
PAO

1
00:00:07,829 --> 00:00:05,749
good morning i'm pat ryan with the

2
00:00:10,470 --> 00:00:07,839
public affairs office at nasa's johnson

3
00:00:13,270 --> 00:00:10,480
space center and we're happy to join you

4
00:00:15,430 --> 00:00:13,280
with me today is angela bauer she is the

5
00:00:17,109 --> 00:00:15,440
lead of the facilities operation

6
00:00:19,429 --> 00:00:17,119
maintenance group

7
00:00:21,670 --> 00:00:19,439
which is part of the mission operations

8
00:00:23,189 --> 00:00:21,680
directorate and they are the folks who

9
00:00:25,109 --> 00:00:23,199
are responsible for

10
00:00:26,870 --> 00:00:25,119
taking care of everything in these

11
00:00:28,790 --> 00:00:26,880
buildings that is

12
00:00:31,429 --> 00:00:28,800
there to help support the people who are

13
00:00:33,030 --> 00:00:31,439

supporting the folks who are on orbit

14
00:00:35,270 --> 00:00:33,040
which is sort of an inarticulate way of

15
00:00:37,270 --> 00:00:35,280
describing what you do but tell us how

16
00:00:39,510 --> 00:00:37,280
you got to that point tell me about what

17
00:00:41,990 --> 00:00:39,520
kind of background does

18
00:00:44,709 --> 00:00:42,000
set somebody up to be in charge of

19
00:00:46,630 --> 00:00:44,719
maintaining this kind of environment

20
00:00:48,709 --> 00:00:46,640
well i actually uh graduated with a

21
00:00:50,229 --> 00:00:48,719
degree in mechanical engineering and

22
00:00:51,590 --> 00:00:50,239
after i graduated i went to work for a

23
00:00:53,990 --> 00:00:51,600
couple of years in the petrochemical

24
00:00:55,830 --> 00:00:54,000
industry but i was always so attracted

25
00:00:58,150 --> 00:00:55,840
to nasa and always looking for a way to

26
00:01:00,150 --> 00:00:58,160
get here and so i did finally find a way

27
00:01:02,389 --> 00:01:00,160
to come and work for nasa and i was

28
00:01:04,549 --> 00:01:02,399
lucky enough to be a shuttle electrical

29
00:01:06,630 --> 00:01:04,559
power systems flight controller so we

30
00:01:07,750 --> 00:01:06,640
controlled all the power systems on the

31
00:01:09,910 --> 00:01:07,760
shuttle

32
00:01:12,310 --> 00:01:09,920
but then after a couple of years i was

33
00:01:13,990 --> 00:01:12,320
given the opportunity to come over and

34
00:01:16,070 --> 00:01:14,000
manage a large project replacing

35
00:01:17,910 --> 00:01:16,080
workstations here in the control center

36
00:01:19,749 --> 00:01:17,920
and i jumped at that opportunity and

37
00:01:21,830 --> 00:01:19,759
i've been here ever since

38
00:01:23,510 --> 00:01:21,840

sounds very exciting we'll find out more

39
00:01:26,710 --> 00:01:23,520
about it and i think we're ready to take

40
00:01:29,429 --> 00:01:26,720
your questions so go ahead

41
00:01:31,030 --> 00:01:29,439
okay our first question says how much

42
00:01:32,390 --> 00:01:31,040
pressure is it to work in mission

43
00:01:34,550 --> 00:01:32,400
control

44
00:01:36,469 --> 00:01:34,560
angela how much pressure well it really

45
00:01:37,749 --> 00:01:36,479
depends on the moment

46
00:01:39,510 --> 00:01:37,759
most of the time working in mission

47
00:01:41,990 --> 00:01:39,520
control is something that you've been

48
00:01:43,510 --> 00:01:42,000
very well trained to do and you sit at

49
00:01:45,670 --> 00:01:43,520
your console and you watch your data do

50
00:01:47,030 --> 00:01:45,680
very predictable things and you do

51
00:01:50,069 --> 00:01:47,040
procedures that you've trained on

52
00:01:51,670 --> 00:01:50,079
extensively and so it's all very easy

53
00:01:54,389 --> 00:01:51,680
the pressure comes when something goes

54
00:01:56,230 --> 00:01:54,399
wrong when something on board breaks and

55
00:01:58,709 --> 00:01:56,240
all of a sudden you have to jump in and

56
00:02:00,630 --> 00:01:58,719
you have to fix it and we train our

57
00:02:02,230 --> 00:02:00,640
flight controllers for that too we do

58
00:02:04,630 --> 00:02:02,240
extensive training we have a saying that

59
00:02:05,749 --> 00:02:04,640
we train like we fly and we fly like we

60
00:02:07,350 --> 00:02:05,759
train

61
00:02:08,949 --> 00:02:07,360
so we feel that our flight controllers

62
00:02:10,630 --> 00:02:08,959
are all very capable of handling all

63
00:02:13,910 --> 00:02:10,640

those but it does make for some exciting

64
00:02:18,229 --> 00:02:15,910
okay the next one says what is the

65
00:02:21,350 --> 00:02:18,239
average education of someone in mission

66
00:02:22,949 --> 00:02:21,360
control and an astronaut

67
00:02:24,470 --> 00:02:22,959
okay well it's different for flight

68
00:02:26,630 --> 00:02:24,480
controllers and mission control and

69
00:02:28,309 --> 00:02:26,640
astronauts not that it has to be

70
00:02:30,309 --> 00:02:28,319
to be a flight controller all you have

71
00:02:32,470 --> 00:02:30,319
to have is a science degree so that

72
00:02:34,150 --> 00:02:32,480
would be either science engineering or

73
00:02:35,509 --> 00:02:34,160
math and

74
00:02:37,670 --> 00:02:35,519
most of our flight controllers have

75
00:02:38,949 --> 00:02:37,680
bachelor degrees we do have some who

76
00:02:40,949 --> 00:02:38,959
have masters and we have some who have

77
00:02:42,150 --> 00:02:40,959
phds it really depends on the person and

78
00:02:43,430 --> 00:02:42,160
the choice that they made in their

79
00:02:44,630 --> 00:02:43,440
schooling but all that you're required

80
00:02:46,229 --> 00:02:44,640
to have is a bachelor's degree in

81
00:02:48,229 --> 00:02:46,239
science and engineering

82
00:02:50,070 --> 00:02:48,239
most of the astronauts do have advanced

83
00:02:52,309 --> 00:02:50,080
degrees though of master's degrees and a

84
00:02:54,949 --> 00:02:52,319
lot of them doctorates as well even the

85
00:02:57,430 --> 00:02:54,959
pilot astronauts who are in charge of

86
00:02:58,710 --> 00:02:57,440
driving the spacecraft if you will a lot

87
00:03:02,710 --> 00:02:58,720
of them have advanced degrees in

88
00:03:06,790 --> 00:03:04,790

okay the next one says what is the

89
00:03:08,630 --> 00:03:06,800
additional training for someone working

90
00:03:10,790 --> 00:03:08,640
in mission control

91
00:03:12,790 --> 00:03:10,800
well when we bring our our

92
00:03:14,070 --> 00:03:12,800
new flight controllers in we actually

93
00:03:15,270 --> 00:03:14,080
have a

94
00:03:16,630 --> 00:03:15,280
set of classes that right now we're

95
00:03:18,550 --> 00:03:16,640
calling boot camp it's been called

96
00:03:20,229 --> 00:03:18,560
different names over the years where

97
00:03:21,750 --> 00:03:20,239
they spend several months going through

98
00:03:23,030 --> 00:03:21,760
intensive training on all of the

99
00:03:25,190 --> 00:03:23,040
different systems that are on the

100
00:03:26,630 --> 00:03:25,200
international space station and then

101
00:03:28,789 --> 00:03:26,640
after they get through that then they

102
00:03:29,589 --> 00:03:28,799
get put into a training flow where we

103
00:03:31,430 --> 00:03:29,599
have

104
00:03:32,550 --> 00:03:31,440
smaller trainers that are not in this

105
00:03:34,390 --> 00:03:32,560
building they're over in another

106
00:03:36,149 --> 00:03:34,400
building where they can sit with just a

107
00:03:37,430 --> 00:03:36,159
couple of people and start to do

108
00:03:38,949 --> 00:03:37,440
troubleshooting on their systems and

109
00:03:41,110 --> 00:03:38,959
then finally after they've mastered some

110
00:03:43,110 --> 00:03:41,120
of those basics then they come over here

111
00:03:45,830 --> 00:03:43,120
and we do integrated simulations where

112
00:03:47,750 --> 00:03:45,840
we have the entire flight control room

113
00:03:49,430 --> 00:03:47,760

participating we have computer models

114
00:03:51,750 --> 00:03:49,440
that pretend that they are the space

115
00:03:53,190 --> 00:03:51,760
station so we can mimic things and

116
00:03:55,750 --> 00:03:53,200
conditions on the space station and we

117
00:03:57,509 --> 00:03:55,760
have a whole group of instructors where

118
00:03:59,350 --> 00:03:57,519
their whole job all they've been trained

119
00:04:02,550 --> 00:03:59,360
to do is to teach our flight controllers

120
00:04:06,869 --> 00:04:05,190
um if our space shuttle program is not

121
00:04:09,110 --> 00:04:06,879
operating how do we plan on getting

122
00:04:10,789 --> 00:04:09,120
astronauts to the iss

123
00:04:12,390 --> 00:04:10,799
well you know we actually knew for for

124
00:04:14,470 --> 00:04:12,400
quite a few years that the space station

125
00:04:17,189 --> 00:04:14,480
program was ending or the space shuttle

126
00:04:19,110 --> 00:04:17,199
program was ending and so we had a long

127
00:04:21,509 --> 00:04:19,120
long time to plan for it so what we do

128
00:04:23,830 --> 00:04:21,519
right now is that we have the russians

129
00:04:25,590 --> 00:04:23,840
send up our astronauts in their soyuz

130
00:04:27,590 --> 00:04:25,600
spacecraft and so that's been well

131
00:04:30,950 --> 00:04:27,600
negotiated and they change out their

132
00:04:35,590 --> 00:04:33,189
how much oxygen do they know to bring

133
00:04:36,870 --> 00:04:35,600
and have on the iss

134
00:04:38,950 --> 00:04:36,880
well since we've been doing spaceflight

135
00:04:42,469 --> 00:04:38,960
for a long time we know how much oxygen

136
00:04:44,070 --> 00:04:42,479
a typical person needs in a day and so i

137
00:04:46,150 --> 00:04:44,080
can say for space shuttle we actually

138
00:04:47,670 --> 00:04:46,160

had to take all of our oxygen and so we

139
00:04:49,189 --> 00:04:47,680
took it in big tanks but for space

140
00:04:50,710 --> 00:04:49,199
station they're up there for such a long

141
00:04:53,189 --> 00:04:50,720
time that we have many different ways of

142
00:04:54,790 --> 00:04:53,199
getting them oxygen so we have some

143
00:04:57,189 --> 00:04:54,800
equipment on board that can turn water

144
00:04:58,629 --> 00:04:57,199
into oxygen we have equipment that when

145
00:05:00,550 --> 00:04:58,639
activated

146
00:05:02,870 --> 00:05:00,560
it's basically like a candle that has a

147
00:05:04,790 --> 00:05:02,880
chemical reaction and releases oxygen

148
00:05:07,670 --> 00:05:04,800
and we also can send oxygen up in some

149
00:05:10,790 --> 00:05:07,680
of our resupply vehicles

150
00:05:13,430 --> 00:05:10,800
how long does it take to get to the iss

151
00:05:15,670 --> 00:05:13,440
well that also depends on the vehicle

152
00:05:17,430 --> 00:05:15,680
technically it doesn't take that long to

153
00:05:19,430 --> 00:05:17,440
get there coming back it takes about two

154
00:05:21,510 --> 00:05:19,440
hours but going there it takes a lot

155
00:05:22,870 --> 00:05:21,520
longer first of all because we have to

156
00:05:24,390 --> 00:05:22,880
launch it takes you about eight minutes

157
00:05:26,310 --> 00:05:24,400
to get to orbit but then we have to

158
00:05:27,510 --> 00:05:26,320
catch up with the space station

159
00:05:29,189 --> 00:05:27,520
you also have to make sure that your

160
00:05:31,110 --> 00:05:29,199
vehicle is correctly oriented and you

161
00:05:33,430 --> 00:05:31,120
have to make sure that your crew has

162
00:05:35,430 --> 00:05:33,440
acclimated to to space travel so that

163
00:05:37,270 --> 00:05:35,440

they're able to do the docking so

164
00:05:38,790 --> 00:05:37,280
normally for us it takes us between

165
00:05:40,310 --> 00:05:38,800
three and four days

166
00:05:42,550 --> 00:05:40,320
the europeans sometimes take a little

167
00:05:45,270 --> 00:05:42,560
bit longer so it just depends on the

168
00:05:46,390 --> 00:05:45,280
flight control team and the astronauts

169
00:05:48,390 --> 00:05:46,400
and

170
00:05:50,629 --> 00:05:48,400
which company which country is operating

171
00:05:52,790 --> 00:05:50,639
the vehicle

172
00:05:55,110 --> 00:05:52,800
do you see robotics as an important part

173
00:05:57,590 --> 00:05:55,120
of the future of space travel

174
00:05:59,749 --> 00:05:57,600
robotics is very important we can send

175
00:06:01,189 --> 00:05:59,759
robots to do things that we wouldn't

176
00:06:02,950 --> 00:06:01,199
want to send humans to do or that we

177
00:06:05,510 --> 00:06:02,960
don't have enough humans to do

178
00:06:07,590 --> 00:06:05,520
so we already use many robots in space

179
00:06:08,870 --> 00:06:07,600
travel we have a robotic arm on the

180
00:06:10,710 --> 00:06:08,880
space station

181
00:06:12,629 --> 00:06:10,720
we also have dexter which is on the

182
00:06:13,430 --> 00:06:12,639
space station that can do tasks

183
00:06:15,110 --> 00:06:13,440
and

184
00:06:16,950 --> 00:06:15,120
in addition to that we also have things

185
00:06:18,710 --> 00:06:16,960
like our mars rovers that are robots

186
00:06:20,950 --> 00:06:18,720
that we operate so robotics is very

187
00:06:23,189 --> 00:06:20,960
important

188
00:06:24,550 --> 00:06:23,199

discuss the funding for future space

189
00:06:27,029 --> 00:06:24,560
flight do you think it will be more

190
00:06:28,790 --> 00:06:27,039
commercialized

191
00:06:29,990 --> 00:06:28,800
well okay that's two questions first for

192
00:06:31,990 --> 00:06:30,000
the funding

193
00:06:33,749 --> 00:06:32,000
you know we are a government agency and

194
00:06:35,510 --> 00:06:33,759
so our funding depends on whatever

195
00:06:36,790 --> 00:06:35,520
congress has money to do and how they

196
00:06:38,150 --> 00:06:36,800
allocate it so

197
00:06:39,510 --> 00:06:38,160
we only know our funding from year to

198
00:06:41,990 --> 00:06:39,520
year and we always hope that they'll

199
00:06:44,150 --> 00:06:42,000
give us more but we won't know um

200
00:06:46,070 --> 00:06:44,160
for commercialization we are actively

201
00:06:48,629 --> 00:06:46,080
striving to increase the commercial

202
00:06:50,309 --> 00:06:48,639
participation in space flight in fact

203
00:06:51,909 --> 00:06:50,319
we're using some of the money that we

204
00:06:54,390 --> 00:06:51,919
have in order to

205
00:06:56,550 --> 00:06:54,400
provide seed money for private companies

206
00:06:58,469 --> 00:06:56,560
that are currently working on developing

207
00:07:00,550 --> 00:06:58,479
both cargo ships to help supply the

208
00:07:02,309 --> 00:07:00,560
space station and some of them are also

209
00:07:04,710 --> 00:07:02,319
working on future vehicles to bring

210
00:07:06,710 --> 00:07:04,720
crews to the space station and maybe to

211
00:07:08,790 --> 00:07:06,720
other destinations as well so nasa is

212
00:07:13,350 --> 00:07:08,800
investing in that in that as a way to

213
00:07:17,589 --> 00:07:14,870

could you describe the orion

214
00:07:19,350 --> 00:07:17,599
multi-purpose vehicle

215
00:07:21,350 --> 00:07:19,360
could i describe it

216
00:07:23,909 --> 00:07:21,360
well you know we're getting away from

217
00:07:25,670 --> 00:07:23,919
having the the space shuttle type of

218
00:07:27,909 --> 00:07:25,680
vehicle the space shuttle wallet it's

219
00:07:30,710 --> 00:07:27,919
really cool and very flexible that it

220
00:07:32,710 --> 00:07:30,720
can go up and down many times is also

221
00:07:36,230 --> 00:07:32,720
very very expensive to maintain and

222
00:07:38,469 --> 00:07:36,240
operate and so the orion capsule is more

223
00:07:40,150 --> 00:07:38,479
like what we had back in the apollo days

224
00:07:42,390 --> 00:07:40,160
so it's a

225
00:07:43,909 --> 00:07:42,400
smaller capsule that is easier to launch

226
00:07:45,589 --> 00:07:43,919
and it enters just like the apollo

227
00:07:47,749 --> 00:07:45,599
capsule did

228
00:07:50,309 --> 00:07:47,759
although the it's bigger than the apollo

229
00:07:52,629 --> 00:07:50,319
capsule and it will be able to carry uh

230
00:07:54,790 --> 00:07:52,639
four or six astronauts where the apollo

231
00:07:56,790 --> 00:07:54,800
could only carry three and it's being

232
00:08:08,309 --> 00:07:56,800
designed to be able to go a lot farther

233
00:08:12,790 --> 00:08:11,110
hold on just a second

234
00:08:16,150 --> 00:08:12,800
are there any questions that you guys

235
00:08:18,469 --> 00:08:16,160
have that we haven't asked already

236
00:08:20,869 --> 00:08:18,479
if you have a question come on up and

237
00:08:23,670 --> 00:08:20,879
just stand over here

238
00:08:25,430 --> 00:08:23,680

please feel free

239
00:08:27,430 --> 00:08:25,440
this is your chance to talk to mission

240
00:08:29,350 --> 00:08:27,440
control this might be a once in a

241
00:08:30,629 --> 00:08:29,360
lifetime thing so please think if you

242
00:08:32,310 --> 00:08:30,639
have a question

243
00:08:33,990 --> 00:08:32,320
is there any possibility of speaking

244
00:08:36,310 --> 00:08:34,000
microphones

245
00:08:38,149 --> 00:08:36,320
uh is there any possibility of getting

246
00:08:39,990 --> 00:08:38,159
to mars soon

247
00:08:42,389 --> 00:08:40,000
or in the future well that depends on

248
00:08:43,909 --> 00:08:42,399
your definition of soon um

249
00:08:46,389 --> 00:08:43,919
i definitely think we'll get tomorrow

250
00:08:48,550 --> 00:08:46,399
sometime in your lifetime um it's not

251
00:08:50,870 --> 00:08:48,560
going to be this decade right now we

252
00:08:51,990 --> 00:08:50,880
have got plans for the orion capsule to

253
00:08:54,389 --> 00:08:52,000
launch and they're they're looking at

254
00:08:55,990 --> 00:08:54,399
going to an asteroid first and then

255
00:08:58,470 --> 00:08:56,000
perhaps to mars probably somewhere out

256
00:09:00,230 --> 00:08:58,480
in 2013 would be or 2030 would be the

257
00:09:01,590 --> 00:09:00,240
earliest but i think it's definitely

258
00:09:05,030 --> 00:09:01,600
going to happen there are a lot of

259
00:09:07,590 --> 00:09:05,040
people who are working on developing on

260
00:09:10,150 --> 00:09:07,600
working out the issues with propulsion

261
00:09:12,150 --> 00:09:10,160
that are necessary in order to get a

262
00:09:13,910 --> 00:09:12,160
spaceship that far away they're also

263
00:09:16,790 --> 00:09:13,920

working up on the issues that are

264
00:09:18,870 --> 00:09:16,800
required to be able to sustain a crew i

265
00:09:21,670 --> 00:09:18,880
mean we could shoot a rocket to mars we

266
00:09:23,590 --> 00:09:21,680
do it all we do it now but we want to be

267
00:09:26,230 --> 00:09:23,600
able to have the crew members who are on

268
00:09:27,829 --> 00:09:26,240
board be able to be safe and to be

269
00:09:29,829 --> 00:09:27,839
healthy when they get there because it's

270
00:09:31,269 --> 00:09:29,839
about a six-month trip to get there and

271
00:09:33,509 --> 00:09:31,279
then there's the amount of time that you

272
00:09:35,670 --> 00:09:33,519
would be there to do the work to do the

273
00:09:38,310 --> 00:09:35,680
exploration and then another six months

274
00:09:40,470 --> 00:09:38,320
to come back so there are are mechanical

275
00:09:42,230 --> 00:09:40,480
issues and there are also human issues

276
00:09:44,630 --> 00:09:42,240
that still have to be worked out before

277
00:09:50,710 --> 00:09:44,640
we could do it in with a relative degree

278
00:09:53,590 --> 00:09:51,829
what kind of

279
00:09:56,790 --> 00:09:53,600
problems do you face

280
00:09:58,470 --> 00:09:56,800
normally when they're launching

281
00:10:00,389 --> 00:09:58,480
if there are any

282
00:10:01,750 --> 00:10:00,399
are there any problems in launching

283
00:10:03,829 --> 00:10:01,760
there are occasionally problems in

284
00:10:05,910 --> 00:10:03,839
launching

285
00:10:08,550 --> 00:10:05,920
right now all of our launches are done

286
00:10:09,910 --> 00:10:08,560
by the russians and so they control all

287
00:10:11,190 --> 00:10:09,920
of that so i can tell you a little bit

288
00:10:12,550 --> 00:10:11,200

about some of the problems that we would

289
00:10:14,870 --> 00:10:12,560
have during the space shuttle when we

290
00:10:16,870 --> 00:10:14,880
were in control of that launch um and

291
00:10:19,190 --> 00:10:16,880
actually problems were very rare we we

292
00:10:20,949 --> 00:10:19,200
do so much testing that

293
00:10:22,230 --> 00:10:20,959
it's uncommon

294
00:10:23,590 --> 00:10:22,240
most likely

295
00:10:25,030 --> 00:10:23,600
probably if we looked at what the most

296
00:10:27,030 --> 00:10:25,040
common failure would be it would be that

297
00:10:28,870 --> 00:10:27,040
we lost a piece of telemetry not that

298
00:10:30,870 --> 00:10:28,880
something actually happened on board but

299
00:10:32,550 --> 00:10:30,880
for some reason that transducer stopped

300
00:10:34,230 --> 00:10:32,560
working and by telemetry we're talking

301
00:10:36,150 --> 00:10:34,240
about information data that's coming

302
00:10:37,750 --> 00:10:36,160
down right a number that tells us how

303
00:10:39,750 --> 00:10:37,760
many volts a certain piece of equipment

304
00:10:46,310 --> 00:10:39,760
has or how fast a certain piece of

305
00:10:51,350 --> 00:10:48,870
so since uh rocking is basically a

306
00:10:54,069 --> 00:10:51,360
controlled explosion is there any chance

307
00:10:57,430 --> 00:10:54,079
of using a nuclear blast to

308
00:10:58,949 --> 00:10:57,440
go into deep space in the future

309
00:11:01,110 --> 00:10:58,959
well we're always looking at advanced

310
00:11:04,230 --> 00:11:01,120
proposal propulsion i haven't heard

311
00:11:06,150 --> 00:11:04,240
anything about using a nuclear blast

312
00:11:08,949 --> 00:11:06,160
to get into space actually most of our

313
00:11:11,269 --> 00:11:08,959

efforts right now are looking at

314
00:11:13,670 --> 00:11:11,279
using

315
00:11:16,790 --> 00:11:13,680
rockets that have less energy but end up

316
00:11:18,230 --> 00:11:16,800
spitting it out at a longer time so that

317
00:11:21,430 --> 00:11:18,240
you would be able to go a farther

318
00:11:23,990 --> 00:11:21,440
distance with less fuel there's a former

319
00:11:26,389 --> 00:11:24,000
nasa astronaut named franklin chang diaz

320
00:11:28,389 --> 00:11:26,399
who is really in the lead in developing

321
00:11:30,550 --> 00:11:28,399
this kind of engine where you would

322
00:11:32,870 --> 00:11:30,560
carry enough fuel to be able to make a

323
00:11:36,230 --> 00:11:32,880
just a little thrust that would push

324
00:11:39,829 --> 00:11:36,240
your vehicle along and on a

325
00:11:41,990 --> 00:11:39,839
on a regular basis but because in orbit

326
00:11:44,550 --> 00:11:42,000
and out beyond earth orbit you don't

327
00:11:47,430 --> 00:11:44,560
have the resistance you don't need very

328
00:11:49,590 --> 00:11:47,440
much push in order to get it going and

329
00:11:53,030 --> 00:11:49,600
you continue to build up the momentum

330
00:11:55,030 --> 00:11:53,040
with every new impulse and you can go a

331
00:12:06,230 --> 00:11:55,040
great distance in a relatively short

332
00:12:11,829 --> 00:12:08,470
how do you choose the astronauts that go

333
00:12:13,590 --> 00:12:11,839
up to the space stations

334
00:12:15,670 --> 00:12:13,600
and that's really a question for the

335
00:12:18,069 --> 00:12:15,680
astronaut office

336
00:12:19,430 --> 00:12:18,079
i know that they do a lot of screening

337
00:12:20,870 --> 00:12:19,440
on their astronauts when they pick them

338
00:12:22,550 --> 00:12:20,880

to be candidates in the first place and

339
00:12:23,990 --> 00:12:22,560
then astronauts go through about two

340
00:12:25,990 --> 00:12:24,000
years of training once they get selected

341
00:12:27,509 --> 00:12:26,000
so they go through one year where they

342
00:12:28,949 --> 00:12:27,519
do astronaut candidate training which is

343
00:12:31,110 --> 00:12:28,959
kind of generic training and then they

344
00:12:33,030 --> 00:12:31,120
do about another year of

345
00:12:35,269 --> 00:12:33,040
vehicle specific and mission specific

346
00:12:36,550 --> 00:12:35,279
training and so i would imagine that

347
00:12:38,069 --> 00:12:36,560
their choice of who they're going to

348
00:12:46,150 --> 00:12:38,079
pick depends on how well those

349
00:12:51,269 --> 00:12:48,069
do you ever think we'll like officially

350
00:12:55,190 --> 00:12:53,030
personally i do think that we will live

351
00:12:57,670 --> 00:12:55,200
in space um

352
00:12:59,910 --> 00:12:57,680
nasa is always trying to put ourselves

353
00:13:01,590 --> 00:12:59,920
at the front of the space technology

354
00:13:04,389 --> 00:13:01,600
we're trying to do the new things that

355
00:13:06,550 --> 00:13:04,399
nobody else has done before and as we

356
00:13:08,389 --> 00:13:06,560
figure out more more ways to travel in

357
00:13:10,629 --> 00:13:08,399
space then we end up giving that

358
00:13:12,790 --> 00:13:10,639
information over to other people such as

359
00:13:15,430 --> 00:13:12,800
commercial partners so that they can

360
00:13:17,190 --> 00:13:15,440
then use that information to make a

361
00:13:20,230 --> 00:13:17,200
commercial venture a company that can

362
00:13:21,829 --> 00:13:20,240
then capitalize on that and make space

363
00:13:23,910 --> 00:13:21,839

travel accessible for

364
00:13:26,310 --> 00:13:23,920
for all people so i do believe that

365
00:13:27,590 --> 00:13:26,320
we'll get technology to the point that

366
00:13:29,829 --> 00:13:27,600
we can give it over to commercial

367
00:13:32,069 --> 00:13:29,839
partners and they can make space tourism

368
00:13:33,590 --> 00:13:32,079
a real option and in the meantime you

369
00:13:35,990 --> 00:13:33,600
know there are people living in space

370
00:13:38,230 --> 00:13:36,000
right now there are six people on board

371
00:13:40,550 --> 00:13:38,240
the international space station uh three

372
00:13:42,790 --> 00:13:40,560
of them have been living there since

373
00:13:45,350 --> 00:13:42,800
late november the other three actually

374
00:13:47,750 --> 00:13:45,360
today is the 100th day that the other

375
00:13:50,069 --> 00:13:47,760
three have been in space

376
00:13:53,829 --> 00:13:50,079
there is one russian cosmonaut who lived

377
00:13:56,069 --> 00:13:53,839
in space for over 430 days without

378
00:13:57,829 --> 00:13:56,079
coming back to the earth so we are

379
00:13:59,990 --> 00:13:57,839
living there now we're not living there

380
00:14:03,269 --> 00:14:00,000
for as long as we will in the future

381
00:14:06,949 --> 00:14:05,030
is there any possibility of going back

382
00:14:08,310 --> 00:14:06,959
to the moon

383
00:14:10,150 --> 00:14:08,320
well there's always a possibility of

384
00:14:12,389 --> 00:14:10,160
going back to the moon

385
00:14:14,470 --> 00:14:12,399
when the president made the decision to

386
00:14:16,389 --> 00:14:14,480
refocus the constellation efforts we

387
00:14:18,629 --> 00:14:16,399
decided that we were going to instead

388
00:14:21,189 --> 00:14:18,639

focus on going out to an asteroid and

389
00:14:23,430 --> 00:14:21,199
then to mars so we don't have any plans

390
00:14:25,350 --> 00:14:23,440
to send people to the moon right now

391
00:14:26,949 --> 00:14:25,360
we're always looking at what kind of

392
00:14:28,949 --> 00:14:26,959
rovers and robotics we could do at the

393
00:14:30,470 --> 00:14:28,959
moon and actually one of the

394
00:14:32,550 --> 00:14:30,480
the activities that's operated out of

395
00:14:35,670 --> 00:14:32,560
this building is a program called desert

396
00:14:37,030 --> 00:14:35,680
rats where we do a simulation of what it

397
00:14:39,829 --> 00:14:37,040
would be like on the moon that go out to

398
00:14:42,949 --> 00:14:39,839
the desert in arizona and they uh

399
00:14:44,710 --> 00:14:42,959
test spacesuits and and rovers to see

400
00:14:48,230 --> 00:14:44,720
how they work so we're constantly

401
00:14:50,389 --> 00:14:48,240
striving for that and nasa has a pair of

402
00:14:52,949 --> 00:14:50,399
of spacecraft orbiting the moon right

403
00:14:55,670 --> 00:14:52,959
now the the grail mission uh just sent

404
00:14:58,310 --> 00:14:55,680
two spacecraft that are mapping uh moon

405
00:15:00,550 --> 00:14:58,320
so we have we haven't send people back

406
00:15:02,629 --> 00:15:00,560
just yet but uh we are still going to

407
00:15:03,590 --> 00:15:02,639
the moon

408
00:15:05,829 --> 00:15:03,600
okay

409
00:15:08,150 --> 00:15:05,839
are you looking into fusion reaction for

410
00:15:09,829 --> 00:15:08,160
energy

411
00:15:12,310 --> 00:15:09,839
fusion reaction

412
00:15:14,150 --> 00:15:12,320
are we looking into that for energy not

413
00:15:16,470 --> 00:15:14,160

that i well i'm not sure i don't know

414
00:15:18,870 --> 00:15:16,480
that nasa is yeah there are people who

415
00:15:21,269 --> 00:15:18,880
are but that's that seems to be still

416
00:15:22,870 --> 00:15:21,279
quite a bit of ways away i know in

417
00:15:24,389 --> 00:15:22,880
mission control we're not focusing on it

418
00:15:28,389 --> 00:15:24,399
right now that's not in one of your

419
00:15:32,150 --> 00:15:30,949
when apollo 13 claimed the moon for the

420
00:15:35,110 --> 00:15:32,160
usa

421
00:15:37,030 --> 00:15:35,120
uh is it possible that other countries

422
00:15:38,310 --> 00:15:37,040
that we will be sharing the moon with

423
00:15:40,629 --> 00:15:38,320
other countries

424
00:15:42,389 --> 00:15:40,639
i think that's entirely possible you for

425
00:15:44,949 --> 00:15:42,399
for us the moon was our goal back in the

426
00:15:46,790 --> 00:15:44,959
60s and we achieved it and i see no

427
00:15:48,629 --> 00:15:46,800
reason why other countries wouldn't want

428
00:15:50,629 --> 00:15:48,639
to have that same goal and achieve it

429
00:15:52,310 --> 00:15:50,639
just like we did yeah when when apollo

430
00:15:54,310 --> 00:15:52,320
11 was the first

431
00:15:55,910 --> 00:15:54,320
mission to land on the moon and and they

432
00:15:58,629 --> 00:15:55,920
planted an american flag but they didn't

433
00:16:00,470 --> 00:15:58,639
really claim it for america and uh

434
00:16:02,550 --> 00:16:00,480
you're remembering apollo 13 that was

435
00:16:11,590 --> 00:16:02,560
the mission that uh circled the moon but

436
00:16:15,030 --> 00:16:13,189
how many missions have you helped get

437
00:16:19,430 --> 00:16:15,040
into space

438
00:16:21,509 --> 00:16:19,440

we had 130 135 space shuttle missions

439
00:16:23,670 --> 00:16:21,519
that that flew right then we also had

440
00:16:26,389 --> 00:16:23,680
all of the apollo missions and all the

441
00:16:28,790 --> 00:16:26,399
gemini and mercury missions uh as well

442
00:16:30,230 --> 00:16:28,800
as all of the launches to the

443
00:16:32,150 --> 00:16:30,240
international space station the group

444
00:16:34,150 --> 00:16:32,160
that's on board right now is expedition

445
00:16:37,350 --> 00:16:34,160
number 30

446
00:16:39,910 --> 00:16:37,360
and there are crews uh

447
00:16:41,670 --> 00:16:39,920
who aren't even gonna launch for another

448
00:16:48,550 --> 00:16:41,680
two and a half years who are already

449
00:16:48,560 --> 00:16:53,110
are there any other questions

450
00:16:53,120 --> 00:16:56,389
come on gabby

451
00:16:59,509 --> 00:16:58,150
do you remember how many space shuttle

452
00:17:01,509 --> 00:16:59,519
missions you worked how many of those

453
00:17:02,829 --> 00:17:01,519
did you help put into space you know i

454
00:17:06,309 --> 00:17:02,839
didn't

455
00:17:11,510 --> 00:17:06,319
count a dozen or so probably yeah it was

456
00:17:14,150 --> 00:17:12,549
okay

457
00:17:15,909 --> 00:17:14,160
what kind of problems

458
00:17:17,990 --> 00:17:15,919
are not problems like what kind of

459
00:17:20,230 --> 00:17:18,000
things do you have to do to prepare to

460
00:17:22,630 --> 00:17:20,240
go up into space

461
00:17:25,270 --> 00:17:22,640
you mean if you're an astronaut

462
00:17:27,270 --> 00:17:25,280
no like for your mission control

463
00:17:29,190 --> 00:17:27,280

well okay so we start our flight

464
00:17:30,310 --> 00:17:29,200
controllers out with generic training

465
00:17:33,430 --> 00:17:30,320
where they

466
00:17:35,669 --> 00:17:33,440
do training on basic simulations and

467
00:17:37,669 --> 00:17:35,679
basic procedures that we go through and

468
00:17:39,590 --> 00:17:37,679
then about six months out we start with

469
00:17:42,070 --> 00:17:39,600
what we call flight specific training

470
00:17:43,909 --> 00:17:42,080
where we actually rehearse every single

471
00:17:46,390 --> 00:17:43,919
major activity that's going to happen on

472
00:17:49,029 --> 00:17:46,400
orbit and so we probably have about

473
00:17:50,390 --> 00:17:49,039
15 to 20 of those type of activities

474
00:17:51,990 --> 00:17:50,400
that involve the entire flight control

475
00:17:53,669 --> 00:17:52,000
team and

476
00:18:01,990 --> 00:17:53,679
they increase in frequency as we get

477
00:18:07,909 --> 00:18:04,310
how many rockets have blown up during

478
00:18:11,990 --> 00:18:09,029
well okay so if you're going to talk

479
00:18:14,150 --> 00:18:12,000
about manned space flight i only know of

480
00:18:15,590 --> 00:18:14,160
one that's blown up and that was

481
00:18:17,590 --> 00:18:15,600
challenger

482
00:18:20,150 --> 00:18:17,600
we we had another accident with an

483
00:18:21,990 --> 00:18:20,160
apollo rocket but that didn't blow up

484
00:18:23,830 --> 00:18:22,000
it was on the pad and if you're talking

485
00:18:26,150 --> 00:18:23,840
about the other rocket rockets that get

486
00:18:28,710 --> 00:18:26,160
sent up most of those are handled by

487
00:18:30,789 --> 00:18:28,720
the department of defense or through

488
00:18:33,190 --> 00:18:30,799

another company which is united launch

489
00:18:34,789 --> 00:18:33,200
alliance which is a combination of

490
00:18:36,710 --> 00:18:34,799
lockheed martin

491
00:18:38,230 --> 00:18:36,720
and boeing and so i don't know how many

492
00:18:39,669 --> 00:18:38,240
they've had blow up but they're the ones

493
00:18:45,190 --> 00:18:39,679
who do most of the actual rocket

494
00:18:51,110 --> 00:18:47,990
what is nasa's ultimate goal

495
00:18:53,510 --> 00:18:51,120
as far as space travel

496
00:18:55,830 --> 00:18:53,520
well nasa is always trying to explore so

497
00:18:58,230 --> 00:18:55,840
our goal is to get as far away from this

498
00:19:00,310 --> 00:18:58,240
planet as possible and to do so in a

499
00:19:03,029 --> 00:19:00,320
safe manner so we're constantly striving

500
00:19:05,430 --> 00:19:03,039
to do new science that lets us figure

501
00:19:07,909 --> 00:19:05,440
out exactly how people are going to be

502
00:19:09,750 --> 00:19:07,919
affected by long time long term space

503
00:19:10,870 --> 00:19:09,760
travel how equipment's going to be

504
00:19:12,870 --> 00:19:10,880
affected

505
00:19:15,110 --> 00:19:12,880
more effective ways to do things so that

506
00:19:16,390 --> 00:19:15,120
we can get to farther places with less

507
00:19:18,070 --> 00:19:16,400
mass

508
00:19:19,990 --> 00:19:18,080
less energy

509
00:19:21,510 --> 00:19:20,000
so i think nasa

510
00:19:22,950 --> 00:19:21,520
long term is going to try and go as far

511
00:19:26,549 --> 00:19:22,960
as they can right now they've set their

512
00:19:30,150 --> 00:19:28,710
how does nasa work with department of

513
00:19:31,190 --> 00:19:30,160

defense

514
00:19:33,190 --> 00:19:31,200
you know we actually have some

515
00:19:34,310 --> 00:19:33,200
department of defense folks who are on

516
00:19:35,590 --> 00:19:34,320
site with us

517
00:19:37,830 --> 00:19:35,600
we used to do a lot more with them

518
00:19:39,830 --> 00:19:37,840
because back in the

519
00:19:41,909 --> 00:19:39,840
middle days of shuttle there were actual

520
00:19:43,909 --> 00:19:41,919
department of defense missions and so we

521
00:19:46,549 --> 00:19:43,919
had one of the flight control rooms was

522
00:19:47,990 --> 00:19:46,559
actually locked down and was very secret

523
00:19:49,590 --> 00:19:48,000
because it had department of defense

524
00:19:51,430 --> 00:19:49,600
assets in it

525
00:19:54,549 --> 00:19:51,440
these days we do interface with them

526
00:19:57,029 --> 00:19:54,559
some but most of our involvement is with

527
00:20:00,230 --> 00:19:57,039
either universities or

528
00:20:02,470 --> 00:20:00,240
commercial companies that have payloads

529
00:20:04,149 --> 00:20:02,480
but there are people from

530
00:20:06,789 --> 00:20:04,159
branches several branches of the service

531
00:20:08,390 --> 00:20:06,799
who work here in a variety of places not

532
00:20:09,990 --> 00:20:08,400
only astronauts

533
00:20:12,630 --> 00:20:10,000
but there are other people who are

534
00:20:14,870 --> 00:20:12,640
assigned by the army or the navy to come

535
00:20:17,430 --> 00:20:14,880
to nasa to work in flight control

536
00:20:21,190 --> 00:20:17,440
positions and in other places around

537
00:20:25,830 --> 00:20:23,590
do you have a question

538
00:20:28,149 --> 00:20:25,840

what's the furthest a robotic spacecraft

539
00:20:30,549 --> 00:20:28,159
has gotten away from the earth

540
00:20:32,390 --> 00:20:30,559
just left the solar system

541
00:20:33,909 --> 00:20:32,400
yeah the voyager

542
00:20:35,990 --> 00:20:33,919
i'm not sure if that's the farthest

543
00:20:36,950 --> 00:20:36,000
we've gone or the furthest whichever is

544
00:20:39,909 --> 00:20:36,960
correct

545
00:20:42,149 --> 00:20:39,919
but uh early uh robotic spacecraft that

546
00:20:48,310 --> 00:20:42,159
were launched back in the 60s have have

547
00:20:53,270 --> 00:20:50,149
what is your favorite part about working

548
00:20:57,350 --> 00:20:55,750
that's a hard question because honestly

549
00:20:59,190 --> 00:20:57,360
i love everything um

550
00:21:01,270 --> 00:20:59,200
probably my favorite thing to do here at

551
00:21:02,950 --> 00:21:01,280
nasa is to do events like this and take

552
00:21:05,110 --> 00:21:02,960
people on tours because when you're

553
00:21:07,190 --> 00:21:05,120
doing your job even though it's space it

554
00:21:08,390 --> 00:21:07,200
tends to still be processing paperwork

555
00:21:10,870 --> 00:21:08,400
to get monitors replaced and

556
00:21:12,390 --> 00:21:10,880
workstations replaced and update code

557
00:21:13,669 --> 00:21:12,400
and when you get an opportunity to do

558
00:21:15,029 --> 00:21:13,679
something like this or to bring people

559
00:21:16,630 --> 00:21:15,039
through mission control it reminds you

560
00:21:18,310 --> 00:21:16,640
how cool it really is yeah working

561
00:21:20,230 --> 00:21:18,320
working in this room is pretty cool

562
00:21:22,549 --> 00:21:20,240
getting to sit at one of these consoles

563
00:21:24,390 --> 00:21:22,559

and listen to all of these people talk

564
00:21:26,710 --> 00:21:24,400
about what's going on in the space

565
00:21:28,230 --> 00:21:26,720
station and and how we're making sure

566
00:21:30,230 --> 00:21:28,240
that we stay on the plan for what we

567
00:21:32,950 --> 00:21:30,240
want to do or how we're going to try to

568
00:21:34,950 --> 00:21:32,960
resolve some issue that's come up and

569
00:21:41,110 --> 00:21:34,960
and being right here in the middle of it

570
00:21:44,630 --> 00:21:42,390
um

571
00:21:48,390 --> 00:21:44,640
do you use guys like still send animals

572
00:21:51,669 --> 00:21:49,830
you know i think there have been some

573
00:21:53,590 --> 00:21:51,679
payloads recently that were sent up that

574
00:21:55,029 --> 00:21:53,600
did involve rats i know when i was

575
00:21:56,390 --> 00:21:55,039
working as a shuttle flight controller

576
00:21:58,630 --> 00:21:56,400
we had to account for the amount of

577
00:22:01,430 --> 00:21:58,640
oxygen the rats would consume

578
00:22:03,669 --> 00:22:01,440
but we haven't sent

579
00:22:04,789 --> 00:22:03,679
primates up in many many years we did

580
00:22:06,310 --> 00:22:04,799
that in the beginning because we weren't

581
00:22:07,909 --> 00:22:06,320
sure what the effects would be of human

582
00:22:09,510 --> 00:22:07,919
space flight on humans and so we wanted

583
00:22:10,950 --> 00:22:09,520
to be very cautious but

584
00:22:12,390 --> 00:22:10,960
these days the only animals that go up

585
00:22:16,789 --> 00:22:12,400
are going to be part of us in an

586
00:22:21,029 --> 00:22:18,950
what happens when an astronaut gets sick

587
00:22:23,430 --> 00:22:21,039
up in space

588
00:22:25,830 --> 00:22:23,440

well we actually have a whole team down

589
00:22:28,310 --> 00:22:25,840
here called the flight surgeons who take

590
00:22:30,230 --> 00:22:28,320
care of astronaut health and they carry

591
00:22:32,230 --> 00:22:30,240
a lot of medicine with them up in space

592
00:22:34,230 --> 00:22:32,240
and we have a capability for them to do

593
00:22:36,470 --> 00:22:34,240
private medical conferences where they

594
00:22:38,630 --> 00:22:36,480
can call down and talk to or have a

595
00:22:40,390 --> 00:22:38,640
video teleconference with the flight

596
00:22:41,669 --> 00:22:40,400
surgeons to discuss whatever ailment

597
00:22:44,230 --> 00:22:41,679
that they have

598
00:22:45,990 --> 00:22:44,240
our astronauts are also trained in many

599
00:22:47,909 --> 00:22:46,000
of the standard medical procedures that

600
00:22:49,909 --> 00:22:47,919
you would expect from say an ambulance

601
00:22:51,510 --> 00:22:49,919
crew so if something critical were to

602
00:22:52,870 --> 00:22:51,520
happen then they have the capability of

603
00:23:00,549 --> 00:22:52,880
responding to it as long as it's

604
00:23:05,350 --> 00:23:02,310
i heard somewhere that like

605
00:23:07,270 --> 00:23:05,360
astronauts can like swell up in space

606
00:23:09,830 --> 00:23:07,280
how does that happen

607
00:23:11,830 --> 00:23:09,840
well in space there's no gravity so on

608
00:23:13,270 --> 00:23:11,840
the earth all of your fluids are pulled

609
00:23:15,190 --> 00:23:13,280
constantly towards your feet and your

610
00:23:16,710 --> 00:23:15,200
body does account for that in some ways

611
00:23:17,830 --> 00:23:16,720
i mean by the end of the day you are

612
00:23:19,669 --> 00:23:17,840
going to have more fluid at your feet

613
00:23:21,350 --> 00:23:19,679

than your head but overall it stays

614
00:23:23,270 --> 00:23:21,360
pretty constant but when you're in space

615
00:23:24,870 --> 00:23:23,280
there's no gravity so the fluid just

616
00:23:26,950 --> 00:23:24,880
accumulates in your body and it's not

617
00:23:29,190 --> 00:23:26,960
pulled down towards your feet so they do

618
00:23:30,630 --> 00:23:29,200
tend to have puffier faces when they are

619
00:23:33,350 --> 00:23:30,640
in orbit but it changes when they get

620
00:23:39,110 --> 00:23:34,870
is there any other questions that we

621
00:23:44,470 --> 00:23:40,549
i think you've got you've asked some

622
00:23:48,710 --> 00:23:46,549
all right wonderful dowell middle school

623
00:23:51,029 --> 00:23:48,720
this is uh michael harrigan from the

624
00:23:53,590 --> 00:23:51,039
digital learning network um did you want

625
00:23:56,230 --> 00:23:53,600
to say a final goodbye thank you to uh

626
00:23:57,510 --> 00:23:56,240
pat ryan and angela bauer for all their

627
00:24:05,269 --> 00:23:57,520
great answers

628
00:24:09,590 --> 00:24:07,430
goodbye hey it was great to talk to you