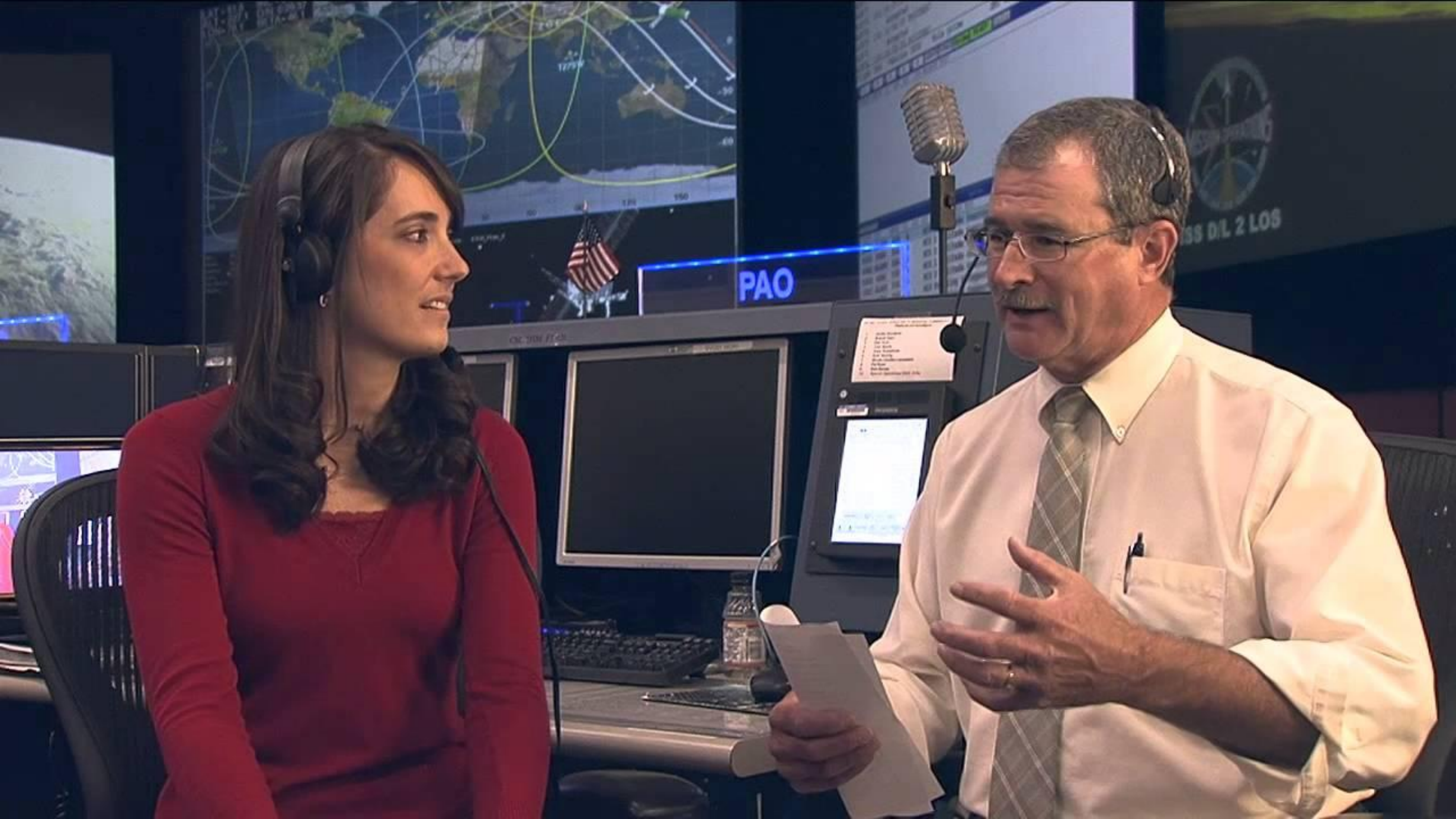
PAO

1
00:00:05,749 --> 00:00:04,070
a good morning everyone i'm pat ryan

2
00:00:07,829 --> 00:00:05,759
with the public affairs office here at

3
00:00:10,230 --> 00:00:07,839
the johnson space center in houston with

4
00:00:13,110 --> 00:00:10,240
me is megan levins she is one of the

5
00:00:15,270 --> 00:00:13,120
senior robotics instructors here and is

6
00:00:17,109 --> 00:00:15,280
currently getting certified to be a

7
00:00:19,109 --> 00:00:17,119
robotics officer to work here in the

8
00:00:21,189 --> 00:00:19,119
mission control room uh tell me real

9
00:00:23,670 --> 00:00:21,199
quickly about how you got interested in

10
00:00:25,189 --> 00:00:23,680
in that area of work

11
00:00:27,109 --> 00:00:25,199
well i've always been interested in the

12
00:00:28,710 --> 00:00:27,119
space program and who doesn't want to

13
00:00:31,349 --> 00:00:28,720

fly robots in space so it seemed like

14
00:00:32,790 --> 00:00:31,359
the right place to go um

15
00:00:34,310 --> 00:00:32,800
i grew up in hawaii where we have very

16
00:00:36,229 --> 00:00:34,320
clear skies and you get a really nice

17
00:00:38,950 --> 00:00:36,239
view of those stars at night and it's

18
00:00:41,670 --> 00:00:38,960
inspiring nice nice well we're ready to

19
00:00:43,670 --> 00:00:41,680
to find out what the you guys

20
00:00:46,549 --> 00:00:43,680
in pennsylvania are interested in

21
00:00:48,950 --> 00:00:46,559
my name is valeria and my question is

22
00:00:52,069 --> 00:00:48,960
how much training do you have to do to

23
00:00:53,830 --> 00:00:52,079
become a robotics engineer

24
00:00:55,990 --> 00:00:53,840
well to be a robotics engineer there's a

25
00:00:57,750 --> 00:00:56,000
lot of training you go through once you

26
00:01:00,630 --> 00:00:57,760
get out of college or university and

27
00:01:02,150 --> 00:01:00,640
come to nasa it's many years of training

28
00:01:04,390 --> 00:01:02,160
and you start off with writing

29
00:01:05,990 --> 00:01:04,400
procedures for crew members and learning

30
00:01:07,670 --> 00:01:06,000
all you can about your robotic system

31
00:01:09,830 --> 00:01:07,680
before you can come into mission control

32
00:01:11,830 --> 00:01:09,840
and and start moving the robots in space

33
00:01:15,830 --> 00:01:11,840
so it's a long process and there's lots

34
00:01:19,270 --> 00:01:15,840
to learn but it's a very interesting one

35
00:01:21,590 --> 00:01:19,280
hello my name is claire and my question

36
00:01:25,429 --> 00:01:21,600
is what controller would you call the

37
00:01:27,270 --> 00:01:25,439
brain of the mission control center

38
00:01:28,870 --> 00:01:27,280

the brain

39
00:01:30,630 --> 00:01:28,880
that's a tough one a lot of people would

40
00:01:33,190 --> 00:01:30,640
say that that's the the flight director

41
00:01:35,429 --> 00:01:33,200
flight director is the person who's in

42
00:01:36,149 --> 00:01:35,439
charge of the whole team there's a team

43
00:01:40,870 --> 00:01:36,159
of

44
00:01:42,389 --> 00:01:40,880
them looking at just a specific system

45
00:01:44,789 --> 00:01:42,399
but they're all reporting to the flight

46
00:01:46,789 --> 00:01:44,799
director who has to keep track of what's

47
00:01:48,469 --> 00:01:46,799
going on on all of those systems all the

48
00:01:50,550 --> 00:01:48,479
time to make sure that the different

49
00:01:51,670 --> 00:01:50,560
components all work well with one

50
00:01:52,789 --> 00:01:51,680
another

51
00:01:54,069 --> 00:01:52,799
but if you think it's not the flight

52
00:01:56,389 --> 00:01:54,079
director it's probably the people who

53
00:01:58,950 --> 00:01:56,399
bring the snacks

54
00:02:01,350 --> 00:01:58,960
hello my name is gabriel and my question

55
00:02:02,950 --> 00:02:01,360
is who is the most important person in

56
00:02:06,389 --> 00:02:02,960
the space station

57
00:02:07,830 --> 00:02:06,399
flight control room and why

58
00:02:10,309 --> 00:02:07,840
most important person would be the

59
00:02:12,309 --> 00:02:10,319
robotics officer wouldn't it always yeah

60
00:02:13,910 --> 00:02:12,319
well i have to say the most important

61
00:02:16,309 --> 00:02:13,920
person is probably the person that has

62
00:02:17,750 --> 00:02:16,319
the most going on at that time you never

63
00:02:19,670 --> 00:02:17,760

know what can happen on a space station

64
00:02:21,830 --> 00:02:19,680
so whoever's whether it's the robotic

65
00:02:23,270 --> 00:02:21,840
system or we have astronauts outside

66
00:02:24,470 --> 00:02:23,280
whoever has the most information and

67
00:02:26,070 --> 00:02:24,480
knows what's going on is probably the

68
00:02:28,470 --> 00:02:26,080
most important person

69
00:02:31,270 --> 00:02:28,480
after the snacks

70
00:02:33,270 --> 00:02:31,280
hi my name is emma and my question is if

71
00:02:35,350 --> 00:02:33,280
a crew member gets hurt or sick and they

72
00:02:37,990 --> 00:02:35,360
need surgery is there always a doctor on

73
00:02:43,670 --> 00:02:40,869
there are it is not always an actual

74
00:02:45,830 --> 00:02:43,680
doctor on board but there is always one

75
00:02:47,350 --> 00:02:45,840
member of the crew who is trained as a

76
00:02:50,390 --> 00:02:47,360
medical officer

77
00:02:52,710 --> 00:02:50,400
in some cases you have a doctor or two

78
00:02:54,470 --> 00:02:52,720
doctors who may be on board at the time

79
00:02:57,750 --> 00:02:54,480
and so far we've been lucky enough that

80
00:02:59,830 --> 00:02:57,760
nobody has had to have surgery but all

81
00:03:01,990 --> 00:02:59,840
of the crew members get trained in not

82
00:03:03,910 --> 00:03:02,000
only first aid but also some more

83
00:03:05,589 --> 00:03:03,920
advanced things to take care of their

84
00:03:07,030 --> 00:03:05,599
crewmates just in case somebody does get

85
00:03:09,990 --> 00:03:07,040
hurt

86
00:03:11,830 --> 00:03:10,000
hi my name is jassidy and my question is

87
00:03:13,990 --> 00:03:11,840
do the team switch on and off so that

88
00:03:18,229 --> 00:03:14,000

they can get sleep if so how does it

89
00:03:19,750 --> 00:03:18,239
work and when do the teams take a break

90
00:03:22,149 --> 00:03:19,760
i think when the team switch over might

91
00:03:24,309 --> 00:03:22,159
be one of my favorite parts of the day

92
00:03:25,750 --> 00:03:24,319
we have about three teams that run in

93
00:03:27,190 --> 00:03:25,760
mission control

94
00:03:28,550 --> 00:03:27,200
every day of the week all year round

95
00:03:30,149 --> 00:03:28,560
even on christmas

96
00:03:31,589 --> 00:03:30,159
so luckily they only have to work one

97
00:03:32,789 --> 00:03:31,599
shift a day and then the next shift will

98
00:03:34,309 --> 00:03:32,799
come on so we can all go home and get

99
00:03:36,229 --> 00:03:34,319
some rest

100
00:03:38,789 --> 00:03:36,239
so the day gets split up into into

101
00:03:40,550 --> 00:03:38,799
thirds really so any the teams that are

102
00:03:41,830 --> 00:03:40,560
here are here for

103
00:03:43,670 --> 00:03:41,840
uh about

104
00:03:45,509 --> 00:03:43,680
seven or eight hours in the room they

105
00:03:46,869 --> 00:03:45,519
come in and they find out from the

106
00:03:49,350 --> 00:03:46,879
person in front of them what's been

107
00:03:50,869 --> 00:03:49,360
going on then they take over and then at

108
00:03:52,949 --> 00:03:50,879
the end of the shift the next person

109
00:03:55,750 --> 00:03:52,959
comes in and you brief them about what's

110
00:03:58,309 --> 00:03:55,760
going on so that they can take over

111
00:04:01,670 --> 00:03:58,319
hello my name is gavin i would like to

112
00:04:03,509 --> 00:04:01,680
know how long is your shift

113
00:04:05,589 --> 00:04:03,519

well as a robotics officer my shifts are

114
00:04:07,429 --> 00:04:05,599
actually a little different than a lot

115
00:04:09,190 --> 00:04:07,439
of the other timbers like we said

116
00:04:11,110 --> 00:04:09,200
when you're here all the time your shift

117
00:04:12,630 --> 00:04:11,120
is roughly seven hours and then you pass

118
00:04:14,470 --> 00:04:12,640
off to the next person

119
00:04:17,030 --> 00:04:14,480
for robotic chips we can go from seven

120
00:04:19,349 --> 00:04:17,040
to 12 hours depending on what kind of

121
00:04:21,270 --> 00:04:19,359
task we have for that day and then we're

122
00:04:22,790 --> 00:04:21,280
off for the rest of the day so ours may

123
00:04:24,950 --> 00:04:22,800
be a little longer but we have we're not

124
00:04:27,030 --> 00:04:24,960
always here all the time

125
00:04:29,110 --> 00:04:27,040
hello my name is bella and i would like

126
00:04:30,550 --> 00:04:29,120
to know what is your favorite and least

127
00:04:32,629 --> 00:04:30,560
favorite part of working at mission

128
00:04:34,790 --> 00:04:32,639
control

129
00:04:36,550 --> 00:04:34,800
okay that's a good question

130
00:04:38,629 --> 00:04:36,560
i have to say my favorite part is every

131
00:04:40,150 --> 00:04:38,639
time i get to talk to an astronaut in

132
00:04:42,550 --> 00:04:40,160
space there's nothing like talking to

133
00:04:44,550 --> 00:04:42,560
somebody who you know is orbiting miles

134
00:04:46,790 --> 00:04:44,560
and miles and miles above you and doing

135
00:04:48,070 --> 00:04:46,800
some robotic tasks or another activity

136
00:04:49,590 --> 00:04:48,080
and getting to talk to them and get

137
00:04:51,510 --> 00:04:49,600
their thoughts and what they have going

138
00:04:53,189 --> 00:04:51,520

on in their day and in your job you

139
00:04:55,270 --> 00:04:53,199
folks do get to talk to them while

140
00:04:58,390 --> 00:04:55,280
they're in the midst of these of moving

141
00:05:00,870 --> 00:04:58,400
flying these big robots around we do um

142
00:05:02,629 --> 00:05:00,880
for robotics we do a lot of activities

143
00:05:04,150 --> 00:05:02,639
free flyer captures when new vehicles

144
00:05:05,670 --> 00:05:04,160
are coming up and then we also train for

145
00:05:06,950 --> 00:05:05,680
them as well so not only do i get to

146
00:05:08,629 --> 00:05:06,960
talk to them about the activity they're

147
00:05:10,710 --> 00:05:08,639
doing but also in all their training

148
00:05:12,230 --> 00:05:10,720
sessions as they get ready

149
00:05:13,749 --> 00:05:12,240
i'd say my least favorite part is

150
00:05:15,189 --> 00:05:13,759
probably comes around two in the morning

151
00:05:16,629 --> 00:05:15,199
when you're still on console and ready

152
00:05:19,749 --> 00:05:16,639
to go home and it is way past your

153
00:05:27,350 --> 00:05:22,950
hi my name is reagan and what is your

154
00:05:31,830 --> 00:05:30,070
my favorite training exercise

155
00:05:33,029 --> 00:05:31,840
well you know here at jsc or johnson

156
00:05:34,710 --> 00:05:33,039
space center we have the neutral

157
00:05:36,950 --> 00:05:34,720
buoyancy lab and in the neutral buoyancy

158
00:05:38,790 --> 00:05:36,960
lab it's this huge pool with the almost

159
00:05:40,550 --> 00:05:38,800
exact replica of the whole space station

160
00:05:42,870 --> 00:05:40,560
at least parts of it and they have a

161
00:05:44,390 --> 00:05:42,880
robotic arm that is under water and can

162
00:05:46,070 --> 00:05:44,400
move around in this pool just like we do

163
00:05:47,830 --> 00:05:46,080

in space so my favorite training

164
00:05:50,150 --> 00:05:47,840
exercise is when we get to go there and

165
00:05:51,830 --> 00:05:50,160
put a crew member in their astronaut

166
00:05:54,150 --> 00:05:51,840
suit in the water and they're under

167
00:05:55,830 --> 00:05:54,160
water and on the robotic arm doing

168
00:05:57,510 --> 00:05:55,840
activities and i can fly the arm around

169
00:05:59,590 --> 00:05:57,520
with them on it it's my favorite part of

170
00:06:01,029 --> 00:05:59,600
the day that's an example of what's

171
00:06:02,629 --> 00:06:01,039
going on in the neutral buoyancy

172
00:06:04,710 --> 00:06:02,639
laboratory it's what it looks like from

173
00:06:07,110 --> 00:06:04,720
one of the cameras that the divers have

174
00:06:09,270 --> 00:06:07,120
that they're floating around making sure

175
00:06:11,590 --> 00:06:09,280
that the astronauts are safe but also

176
00:06:13,670 --> 00:06:11,600
giving the the instructors a good

177
00:06:15,830 --> 00:06:13,680
close-up look at what the astronauts are

178
00:06:17,990 --> 00:06:15,840
doing so that they can get better

179
00:06:19,909 --> 00:06:18,000
information and help the astronauts

180
00:06:22,070 --> 00:06:19,919
become better prepared to do those tasks

181
00:06:25,110 --> 00:06:22,080
when they get in space

182
00:06:29,990 --> 00:06:25,120
hello my name is braden how and when did

183
00:06:34,469 --> 00:06:32,710
i've been interested in robotics and

184
00:06:36,230 --> 00:06:34,479
more specifically the space station

185
00:06:39,189 --> 00:06:36,240
since i was a little kid well in space

186
00:06:40,790 --> 00:06:39,199
since i was a little kid

187
00:06:42,629 --> 00:06:40,800
robotics has always been interesting you

188
00:06:44,309 --> 00:06:42,639

know i was always really excited for my

189
00:06:46,070 --> 00:06:44,319
math and my science classes and those

190
00:06:47,510 --> 00:06:46,080
are my favorite parts of my school day

191
00:06:48,870 --> 00:06:47,520
and from there you go to college and you

192
00:06:50,790 --> 00:06:48,880
get to learn more about the robotics and

193
00:06:53,110 --> 00:06:50,800
you build things with you know like you

194
00:06:54,629 --> 00:06:53,120
guys with your lego robots and it was

195
00:06:56,550 --> 00:06:54,639
just really fun and i wanted to do that

196
00:06:59,830 --> 00:06:56,560
forever

197
00:07:01,830 --> 00:06:59,840
hello my name is ella my question is did

198
00:07:05,670 --> 00:07:01,840
anything in your childhood inspire you

199
00:07:07,909 --> 00:07:05,680
to work with robotics and or nasa

200
00:07:09,430 --> 00:07:07,919
as a big fan of my lego set

201
00:07:10,950 --> 00:07:09,440
anytime you get to build robots with

202
00:07:14,710 --> 00:07:10,960
legos and then you get to do it on a

203
00:07:17,189 --> 00:07:14,720
much larger scale it's pretty exciting

204
00:07:19,110 --> 00:07:17,199
hello my name is alex can you give us

205
00:07:21,990 --> 00:07:19,120
any tips on what to study if we are

206
00:07:23,990 --> 00:07:22,000
interested in robotics

207
00:07:25,749 --> 00:07:24,000
i think you definitely should pay real

208
00:07:28,150 --> 00:07:25,759
close attention in your math and science

209
00:07:30,230 --> 00:07:28,160
classes

210
00:07:32,150 --> 00:07:30,240
those were the basis and everything

211
00:07:33,830 --> 00:07:32,160
builds from there so if you're you know

212
00:07:34,790 --> 00:07:33,840
paying attention and really studying up

213
00:07:36,230 --> 00:07:34,800

on there and then when you get to

214
00:07:37,909 --> 00:07:36,240
college you'll study math and science

215
00:07:40,950 --> 00:07:37,919
there and it just keeps going

216
00:07:42,710 --> 00:07:40,960
are there particular kinds of math or or

217
00:07:45,029 --> 00:07:42,720
different areas of science that you

218
00:07:47,110 --> 00:07:45,039
found to be most helpful

219
00:07:48,790 --> 00:07:47,120
um

220
00:07:50,869 --> 00:07:48,800
i mean math is math is our universal

221
00:07:55,430 --> 00:07:50,879
language so it applies all kinds of math

222
00:07:58,469 --> 00:07:56,710
all the engineering stuff you know

223
00:08:00,790 --> 00:07:58,479
building things or getting to work with

224
00:08:02,950 --> 00:08:00,800
your hands all of that applies and worry

225
00:08:05,110 --> 00:08:02,960
the basics of those

226
00:08:07,029 --> 00:08:05,120
hi my name is maggie and i would like to

227
00:08:10,070 --> 00:08:07,039
know what you find most interesting

228
00:08:12,710 --> 00:08:10,080
about robotics and why

229
00:08:14,070 --> 00:08:12,720
most interesting about robotics

230
00:08:15,189 --> 00:08:14,080
you know one of the most

231
00:08:17,830 --> 00:08:15,199
the greatest things i think about

232
00:08:19,990 --> 00:08:17,840
robotics is you are working and moving

233
00:08:23,029 --> 00:08:20,000
something that is miles and miles above

234
00:08:24,550 --> 00:08:23,039
you i come to work every day and i get

235
00:08:26,230 --> 00:08:24,560
to move around a robot that i will never

236
00:08:28,070 --> 00:08:26,240
see in real life i only get to see it

237
00:08:29,510 --> 00:08:28,080
through my camera views and my my

238
00:08:32,469 --> 00:08:29,520

workstation

239
00:08:34,630 --> 00:08:32,479
but here i am moving something you know

240
00:08:36,469 --> 00:08:34,640
all over a space station that's miles

241
00:08:39,589 --> 00:08:36,479
away from me without actually ever

242
00:08:42,709 --> 00:08:39,599
touching it and that arm is huge it is

243
00:08:44,710 --> 00:08:42,719
it's seven meters 11 meters huge the

244
00:08:47,190 --> 00:08:44,720
main arm on the international space

245
00:08:49,269 --> 00:08:47,200
station is over 50 feet long i don't

246
00:08:50,230 --> 00:08:49,279
remember how much it weighs on earth but

247
00:08:53,030 --> 00:08:50,240
uh

248
00:08:54,710 --> 00:08:53,040
it's not small it's it go across this

249
00:08:56,870 --> 00:08:54,720
room

250
00:08:58,150 --> 00:08:56,880
my name is evan and my question is

251
00:09:00,150 --> 00:08:58,160
working at

252
00:09:02,310 --> 00:09:00,160
mission control how many experiments

253
00:09:06,550 --> 00:09:02,320
have you supervised and finished with

254
00:09:10,070 --> 00:09:08,150
that's one of the fun things about the

255
00:09:11,110 --> 00:09:10,080
space station and specifically robotics

256
00:09:14,470 --> 00:09:11,120
is we

257
00:09:16,389 --> 00:09:14,480
help start so many experiments i mean we

258
00:09:18,230 --> 00:09:16,399
put the alpha magnetic spectrometer

259
00:09:20,150 --> 00:09:18,240
outside on part of the space station and

260
00:09:23,350 --> 00:09:20,160
it's still to this day looking at the

261
00:09:25,269 --> 00:09:23,360
cosmic rays and how the universe is made

262
00:09:27,269 --> 00:09:25,279
i don't know of any experiment that

263
00:09:29,829 --> 00:09:27,279

we've really completed as we just keep

264
00:09:31,829 --> 00:09:29,839
learning more and we keep going and we

265
00:09:35,110 --> 00:09:31,839
get to work with you know installing

266
00:09:37,910 --> 00:09:35,120
these new modules or free flyers like

267
00:09:39,990 --> 00:09:37,920
the dragon vehicle from spacex and the

268
00:09:41,350 --> 00:09:40,000
orbital vehicles and they bring more

269
00:09:43,350 --> 00:09:41,360
science experiments so the science just

270
00:09:44,230 --> 00:09:43,360
keeps going and we in robotics just help

271
00:09:46,230 --> 00:09:44,240
to keep

272
00:09:47,990 --> 00:09:46,240
keep all these experiments coming and

273
00:09:49,910 --> 00:09:48,000
it's a good example too because there's

274
00:09:51,110 --> 00:09:49,920
another one of those dragon spacecraft

275
00:09:53,990 --> 00:09:51,120
that's supposed to be coming up to the

276
00:09:56,710 --> 00:09:54,000
station next week and your arm is is

277
00:09:58,710 --> 00:09:56,720
critical to getting it there we will be

278
00:10:01,750 --> 00:09:58,720
capturing and installing the

279
00:10:04,949 --> 00:10:01,760
third fourth dragon dragon 3 on the 16th

280
00:10:07,350 --> 00:10:04,959
of april we're very excited

281
00:10:08,949 --> 00:10:07,360
my name is eric and my question is what

282
00:10:11,269 --> 00:10:08,959
is the most challenging project you have

283
00:10:12,949 --> 00:10:11,279
worked on

284
00:10:14,949 --> 00:10:12,959
gosh i have to say the most challenging

285
00:10:16,949 --> 00:10:14,959
project i've ever worked on

286
00:10:19,030 --> 00:10:16,959
was when we first started capturing

287
00:10:21,590 --> 00:10:19,040
these free flying vehicles and the first

288
00:10:23,670 --> 00:10:21,600

one that came was an htv from japanese

289
00:10:25,750 --> 00:10:23,680
space agency and it was something that

290
00:10:28,150 --> 00:10:25,760
had never been done before and not

291
00:10:30,150 --> 00:10:28,160
something we had were had ever

292
00:10:31,509 --> 00:10:30,160
really looked into and i got to help and

293
00:10:33,190 --> 00:10:31,519
be on the team that looked into doing

294
00:10:34,630 --> 00:10:33,200
this for the first time how are we going

295
00:10:36,230 --> 00:10:34,640
to train these crew members and what are

296
00:10:38,230 --> 00:10:36,240
we going to do and what does this

297
00:10:39,910 --> 00:10:38,240
operation really look like all from from

298
00:10:42,230 --> 00:10:39,920
scratch all the way until it actually

299
00:10:43,430 --> 00:10:42,240
was captured that first day in 2009 so

300
00:10:44,630 --> 00:10:43,440
it's really nice to be on something all

301
00:10:46,710 --> 00:10:44,640
the way from the beginning and get to

302
00:10:47,750 --> 00:10:46,720
imagine it and see it played out and

303
00:10:49,509 --> 00:10:47,760
it's it

304
00:10:51,190 --> 00:10:49,519
if you haven't done it it's hard to

305
00:10:53,190 --> 00:10:51,200
imagine because we're talking about a

306
00:10:54,710 --> 00:10:53,200
space station and another thing that are

307
00:10:57,590 --> 00:10:54,720
both moving at

308
00:11:00,150 --> 00:10:57,600
five miles a second and you have to get

309
00:11:01,990 --> 00:11:00,160
them relatively so that they they are

310
00:11:05,350 --> 00:11:02,000
still so that you can reach out with a

311
00:11:11,350 --> 00:11:05,360
giant robot and grab the other thing

312
00:11:16,310 --> 00:11:14,389
hi my name is julia and my question is

313
00:11:18,710 --> 00:11:16,320

by what year would a manned mission to

314
00:11:20,949 --> 00:11:18,720
mars be possible

315
00:11:22,790 --> 00:11:20,959
go ahead

316
00:11:23,750 --> 00:11:22,800
oh gosh i don't know if i can put a year

317
00:11:25,590 --> 00:11:23,760
on that

318
00:11:26,949 --> 00:11:25,600
i think it will be sooner than we all

319
00:11:28,870 --> 00:11:26,959
think and i hope it's sooner than we

320
00:11:30,550 --> 00:11:28,880
think and it will definitely be in one

321
00:11:32,230 --> 00:11:30,560
of our lifetimes and who knows maybe you

322
00:11:34,389 --> 00:11:32,240
could be the first

323
00:11:35,670 --> 00:11:34,399
hello my name is eric reed and my

324
00:11:37,670 --> 00:11:35,680
question is

325
00:11:39,350 --> 00:11:37,680
on what planets have you sent the rover

326
00:11:43,670 --> 00:11:39,360
to

327
00:11:45,190 --> 00:11:43,680
and i think mars is the only planet we

328
00:11:47,350 --> 00:11:45,200
have sent rovers to

329
00:11:49,269 --> 00:11:47,360
we also had manned rovers during the

330
00:11:50,069 --> 00:11:49,279
apollo program on the moon but mars is

331
00:11:55,269 --> 00:11:50,079
our

332
00:11:57,670 --> 00:11:55,279
my name is martine and my question is

333
00:11:59,829 --> 00:11:57,680
how many robots have you built

334
00:12:02,550 --> 00:11:59,839
well on the space station we have a few

335
00:12:04,790 --> 00:12:02,560
robotic arms the canadian space agency

336
00:12:06,790 --> 00:12:04,800
has two and there's the space station

337
00:12:09,509 --> 00:12:06,800
robotic manipulator which is the arm i

338
00:12:11,350 --> 00:12:09,519

work with the most and it's the one that

339
00:12:13,670 --> 00:12:11,360
helps with our when our astronauts are

340
00:12:15,190 --> 00:12:13,680
outside and with and we have these

341
00:12:16,310 --> 00:12:15,200
vehicles coming up and captures them out

342
00:12:17,509 --> 00:12:16,320
of the sky

343
00:12:20,470 --> 00:12:17,519
and then we also have the special

344
00:12:23,190 --> 00:12:20,480
purpose dextrous manipulator and he does

345
00:12:25,590 --> 00:12:23,200
even small tasks with payloads and

346
00:12:27,590 --> 00:12:25,600
and really fine you know tuning things

347
00:12:29,590 --> 00:12:27,600
and he works with different tools

348
00:12:31,670 --> 00:12:29,600
and then the japanese space agency also

349
00:12:33,430 --> 00:12:31,680
built a robot and they have two robots

350
00:12:35,750 --> 00:12:33,440
up there as well

351
00:12:37,590 --> 00:12:35,760
hi my name is madeline and my question

352
00:12:40,310 --> 00:12:37,600
is are there any robots that have a mind

353
00:12:41,509 --> 00:12:40,320
of their own or are they all programmed

354
00:12:44,310 --> 00:12:41,519
actually i've worked for a couple of

355
00:12:45,590 --> 00:12:44,320
robots that had a mind of their own

356
00:12:46,949 --> 00:12:45,600
if they have a mind of their own they

357
00:12:48,550 --> 00:12:46,959
haven't told me yet they're very

358
00:12:49,829 --> 00:12:48,560
secretive but most of them are

359
00:12:51,110 --> 00:12:49,839
programmed but they're programmed so

360
00:12:52,710 --> 00:12:51,120
well you would think they have a mind of

361
00:12:55,190 --> 00:12:52,720
their own

362
00:12:57,590 --> 00:12:55,200
hi my name is hannah and my question is

363
00:12:59,110 --> 00:12:57,600

how do you train for operations on the

364
00:13:00,550 --> 00:12:59,120
iss

365
00:13:02,870 --> 00:13:00,560
well when i'm training to work in

366
00:13:04,870 --> 00:13:02,880
mission control we do these

367
00:13:06,310 --> 00:13:04,880
we do simulations and we do it with the

368
00:13:07,350 --> 00:13:06,320
whole team and it's really exciting

369
00:13:09,269 --> 00:13:07,360
because we'll

370
00:13:11,110 --> 00:13:09,279
you know pretend to do a put the

371
00:13:12,870 --> 00:13:11,120
astronauts outside and we'll have real

372
00:13:14,949 --> 00:13:12,880
crew members participating and we'll

373
00:13:16,310 --> 00:13:14,959
have look at all of our data and get

374
00:13:18,470 --> 00:13:16,320
everything just like it's the real day

375
00:13:20,069 --> 00:13:18,480
but it's a simulation and the whole team

376
00:13:21,910 --> 00:13:20,079
gets to work together and work through

377
00:13:23,829 --> 00:13:21,920
different scenarios that our training

378
00:13:24,790 --> 00:13:23,839
counterparts have come up with

379
00:13:26,870 --> 00:13:24,800
you know

380
00:13:27,670 --> 00:13:26,880
rescuing a crew member or

381
00:13:30,790 --> 00:13:27,680
you know

382
00:13:32,310 --> 00:13:30,800
any kind of failure you might have in

383
00:13:33,910 --> 00:13:32,320
your house is just magnified on the

384
00:13:35,670 --> 00:13:33,920
space station and we plan for it and

385
00:13:37,590 --> 00:13:35,680
train for it it's really exciting to get

386
00:13:40,310 --> 00:13:37,600
everybody together in a room and work

387
00:13:42,470 --> 00:13:40,320
through these different scenarios

388
00:13:44,949 --> 00:13:42,480

my name is olivia and my question is

389
00:13:46,550 --> 00:13:44,959
what kind of instruments do you use

390
00:13:48,870 --> 00:13:46,560
well when we use bunch of different

391
00:13:50,629 --> 00:13:48,880
instruments when we do training we have

392
00:13:52,949 --> 00:13:50,639
the virtual reality lab where our

393
00:13:54,230 --> 00:13:52,959
astronauts and and flight controllers

394
00:13:56,310 --> 00:13:54,240
can train where you actually put a

395
00:13:58,069 --> 00:13:56,320
helmet on like a virtual reality helmet

396
00:13:59,350 --> 00:13:58,079
and you can look out of this helmet and

397
00:14:01,509 --> 00:13:59,360
it looks just like you're on a space

398
00:14:03,670 --> 00:14:01,519
station and there we have a robotic arm

399
00:14:05,350 --> 00:14:03,680
that we can drive around just like we do

400
00:14:07,189 --> 00:14:05,360
and the remember in their helmet can see

401
00:14:08,710 --> 00:14:07,199
it and we see it in our in our simulated

402
00:14:09,509 --> 00:14:08,720
camera views

403
00:14:11,110 --> 00:14:09,519
um

404
00:14:13,269 --> 00:14:11,120
on the real day we get telemetry to a

405
00:14:15,030 --> 00:14:13,279
computer very similar to how you can

406
00:14:16,629 --> 00:14:15,040
download books on the internet and it

407
00:14:17,990 --> 00:14:16,639
just comes from space station so we can

408
00:14:19,189 --> 00:14:18,000
see everything that's going on up there

409
00:14:20,629 --> 00:14:19,199
and look at where

410
00:14:22,310 --> 00:14:20,639
where everything is

411
00:14:23,990 --> 00:14:22,320
the big thing is our cameras we use a

412
00:14:25,910 --> 00:14:24,000
lot of cameras

413
00:14:28,870 --> 00:14:25,920

i believe that's the um the last of the

414
00:14:31,030 --> 00:14:28,880
student questions we have

415
00:14:33,110 --> 00:14:31,040
all right real quickly this is michael

416
00:14:35,110 --> 00:14:33,120
here at nasa's digital learning network

417
00:14:36,470 --> 00:14:35,120
just wanted to see do you guys have any

418
00:14:38,629 --> 00:14:36,480
additional ones maybe that weren't

419
00:14:40,310 --> 00:14:38,639
written down initially that you uh

420
00:14:42,710 --> 00:14:40,320
thought about as we did our first

421
00:14:43,670 --> 00:14:42,720
portion or you actually connected with

422
00:14:45,030 --> 00:14:43,680
uh

423
00:14:47,910 --> 00:14:45,040
myself

424
00:14:50,389 --> 00:14:47,920
looks like we got a few hands

425
00:14:52,629 --> 00:14:50,399
hi my name is isaac and i would like to

426
00:14:55,110 --> 00:14:52,639
ask what programming language do you use

427
00:14:56,829 --> 00:14:55,120
to program robots

428
00:14:58,870 --> 00:14:56,839
that is a great

429
00:15:00,230 --> 00:14:58,880
question and i'm not actually on the

430
00:15:02,069 --> 00:15:00,240
program team and i don't know the

431
00:15:04,310 --> 00:15:02,079
specific language as i mentioned the arm

432
00:15:06,069 --> 00:15:04,320
is built by the canadian space agency

433
00:15:07,990 --> 00:15:06,079
and they took care of all of that for us

434
00:15:09,269 --> 00:15:08,000
what we get to deal with a lot is more

435
00:15:11,269 --> 00:15:09,279
like what that looks like on our

436
00:15:12,389 --> 00:15:11,279
computer screens with the data that

437
00:15:13,990 --> 00:15:12,399
comes down and how it's already

438
00:15:19,430 --> 00:15:14,000

processed

439
00:15:24,550 --> 00:15:21,670
it's a combination actually there is an

440
00:15:26,629 --> 00:15:24,560
official language that's english

441
00:15:28,389 --> 00:15:26,639
but right now for example you've got

442
00:15:31,430 --> 00:15:28,399
crew members who are from the united

443
00:15:33,670 --> 00:15:31,440
states and from russia and japan and of

444
00:15:34,949 --> 00:15:33,680
course they all speak their own native

445
00:15:36,550 --> 00:15:34,959
languages

446
00:15:38,470 --> 00:15:36,560
because they've been training together

447
00:15:40,790 --> 00:15:38,480
for a long time and working together to

448
00:15:42,949 --> 00:15:40,800
prepare for the flight and then fly it

449
00:15:44,790 --> 00:15:42,959
they've all learned a little bit of all

450
00:15:46,310 --> 00:15:44,800
the other languages and i've heard some

451
00:15:48,150 --> 00:15:46,320
crews say that they've really developed

452
00:15:49,749 --> 00:15:48,160
a language of their own they can always

453
00:15:52,069 --> 00:15:49,759
communicate with each other through some

454
00:15:55,030 --> 00:15:52,079
combination of english and russian

455
00:15:57,509 --> 00:15:55,040
we also have european astronauts who fly

456
00:15:59,670 --> 00:15:57,519
who bring a variety of their languages

457
00:16:01,110 --> 00:15:59,680
as well so

458
00:16:02,470 --> 00:16:01,120
when they talk to the ground when they

459
00:16:04,150 --> 00:16:02,480
talk to houston they're speaking in

460
00:16:05,590 --> 00:16:04,160
english but they could be speaking in

461
00:16:08,230 --> 00:16:05,600
other languages when they talk to other

462
00:16:10,710 --> 00:16:08,240
control centers too

463
00:16:12,310 --> 00:16:10,720

my name is savannah

464
00:16:14,069 --> 00:16:12,320
my question is

465
00:16:16,870 --> 00:16:14,079
did your parents support you through

466
00:16:18,550 --> 00:16:16,880
what you wanted to do

467
00:16:20,870 --> 00:16:18,560
my parents were very supportive with

468
00:16:22,230 --> 00:16:20,880
what i wanted to do and encouraged me

469
00:16:23,990 --> 00:16:22,240
all through college and when i got the

470
00:16:25,430 --> 00:16:24,000
job here at nasa

471
00:16:27,350 --> 00:16:25,440
the space station is very exciting and

472
00:16:28,790 --> 00:16:27,360
my family was very excited when i chose

473
00:16:31,749 --> 00:16:28,800
this career path as well and supported

474
00:16:38,470 --> 00:16:34,949
hi my name is olivia i was wondering

475
00:16:40,949 --> 00:16:38,480
if you have a regular daily basis and if

476
00:16:42,629 --> 00:16:40,959
you do what is it

477
00:16:45,350 --> 00:16:42,639
a daily schedule

478
00:16:48,550 --> 00:16:45,360
a regular daily schedule

479
00:16:51,430 --> 00:16:48,560
um

480
00:16:53,430 --> 00:16:51,440
we do and we don't when

481
00:16:55,430 --> 00:16:53,440
there is nothing going on

482
00:16:57,749 --> 00:16:55,440
robotically on the space station our day

483
00:16:59,910 --> 00:16:57,759
looks just like a normal work day where

484
00:17:01,110 --> 00:16:59,920
we come into the office and we we work

485
00:17:02,470 --> 00:17:01,120
on our plans

486
00:17:03,910 --> 00:17:02,480
when it gets really interesting is when

487
00:17:05,750 --> 00:17:03,920
we do have robotics plans and those

488
00:17:07,350 --> 00:17:05,760

plans will go in and you find out about

489
00:17:09,110 --> 00:17:07,360
those weeks in advance you can really

490
00:17:11,029 --> 00:17:09,120
prepare for them and that's when you'll

491
00:17:12,630 --> 00:17:11,039
come in and you come onto console and

492
00:17:14,230 --> 00:17:12,640
you'll set up your workstation so you

493
00:17:16,069 --> 00:17:14,240
can see all the telemetry and the data

494
00:17:18,069 --> 00:17:16,079
that you need for whatever task it is

495
00:17:19,590 --> 00:17:18,079
you're doing that day and review the

496
00:17:21,350 --> 00:17:19,600
operation that you'll be doing that day

497
00:17:22,949 --> 00:17:21,360
and then actually execute it and you'll

498
00:17:25,189 --> 00:17:22,959
go through your shift and execute your

499
00:17:26,949 --> 00:17:25,199
procedures or whatever plan it is that

500
00:17:28,309 --> 00:17:26,959
you have in order to complete the task

501
00:17:31,990 --> 00:17:28,319
that you're doing whether it's a free

502
00:17:33,350 --> 00:17:32,000
flyer capture or a science experiment or

503
00:17:34,950 --> 00:17:33,360
working with the special purpose

504
00:17:36,470 --> 00:17:34,960
dexterous manipulator all those

505
00:17:38,150 --> 00:17:36,480
activities you'll go through and plan

506
00:17:40,070 --> 00:17:38,160
and then at the end you'll review your

507
00:17:43,029 --> 00:17:40,080
data make sure you have everything ready

508
00:17:45,590 --> 00:17:43,039
for the next team before you hand off

509
00:17:47,110 --> 00:17:45,600
hello my name is aiden and my question

510
00:17:48,710 --> 00:17:47,120
is how long do you expect the

511
00:17:50,789 --> 00:17:48,720
international space station to stay

512
00:17:53,270 --> 00:17:50,799
living livable

513
00:17:54,549 --> 00:17:53,280

how long will it stay livable

514
00:17:56,630 --> 00:17:54,559
they well it's

515
00:17:58,950 --> 00:17:56,640
the partners have recently made an

516
00:18:02,549 --> 00:17:58,960
agreement to extend the life for another

517
00:18:05,270 --> 00:18:02,559
10 years that's to 2024.

518
00:18:07,350 --> 00:18:05,280
i think that there's some thought among

519
00:18:09,430 --> 00:18:07,360
some people that with a with the right

520
00:18:11,990 --> 00:18:09,440
kind of work it might be able to fly for

521
00:18:14,150 --> 00:18:12,000
even longer than that but right now uh

522
00:18:16,630 --> 00:18:14,160
we're looking at the station flying

523
00:18:18,950 --> 00:18:16,640
until 2024.

524
00:18:21,909 --> 00:18:18,960
hi my name is jenna and i was wondering

525
00:18:24,070 --> 00:18:21,919
what college you went to

526
00:18:29,830 --> 00:18:24,080
i went to the university of nevada in

527
00:18:36,549 --> 00:18:32,230
um when you're on the space station

528
00:18:40,789 --> 00:18:38,630
well the space station uses greenwich

529
00:18:43,990 --> 00:18:40,799
mean time which is a little different

530
00:18:45,750 --> 00:18:44,000
than houston time and can change

531
00:18:47,190 --> 00:18:45,760
periodically change back and greenwich

532
00:18:49,350 --> 00:18:47,200
meantime is

533
00:18:50,150 --> 00:18:49,360
essentially the same as london because

534
00:18:56,230 --> 00:18:50,160
the

535
00:18:59,029 --> 00:18:56,240
to pick just one time to operate on so

536
00:19:02,070 --> 00:18:59,039
on board it's a greenwich mean time

537
00:19:04,630 --> 00:19:02,080
which right now is five hours ahead of

538
00:19:07,510 --> 00:19:04,640

houston time

539
00:19:09,830 --> 00:19:07,520
hi i'm michael and do you think nasa has

540
00:19:13,110 --> 00:19:09,840
the technology and robots to search the

541
00:19:14,390 --> 00:19:13,120
water for the missing malaysia airplane

542
00:19:19,350 --> 00:19:14,400
that took longer for that question to

543
00:19:22,390 --> 00:19:21,270
i think if nasa has the technology to do

544
00:19:24,470 --> 00:19:22,400
it they would be doing everything they

545
00:19:26,310 --> 00:19:24,480
can to try to find it

546
00:19:28,150 --> 00:19:26,320
and they are doing everything they can

547
00:19:31,110 --> 00:19:28,160
i know we do have we have been using

548
00:19:34,310 --> 00:19:31,120
some of the cameras on board the station

549
00:19:35,909 --> 00:19:34,320
to take pictures of the search areas

550
00:19:37,510 --> 00:19:35,919
and they they have contributed in that

551
00:19:39,750 --> 00:19:37,520
way

552
00:19:41,430 --> 00:19:39,760
hello my name is elissa and i was

553
00:19:42,549 --> 00:19:41,440
wondering if there is a problem with the

554
00:19:44,549 --> 00:19:42,559
connection

555
00:19:45,750 --> 00:19:44,559
how it

556
00:19:48,150 --> 00:19:45,760
if there was a problem with the

557
00:19:50,789 --> 00:19:48,160
connection to the people on the iss who

558
00:19:52,789 --> 00:19:50,799
would you talk to to fix it

559
00:19:54,230 --> 00:19:52,799
well it would be a combination of our

560
00:19:55,750 --> 00:19:54,240
communications experts here on the

561
00:19:57,990 --> 00:19:55,760
ground as well as our astronauts on

562
00:19:59,669 --> 00:19:58,000
board you can believe if we've lost

563
00:20:01,510 --> 00:19:59,679

communication with our space station for

564
00:20:03,110 --> 00:20:01,520
any reason everybody is trying to

565
00:20:04,870 --> 00:20:03,120
recover it and they'll be looking on

566
00:20:06,149 --> 00:20:04,880
both sides both on the space station and

567
00:20:09,590 --> 00:20:06,159
here on the ground for what could

568
00:20:12,870 --> 00:20:09,600
possibly be the reason and fixing it

569
00:20:15,990 --> 00:20:12,880
hi my name is colby and

570
00:20:18,070 --> 00:20:16,000
why is the international space station

571
00:20:24,070 --> 00:20:18,080
shaped the way it is

572
00:20:25,510 --> 00:20:24,080
a lot of it has to do it it wasn't

573
00:20:27,029 --> 00:20:25,520
i don't think they started off thinking

574
00:20:29,750 --> 00:20:27,039
let's have a station that looks like

575
00:20:31,830 --> 00:20:29,760
this it looks like it does because the

576
00:20:34,310 --> 00:20:31,840
components are built to to serve a

577
00:20:36,549 --> 00:20:34,320
purpose uh it's got these giant solar

578
00:20:38,549 --> 00:20:36,559
array wings out there because they need

579
00:20:40,470 --> 00:20:38,559
them to generate electro electrical

580
00:20:43,190 --> 00:20:40,480
power that runs everything on it for

581
00:20:44,950 --> 00:20:43,200
example and so i mean if you were flying

582
00:20:47,029 --> 00:20:44,960
through the air that wouldn't be a good

583
00:20:48,710 --> 00:20:47,039
shape when you're flying in orbit the

584
00:20:50,789 --> 00:20:48,720
shape doesn't matter it's not not a

585
00:20:52,950 --> 00:20:50,799
question of being moving smoothly

586
00:20:54,710 --> 00:20:52,960
through the air because there is no air

587
00:20:56,630 --> 00:20:54,720
and all of the rest of the components of

588
00:20:58,549 --> 00:20:56,640

it too are built with that in mind that

589
00:20:59,990 --> 00:20:58,559
that along with the

590
00:21:02,310 --> 00:21:00,000
knowing that they had to be a certain

591
00:21:04,470 --> 00:21:02,320
shape in order to fit inside the space

592
00:21:05,909 --> 00:21:04,480
shuttle or or russian rockets in order

593
00:21:07,510 --> 00:21:05,919
to be launched

594
00:21:09,270 --> 00:21:07,520
we couldn't be

595
00:21:10,870 --> 00:21:09,280
much bigger than that in terms of the

596
00:21:13,909 --> 00:21:10,880
cylinders because they wouldn't have fit

597
00:21:16,310 --> 00:21:13,919
inside the shuttle in the first place

598
00:21:18,470 --> 00:21:16,320
and corpus christi catholic school this

599
00:21:20,149 --> 00:21:18,480
is nasa's johnson space center this is a

600
00:21:22,390 --> 00:21:20,159
digital learning network it looks like

601
00:21:24,230 --> 00:21:22,400
we've run out of time so i wanted to see

602
00:21:27,029 --> 00:21:24,240
if you want to say any final words uh

603
00:21:28,710 --> 00:21:27,039
maybe a teacher uh speak up and

604
00:21:31,029 --> 00:21:28,720
thank our very special guests in mission

605
00:21:33,430 --> 00:21:31,039
control for actually connecting for this

606
00:21:35,430 --> 00:21:33,440
live educational event

607
00:21:37,270 --> 00:21:35,440
on behalf of corpus christi catholic

608
00:21:38,789 --> 00:21:37,280
school we'd like um to thank you for

609
00:21:40,950 --> 00:21:38,799
taking the time out of your day to talk

610
00:21:42,870 --> 00:21:40,960
to our students i know they were looking

611
00:21:45,110 --> 00:21:42,880
very forward to this