00:00:46,010 --> 00:00:43,670
question is for commander Scott Kelly

17
00:00:47,720 --> 00:00:46,020
what are some ways that the work you do

18
00:00:52,420 --> 00:00:47,730
in space can encourage both our youth

19
00:00:59,090 --> 00:00:55,760
well I think one of the ways we can

20
00:01:01,670 --> 00:00:59,100
encourage kids and and scientists is

21
00:01:04,609 --> 00:01:01,680
that we have a incredibly challenging

22
00:01:06,980 --> 00:01:04,619
work environment and a in challenging

23
00:01:09,020 --> 00:01:06,990
problem building a space station and

24
00:01:11,530 --> 00:01:09,030
then and then utilizing it and the way

25
00:01:14,660 --> 00:01:11,540
we do that is through teamwork and

26
00:01:17,210 --> 00:01:14,670
teamwork is critical I think not only

27
00:01:20,749 --> 00:01:17,220
here but getting things accomplished on

28
00:01:22,609 --> 00:01:20,759
the ground so hopefully in kids and

29
00:01:24,710 --> 00:01:22,619
scientists and other professionals

30
00:01:26,390 --> 00:01:24,720
looking at the teamwork that nASA uses

31
00:01:29,600 --> 00:01:26,400
to get things done they can take

32
00:01:32,510 --> 00:01:29,610
inspiration from that and and use that

33
00:01:35,150 --> 00:01:32,520
themselves for whatever they're involved

34
00:01:37,710 --> 00:01:35,160
with on the ground

35
00:01:38,160 --> 00:01:37,720
great the next question is for Katie

36
00:01:40,740 --> 00:01:38,170
Collman

37
00:01:42,540 --> 00:01:40,750
what kinds of experiments are currently

38
00:01:44,100 --> 00:01:42,550

being conducted on the station and how

39
00:01:51,200 --> 00:01:44,110
will the research benefit people on

40
00:01:54,330 --> 00:01:51,210
earth we're doing some really exciting

41
00:01:57,210 --> 00:01:54,340
experiments in crystal growth in fluid

42
00:01:58,800 --> 00:01:57,220
physics and combustion and sometimes

43
00:02:00,660 --> 00:01:58,810
those things sound like well why would I

44
00:02:02,970 --> 00:02:00,670
want to know about that well combustion

45
00:02:04,920 --> 00:02:02,980
it's all about pollution up here where

46
00:02:07,680 --> 00:02:04,930
everything is weightless those hot gases

47
00:02:09,960 --> 00:02:07,690
don't rise and we can understand how we

48
00:02:11,940 --> 00:02:09,970
can actually look at how things burn and

49
00:02:14,280 --> 00:02:11,950
how pollution products are generated so

50
00:02:16,170 --> 00:02:14,290
we can do combustion research we get to

51
00:02:18,660 --> 00:02:16,180
see for fluid physics we get to see what

52
00:02:21,120 --> 00:02:18,670
liquids really want to do down on earth

53
00:02:23,010 --> 00:02:21,130
gravity actually dictates it's such a

54
00:02:25,020 --> 00:02:23,020
big force compared to all the other ones

55
00:02:26,760 --> 00:02:25,030
gravity dictates and so we can

56
00:02:29,270 --> 00:02:26,770
understand what liquids really want to

57
00:02:31,800 --> 00:02:29,280
do and so many processes on earth are

58
00:02:33,600 --> 00:02:31,810
liquids going through pipes everything

59
00:02:36,030 --> 00:02:33,610
that you want to play with or that it's

60
00:02:38,040 --> 00:02:36,040
um that is made and manufactured is

61
00:02:40,110 --> 00:02:38,050
liquid flowing through a pipe and making

62
00:02:41,820 --> 00:02:40,120
a product so we learn a lot about how to

63
00:02:46,770 --> 00:02:41,830

make things on earth by experimenting

64
00:02:49,110 --> 00:02:46,780
appearance in space okay for commander

65
00:02:55,199 --> 00:02:49,120
Lindsay how has the station changed

66
00:02:57,960 --> 00:02:55,209
since you were first there well the

67
00:02:59,729 --> 00:02:57,970
station is probably on the inside and

68
00:03:02,070 --> 00:02:59,739
the outside about three times bigger

69
00:03:04,770 --> 00:03:02,080
than the last time I was here when I was

70
00:03:07,680 --> 00:03:04,780
here last time we had the u.s. lab in

71
00:03:10,680 --> 00:03:07,690
the airlock and in the Russian segment

72
00:03:13,380 --> 00:03:10,690
but since then the Russians have added I

73
00:03:16,680 --> 00:03:13,390
guess three modules we've added the

74
00:03:19,050 --> 00:03:16,690
module we're in here now the the the

75
00:03:21,479 --> 00:03:19,060
Japanese module the Columbus module of

76
00:03:23,850 --> 00:03:21,489
course the multi-purpose module that we

77
00:03:25,229 --> 00:03:23,860
just added we have a couple of transfer

78
00:03:27,420 --> 00:03:25,239
vehicles here that we didn't have before

79
00:03:30,570 --> 00:03:27,430
we've had an additional two additional

80
00:03:32,729 --> 00:03:30,580
nodes on the cupola and it's a

81
00:03:34,680 --> 00:03:32,739
magnificent place now I when I first

82
00:03:37,350 --> 00:03:34,690
opened the hatches and floated in a few

83
00:03:39,180 --> 00:03:37,360
days ago after docking I was just

84
00:03:41,759 --> 00:03:39,190
shocked at the size of the station

85
00:03:43,559 --> 00:03:41,769
additionally we've added the three more

86
00:03:46,500 --> 00:03:43,569
solar arrays since I was here and so

87
00:03:47,910 --> 00:03:46,510
even coming up to rendezvous looking out

88
00:03:48,780 --> 00:03:47,920

and seeing the station it looked like

89
00:03:50,190 --> 00:03:48,790
almost a totally

90
00:03:52,709 --> 00:03:50,200
different place so it has changed

91
00:03:55,199 --> 00:03:52,719
dramatically and I'm it's really excited

92
00:03:57,770 --> 00:03:55,209
just exciting for all of us to see the

93
00:03:59,429 --> 00:03:57,780
the Space Station completely assembled

94
00:04:01,619 --> 00:03:59,439
great thank you

95
00:04:03,449 --> 00:04:01,629
this is Joe Charbonnet I'm an intern

96
00:04:06,089 --> 00:04:03,459
from Georgia Tech and my question is for

97
00:04:07,710 --> 00:04:06,099
Colonel Bell a fellow ramblin wreck what

98
00:04:09,990 --> 00:04:07,720
role do you think that robots will play

99
00:04:16,080 --> 00:04:10,000
in the future of space exploration go

100
00:04:16,800 --> 00:04:16,090
jackets and what's the good word go

101
00:04:19,770 --> 00:04:16,810
jackets

102
00:04:22,830 --> 00:04:19,780
I think robots will take a more and more

103
00:04:24,810 --> 00:04:22,840
a much bigger role as time goes on just

104
00:04:27,450 --> 00:04:24,820
like a peter's past someone back in the

105
00:04:29,100 --> 00:04:27,460
60s and 70s what what would the role be

106
00:04:30,810 --> 00:04:29,110
of computers in the average person's

107
00:04:32,670 --> 00:04:30,820
life most people probably said not a

108
00:04:34,140 --> 00:04:32,680
whole lot but now we have computers and

109
00:04:36,960 --> 00:04:34,150
everything so I think robots is the same

110
00:04:38,670 --> 00:04:36,970
way and that's robots will allow us

111
00:04:40,800 --> 00:04:38,680
we'll have a good synergy between the

112
00:04:42,810 --> 00:04:40,810
humans and the robot and they'll be able

113
00:04:44,640 --> 00:04:42,820

to do things that we consider mundane or

114
00:04:46,170 --> 00:04:44,650
dangerous like going into smoke-filled

115
00:04:48,600 --> 00:04:46,180
compartments and that's the purpose of a

116
00:04:50,400 --> 00:04:48,610
Robonaut RT that we have up here is to

117
00:04:52,050 --> 00:04:50,410
start looking at those tasks and trying

118
00:04:54,659 --> 00:04:52,060
to refine them and optimize them so I

119
00:04:59,610 --> 00:04:54,669
see a bigger role as time continues for

120
00:05:01,980 --> 00:04:59,620
Robonaut in the robotics okay back to

121
00:05:03,960 --> 00:05:01,990
Heather this question is for aldrick how

122
00:05:11,600 --> 00:05:03,970
well does reduce gravity flight prepare

123
00:05:15,629 --> 00:05:13,950
well the short answers is very useful

124
00:05:17,700 --> 00:05:15,639
I'm preparing for space we have a number

125
00:05:19,500 --> 00:05:17,710
of different things we can use we have

126
00:05:21,089 --> 00:05:19,510
the neutral buoyancy laboratory of the

127
00:05:23,279 --> 00:05:21,099
pool that helps us but it doesn't

128
00:05:24,810 --> 00:05:23,289
necessarily give us that free-flowing

129
00:05:27,060 --> 00:05:24,820
field because that the water's viscous

130
00:05:28,830 --> 00:05:27,070
and it resists our motion we also have

131
00:05:30,480 --> 00:05:28,840
virtual reality laboratories which give

132
00:05:32,460 --> 00:05:30,490
us a good visual sense of what it's like

133
00:05:34,409 --> 00:05:32,470
to be in space but it doesn't also

134
00:05:36,480 --> 00:05:34,419
doesn't all it doesn't give us that same

135
00:05:39,420 --> 00:05:36,490
two dynamics akin it like kinematics of

136
00:05:41,370 --> 00:05:39,430
running around in space the reduced

137
00:05:42,779 --> 00:05:41,380
gravity flights give you all that you

138
00:05:44,790 --> 00:05:42,789

are weightless just like you'd be in

139
00:05:46,260 --> 00:05:44,800
orbit for brief periods of time so you

140
00:05:49,439 --> 00:05:46,270
can get a sense of you know how things

141
00:05:52,730 --> 00:05:49,449
can move around freely without those

142
00:05:57,110 --> 00:05:55,189
this question is for Steve Bowen how has

143
00:05:58,520 --> 00:05:57,120
greater internet connectivity and social

144
00:06:11,839 --> 00:05:58,530
media affected the spaceflight

145
00:06:12,890 --> 00:06:11,849
experience sorry about the delay that's

146
00:06:15,830 --> 00:06:12,900
actually an interesting question because

147
00:06:18,830 --> 00:06:15,840
I actually spent 14 years in summary

148
00:06:22,400 --> 00:06:18,840
enforce where we had zero internet

149
00:06:25,580 --> 00:06:22,410
connection and so the similarities

150
00:06:29,180 --> 00:06:25,590
between spaceflight and submarines is

151
00:06:31,850 --> 00:06:29,190
very real and this communication up here

152
00:06:34,899 --> 00:06:31,860
with the internet with the ability to

153
00:06:41,450 --> 00:06:34,909
tweet it's all about communication and

154
00:06:43,249 --> 00:06:41,460
communication can lead to some deception

155
00:06:45,860 --> 00:06:43,259
as well you know just like the internet

156
00:06:49,270 --> 00:06:45,870
is full of information but it's not

157
00:06:51,620 --> 00:06:49,280
necessarily the knowledge it's data its

158
00:06:52,850 --> 00:06:51,630
information but it's not real knowledge

159
00:06:55,309 --> 00:06:52,860
it's not real action

160
00:06:58,640 --> 00:06:55,319
you know tweeting provides little bits

161
00:06:59,689 --> 00:06:58,650
and glimmers of data and little hints

162
00:07:01,550 --> 00:06:59,699
and information but unless you're

163
00:07:04,490 --> 00:07:01,560

actually there and you have the ability

164
00:07:06,379 --> 00:07:04,500
to perform some action you know it can

165
00:07:08,089 --> 00:07:06,389
give you a slight sense of it but you

166
00:07:09,620 --> 00:07:08,099
really need to be there in any of these

167
00:07:12,290 --> 00:07:09,630
communication forms regardless whether

168
00:07:14,390 --> 00:07:12,300
it's social media or whatever term you

169
00:07:20,689 --> 00:07:14,400
want to use now for modern communication

170
00:07:22,550 --> 00:07:20,699
so it's it can lead to the missed idea

171
00:07:23,930 --> 00:07:22,560
that's the misapprehension that you have

172
00:07:24,920 --> 00:07:23,940
to control over something when you don't

173
00:07:26,749 --> 00:07:24,930
so you don't want to be running your

174
00:07:28,279 --> 00:07:26,759
life on the internet from here you

175
00:07:30,860 --> 00:07:28,289
actually need to be someplace to do

176
00:07:33,140 --> 00:07:30,870
something so while it helps bring people

177
00:07:35,360 --> 00:07:33,150
in I hopefully it draws you in so you

178
00:07:37,070 --> 00:07:35,370
actually want to be there that in and of

179
00:07:39,409 --> 00:07:37,080
itself it's not sufficient to replace

180
00:07:44,300 --> 00:07:39,419
you know spaceflight or any other

181
00:07:46,159 --> 00:07:44,310
activity that you're doing okay there's

182
00:07:47,809 --> 00:07:46,169
questions for mike barratt what do you

183
00:07:54,379 --> 00:07:47,819
think is the greatest legacy of the

184
00:07:56,330 --> 00:07:54,389
space shuttle program well that's a

185
00:07:57,920 --> 00:07:56,340
great question with a really big answer

186
00:07:59,959 --> 00:07:57,930
yeah you know the Space Shuttle has

187
00:08:02,990 --> 00:07:59,969
become such an icon of human spaceflight

188
00:08:04,850 --> 00:08:03,000

and I think that's well deserved if you

189
00:08:06,110 --> 00:08:04,860
look at it you have a the biggest thing

190
00:08:08,210 --> 00:08:06,120
is really a broad

191
00:08:11,150 --> 00:08:08,220
based knowledge base of how to work in

192
00:08:12,500 --> 00:08:11,160
space as a space medicine guy I look at

193
00:08:14,629 --> 00:08:12,510
the hundreds of human spaceflight

194
00:08:16,939 --> 00:08:14,639
experiences we have off the shuttle and

195
00:08:18,860 --> 00:08:16,949
that's what you need to really solidify

196
00:08:20,390 --> 00:08:18,870
your knowledge of how the human reacts

197
00:08:22,640 --> 00:08:20,400
to the short-term spaceflight the

198
00:08:26,570 --> 00:08:22,650
shuttle has given us and beyond that

199
00:08:29,750 --> 00:08:26,580
we've got propulsion robotics hypersonic

200
00:08:31,250 --> 00:08:29,760
flight physics of low-earth orbit I mean

201
00:08:33,769 --> 00:08:31,260
the Space Shuttle has just given us a

202
00:08:35,360 --> 00:08:33,779
tremendous knowledge base of how to do

203
00:08:40,130 --> 00:08:35,370
business in space so I think that's

204
00:08:42,200 --> 00:08:40,140
really the big thing okay for nicole

205
00:08:48,500 --> 00:08:42,210
stott well in life in space be like

206
00:08:50,840 --> 00:08:48,510
without the use of robotics well I think

207
00:08:54,200 --> 00:08:50,850
very simply it would be a lot more

208
00:08:56,079 --> 00:08:54,210
difficult if we just look at the space

209
00:08:58,640 --> 00:08:56,089
station as an example whether it's

210
00:09:01,940 --> 00:08:58,650
assembly or the e V a task that we have

211
00:09:04,490 --> 00:09:01,950
or some of the what might be thought of

212
00:09:06,019 --> 00:09:04,500
today because of robotics simple

213
00:09:08,660 --> 00:09:06,029

maintenance tasks that we have on the

214
00:09:11,449 --> 00:09:08,670
outside of the vehicle it would be a lot

215
00:09:13,640 --> 00:09:11,459
more difficult if we didn't have the

216
00:09:16,490 --> 00:09:13,650
robotic arms that we use to manipulate

217
00:09:18,980 --> 00:09:16,500
both our EVM embers and the hardware

218
00:09:21,050 --> 00:09:18,990
that we have outside and I think that's

219
00:09:25,329 --> 00:09:21,060
just one simple example of how robotics

220
00:09:29,540 --> 00:09:28,160
sir commander Kelly since many high

221
00:09:31,670 --> 00:09:29,550
school and college students are involved

222
00:09:38,269 --> 00:09:31,680
in programming spheres robots can you

223
00:09:41,890 --> 00:09:38,279
tell us more about the experiment well

224
00:09:45,829 --> 00:09:41,900
spheres is a a experiment that's

225
00:09:48,019 --> 00:09:45,839
operated and conducted by MIT with

226
00:09:48,680 --> 00:09:48,029
partnership with NASA here onboard the

227
00:09:51,710 --> 00:09:48,690
space station

228
00:09:53,750 --> 00:09:51,720
it's really interesting for us because

229
00:09:56,150 --> 00:09:53,760
it's very interactive with the crew

230
00:10:00,079 --> 00:09:56,160
members it's basically three satellites

231
00:10:04,160 --> 00:10:00,089
that look at and investigate different

232
00:10:07,190 --> 00:10:04,170
control system laws for operating

233
00:10:10,280 --> 00:10:07,200
satellites in space and you know as our

234
00:10:14,360 --> 00:10:10,290
technology improves there's there's need

235
00:10:17,120 --> 00:10:14,370
to understand how satellites can operate

236
00:10:18,829 --> 00:10:17,130
together not that mostly we have

237
00:10:19,759 --> 00:10:18,839
satellites that operate independently

238
00:10:21,290 --> 00:10:19,769

but

239
00:10:24,710 --> 00:10:21,300
years is designed to see how they can

240
00:10:27,259 --> 00:10:24,720
work together fly in formation do tasks

241
00:10:30,319 --> 00:10:27,269
as part of a larger group of satellites

242
00:10:33,259 --> 00:10:30,329
versus individually and it's a lot of

243
00:10:35,449 --> 00:10:33,269
fun for us recently I did a contest with

244
00:10:37,100 --> 00:10:35,459
high school kids from around the country

245
00:10:39,289 --> 00:10:37,110
where they programmed the satellites

246
00:10:41,840 --> 00:10:39,299
themselves to do certain tasks and it

247
00:10:44,059 --> 00:10:41,850
was a competition and I think the kids

248
00:10:48,889 --> 00:10:44,069
really enjoyed it as did that as did we

249
00:10:50,629 --> 00:10:48,899
onboard / Katie what were you most

250
00:10:56,989 --> 00:10:50,639
looking forward to experiencing again on

251
00:10:58,519 --> 00:10:56,999
your return to space well you know my

252
00:11:00,710 --> 00:10:58,529
family might not want to hear this but

253
00:11:03,979 --> 00:11:00,720
I'm I'm I'm actually really happy up

254
00:11:06,439 --> 00:11:03,989
here living in space and in everything

255
00:11:08,119 --> 00:11:06,449
that we need is up here we we spent a

256
00:11:10,069 --> 00:11:08,129
long time learning all the things that

257
00:11:12,139 --> 00:11:10,079
we needed to know in order to operate

258
00:11:14,539 --> 00:11:12,149
safely up here so I spent a long time in

259
00:11:16,850 --> 00:11:14,549
school learning things practicing things

260
00:11:17,960 --> 00:11:16,860
in school is is the astronaut job as

261
00:11:20,419 --> 00:11:17,970
well you know we're always learning

262
00:11:22,549 --> 00:11:20,429
things and so I feel very well prepared

263
00:11:23,749 --> 00:11:22,559

I feel very very comfortable and when

264
00:11:26,090 --> 00:11:23,759
you think about it you don't need that

265
00:11:28,100 --> 00:11:26,100
much we have a lot of nice food I guess

266
00:11:29,989 --> 00:11:28,110
I would I would vote for having a little

267
00:11:31,489 --> 00:11:29,999
more variety in our food when I get hope

268
00:11:32,900 --> 00:11:31,499
when I get home I look forward to eating

269
00:11:34,639 --> 00:11:32,910
things that we don't have here I

270
00:11:36,769 --> 00:11:34,649
probably look forward to having a shower

271
00:11:39,139 --> 00:11:36,779
because I take a sponge bath here but in

272
00:11:41,359 --> 00:11:39,149
general I think that it's really amazing

273
00:11:45,340 --> 00:11:41,369
that we've designed a place that we can

274
00:11:48,230 --> 00:11:45,350
live in space and I am really happy here

275
00:11:49,789 --> 00:11:48,240
for commander Lindsay what do you do for

276
00:11:55,910 --> 00:11:49,799
fun in microgravity and do you have any

277
00:11:58,220 --> 00:11:55,920
special tricks you like to do yeah we

278
00:12:00,259 --> 00:11:58,230
call those stupid astronaut tricks and I

279
00:12:03,829 --> 00:12:00,269
have several that I'm not very good at

280
00:12:03,980 --> 00:12:03,839
but and I have the bruises to show for

281
00:12:07,249 --> 00:12:03,990
it

282
00:12:09,409 --> 00:12:07,259
but you know just you just see one of

283
00:12:12,350 --> 00:12:09,419
our crew members just floated away

284
00:12:14,689 --> 00:12:12,360
you see Scott's doing a little flip for

285
00:12:18,139 --> 00:12:14,699
you so we can do that all day long

286
00:12:19,999 --> 00:12:18,149
what's really interesting is I'll give

287
00:12:22,639 --> 00:12:20,009
you a little physics lesson here is that

288
00:12:24,199 --> 00:12:22,649

when you throw a ball on the earth and

289
00:12:27,139 --> 00:12:24,209
play catch or something like that you

290
00:12:29,239 --> 00:12:27,149
you have to actually loft that ball for

291
00:12:32,419 --> 00:12:29,249
because gravity will cause that ball to

292
00:12:33,650 --> 00:12:32,429
drop and we do it subconsciously just

293
00:12:35,240 --> 00:12:33,660
because we're used to living in one

294
00:12:37,670 --> 00:12:35,250
when you come up here in space the first

295
00:12:40,130 --> 00:12:37,680
time you tried to throw a ball or a or

296
00:12:41,690 --> 00:12:40,140
any item to another crew member you and

297
00:12:43,550 --> 00:12:41,700
invariably will throw it over that

298
00:12:45,320 --> 00:12:43,560
person's head because you are used to

299
00:12:47,810 --> 00:12:45,330
lofting all the time so the one of the

300
00:12:49,670 --> 00:12:47,820
biggest challenges in just moving around

301
00:12:51,860 --> 00:12:49,680
and floating through the module just

302
00:12:53,870 --> 00:12:51,870
unlock loft yourself so that you don't

303
00:12:56,450 --> 00:12:53,880
slam into the top of wherever you're

304
00:12:58,670 --> 00:12:56,460
traveling but but you never get tired of

305
00:13:02,870 --> 00:12:58,680
a plane in microgravity and learning how

306
00:13:05,090 --> 00:13:02,880
to move around and do things for eric

307
00:13:11,500 --> 00:13:05,100
boe what emotions are you feeling during

308
00:13:15,680 --> 00:13:14,210
well I remember when I was in high

309
00:13:18,860 --> 00:13:15,690
school I went to the new Air and Space

310
00:13:20,960 --> 00:13:18,870
Museum in Washington and seeing a large

311
00:13:23,450 --> 00:13:20,970
scale model of the Space Shuttle being

312
00:13:25,070 --> 00:13:23,460
displayed and I marveled at it and I'm

313
00:13:27,140 --> 00:13:25,080

up here on discovery on its final flight

314
00:13:30,080 --> 00:13:27,150
and still marveling it's an amazing

315
00:13:32,120 --> 00:13:30,090
machine amazing ship and just trying to

316
00:13:33,590 --> 00:13:32,130
savor every moment up here that we have

317
00:13:35,360 --> 00:13:33,600
to enjoy but obviously when we come back

318
00:13:37,160 --> 00:13:35,370
and land back at Earth we're focused on

319
00:13:38,690 --> 00:13:37,170
the mission right now I think that's

320
00:13:41,380 --> 00:13:38,700
when the bittersweet moment when we land

321
00:13:44,240 --> 00:13:41,390
will happen and we actually look at and

322
00:13:46,430 --> 00:13:44,250
survey the shuttles had a made amazing

323
00:13:49,820 --> 00:13:46,440
legacy and discovery all the people that

324
00:13:50,960 --> 00:13:49,830
have worked on her and to me that's what

325
00:13:52,220 --> 00:13:50,970
makes the ship that's what makes

326
00:13:56,750 --> 00:13:52,230
Discovery's all the people that are

327
00:13:58,670 --> 00:13:56,760
involved with making her fly hi this is

328
00:14:01,220 --> 00:13:58,680
Joel Stein I'm an intern from Virginia

329
00:14:03,650 --> 00:14:01,230
Tech and I was just wondering for our

330
00:14:05,210 --> 00:14:03,660
true astronauts trained long and hard to

331
00:14:06,560 --> 00:14:05,220
be prepared in space but once we get

332
00:14:13,240 --> 00:14:06,570
there is there anything that you have

333
00:14:16,300 --> 00:14:14,980
there's always plenty of things that are

334
00:14:18,310 --> 00:14:16,310
anyplace you go that you're never

335
00:14:21,580 --> 00:14:18,320
prepared for I think for me the biggest

336
00:14:24,190 --> 00:14:21,590
thing is stuckness is probably the one

337
00:14:25,750 --> 00:14:24,200
word that comes to mind like being

338
00:14:27,700 --> 00:14:25,760

outside my last two spacewalks there

339
00:14:29,500 --> 00:14:27,710
were no things out there that are

340
00:14:31,090 --> 00:14:29,510
supposed to move that didn't want to

341
00:14:32,950 --> 00:14:31,100
move all the time I would love to have

342
00:14:35,350 --> 00:14:32,960
had a can of wd-40 out there with me to

343
00:14:37,090 --> 00:14:35,360
loosen up a lot of those things the

344
00:14:38,620 --> 00:14:37,100
other part is the things around here

345
00:14:42,040 --> 00:14:38,630
inside have the opposite problem nothing

346
00:14:43,300 --> 00:14:42,050
stays put so you look for your glasses

347
00:14:44,650 --> 00:14:43,310
you look for your checklist there

348
00:14:46,960 --> 00:14:44,660
they're always sitting right behind your

349
00:14:48,250 --> 00:14:46,970
head inevitably but so they they don't

350
00:14:49,330 --> 00:14:48,260
stay stuck when they want them say stuck

351
00:14:50,530 --> 00:14:49,340
and there's velcro that sticks to

352
00:14:52,660 --> 00:14:50,540
everything you don't want it to stick to

353
00:14:54,460 --> 00:14:52,670
as well as the things you do want it to

354
00:14:56,350 --> 00:14:54,470
stick to and the final element of

355
00:14:57,760 --> 00:14:56,360
stuckness I've run into is just traffic

356
00:14:59,200 --> 00:14:57,770
around here we've got a bunch of narrow

357
00:15:00,520 --> 00:14:59,210
corridors that connect us through all

358
00:15:02,350 --> 00:15:00,530
these different modules as well as a

359
00:15:04,090 --> 00:15:02,360
shuttle and we're always working in the

360
00:15:05,260 --> 00:15:04,100
exact same place the exact same time

361
00:15:06,940 --> 00:15:05,270
where they're trying to get meals or

362
00:15:08,260 --> 00:15:06,950
trying to fix the same thing and there's

363
00:15:10,540 --> 00:15:08,270

12 of us up here there's always just

364
00:15:12,070 --> 00:15:10,550
traffic jams that go on here and so you

365
00:15:14,560 --> 00:15:12,080
wind up in a queue waiting to get where

366
00:15:15,790 --> 00:15:14,570
you're going and it means what it means

367
00:15:17,320 --> 00:15:15,800
it's things to take longer than you

368
00:15:18,550 --> 00:15:17,330
planned on and so you said to have a

369
00:15:20,410 --> 00:15:18,560
little patience and you understand why

370
00:15:24,370 --> 00:15:20,420
they give you maybe an hour for what you

371
00:15:26,170 --> 00:15:24,380
thought was a 20-minute task for Steve

372
00:15:28,120 --> 00:15:26,180
Bowen what do you think is some of the

373
00:15:36,320 --> 00:15:28,130
most valuable science or information to

374
00:15:42,570 --> 00:15:39,960
let's see actually I saw this in two

375
00:15:46,740 --> 00:15:42,580
parts the first part is I have

376
00:15:47,790 --> 00:15:46,750
absolutely no idea because a lot of

377
00:15:49,710 --> 00:15:47,800
special e here on the International

378
00:15:52,560 --> 00:15:49,720
Space Station what a lot of what you do

379
00:15:54,990 --> 00:15:52,570
is basic research which is fundamental

380
00:15:57,450 --> 00:15:55,000
properties of how things interrelate how

381
00:16:00,300 --> 00:15:57,460
they operate how the world actually

382
00:16:02,190 --> 00:16:00,310
works and it's impossible at least for

383
00:16:03,780 --> 00:16:02,200
me to look at some of this stuff and say

384
00:16:06,870 --> 00:16:03,790
what that will lead to what knowledge

385
00:16:09,090 --> 00:16:06,880
that will lead to in the future so I

386
00:16:11,010 --> 00:16:09,100
think the contributions are incredible I

387
00:16:12,920 --> 00:16:11,020
can't point to one right now but our

388
00:16:14,550 --> 00:16:12,930

understanding the universe is expanding

389
00:16:18,420 --> 00:16:14,560
continuously while we're doing research

390
00:16:22,380 --> 00:16:18,430
up here the second part though being old

391
00:16:24,990 --> 00:16:22,390
like I am and remembering when we landed

392
00:16:26,760 --> 00:16:25,000
on the moon that whole my whole

393
00:16:28,320 --> 00:16:26,770
generation everybody that's about my age

394
00:16:31,500 --> 00:16:28,330
which there are some people here who

395
00:16:33,210 --> 00:16:31,510
about my age of engineers and scientists

396
00:16:35,790 --> 00:16:33,220
that were inspired by the early space

397
00:16:38,130 --> 00:16:35,800
program that's really our greatest

398
00:16:41,910 --> 00:16:38,140
contribution to science and knowledge on

399
00:16:44,610 --> 00:16:41,920
earth is the whole generation of kids

400
00:16:46,200 --> 00:16:44,620
who are now adults that became engineers

401
00:16:48,810 --> 00:16:46,210
and scientists because of the research

402
00:16:51,270 --> 00:16:48,820
on exploration we did to Apollo and

403
00:16:53,220 --> 00:16:51,280
Gemini and Mercury that was really

404
00:16:55,650 --> 00:16:53,230
exciting stuff and even though we all

405
00:16:57,150 --> 00:16:55,660
can't grow up to be astronauts I was

406
00:16:58,830 --> 00:16:57,160
perfectly happy being an engineer and

407
00:17:02,550 --> 00:16:58,840
that would have been a great great place

408
00:17:04,140 --> 00:17:02,560
to spend my life for mike barratt what

409
00:17:05,400 --> 00:17:04,150
is a failure that occurred during one of

410
00:17:11,100 --> 00:17:05,410
your space flights and how did the crew

411
00:17:13,439 --> 00:17:11,110
handle it well that's a really good

412
00:17:15,480 --> 00:17:13,449
question you know I've got a little over

413
00:17:17,939 --> 00:17:15,490

200 days in space and let me tell you

414
00:17:20,100 --> 00:17:17,949
that failures happen and the one thing I

415
00:17:21,809 --> 00:17:20,110
learned is that the best way to react to

416
00:17:24,240 --> 00:17:21,819
a failure is to be ready for it in the

417
00:17:26,579 --> 00:17:24,250
first place and everything we do up here

418
00:17:28,530 --> 00:17:26,589
involves a lot of planning and having

419
00:17:30,750 --> 00:17:28,540
backup systems and methods to handle

420
00:17:32,400 --> 00:17:30,760
things when I first arrived at the space

421
00:17:34,920 --> 00:17:32,410
station on the Soyuz our automatic

422
00:17:36,950 --> 00:17:34,930
docking system failed and we were

423
00:17:39,630 --> 00:17:36,960
trained and equipped to bring it in

424
00:17:42,180 --> 00:17:39,640
manually and we did that and more

425
00:17:44,160 --> 00:17:42,190
recently here oh and I had steve bowen

426
00:17:46,200 --> 00:17:44,170
out on the end of the robotic arm and he

427
00:17:48,840 --> 00:17:46,210
had a big big heavy piece of very

428
00:17:50,170 --> 00:17:48,850
expensive hardware and our robotic

429
00:17:52,810 --> 00:17:50,180
workstation crash

430
00:17:55,630 --> 00:17:52,820
and you know that's not a good place to

431
00:17:58,120 --> 00:17:55,640
be but we had a backup system and the

432
00:18:00,090 --> 00:17:58,130
space station crew in a very calm very

433
00:18:03,280 --> 00:18:00,100
cool headed but very quick response

434
00:18:05,770 --> 00:18:03,290
brought up that secondary work station

435
00:18:07,960 --> 00:18:05,780
and within a few minutes we were back in

436
00:18:11,410 --> 00:18:07,970
business and good to go and and Steve

437
00:18:14,470 --> 00:18:11,420
was moving again so Steve a long time to

438
00:18:16,870 --> 00:18:14,480

Steve but obviously being prepared is is

439
00:18:18,880 --> 00:18:16,880
the the biggest thing and it's just it's

440
00:18:20,320 --> 00:18:18,890
great to see that when everything is in

441
00:18:22,990 --> 00:18:20,330
order and the crew reacts to their

442
00:18:26,200 --> 00:18:23,000
training and cool heads and you're back

443
00:18:28,210 --> 00:18:26,210
in business really fast turn nicole

444
00:18:29,530 --> 00:18:28,220
stott if you could pick any flight in

445
00:18:35,370 --> 00:18:29,540
the history of the space program to

446
00:18:41,110 --> 00:18:38,530
well I think I have to answer two

447
00:18:43,030 --> 00:18:41,120
flights the flight I had before to the

448
00:18:46,690 --> 00:18:43,040
space station and the flight that I have

449
00:18:48,850 --> 00:18:46,700
now for different reasons the the the

450
00:18:50,830 --> 00:18:48,860
space station flight was something I was

451
00:18:52,840 --> 00:18:50,840
really looking forward to we were at a

452
00:18:54,970 --> 00:18:52,850
point in the program where he had just

453
00:18:57,160 --> 00:18:54,980
moved to a six-person crew so I was

454
00:19:00,310 --> 00:18:57,170
really interested to see how how that

455
00:19:02,320 --> 00:19:00,320
would work I had a fantastic crew up

456
00:19:06,130 --> 00:19:02,330
here and I think we did a lot of really

457
00:19:09,670 --> 00:19:06,140
good things with robotics with the HTV

458
00:19:12,240 --> 00:19:09,680
the first HTV capture that we had and we

459
00:19:14,620 --> 00:19:12,250
had over a hundred and fifty or so

460
00:19:17,020 --> 00:19:14,630
science investigations going on at any

461
00:19:19,450 --> 00:19:17,030
one time so it felt like a really

462
00:19:22,690 --> 00:19:19,460
productive time and and this flight on

463
00:19:25,060 --> 00:19:22,700

discovery I think I was really really

464
00:19:27,490 --> 00:19:25,070
honored to be asked to be a part of this

465
00:19:29,950 --> 00:19:27,500
crew given that at the point it was

466
00:19:32,650 --> 00:19:29,960
going to be the last space shuttle

467
00:19:37,390 --> 00:19:32,660
flight and the last as we know space

468
00:19:40,360 --> 00:19:37,400
shuttle flight of discovery and there's

469
00:19:42,610 --> 00:19:40,370
a lot of you know emotion and sentiment

470
00:19:45,580 --> 00:19:42,620
I think associated with that and just

471
00:19:48,040 --> 00:19:45,590
pride and the the legacy of this program

472
00:19:52,450 --> 00:19:48,050
and that you know that we have the honor

473
00:19:54,370 --> 00:19:52,460
of being a part of that sir commander

474
00:20:02,680 --> 00:19:54,380
Kelly what do you think is the coolest

475
00:20:06,660 --> 00:20:05,110
he listens to what I say and he does all

476
00:20:12,190 --> 00:20:06,670
of his homework

477
00:20:15,220 --> 00:20:12,200
unlike to other people I know actually

478
00:20:18,190 --> 00:20:15,230
it's a you know it's a great technology

479
00:20:21,700 --> 00:20:18,200
demonstrator it's actually has pretty

480
00:20:24,090 --> 00:20:21,710
limited functionality right now but in

481
00:20:27,070 --> 00:20:24,100
the future like someone here was saying

482
00:20:30,070 --> 00:20:27,080
like I think Steve or Eric was saying

483
00:20:31,810 --> 00:20:30,080
you know like computers robots are going

484
00:20:33,940 --> 00:20:31,820
to become a integral part of our lives

485
00:20:37,200 --> 00:20:33,950
and it's a great way to start with

486
00:20:39,460 --> 00:20:37,210
Robonaut here on the space station and

487
00:20:42,370 --> 00:20:39,470
you know we're gonna we're going to put

488
00:20:44,260 --> 00:20:42,380

them to work in in the limited capacity

489
00:20:46,780 --> 00:20:44,270
he can work in and hopefully that will

490
00:20:50,290 --> 00:20:46,790
lead to more sophisticated and useful

491
00:20:52,450 --> 00:20:50,300
robots in the future for Cady Coleman

492
00:20:54,370 --> 00:20:52,460
when when you were viewing the Earth

493
00:20:59,080 --> 00:20:54,380
from space what do you most like to look

494
00:21:04,720 --> 00:21:01,019
well for me looking straight down

495
00:21:06,669 --> 00:21:04,730
geography just becomes alive I was never

496
00:21:08,320 --> 00:21:06,679
a kid that sort of knew every country

497
00:21:10,119 --> 00:21:08,330
and where it was and now when I look

498
00:21:12,580 --> 00:21:10,129
down at the earth and you get to see all

499
00:21:14,680 --> 00:21:12,590
the all the different features the

500
00:21:16,509 --> 00:21:14,690
mountains the rivers and you know you

501
00:21:18,430 --> 00:21:16,519
can see where people are living you can

502
00:21:21,249 --> 00:21:18,440
see where people aren't living and think

503
00:21:23,680 --> 00:21:21,259
about why it makes me think of how

504
00:21:26,590 --> 00:21:23,690
incredible it was when we you know where

505
00:21:28,210 --> 00:21:26,600
we still are exploring but even when you

506
00:21:30,070 --> 00:21:28,220
know going across the United States when

507
00:21:31,749 --> 00:21:30,080
there was just nothing down there and

508
00:21:33,789 --> 00:21:31,759
then the pioneers crossing the country

509
00:21:35,769 --> 00:21:33,799
how difficult that must have been I can

510
00:21:37,539 --> 00:21:35,779
see all that through geography because I

511
00:21:39,940 --> 00:21:37,549
see the mountain ranges and you see the

512
00:21:41,649 --> 00:21:39,950
weather and so to me it's like looking

513
00:21:43,419 --> 00:21:41,659

at the history that already was in

514
00:21:46,810 --> 00:21:43,429
thinking about the places that we still

515
00:21:48,340 --> 00:21:46,820
have yet to enjoy and explore and I love

516
00:21:50,619 --> 00:21:48,350
looking down at the earth just because

517
00:21:53,080 --> 00:21:50,629
it's it's really it's our place it's our

518
00:21:54,700 --> 00:21:53,090
special place there's no lines between

519
00:21:56,649 --> 00:21:54,710
the countries there's no capital letters

520
00:21:59,080 --> 00:21:56,659
saying what countries are where it's

521
00:22:01,180 --> 00:21:59,090
just all of our planet all the countries

522
00:22:04,480 --> 00:22:01,190
all the people and I feel very special

523
00:22:06,609 --> 00:22:04,490
being one to have this viewpoint for

524
00:22:08,109 --> 00:22:06,619
commander Lindsay with so much equipment

525
00:22:15,460 --> 00:22:08,119
on station how do you find something

526
00:22:18,220 --> 00:22:15,470
you're looking for wow that's I tell you

527
00:22:19,690 --> 00:22:18,230
what that's a big challenge and but we

528
00:22:21,279 --> 00:22:19,700
actually have a system up here on the

529
00:22:25,600 --> 00:22:21,289
space station an inventory management

530
00:22:27,940 --> 00:22:25,610
system that every time something's moved

531
00:22:29,799 --> 00:22:27,950
or put away or moved to new location

532
00:22:32,409 --> 00:22:29,809
it's actually logged into the computer

533
00:22:35,049 --> 00:22:32,419
and all of the bags and all the

534
00:22:36,549 --> 00:22:35,059
equipment have little barcodes on them

535
00:22:39,129 --> 00:22:36,559
like when you go to the grocery store

536
00:22:42,730 --> 00:22:39,139
and checkout now you you swipe the items

537
00:22:45,700 --> 00:22:42,740
the the cashier swipes the items through

538
00:22:48,759 --> 00:22:45,710

this barcode reader and in a logs price

539
00:22:50,919 --> 00:22:48,769
well what we have up here is is these

540
00:22:53,409 --> 00:22:50,929
barcodes will track all of these items

541
00:22:55,419 --> 00:22:53,419
so when you go to do a new procedure or

542
00:22:57,220 --> 00:22:55,429
get equipment out the procedure will

543
00:22:59,499 --> 00:22:57,230
tell you where it's located and it's

544
00:23:01,779 --> 00:22:59,509
tracked all based on that barcode now on

545
00:23:05,259 --> 00:23:01,789
the Space Shuttle we don't have quite so

546
00:23:07,389 --> 00:23:05,269
elegant a system we have things stowed

547
00:23:09,609 --> 00:23:07,399
and we have a stowage locations and

548
00:23:11,139 --> 00:23:09,619
things like that but as things get moved

549
00:23:12,490 --> 00:23:11,149
around it becomes a little more

550
00:23:14,140 --> 00:23:12,500
challenging

551
00:23:16,390 --> 00:23:14,150
for us to find things on shuttle but

552
00:23:18,250 --> 00:23:16,400
fortunately the shuttle has a much

553
00:23:21,580 --> 00:23:18,260
smaller space in the space station it

554
00:23:23,650 --> 00:23:21,590
can only go so far our last question is

555
00:23:25,510 --> 00:23:23,660
for Eric both are there any basic tasks

556
00:23:32,230 --> 00:23:25,520
that are much harder or easier to do in

557
00:23:34,300 --> 00:23:32,240
space yes - but both they're much harder

558
00:23:36,910 --> 00:23:34,310
things and much easier things let me do

559
00:23:38,200 --> 00:23:36,920
an example for harder yesterday I was in

560
00:23:39,670 --> 00:23:38,210
the module that we brought up on

561
00:23:44,470 --> 00:23:39,680
discovery the permanent multi-purpose

562
00:23:45,730 --> 00:23:44,480
module and I had to take off 22 bolts

563
00:23:48,760 --> 00:23:45,740

that were in there and they also had on

564
00:23:50,500 --> 00:23:48,770
the the fasteners were free so as soon

565
00:23:52,870 --> 00:23:50,510
as you the watcher that was on it could

566
00:23:55,240 --> 00:23:52,880
come free and be released so basically

567
00:23:57,880 --> 00:23:55,250
44 parts on earth you could just take a

568
00:24:00,070 --> 00:23:57,890
drill do all those let the let the

569
00:24:01,570 --> 00:24:00,080
screws sit there but in space they would

570
00:24:03,100 --> 00:24:01,580
actually float away and those pieces

571
00:24:04,600 --> 00:24:03,110
would get lost might get stuck some more

572
00:24:05,830 --> 00:24:04,610
so that test makes it much harder

573
00:24:07,270 --> 00:24:05,840
because every one of them you have to

574
00:24:08,710 --> 00:24:07,280
make sure that you pull it off by hand

575
00:24:09,550 --> 00:24:08,720
and stick it into a bag so that it

576
00:24:11,920 --> 00:24:09,560
doesn't get lost

577
00:24:13,630 --> 00:24:11,930
on the much easier side moving a rack a

578
00:24:15,640 --> 00:24:13,640
lot of our racks on the space station or

579
00:24:17,320 --> 00:24:15,650
about the size of a refrigerator weigh

580
00:24:19,360 --> 00:24:17,330
anywhere from 500 to a thousand pounds

581
00:24:21,760 --> 00:24:19,370
you can pick that out and leave it with

582
00:24:23,470 --> 00:24:21,770
one person and move it around from place

583
00:24:25,480 --> 00:24:23,480
to place you know like moving on a piano

584
00:24:27,130 --> 00:24:25,490
on the ground is usually considered a

585
00:24:29,170 --> 00:24:27,140
very difficult task in space if you had

586
00:24:32,190 --> 00:24:29,180
a piano up here would be significantly

587
00:24:34,270 --> 00:24:32,200
easier moving it from point A to point B

588
00:24:40,510 --> 00:24:34,280

thank you all so much for joining us

589
00:24:43,240 --> 00:24:40,520
today and answering our questions well

590
00:24:48,100 --> 00:24:43,250
you're welcome and thanks for joining us

591
00:24:50,230 --> 00:24:48,110
we we enjoyed your questions discovery

592
00:24:55,180 --> 00:24:50,240
ISS this is Houston ACR that concludes

593
00:24:58,240 --> 00:24:55,190
the event thank you thank you discovery

594
00:25:01,030 --> 00:24:58,250
ISS and NASA educational technology

595
00:25:07,720 --> 00:25:01,040
services we are now resuming normal

596
00:25:10,060 --> 00:25:07,730
audio communications this is Mission

597
00:25:11,500 --> 00:25:10,070
Control Houston the expedition 26 crew

598
00:25:13,420 --> 00:25:11,510
and Discovery's crew they are finishing

599
00:25:14,920 --> 00:25:13,430
up an education event answering some