
S.A

1
00:00:06,550 --> 00:00:05,110
good afternoon and welcome to nasa's

2
00:00:08,230 --> 00:00:06,560
wallops flight facility in wallops

3
00:00:10,150 --> 00:00:08,240
island virginia i'm nasa public affairs

4
00:00:11,669 --> 00:00:10,160
officer trent parado we're here for the

5
00:00:14,070 --> 00:00:11,679
first of two briefings to look ahead to

6
00:00:16,070 --> 00:00:14,080
the orbital one cargo resupply mission

7
00:00:18,470 --> 00:00:16,080
set to launch tomorrow wednesday january

8
00:00:19,750 --> 00:00:18,480
8th at 1 32 p.m from right right here at

9
00:00:21,349 --> 00:00:19,760
wallops you can find out more

10
00:00:24,230 --> 00:00:21,359
information about the mission at

11
00:00:25,670 --> 00:00:24,240
nasa.gov station over the next hour

12
00:00:28,150 --> 00:00:25,680
we're going to hear from four guest

13
00:00:29,669 --> 00:00:28,160

speakers a little bit of some highlights

14
00:00:31,189 --> 00:00:29,679
of science that are that's headed to the

15
00:00:33,830 --> 00:00:31,199
international space station and the

16
00:00:35,190 --> 00:00:33,840
microgravity laboratory uh each speaker

17
00:00:36,470 --> 00:00:35,200
i'll give a short presentation then

18
00:00:38,310 --> 00:00:36,480
we'll take question answer from the

19
00:00:41,190 --> 00:00:38,320
audience and from the phone lines we'll

20
00:00:43,030 --> 00:00:41,200
begin to my left with tara rutley the

21
00:00:45,110 --> 00:00:43,040
international space station associate

22
00:00:47,350 --> 00:00:45,120
program scientist

23
00:00:49,590 --> 00:00:47,360
to her left is patrick o'neill the

24
00:00:52,790 --> 00:00:49,600
center for the advancement of science

25
00:00:54,950 --> 00:00:52,800
and space communications manager cases

26
00:00:56,790 --> 00:00:54,960
next is louis zia

27
00:00:58,790 --> 00:00:56,800
a phd candidate the university of

28
00:01:00,790 --> 00:00:58,800
colorado boulder and with biosearch

29
00:01:03,430 --> 00:01:00,800
based technologies

30
00:01:05,350 --> 00:01:03,440
and we have peter platzer ceo of nano

31
00:01:06,310 --> 00:01:05,360
satisfying if you have any questions for

32
00:01:08,070 --> 00:01:06,320
our panelists and you're joining

33
00:01:09,910 --> 00:01:08,080
remotely remember you can ask your

34
00:01:12,390 --> 00:01:09,920
questions using the hashtag ask nasa on

35
00:01:14,789 --> 00:01:12,400
google plus or twitter

36
00:01:17,030 --> 00:01:14,799
and with that we'll begin with tara hey

37
00:01:18,710 --> 00:01:17,040
great thanks trent so the science

38
00:01:20,870 --> 00:01:18,720

community is really really excited about

39
00:01:22,149 --> 00:01:20,880
this particular launch of orbital

40
00:01:23,910 --> 00:01:22,159
because it's going to enable us to

41
00:01:25,670 --> 00:01:23,920
deliver more and more science to station

42
00:01:28,789 --> 00:01:25,680
over the next few years

43
00:01:32,550 --> 00:01:28,799
you know over it's 15 years on orbit

44
00:01:34,870 --> 00:01:32,560
already iss has performed around 1500

45
00:01:37,749 --> 00:01:34,880
investigations which is sounds like a

46
00:01:39,030 --> 00:01:37,759
lot and the big key to that is that most

47
00:01:41,510 --> 00:01:39,040
of those actually happen during the

48
00:01:43,429 --> 00:01:41,520
assembly phase a good chunk of them and

49
00:01:45,270 --> 00:01:43,439
the assembly phase came to completion in

50
00:01:47,830 --> 00:01:45,280
around 2011 and now we're actually in

51
00:01:49,270 --> 00:01:47,840
the what we call utilization phase so

52
00:01:51,590 --> 00:01:49,280
what we've seen

53
00:01:53,510 --> 00:01:51,600
is just the beginning and so

54
00:01:55,510 --> 00:01:53,520
because we're upping our research

55
00:01:57,910 --> 00:01:55,520
portfolio and seeing more and more new

56
00:02:00,230 --> 00:01:57,920
scientists and new science to station

57
00:02:02,230 --> 00:02:00,240
these capabilities like this new orbital

58
00:02:04,950 --> 00:02:02,240
launch is critical for the research

59
00:02:07,749 --> 00:02:04,960
portfolio for station

60
00:02:10,710 --> 00:02:07,759
at any six month period on iss you'll

61
00:02:12,869 --> 00:02:10,720
see about 200 active investigations and

62
00:02:15,830 --> 00:02:12,879
they'll range in disciplines from human

63
00:02:18,470 --> 00:02:15,840

physiology to biology and biotech it'll

64
00:02:21,350 --> 00:02:18,480
include space and earth observations

65
00:02:23,910 --> 00:02:21,360
education and physical sciences as well

66
00:02:26,309 --> 00:02:23,920
so this launch in particular will

67
00:02:28,710 --> 00:02:26,319
support ongoing experiments on station

68
00:02:31,110 --> 00:02:28,720
but it'll also deliver deliver several

69
00:02:32,710 --> 00:02:31,120
new investigations and so i have some

70
00:02:35,110 --> 00:02:32,720
scientists up here with me today who

71
00:02:37,830 --> 00:02:35,120
will share what those new investing

72
00:02:40,150 --> 00:02:37,840
investigations will be about

73
00:02:42,550 --> 00:02:40,160
you know research is happening every day

74
00:02:45,030 --> 00:02:42,560
on the space station it is a laboratory

75
00:02:46,470 --> 00:02:45,040
it's a unique laboratory of course

76
00:02:48,309 --> 00:02:46,480
but it's much like a ground-based

77
00:02:50,150 --> 00:02:48,319
laboratory in that you know there are

78
00:02:51,350 --> 00:02:50,160
new discoveries that we're finding very

79
00:02:52,790 --> 00:02:51,360
regularly

80
00:02:54,390 --> 00:02:52,800
and then we're also building on those

81
00:02:55,750 --> 00:02:54,400
discoveries and that's what science does

82
00:02:57,910 --> 00:02:55,760
it builds and builds and builds on

83
00:03:00,470 --> 00:02:57,920
discoveries until we can find knowledge

84
00:03:02,790 --> 00:03:00,480
that we can use to apply to

85
00:03:05,110 --> 00:03:02,800
nasa's mission of human exploration of

86
00:03:07,350 --> 00:03:05,120
space and also the ways that we can

87
00:03:09,110 --> 00:03:07,360
apply to earth applications and benefits

88
00:03:11,589 --> 00:03:09,120

for those of us here on the ground so

89
00:03:13,750 --> 00:03:11,599
that's what we're busy doing these 600

90
00:03:15,030 --> 00:03:13,760
or so scientists who are represented by

91
00:03:16,630 --> 00:03:15,040
this flight

92
00:03:18,390 --> 00:03:16,640
on the ground

93
00:03:21,990 --> 00:03:18,400
um so this orbital flight is

94
00:03:23,670 --> 00:03:22,000
particularly notable because it is a big

95
00:03:26,070 --> 00:03:23,680
one for the center for the advancement

96
00:03:27,990 --> 00:03:26,080
of science and space as it is going to

97
00:03:30,949 --> 00:03:28,000
deliver the biggest suite of national

98
00:03:32,630 --> 00:03:30,959
laboratory experiments uh to on on any

99
00:03:34,949 --> 00:03:32,640
kind of launch to date

100
00:03:37,910 --> 00:03:34,959
and so the national lab experiments are

101
00:03:40,309 --> 00:03:37,920
uh critical for opening new pathways for

102
00:03:42,390 --> 00:03:40,319
non-nasa users to space station and and

103
00:03:43,830 --> 00:03:42,400
new investigators are are uh are

104
00:03:46,229 --> 00:03:43,840
participating so we're seeing lots of

105
00:03:48,229 --> 00:03:46,239
new and really unique science so with

106
00:03:49,589 --> 00:03:48,239
that i'd like to turn it over to patrick

107
00:03:51,190 --> 00:03:49,599
o'neill of cases i'll tell you a little

108
00:03:53,110 --> 00:03:51,200
bit more about those

109
00:03:54,869 --> 00:03:53,120
thank you very much tara and a little

110
00:03:56,149 --> 00:03:54,879
bit of background on cases as i'm not

111
00:03:57,429 --> 00:03:56,159
sure if everyone here is entirely

112
00:03:59,190 --> 00:03:57,439
familiar with who we are as an

113
00:04:01,110 --> 00:03:59,200

organization but we stand for the center

114
00:04:02,710 --> 00:04:01,120
for the advancement of science and space

115
00:04:04,309 --> 00:04:02,720
and we are responsible for the

116
00:04:06,550 --> 00:04:04,319
management of the international space

117
00:04:09,110 --> 00:04:06,560
station us national laboratory

118
00:04:11,110 --> 00:04:09,120
effectively what that means is that we

119
00:04:12,789 --> 00:04:11,120
are tasked with bringing

120
00:04:14,710 --> 00:04:12,799
previous users as well as new and

121
00:04:17,270 --> 00:04:14,720
non-traditional users

122
00:04:19,830 --> 00:04:17,280
their research opportunities to the iss

123
00:04:21,509 --> 00:04:19,840
with with the hope of creating products

124
00:04:23,350 --> 00:04:21,519
therapies

125
00:04:25,909 --> 00:04:23,360
that could potentially benefit humankind

126
00:04:27,110 --> 00:04:25,919
or life here on earth the easiest way to

127
00:04:29,909 --> 00:04:27,120
kind of characterize the difference

128
00:04:31,670 --> 00:04:29,919
between nasa and cases i would say is

129
00:04:33,270 --> 00:04:31,680
when you think of nasa think of them as

130
00:04:35,030 --> 00:04:33,280
exploration driven especially as it

131
00:04:36,870 --> 00:04:35,040
relates to their research when you're

132
00:04:38,550 --> 00:04:36,880
talking about cases you're talking about

133
00:04:40,790 --> 00:04:38,560
research that could potentially benefit

134
00:04:42,870 --> 00:04:40,800
our lives here on earth

135
00:04:44,310 --> 00:04:42,880
so that's it before i get too far into

136
00:04:46,310 --> 00:04:44,320
the research that's going to be going up

137
00:04:48,070 --> 00:04:46,320
under our manifest at this point in time

138
00:04:49,909 --> 00:04:48,080

uh if we could please there's a quick

139
00:04:52,710 --> 00:04:49,919
little video that kind of gives a 101 on

140
00:04:55,030 --> 00:04:52,720
who we are as an organization

141
00:04:56,950 --> 00:04:55,040
what is cases

142
00:04:59,510 --> 00:04:56,960
cases is the center for the advancement

143
00:05:01,670 --> 00:04:59,520
of science in space and it manages the

144
00:05:03,270 --> 00:05:01,680
national laboratory on the international

145
00:05:05,670 --> 00:05:03,280
space station

146
00:05:08,390 --> 00:05:05,680
cases is launching a new era of space

147
00:05:10,550 --> 00:05:08,400
research to help reduce cost increasing

148
00:05:12,950 --> 00:05:10,560
access and opportunity

149
00:05:15,749 --> 00:05:12,960
cases is your gateway to innovation

150
00:05:17,830 --> 00:05:15,759
breakthroughs commercial r d research

151
00:05:20,469 --> 00:05:17,840
giving scientific commercial and

152
00:05:22,070 --> 00:05:20,479
educational industries equal access to

153
00:05:24,870 --> 00:05:22,080
space

154
00:05:26,790 --> 00:05:24,880
for the betterment of humankind

155
00:05:28,550 --> 00:05:26,800
kasis is appointed by congress to

156
00:05:30,629 --> 00:05:28,560
identify the opportunities for the

157
00:05:32,710 --> 00:05:30,639
international space station to take

158
00:05:35,110 --> 00:05:32,720
advantage of its unique environments to

159
00:05:37,670 --> 00:05:35,120
generate a return on investments

160
00:05:39,749 --> 00:05:37,680
not only financially but to improve life

161
00:05:41,430 --> 00:05:39,759
on earth as well for the citizens of the

162
00:05:44,230 --> 00:05:41,440
united states

163
00:05:47,029 --> 00:05:44,240

we do this by breaking down barriers

164
00:05:48,150 --> 00:05:47,039
assisting in research connecting

165
00:05:49,909 --> 00:05:48,160
hardware

166
00:05:51,110 --> 00:05:49,919
and funding

167
00:05:56,950 --> 00:05:51,120
cases

168
00:05:59,990 --> 00:05:58,070
thank you

169
00:06:01,749 --> 00:06:00,000
so as tara mentioned this is a very

170
00:06:03,909 --> 00:06:01,759
historic moment for cases as an

171
00:06:06,390 --> 00:06:03,919
organization we are just over two years

172
00:06:08,070 --> 00:06:06,400
old and uh during that time frame we

173
00:06:10,150 --> 00:06:08,080
have now evolved from a startup

174
00:06:12,629 --> 00:06:10,160
organization to once this launch is

175
00:06:14,870 --> 00:06:12,639
successful and uh and the cygnus is able

176
00:06:16,710 --> 00:06:14,880
to birth with the iss that research will

177
00:06:18,390 --> 00:06:16,720
go on the iss and then from there cases

178
00:06:21,110 --> 00:06:18,400
could basically say that we are a fully

179
00:06:23,590 --> 00:06:21,120
operational organization morphing from

180
00:06:25,510 --> 00:06:23,600
not only talking with researchers about

181
00:06:27,749 --> 00:06:25,520
sending their research to the iss but

182
00:06:29,749 --> 00:06:27,759
actually being able to now

183
00:06:31,670 --> 00:06:29,759
have their research go to the iss so

184
00:06:32,950 --> 00:06:31,680
that they can again investigate what

185
00:06:34,390 --> 00:06:32,960
happens within a microgravity

186
00:06:35,590 --> 00:06:34,400
environment for the betterment of

187
00:06:36,469 --> 00:06:35,600
humankind

188
00:06:38,309 --> 00:06:36,479

uh

189
00:06:39,670 --> 00:06:38,319
now a little bit about the research

190
00:06:41,430 --> 00:06:39,680
that's going to be going up under the

191
00:06:43,189 --> 00:06:41,440
cases manifest and i won't be getting

192
00:06:44,950 --> 00:06:43,199
into all of it uh and i'm also very

193
00:06:46,390 --> 00:06:44,960
helpful to have louise here from bioserv

194
00:06:48,469 --> 00:06:46,400
who can also be in a position to talk

195
00:06:50,870 --> 00:06:48,479
about some of the research that uh

196
00:06:53,749 --> 00:06:50,880
the cases is working alongside them with

197
00:06:56,629 --> 00:06:53,759
but this suite really includes a variety

198
00:06:59,990 --> 00:06:56,639
of payloads from physical earth sciences

199
00:07:01,830 --> 00:07:00,000
as well as a a lot of education payloads

200
00:07:03,270 --> 00:07:01,840
uh for instance we'll be talking about

201
00:07:05,589 --> 00:07:03,280
uh proctor and gamble they're working

202
00:07:08,150 --> 00:07:05,599
with zen technologies and they'll be

203
00:07:10,710 --> 00:07:08,160
looking to perform an investigation that

204
00:07:12,629 --> 00:07:10,720
uh that works with solid liquid mixtures

205
00:07:14,469 --> 00:07:12,639
and the thought is that it would help to

206
00:07:16,230 --> 00:07:14,479
improve their their overall product line

207
00:07:17,830 --> 00:07:16,240
which as most of you are familiar with

208
00:07:20,230 --> 00:07:17,840
procter and gamble

209
00:07:22,309 --> 00:07:20,240
foams gels etc

210
00:07:25,189 --> 00:07:22,319
additionally we're looking again as luis

211
00:07:27,430 --> 00:07:25,199
will talk about a little bit later on

212
00:07:28,950 --> 00:07:27,440
antibiotic antibiotic effectiveness

213
00:07:31,270 --> 00:07:28,960

within space

214
00:07:33,670 --> 00:07:31,280
certain bacteria behave differently

215
00:07:35,990 --> 00:07:33,680
within a microgravity environment and

216
00:07:38,150 --> 00:07:36,000
luis's team will have the ability to uh

217
00:07:39,830 --> 00:07:38,160
to dig a little bit deeper into that

218
00:07:41,510 --> 00:07:39,840
and then from from just an overall

219
00:07:43,830 --> 00:07:41,520
education standpoint because education

220
00:07:46,390 --> 00:07:43,840
is something the cases is very involved

221
00:07:47,909 --> 00:07:46,400
with especially as we're trying to spark

222
00:07:50,869 --> 00:07:47,919
the imagination of the future

223
00:07:52,869 --> 00:07:50,879
researchers and engineers of tomorrow so

224
00:07:54,629 --> 00:07:52,879
there is a litany of education payloads

225
00:07:55,990 --> 00:07:54,639
that will be going up under the cases

226
00:07:57,589 --> 00:07:56,000
manifest

227
00:07:59,749 --> 00:07:57,599
including

228
00:08:01,110 --> 00:07:59,759
ants in space which which luis will also

229
00:08:02,629 --> 00:08:01,120
be able to talk about but effectively

230
00:08:03,350 --> 00:08:02,639
what we're talking about ants in space

231
00:08:05,110 --> 00:08:03,360
is

232
00:08:07,110 --> 00:08:05,120
looking and seeing how ants colonize

233
00:08:09,110 --> 00:08:07,120
within a microgravity environment and

234
00:08:11,510 --> 00:08:09,120
seeing how that differentiates with

235
00:08:13,510 --> 00:08:11,520
those ants that are here on earth

236
00:08:15,189 --> 00:08:13,520
additionally there will be a

237
00:08:17,430 --> 00:08:15,199
story time from space program that will

238
00:08:19,589 --> 00:08:17,440

be going up to the iss

239
00:08:22,790 --> 00:08:19,599
an astronaut will be in a position to

240
00:08:25,749 --> 00:08:22,800
read and record themselves reading a

241
00:08:26,950 --> 00:08:25,759
book called max goes to the iss by dr

242
00:08:29,029 --> 00:08:26,960
jeffrey bennett from there there will

243
00:08:30,150 --> 00:08:29,039
hopefully be education curriculum that

244
00:08:32,469 --> 00:08:30,160
will be

245
00:08:33,909 --> 00:08:32,479
passed down to teachers and to parents

246
00:08:35,909 --> 00:08:33,919
getting their students involved with

247
00:08:37,430 --> 00:08:35,919
science and other stem related

248
00:08:39,589 --> 00:08:37,440
activities

249
00:08:41,589 --> 00:08:39,599
so in general again this is this is a

250
00:08:43,350 --> 00:08:41,599
very historic time for cases it's one

251
00:08:44,630 --> 00:08:43,360
that you know we are incredibly excited

252
00:08:46,550 --> 00:08:44,640
about because again it shows the

253
00:08:48,470 --> 00:08:46,560
differentiation between us morphing from

254
00:08:50,790 --> 00:08:48,480
a startup organization to now a fully

255
00:08:53,110 --> 00:08:50,800
operational organization capable of

256
00:08:55,030 --> 00:08:53,120
sending research that could hopefully

257
00:08:56,630 --> 00:08:55,040
create groundbreaking innovations to

258
00:08:58,470 --> 00:08:56,640
improve all of our lives here on earth

259
00:09:00,150 --> 00:08:58,480
so we thank nasa for their continued

260
00:09:01,670 --> 00:09:00,160
support we thank orbital sciences for

261
00:09:03,670 --> 00:09:01,680
their ability to help

262
00:09:06,870 --> 00:09:03,680
send our manifests or our suites up to

263
00:09:10,630 --> 00:09:06,880

the iss so thank you

264
00:09:13,430 --> 00:09:11,750
thank you trent

265
00:09:15,590 --> 00:09:13,440
so bioseries flying two different

266
00:09:17,430 --> 00:09:15,600
payloads the first one is aes1 which

267
00:09:20,150 --> 00:09:17,440
stands for antibiotic effectiveness in

268
00:09:22,550 --> 00:09:20,160
space one and uh what we're trying to

269
00:09:24,949 --> 00:09:22,560
find with this project is identify what

270
00:09:26,389 --> 00:09:24,959
genes are expressed and what changes

271
00:09:28,710 --> 00:09:26,399
happen in bacterial cells that are

272
00:09:30,310 --> 00:09:28,720
allowing them to resist antibiotics

273
00:09:32,790 --> 00:09:30,320
now there's two reasons we're doing this

274
00:09:34,310 --> 00:09:32,800
the first one is for space exploration

275
00:09:36,470 --> 00:09:34,320
there are several bacterial phenomena

276
00:09:38,070 --> 00:09:36,480
that have been observed in space one is

277
00:09:39,990 --> 00:09:38,080
that it has it has been seen that

278
00:09:42,470 --> 00:09:40,000
bacteria grow to larger numbers that's

279
00:09:43,910 --> 00:09:42,480
one thing another thing is that uh it

280
00:09:45,750 --> 00:09:43,920
has also been observed that higher

281
00:09:47,990 --> 00:09:45,760
concentrations of antibiotics have been

282
00:09:50,310 --> 00:09:48,000
needed to kill bacteria in space and

283
00:09:51,829 --> 00:09:50,320
there's a myriad of of other phenomena

284
00:09:53,750 --> 00:09:51,839
but really we're focusing on those two

285
00:09:55,829 --> 00:09:53,760
and taking advantage of them and the

286
00:09:57,990 --> 00:09:55,839
second reason is the problem on earth of

287
00:09:59,350 --> 00:09:58,000
bacterial drug resistance according to

288
00:10:01,110 --> 00:09:59,360

the national institutes of health

289
00:10:02,630 --> 00:10:01,120
between five and ten percent of people

290
00:10:05,590 --> 00:10:02,640
that go into hospitals here in the

291
00:10:07,590 --> 00:10:05,600
united states are acquiring an infection

292
00:10:09,590 --> 00:10:07,600
and in 1992

293
00:10:12,230 --> 00:10:09,600
it was 10 000 people who were dying

294
00:10:14,550 --> 00:10:12,240
every year because of that in 2012 that

295
00:10:16,069 --> 00:10:14,560
number is closer to a hundred thousand

296
00:10:17,430 --> 00:10:16,079
so this is a problem that's increasing

297
00:10:19,430 --> 00:10:17,440
significantly and that's something that

298
00:10:21,030 --> 00:10:19,440
we need to address as soon as possible

299
00:10:23,590 --> 00:10:21,040
what we're doing in aes 1 is we're

300
00:10:25,269 --> 00:10:23,600
flying e coli it's a it's a strain that

301
00:10:26,949 --> 00:10:25,279
is non-pathogenic it cannot cause

302
00:10:30,470 --> 00:10:26,959
disease and we have flown six several

303
00:10:31,750 --> 00:10:30,480
space shuttle flights with this train

304
00:10:33,509 --> 00:10:31,760
we are also flying two different

305
00:10:37,110 --> 00:10:33,519
antibiotics they have different

306
00:10:38,630 --> 00:10:37,120
mechanisms of action and we have 128

307
00:10:41,110 --> 00:10:38,640
test tubes if i could have the first

308
00:10:41,990 --> 00:10:41,120
slide in the first picture here

309
00:10:43,990 --> 00:10:42,000
and

310
00:10:45,509 --> 00:10:44,000
these have four chambers there's a

311
00:10:47,430 --> 00:10:45,519
solution a different solution in each

312
00:10:50,550 --> 00:10:47,440
chamber and we're grouping these in in

313
00:10:52,710 --> 00:10:50,560

sets of eight in gaps which

314
00:10:55,670 --> 00:10:52,720
are group activation packs

315
00:10:58,710 --> 00:10:55,680
like this one right here and

316
00:11:00,150 --> 00:10:58,720
so we have 16 of these gaps inside cgba

317
00:11:02,150 --> 00:11:00,160
which is a commercial generic

318
00:11:04,470 --> 00:11:02,160
bioprocessing apparatus that allows us

319
00:11:06,550 --> 00:11:04,480
to maintain temperature control

320
00:11:08,310 --> 00:11:06,560
throughout the life of the experiment

321
00:11:10,389 --> 00:11:08,320
now what the astronauts will do is they

322
00:11:12,389 --> 00:11:10,399
will use a hand tool just like this one

323
00:11:15,430 --> 00:11:12,399
and they will connect it to the gap and

324
00:11:17,910 --> 00:11:15,440
they crank it so the cranking motion

325
00:11:19,829 --> 00:11:17,920
what it does it allows for a fluid to go

326
00:11:21,829 --> 00:11:19,839
from one chamber to the next

327
00:11:25,350 --> 00:11:21,839
and there are activation lines that tell

328
00:11:26,949 --> 00:11:25,360
the astronauts exactly where to crank to

329
00:11:29,670 --> 00:11:26,959
now for this project we're partnering

330
00:11:31,750 --> 00:11:29,680
with sean levy from hudson alpha

331
00:11:34,310 --> 00:11:31,760
institute for biotechnology in alabama

332
00:11:36,069 --> 00:11:34,320
the principal investigator is dr david

333
00:11:38,630 --> 00:11:36,079
klaus from the university of colorado

334
00:11:40,870 --> 00:11:38,640
the co-investigator is dr louis today

335
00:11:42,630 --> 00:11:40,880
the bioserve director

336
00:11:45,030 --> 00:11:42,640
this is my doctoral dissertation and

337
00:11:46,630 --> 00:11:45,040
it's being built upon over two decades

338
00:11:49,030 --> 00:11:46,640

of knowledge developed by these two

339
00:11:49,910 --> 00:11:49,040
scientists and in particularly dr david

340
00:11:52,550 --> 00:11:49,920
klaus

341
00:11:53,829 --> 00:11:52,560
uh this is a bioserve funded project and

342
00:11:55,590 --> 00:11:53,839
we would like to thank nasa for

343
00:11:57,350 --> 00:11:55,600
facilitating and making this

344
00:11:59,190 --> 00:11:57,360
experiment possible as well as all the

345
00:12:01,829 --> 00:11:59,200
folks in orbital and all the people who

346
00:12:03,670 --> 00:12:01,839
have been working behind the scenes

347
00:12:06,150 --> 00:12:03,680
we would welcome if any other

348
00:12:07,750 --> 00:12:06,160
organization would be interested in uh

349
00:12:09,430 --> 00:12:07,760
getting together with us working either

350
00:12:10,710 --> 00:12:09,440
in this project or a future project we

351
00:12:13,509 --> 00:12:10,720
would be happy to entertain any

352
00:12:15,750 --> 00:12:13,519
conversation now what we expect to get

353
00:12:17,590 --> 00:12:15,760
from this experiment comes from the two

354
00:12:19,509 --> 00:12:17,600
different types of post-flight analysis

355
00:12:21,110 --> 00:12:19,519
that we're going to do at the university

356
00:12:23,350 --> 00:12:21,120
of colorado boulder what we're going to

357
00:12:25,350 --> 00:12:23,360
do is analyze the changes morphological

358
00:12:27,350 --> 00:12:25,360
changes on the cells like increase in

359
00:12:28,710 --> 00:12:27,360
cell envelope thickness increase in cell

360
00:12:30,949 --> 00:12:28,720
size and other things that may change

361
00:12:32,629 --> 00:12:30,959
the physics of mass transport phenomena

362
00:12:34,790 --> 00:12:32,639
uh hudson alpha will be doing the gene

363
00:12:36,949 --> 00:12:34,800

expression analysis finally what we're

364
00:12:38,389 --> 00:12:36,959
trying to get with this is

365
00:12:39,910 --> 00:12:38,399
just gain more knowledge and how

366
00:12:41,829 --> 00:12:39,920
bacteria are acquiring resistance to

367
00:12:43,590 --> 00:12:41,839
antibiotics to develop new and better

368
00:12:45,910 --> 00:12:43,600
drugs and to help us prepare for

369
00:12:47,509 --> 00:12:45,920
long-term space exploration

370
00:12:49,350 --> 00:12:47,519
the second experiment that we're flying

371
00:12:50,870 --> 00:12:49,360
is csi06

372
00:12:52,949 --> 00:12:50,880
or ants in space

373
00:12:55,430 --> 00:12:52,959
now this one is being sponsored in part

374
00:12:57,750 --> 00:12:55,440
by cases and the nasa iss national lab

375
00:12:59,430 --> 00:12:57,760
education office it's based on dr

376
00:13:00,870 --> 00:12:59,440
deborah gordon's research she's a

377
00:13:02,150 --> 00:13:00,880
professor at stanford stanford

378
00:13:03,910 --> 00:13:02,160
university

379
00:13:05,430 --> 00:13:03,920
stephanie countryman bioservices

380
00:13:07,190 --> 00:13:05,440
education program director is the

381
00:13:08,710 --> 00:13:07,200
project manager and the associate

382
00:13:10,629 --> 00:13:08,720
professor at the university of colorado

383
00:13:12,470 --> 00:13:10,639
denver michael green is a research

384
00:13:16,069 --> 00:13:12,480
partner for this experiment eight

385
00:13:19,030 --> 00:13:16,079
habitats are being flown each one has 80

386
00:13:21,829 --> 00:13:19,040
ants if we act we could have

387
00:13:23,990 --> 00:13:21,839
this the picture please

388
00:13:26,230 --> 00:13:24,000

thus the the ants that we're flying is

389
00:13:28,389 --> 00:13:26,240
tetramorium cespatum which is just com

390
00:13:30,069 --> 00:13:28,399
common pavement ant and there's three

391
00:13:32,150 --> 00:13:30,079
different colonies that were used for

392
00:13:34,710 --> 00:13:32,160
this experiment one is from north

393
00:13:37,030 --> 00:13:34,720
carolina the second one is from boulder

394
00:13:39,030 --> 00:13:37,040
colorado and the third one is we're

395
00:13:39,910 --> 00:13:39,040
actually flying ants local ants they

396
00:13:42,230 --> 00:13:39,920
were

397
00:13:44,550 --> 00:13:42,240
harvested here on wallops island

398
00:13:46,470 --> 00:13:44,560
there are three sections in the in the

399
00:13:48,389 --> 00:13:46,480
habitat the first one is the nest which

400
00:13:50,710 --> 00:13:48,399
allows which gives moisture

401
00:13:53,750 --> 00:13:50,720
water and nutrients and then there is

402
00:13:55,350 --> 00:13:53,760
this forage area one and forage area too

403
00:13:58,310 --> 00:13:55,360
and between these areas there are

404
00:14:00,790 --> 00:13:58,320
barriers so what astronauts will do is

405
00:14:03,750 --> 00:14:00,800
they will connect a hand tool to the

406
00:14:05,269 --> 00:14:03,760
habitat which will change the position

407
00:14:06,310 --> 00:14:05,279
of the barrier between these different

408
00:14:08,230 --> 00:14:06,320
chambers

409
00:14:09,670 --> 00:14:08,240
so due to limited time span within the

410
00:14:12,389 --> 00:14:09,680
habitats this experiment is going to

411
00:14:14,230 --> 00:14:12,399
start as soon as possible so soon after

412
00:14:16,069 --> 00:14:14,240
the cygnus is unloaded astronauts will

413
00:14:18,470 --> 00:14:16,079

go ahead and start the experiment which

414
00:14:20,710 --> 00:14:18,480
really entails of uh they will put it

415
00:14:22,550 --> 00:14:20,720
inside uh to put in front of hd cameras

416
00:14:24,150 --> 00:14:22,560
if we could have the next picture please

417
00:14:26,230 --> 00:14:24,160
and that's when the experiment starts

418
00:14:28,150 --> 00:14:26,240
they're gonna videotape the ants in the

419
00:14:30,310 --> 00:14:28,160
nest for five minutes then they're gonna

420
00:14:32,629 --> 00:14:30,320
lower the barrier that connects the nest

421
00:14:34,470 --> 00:14:32,639
to the first forage area and they're

422
00:14:36,150 --> 00:14:34,480
going to allow them to move and they're

423
00:14:37,670 --> 00:14:36,160
going to record this for 25 minutes then

424
00:14:40,710 --> 00:14:37,680
they're going to lower the second

425
00:14:42,550 --> 00:14:40,720
barrier so they can get to forge area 2

426
00:14:44,550 --> 00:14:42,560
and record this for 30 minutes and

427
00:14:46,870 --> 00:14:44,560
that's the conclusion of the experiment

428
00:14:49,030 --> 00:14:46,880
ants will live there for the rest of

429
00:14:51,750 --> 00:14:49,040
their natural lives and the video will

430
00:14:53,910 --> 00:14:51,760
be downloaded to bioserve now the

431
00:14:56,069 --> 00:14:53,920
education component of this is designed

432
00:14:57,910 --> 00:14:56,079
by baylor college of medicine center for

433
00:15:00,790 --> 00:14:57,920
education outreach and they have

434
00:15:02,470 --> 00:15:00,800
developed a curriculum guide and

435
00:15:04,949 --> 00:15:02,480
it's tailored it's actually targeted

436
00:15:06,550 --> 00:15:04,959
towards middle school students but

437
00:15:09,430 --> 00:15:06,560
teachers and students from elementary

438
00:15:11,189 --> 00:15:09,440

high school wherever you are you can

439
00:15:12,949 --> 00:15:11,199
work with this because the curriculum

440
00:15:14,310 --> 00:15:12,959
can be tailored can be modified it's

441
00:15:15,910 --> 00:15:14,320
very flexible

442
00:15:18,949 --> 00:15:15,920
the videos are going to be available

443
00:15:20,949 --> 00:15:18,959
online on bioedonline.org

444
00:15:23,189 --> 00:15:20,959
that's bio as in biology education

445
00:15:24,949 --> 00:15:23,199
education online.org

446
00:15:27,350 --> 00:15:24,959
as of late january

447
00:15:29,670 --> 00:15:27,360
now this uh if we could have the next

448
00:15:32,310 --> 00:15:29,680
picture

449
00:15:33,670 --> 00:15:32,320
bowser has and these partners have flown

450
00:15:35,749 --> 00:15:33,680
similar experiments before with

451
00:15:37,829 --> 00:15:35,759
butterflies and

452
00:15:40,550 --> 00:15:37,839
and other

453
00:15:42,629 --> 00:15:40,560
spiders i probably have heard from them

454
00:15:46,550 --> 00:15:42,639
and typically we have reached between

455
00:15:49,430 --> 00:15:46,560
100 and 200 000 students with these

456
00:15:51,910 --> 00:15:49,440
so and specific uh the reason for which

457
00:15:54,710 --> 00:15:51,920
ants research is important is because

458
00:15:57,269 --> 00:15:54,720
they are organized in a in a coordinated

459
00:15:58,790 --> 00:15:57,279
fashion without a central control

460
00:16:00,870 --> 00:15:58,800
so that is something that can be

461
00:16:02,949 --> 00:16:00,880
applicable to other kinds of research

462
00:16:04,069 --> 00:16:02,959
such as the brain the immune system or

463
00:16:05,749 --> 00:16:04,079

the internet

464
00:16:08,310 --> 00:16:05,759
thank you

465
00:16:10,310 --> 00:16:08,320
okay next we're here from peter platzer

466
00:16:12,949 --> 00:16:10,320
thank you trent um

467
00:16:14,870 --> 00:16:12,959
welcome everyone uh my name is peter and

468
00:16:15,910 --> 00:16:14,880
i'm really excited to be here i'm very

469
00:16:17,910 --> 00:16:15,920
honored

470
00:16:20,550 --> 00:16:17,920
to be here and share a little bit

471
00:16:24,310 --> 00:16:20,560
about a dream that four students had and

472
00:16:26,790 --> 00:16:24,320
that is uh going to find its next step

473
00:16:29,509 --> 00:16:26,800
tomorrow when it's going up into space

474
00:16:32,230 --> 00:16:29,519
we started with a very very simple idea

475
00:16:33,590 --> 00:16:32,240
affordable access to space space should

476
00:16:35,990 --> 00:16:33,600
be for everyone

477
00:16:38,150 --> 00:16:36,000
it shouldn't be just for you know those

478
00:16:39,829 --> 00:16:38,160
which are the right stuff or those which

479
00:16:42,389 --> 00:16:39,839
have enough of the green stuff to get up

480
00:16:45,350 --> 00:16:42,399
there but it should be for everyone

481
00:16:47,590 --> 00:16:45,360
and there are two components to that one

482
00:16:50,310 --> 00:16:47,600
is you need to find a way to make it

483
00:16:52,389 --> 00:16:50,320
truly accessible for everyone and the

484
00:16:55,189 --> 00:16:52,399
other one is you really have to lower

485
00:16:57,829 --> 00:16:55,199
the cost and lowering the cost has two

486
00:17:00,389 --> 00:16:57,839
components one is you drive forward

487
00:17:03,110 --> 00:17:00,399
standards and like work on adopting

488
00:17:06,710 --> 00:17:03,120

those standards on as broad a community

489
00:17:10,230 --> 00:17:06,720
as possible and two you take advantage

490
00:17:12,309 --> 00:17:10,240
of all the cost lowering mechanisms that

491
00:17:14,870 --> 00:17:12,319
is happening right here on earth and

492
00:17:16,789 --> 00:17:14,880
find a way to leverage it into space

493
00:17:18,789 --> 00:17:16,799
so with this mission if we if we go to

494
00:17:21,029 --> 00:17:18,799
the to the first picture

495
00:17:24,710 --> 00:17:21,039
we are launching the next one of our

496
00:17:26,470 --> 00:17:24,720
satellites uh called arduset2

497
00:17:30,390 --> 00:17:26,480
where you see here a picture from the

498
00:17:33,510 --> 00:17:30,400
top showing you the the solar panels um

499
00:17:34,870 --> 00:17:33,520
a custom-made section on top with solar

500
00:17:36,950 --> 00:17:34,880
panels we cut

501
00:17:38,549 --> 00:17:36,960
and uh and glued ourselves in in

502
00:17:39,990 --> 00:17:38,559
painstaking matter

503
00:17:42,230 --> 00:17:40,000
and an antenna

504
00:17:44,789 --> 00:17:42,240
now if you go to the next picture

505
00:17:46,549 --> 00:17:44,799
we try to share with you

506
00:17:48,310 --> 00:17:46,559
a size comparison

507
00:17:49,270 --> 00:17:48,320
what you see in the lower left hand

508
00:17:51,669 --> 00:17:49,280
corner

509
00:17:54,150 --> 00:17:51,679
is one of our magic bullets for

510
00:17:56,789 --> 00:17:54,160
affordable access for everyone

511
00:17:59,029 --> 00:17:56,799
it's an arduino processor

512
00:18:00,549 --> 00:17:59,039
it is a processor that has been used all

513
00:18:02,630 --> 00:18:00,559

across the world this is an apple this

514
00:18:04,710 --> 00:18:02,640
is not the arduino processor anymore but

515
00:18:07,029 --> 00:18:04,720
what you saw beforehand is an arduino

516
00:18:09,430 --> 00:18:07,039
processor that has been used by

517
00:18:11,110 --> 00:18:09,440
literally millions of people across the

518
00:18:14,390 --> 00:18:11,120
world from

519
00:18:15,909 --> 00:18:14,400
four year olds to 100 year olds

520
00:18:17,830 --> 00:18:15,919
and they have used it to make

521
00:18:19,909 --> 00:18:17,840
experiments and to connect the software

522
00:18:22,150 --> 00:18:19,919
world with the real world

523
00:18:25,830 --> 00:18:22,160
and what we have done is we have taken

524
00:18:28,710 --> 00:18:25,840
that and put it into this satellite

525
00:18:32,230 --> 00:18:28,720
and we have created a process and a

526
00:18:33,270 --> 00:18:32,240
capability for students all across the

527
00:18:36,230 --> 00:18:33,280
world

528
00:18:37,990 --> 00:18:36,240
to develop their own science experiment

529
00:18:40,390 --> 00:18:38,000
on an arduino

530
00:18:43,029 --> 00:18:40,400
and using the sensors that we have on

531
00:18:45,430 --> 00:18:43,039
the satellite so we have magnetometers

532
00:18:48,230 --> 00:18:45,440
and we have accelerometers and gyros we

533
00:18:49,990 --> 00:18:48,240
have spectrometers we have cameras

534
00:18:51,750 --> 00:18:50,000
we have geiger counters there's a whole

535
00:18:53,830 --> 00:18:51,760
host of sensors

536
00:18:54,710 --> 00:18:53,840
and they can make these experiments at

537
00:18:56,710 --> 00:18:54,720
home

538
00:18:59,350 --> 00:18:56,720

and then through our web interface they

539
00:19:01,190 --> 00:18:59,360
can upload it to the satellite and they

540
00:19:02,950 --> 00:19:01,200
can run it on the satellite and get

541
00:19:06,310 --> 00:19:02,960
their own data

542
00:19:08,390 --> 00:19:06,320
so instead of being forced to like look

543
00:19:11,270 --> 00:19:08,400
up in a textbook how does the earth's

544
00:19:14,789 --> 00:19:11,280
magnetic field look like or learn

545
00:19:17,430 --> 00:19:14,799
newton's laws of gravitation and motion

546
00:19:21,750 --> 00:19:17,440
or learn some computer programming

547
00:19:24,549 --> 00:19:21,760
they can actually run a project in space

548
00:19:26,549 --> 00:19:24,559
they can join the scientists of nasa and

549
00:19:28,310 --> 00:19:26,559
run something in space and we think

550
00:19:30,390 --> 00:19:28,320
that's something like you know

551
00:19:34,070 --> 00:19:30,400
truly inspirational and can have a huge

552
00:19:35,990 --> 00:19:34,080
impact on how the next generation the

553
00:19:39,110 --> 00:19:36,000
post-space shuttle and walking on the

554
00:19:40,710 --> 00:19:39,120
moon generation gets to experience space

555
00:19:42,710 --> 00:19:40,720
and thanks to um

556
00:19:45,990 --> 00:19:42,720
to nasa and the program of the of the

557
00:19:48,789 --> 00:19:46,000
use of the iss this is the first project

558
00:19:51,669 --> 00:19:48,799
of what we are doing with artist two

559
00:19:53,990 --> 00:19:51,679
the second component that i mentioned

560
00:19:56,070 --> 00:19:54,000
that is that is a big goal of ours is

561
00:19:58,870 --> 00:19:56,080
the creation and use of standards and

562
00:20:01,750 --> 00:19:58,880
the lowering of costs

563
00:20:04,630 --> 00:20:01,760

this is a form factor that was uh

564
00:20:07,110 --> 00:20:04,640
invented by two professors uh professor

565
00:20:09,029 --> 00:20:07,120
bob twix from stanford who actually

566
00:20:12,070 --> 00:20:09,039
works with us and

567
00:20:15,270 --> 00:20:12,080
professor jordy puigsuari from cal poly

568
00:20:17,830 --> 00:20:15,280
and it is by now the single most adopted

569
00:20:19,590 --> 00:20:17,840
satellite standard in the world

570
00:20:21,590 --> 00:20:19,600
there's going to be something like 30

571
00:20:25,750 --> 00:20:21,600
satellites of this form factor actually

572
00:20:28,070 --> 00:20:25,760
a bit larger on this launch tomorrow

573
00:20:29,990 --> 00:20:28,080
one of the largest numbers or the single

574
00:20:31,669 --> 00:20:30,000
largest number of cubesats that have

575
00:20:32,630 --> 00:20:31,679
been launched

576
00:20:34,310 --> 00:20:32,640
and it's

577
00:20:35,830 --> 00:20:34,320
you have to think about it it's like one

578
00:20:38,230 --> 00:20:35,840
of the largest constellation of

579
00:20:40,310 --> 00:20:38,240
satellites being put up in one single

580
00:20:42,390 --> 00:20:40,320
satellite in one single launch and they

581
00:20:45,029 --> 00:20:42,400
all have the same form factor

582
00:20:46,870 --> 00:20:45,039
and what has created is that people all

583
00:20:48,870 --> 00:20:46,880
across the world at universities at

584
00:20:50,470 --> 00:20:48,880
schools at science institutes as

585
00:20:54,710 --> 00:20:50,480
commercial companies

586
00:20:56,390 --> 00:20:54,720
use that standard to drive down cost

587
00:20:58,470 --> 00:20:56,400
but even more so than that and we're

588
00:21:01,350 --> 00:20:58,480

working with that with with our friends

589
00:21:02,950 --> 00:21:01,360
at nasa ames who are very keen on on

590
00:21:05,190 --> 00:21:02,960
treating those standards and and

591
00:21:07,669 --> 00:21:05,200
popularizing it and broadening the

592
00:21:09,270 --> 00:21:07,679
participation in space

593
00:21:12,710 --> 00:21:09,280
but the other component is is that

594
00:21:14,789 --> 00:21:12,720
thanks to consumer goods and robotics

595
00:21:16,470 --> 00:21:14,799
and uavs and and security and

596
00:21:18,230 --> 00:21:16,480
surveillance on earth

597
00:21:21,270 --> 00:21:18,240
there is hundreds of billions of dollars

598
00:21:24,230 --> 00:21:21,280
of investments that drive down the cost

599
00:21:26,870 --> 00:21:24,240
for sensors for computers for devices

600
00:21:29,110 --> 00:21:26,880
they always get smaller lighter more

601
00:21:31,510 --> 00:21:29,120
power efficient and cheaper at the same

602
00:21:34,470 --> 00:21:31,520
time now if you do any kind of mission

603
00:21:37,029 --> 00:21:34,480
planning in space smaller lighter

604
00:21:38,710 --> 00:21:37,039
cheaper using less power those are

605
00:21:40,149 --> 00:21:38,720
really really nice features to have

606
00:21:42,470 --> 00:21:40,159
right i'm pretty sure that anyone who

607
00:21:43,990 --> 00:21:42,480
has ever tried to put a sensor on space

608
00:21:46,390 --> 00:21:44,000
they would love to have things being

609
00:21:48,390 --> 00:21:46,400
lighter and using less power and here on

610
00:21:49,909 --> 00:21:48,400
earth those industries are doing it for

611
00:21:51,990 --> 00:21:49,919
us for free

612
00:21:54,230 --> 00:21:52,000
so what we are doing is we're taking

613
00:21:57,990 --> 00:21:54,240

literally consumer electronics off the

614
00:22:00,230 --> 00:21:58,000
shelf stuff you buy at radio shack at

615
00:22:01,510 --> 00:22:00,240
best buy and you know maybe on the

616
00:22:04,310 --> 00:22:01,520
internet

617
00:22:06,070 --> 00:22:04,320
and we're putting it into the satellite

618
00:22:07,669 --> 00:22:06,080
and we're putting it into the hands of

619
00:22:09,909 --> 00:22:07,679
students all across the world there is

620
00:22:11,990 --> 00:22:09,919
hundreds of students

621
00:22:12,950 --> 00:22:12,000
a large number of schools that are lined

622
00:22:16,230 --> 00:22:12,960
up

623
00:22:17,909 --> 00:22:16,240
trying to get online and desperately

624
00:22:20,630 --> 00:22:17,919
waiting for the launch tomorrow to be

625
00:22:23,110 --> 00:22:20,640
successful and then if we show the last

626
00:22:25,350 --> 00:22:23,120
picture what is going to happen then

627
00:22:26,710 --> 00:22:25,360
is that those satellites will be ejected

628
00:22:28,390 --> 00:22:26,720
from the iss

629
00:22:29,750 --> 00:22:28,400
those are three satellites that have

630
00:22:32,310 --> 00:22:29,760
been ejected

631
00:22:35,270 --> 00:22:32,320
a few months ago two of which are ours

632
00:22:37,110 --> 00:22:35,280
um called artisan one um and artists at

633
00:22:38,870 --> 00:22:37,120
x captain

634
00:22:40,789 --> 00:22:38,880
where we are working with already and

635
00:22:41,990 --> 00:22:40,799
students are starting to get access to

636
00:22:44,310 --> 00:22:42,000
them

637
00:22:47,270 --> 00:22:44,320
this one is the next situation and we

638
00:22:48,470 --> 00:22:47,280

will serve even more students doing real

639
00:22:51,029 --> 00:22:48,480
science

640
00:22:52,549 --> 00:22:51,039
by themselves in space

641
00:22:56,230 --> 00:22:52,559
thank you

642
00:22:58,390 --> 00:22:56,240
the question and answer here uh and

643
00:23:00,310 --> 00:22:58,400
we'll uh do a quick check in the

644
00:23:01,830 --> 00:23:00,320
audience and see who has a question

645
00:23:02,870 --> 00:23:01,840
start with ken kramer in the front wait

646
00:23:06,950 --> 00:23:02,880
for my

647
00:23:11,270 --> 00:23:08,950
hi ken kramer for universe today

648
00:23:14,149 --> 00:23:11,280
question for uh luis can you go a little

649
00:23:16,870 --> 00:23:14,159
bit into um

650
00:23:19,029 --> 00:23:16,880
how many of these samples are going up

651
00:23:20,950 --> 00:23:19,039
um

652
00:23:23,029 --> 00:23:20,960
how much time will the astronauts be

653
00:23:24,630 --> 00:23:23,039
working and i think this is the

654
00:23:27,190 --> 00:23:24,640
experiment that's going up and then

655
00:23:29,029 --> 00:23:27,200
coming back down on spacex can you talk

656
00:23:29,909 --> 00:23:29,039
about about that a little thanks that's

657
00:23:31,909 --> 00:23:29,919
correct

658
00:23:33,510 --> 00:23:31,919
so uh for the first question how many

659
00:23:36,789 --> 00:23:33,520
test tubes how many samples are we

660
00:23:39,029 --> 00:23:36,799
flying so there are 128 test tubes we're

661
00:23:41,110 --> 00:23:39,039
actually testing 32 different conditions

662
00:23:43,350 --> 00:23:41,120
where condition meaning a different

663
00:23:45,110 --> 00:23:43,360

concentration of antibiotic

664
00:23:46,870 --> 00:23:45,120
and it could be a different fixative

665
00:23:48,710 --> 00:23:46,880
depending on what the post and flight

666
00:23:51,110 --> 00:23:48,720
analysis will be

667
00:23:53,909 --> 00:23:51,120
half of them will are planned to return

668
00:23:57,669 --> 00:23:53,919
back to earth on spacex 3 and the second

669
00:24:00,870 --> 00:23:57,679
half are planned to return on spacex 4.

670
00:24:03,110 --> 00:24:00,880
i'm not sure if i answered why why

671
00:24:05,669 --> 00:24:03,120
why the different flights

672
00:24:06,870 --> 00:24:05,679
oh because there's a limited space on

673
00:24:08,549 --> 00:24:06,880
return

674
00:24:11,510 --> 00:24:08,559
ideally they would all come back as soon

675
00:24:12,870 --> 00:24:11,520
as possible but uh there are more and

676
00:24:14,310 --> 00:24:12,880
there are other experiments that need to

677
00:24:15,590 --> 00:24:14,320
come back to earth too and so there is a

678
00:24:18,630 --> 00:24:15,600
manifest

679
00:24:20,470 --> 00:24:18,640
so there's an order to that and the time

680
00:24:22,549 --> 00:24:20,480
the astronauts will work on

681
00:24:25,909 --> 00:24:22,559
thanks so the for the time uh so right

682
00:24:27,990 --> 00:24:25,919
now they're in cygnus inside cgba cgba

683
00:24:30,470 --> 00:24:28,000
maintains them at four celsius

684
00:24:32,390 --> 00:24:30,480
and uh there will be at four celsius

685
00:24:33,669 --> 00:24:32,400
until uh about

686
00:24:35,750 --> 00:24:33,679
a little bit less than two weeks from

687
00:24:38,710 --> 00:24:35,760
now when cg we are going to bring it

688
00:24:40,470 --> 00:24:38,720

back up to 30 celsius and after a couple

689
00:24:42,630 --> 00:24:40,480
hours that's when the astronauts start

690
00:24:45,269 --> 00:24:42,640
the experiment by using the crank and

691
00:24:46,710 --> 00:24:45,279
allowing for the the fluid in the second

692
00:24:49,110 --> 00:24:46,720
chamber go into the first one and that

693
00:24:50,549 --> 00:24:49,120
is the the e coli go into the growth

694
00:24:52,950 --> 00:24:50,559
medium so that's when the experiment

695
00:24:54,390 --> 00:24:52,960
starts the bacteria starts growing after

696
00:24:55,269 --> 00:24:54,400
about 18 hours

697
00:25:04,310 --> 00:24:55,279
the

698
00:25:06,630 --> 00:25:04,320
a specific point where we want it and

699
00:25:08,470 --> 00:25:06,640
then we introduce the antibiotic

700
00:25:09,590 --> 00:25:08,480
about 32 hours after that second

701
00:25:11,269 --> 00:25:09,600
activation

702
00:25:12,950 --> 00:25:11,279
there's the final cranking which we call

703
00:25:15,590 --> 00:25:12,960
termination because it introduces the

704
00:25:17,750 --> 00:25:15,600
fixative which you could say freezes the

705
00:25:19,269 --> 00:25:17,760
experiment so to speak it puts it on

706
00:25:22,310 --> 00:25:19,279
hold so we can do our post-flight

707
00:25:28,549 --> 00:25:24,070
other questions in the audience right

708
00:25:33,750 --> 00:25:30,870
thank you uh tarek malek from space.com

709
00:25:37,430 --> 00:25:33,760
i think i have one for uh luis and and

710
00:25:39,430 --> 00:25:37,440
then a follow-up um this ant habitat uh

711
00:25:41,110 --> 00:25:39,440
you know we've seen the spiders and the

712
00:25:42,390 --> 00:25:41,120
butterflies and some other critters in

713
00:25:43,430 --> 00:25:42,400

space and bees

714
00:25:44,549 --> 00:25:43,440
uh

715
00:25:45,909 --> 00:25:44,559
are very

716
00:25:47,830 --> 00:25:45,919
memorable but

717
00:25:48,630 --> 00:25:47,840
i've never seen ants except in a cartoon

718
00:25:52,390 --> 00:25:48,640
and

719
00:25:54,470 --> 00:25:52,400
with an anterior at home how you see

720
00:25:55,510 --> 00:25:54,480
kind of like the draw

721
00:25:57,190 --> 00:25:55,520
to

722
00:25:59,190 --> 00:25:57,200
students beyond just the science that

723
00:26:01,990 --> 00:25:59,200
you're getting of having animals in

724
00:26:04,789 --> 00:26:02,000
space or insects in space uh and and how

725
00:26:06,230 --> 00:26:04,799
that can uh really help them just grasp

726
00:26:08,310 --> 00:26:06,240
that there's other kinds of science

727
00:26:09,269 --> 00:26:08,320
beyond just the astronauts you can do in

728
00:26:11,669 --> 00:26:09,279
space

729
00:26:13,590 --> 00:26:11,679
thanks that those are great points um

730
00:26:15,510 --> 00:26:13,600
so there is a selection criteria for

731
00:26:17,190 --> 00:26:15,520
defining what will be flown as the next

732
00:26:18,950 --> 00:26:17,200
educational

733
00:26:20,950 --> 00:26:18,960
experiment as you mentioned uh

734
00:26:23,110 --> 00:26:20,960
butterflies and

735
00:26:24,630 --> 00:26:23,120
spiders have been flowing before now one

736
00:26:25,909 --> 00:26:24,640
of the criteria is

737
00:26:27,830 --> 00:26:25,919
it's got to be something that they can

738
00:26:29,909 --> 00:26:27,840

have in their classrooms and habit that

739
00:26:31,590 --> 00:26:29,919
has got to be something relatively easy

740
00:26:33,110 --> 00:26:31,600
to assemble so that the one they have in

741
00:26:36,470 --> 00:26:33,120
their classrooms resembles the one in

742
00:26:37,350 --> 00:26:36,480
the international space station

743
00:26:39,750 --> 00:26:37,360
um

744
00:26:41,590 --> 00:26:39,760
and your other question was

745
00:26:42,470 --> 00:26:41,600
well i'm i'm just kind of curious just

746
00:26:46,950 --> 00:26:42,480
how

747
00:26:48,390 --> 00:26:46,960
relate right so the idea is that because

748
00:26:50,630 --> 00:26:48,400
the videos are gonna be uploaded in

749
00:26:53,510 --> 00:26:50,640
bioid online that teachers can actually

750
00:26:55,029 --> 00:26:53,520
go and use them whenever it's best they

751
00:26:56,310 --> 00:26:55,039
think it's best in the curriculum of

752
00:26:58,789 --> 00:26:56,320
their own class

753
00:27:00,950 --> 00:26:58,799
and uh the idea is for

754
00:27:02,549 --> 00:27:00,960
students to see what's happening in in

755
00:27:04,549 --> 00:27:02,559
earth in terms of how many collisions

756
00:27:06,950 --> 00:27:04,559
there are how many times their ants

757
00:27:08,710 --> 00:27:06,960
their antenna touch each other because

758
00:27:10,149 --> 00:27:08,720
that's how they you can count how many

759
00:27:11,190 --> 00:27:10,159
interactions there are between one end

760
00:27:13,190 --> 00:27:11,200
and the other

761
00:27:15,669 --> 00:27:13,200
and they compare that against the

762
00:27:17,510 --> 00:27:15,679
the videos now as i mentioned this is

763
00:27:19,350 --> 00:27:17,520

very flexible so for example there's a

764
00:27:21,590 --> 00:27:19,360
software

765
00:27:23,590 --> 00:27:21,600
professor who really wants to go and

766
00:27:25,269 --> 00:27:23,600
bring it one notch up they can actually

767
00:27:27,590 --> 00:27:25,279
start doing some video analysis and come

768
00:27:29,269 --> 00:27:27,600
up with algorithms really this is uh

769
00:27:31,029 --> 00:27:29,279
anything can be done with this it's on

770
00:27:32,710 --> 00:27:31,039
on the minds of whatever the students

771
00:27:34,389 --> 00:27:32,720
and the teachers want to do with that

772
00:27:35,669 --> 00:27:34,399
and we expect it will be

773
00:27:37,269 --> 00:27:35,679
a great deal for them because he will

774
00:27:39,990 --> 00:27:37,279
teach them about the scientific method

775
00:27:41,350 --> 00:27:40,000
about doing research in microgravity and

776
00:27:43,029 --> 00:27:41,360
the benefit of international space

777
00:27:44,710 --> 00:27:43,039
station

778
00:27:45,830 --> 00:27:44,720
thank you and then just for for tara it

779
00:27:48,310 --> 00:27:45,840
seems like

780
00:27:49,830 --> 00:27:48,320
there's like this bonanza now of science

781
00:27:50,710 --> 00:27:49,840
that you can do with everything you can

782
00:27:52,870 --> 00:27:50,720
cram

783
00:27:54,470 --> 00:27:52,880
on the cygnus and i'm just wondering how

784
00:27:56,870 --> 00:27:54,480
uh that

785
00:27:58,070 --> 00:27:56,880
that boon and being able to get stuff to

786
00:28:00,230 --> 00:27:58,080
the station

787
00:28:01,669 --> 00:28:00,240
will help the crew really

788
00:28:04,470 --> 00:28:01,679

ramp up the amount of science they can

789
00:28:06,549 --> 00:28:04,480
do and if there's a backlog now if you

790
00:28:09,029 --> 00:28:06,559
think they're going to get too busy with

791
00:28:11,029 --> 00:28:09,039
science i love the word bonanza yeah

792
00:28:13,750 --> 00:28:11,039
there is a boom in the science because

793
00:28:16,389 --> 00:28:13,760
of the increased capabilities and

794
00:28:18,710 --> 00:28:16,399
we plan that out months in advance and

795
00:28:20,149 --> 00:28:18,720
so we're watching the workload for the

796
00:28:22,789 --> 00:28:20,159
crew

797
00:28:24,950 --> 00:28:22,799
that being said you know we've seen

798
00:28:27,430 --> 00:28:24,960
double the amount of crew time dedicated

799
00:28:29,190 --> 00:28:27,440
to research in the last year you know we

800
00:28:31,190 --> 00:28:29,200
plan for a certain amount in a given

801
00:28:32,389 --> 00:28:31,200
week and and then we can plan for more

802
00:28:35,190 --> 00:28:32,399
and more knowing what the crew is

803
00:28:36,149 --> 00:28:35,200
capable of um without overstressing them

804
00:28:37,990 --> 00:28:36,159
so

805
00:28:39,830 --> 00:28:38,000
it's they've been really busy our office

806
00:28:41,990 --> 00:28:39,840
has been really really busy making sure

807
00:28:44,149 --> 00:28:42,000
that the science is prioritized

808
00:28:46,149 --> 00:28:44,159
correctly making sure the scientists are

809
00:28:48,149 --> 00:28:46,159
represented on orbit

810
00:28:49,990 --> 00:28:48,159
making sure we're talking with cases to

811
00:28:52,149 --> 00:28:50,000
bring new users to the station which has

812
00:28:54,630 --> 00:28:52,159
opened up a huge

813
00:28:56,870 --> 00:28:54,640

flood of new research for us

814
00:28:59,190 --> 00:28:56,880
for station with our goal of maximizing

815
00:29:01,430 --> 00:28:59,200
its capabilities on orbit so one of

816
00:29:03,909 --> 00:29:01,440
those capabilities is crew time one of

817
00:29:05,190 --> 00:29:03,919
the resources is crew time so

818
00:29:06,950 --> 00:29:05,200
we we

819
00:29:08,789 --> 00:29:06,960
plan appropriately some of those

820
00:29:11,110 --> 00:29:08,799
investigations are automated and don't

821
00:29:13,430 --> 00:29:11,120
require much crew tending

822
00:29:15,110 --> 00:29:13,440
others are human physiological human

823
00:29:17,430 --> 00:29:15,120
physiology experiments so they are

824
00:29:19,669 --> 00:29:17,440
obviously crew time intensive so it

825
00:29:21,269 --> 00:29:19,679
varies um and so it's our job to just

826
00:29:23,990 --> 00:29:21,279
find the right balance and make sure

827
00:29:25,990 --> 00:29:24,000
that the crew time is being maximized as

828
00:29:28,789 --> 00:29:26,000
well as the other on-orbit resources but

829
00:29:29,510 --> 00:29:28,799
um it's been a really fun year at least

830
00:29:31,350 --> 00:29:29,520
and

831
00:29:35,750 --> 00:29:31,360
in looking ahead it's going to be even

832
00:29:38,789 --> 00:29:37,350
thanks very much okay i think we have a

833
00:29:40,070 --> 00:29:38,799
couple of questions from social media

834
00:29:41,990 --> 00:29:40,080
just a reminder if you're watching from

835
00:29:43,510 --> 00:29:42,000
home either on nasa tv or watching a

836
00:29:45,510 --> 00:29:43,520
stream online you can ask your question

837
00:29:47,269 --> 00:29:45,520
on twitter google plus using the hashtag

838
00:29:48,310 --> 00:29:47,279

ask nasa let's go to jason and see what

839
00:29:49,590 --> 00:29:48,320
we have

840
00:29:51,029 --> 00:29:49,600
indeed we've got a couple of questions

841
00:29:52,710 --> 00:29:51,039
on twitter here the first comes from

842
00:29:54,389 --> 00:29:52,720
zach crane will there be any potential

843
00:29:57,269 --> 00:29:54,399
for students to be involved in future

844
00:29:59,110 --> 00:29:57,279
orbital missions like this one

845
00:30:01,269 --> 00:29:59,120
yep let's see would you like to answer

846
00:30:02,950 --> 00:30:01,279
that or i could well i think that both

847
00:30:04,470 --> 00:30:02,960
of us could very easily answer that so

848
00:30:06,470 --> 00:30:04,480
yeah piggyback if you if you don't

849
00:30:07,990 --> 00:30:06,480
finish up i'll give it a shot um so

850
00:30:09,750 --> 00:30:08,000
there are several education

851
00:30:12,950 --> 00:30:09,760
opportunities um through the national

852
00:30:16,470 --> 00:30:12,960
laboratory effort the one that is headed

853
00:30:18,789 --> 00:30:16,480
up into orbit um tomorrow is known as

854
00:30:20,630 --> 00:30:18,799
the incessy uh student space flight

855
00:30:22,470 --> 00:30:20,640
experiments program and so that's the

856
00:30:25,430 --> 00:30:22,480
nation let's see the national center for

857
00:30:33,590 --> 00:30:27,350
science education thank you

858
00:30:36,710 --> 00:30:34,630
because i knew someone would ask me that

859
00:30:38,630 --> 00:30:36,720
i had to write it down uh

860
00:30:41,669 --> 00:30:38,640
you can go and find out they put out

861
00:30:43,750 --> 00:30:41,679
calls for student participation uh in

862
00:30:46,310 --> 00:30:43,760
space station science experiments via

863
00:30:48,710 --> 00:30:46,320

what's known as the nanoracks effort so

864
00:30:51,269 --> 00:30:48,720
um they'll put let's see what's going up

865
00:30:54,310 --> 00:30:51,279
tomorrow i think is 23

866
00:30:56,710 --> 00:30:54,320
individual student experiments in tiny

867
00:30:59,350 --> 00:30:56,720
little tubes called mix sticks and they

868
00:31:01,830 --> 00:30:59,360
were all student ideas that were

869
00:31:03,669 --> 00:31:01,840
submitted via student proposals so

870
00:31:05,350 --> 00:31:03,679
it's grades five through 12 that's

871
00:31:07,190 --> 00:31:05,360
represented and these students actually

872
00:31:08,870 --> 00:31:07,200
wrote proposals for

873
00:31:11,029 --> 00:31:08,880
what they wanted to do complete with a

874
00:31:13,830 --> 00:31:11,039
hypothesis the methods and what they

875
00:31:15,990 --> 00:31:13,840
what they expect out of their research

876
00:31:17,830 --> 00:31:16,000
and the 23 investigations are actually

877
00:31:20,630 --> 00:31:17,840
going to represent something like

878
00:31:22,789 --> 00:31:20,640
over almost 9 000 students on the ground

879
00:31:25,029 --> 00:31:22,799
in terms of participation and in fact i

880
00:31:27,590 --> 00:31:25,039
think the program received almost 2 000

881
00:31:29,669 --> 00:31:27,600
applications from students so

882
00:31:31,029 --> 00:31:29,679
that is a very robust ongoing program

883
00:31:32,630 --> 00:31:31,039
that happens through

884
00:31:34,149 --> 00:31:32,640
the national laboratory effort through

885
00:31:37,669 --> 00:31:34,159
cases

886
00:31:39,110 --> 00:31:37,679
that i don't see going away anytime soon

887
00:31:40,950 --> 00:31:39,120
and there are

888
00:31:43,669 --> 00:31:40,960

opportunities through

889
00:31:45,750 --> 00:31:43,679
companies like bioserve who reach out

890
00:31:47,750 --> 00:31:45,760
through bioed online

891
00:31:49,430 --> 00:31:47,760
for student participation there are

892
00:31:51,430 --> 00:31:49,440
actually

893
00:31:53,509 --> 00:31:51,440
several astronauts when they fly have a

894
00:31:55,110 --> 00:31:53,519
strong interest in outreach and

895
00:31:57,590 --> 00:31:55,120
education

896
00:31:59,430 --> 00:31:57,600
plans for their stay on orbit so we meet

897
00:32:01,669 --> 00:31:59,440
with them beforehand and and coordinate

898
00:32:03,269 --> 00:32:01,679
with them and what they like to to see

899
00:32:06,070 --> 00:32:03,279
in terms of offering opportunities for

900
00:32:07,990 --> 00:32:06,080
students in education demonstrations on

901
00:32:09,750 --> 00:32:08,000
orbit so there's a lot of demonstrations

902
00:32:11,430 --> 00:32:09,760
uh that happen that explain the changes

903
00:32:13,430 --> 00:32:11,440
in microgravity and some of the cool

904
00:32:14,710 --> 00:32:13,440
things that we see in science um with

905
00:32:16,710 --> 00:32:14,720
regard to that in terms of

906
00:32:19,430 --> 00:32:16,720
demonstrations

907
00:32:22,149 --> 00:32:19,440
i believe there's also earthkam

908
00:32:23,750 --> 00:32:22,159
which is a camera that allows students

909
00:32:26,789 --> 00:32:23,760
to sign up through their middle schools

910
00:32:28,710 --> 00:32:26,799
you go online at sally ride earthkam and

911
00:32:29,909 --> 00:32:28,720
you can participate in taking images of

912
00:32:31,750 --> 00:32:29,919
the earth

913
00:32:32,950 --> 00:32:31,760

from the space station by assigning

914
00:32:34,789 --> 00:32:32,960
coordinates and locations that you'd

915
00:32:35,990 --> 00:32:34,799
like to see and so there are several

916
00:32:37,990 --> 00:32:36,000
opportunities throughout the year for

917
00:32:40,389 --> 00:32:38,000
that for students as well i think the

918
00:32:42,789 --> 00:32:40,399
cases effort is opening up a huge

919
00:32:44,549 --> 00:32:42,799
opportunity for students and launches

920
00:32:46,149 --> 00:32:44,559
like like orbital

921
00:32:50,149 --> 00:32:46,159
give us more up mass to be able to meet

922
00:32:53,830 --> 00:32:52,389
other questions okay yeah another

923
00:32:56,149 --> 00:32:53,840
question here comes from twitter user

924
00:32:57,909 --> 00:32:56,159
kaylee how will the sphere slosh

925
00:33:00,070 --> 00:32:57,919
experiment improve future rocket

926
00:33:01,110 --> 00:33:00,080
launches and why is microgravity slosh

927
00:33:03,509 --> 00:33:01,120
important

928
00:33:05,830 --> 00:33:03,519
okay so the slash experiment it's really

929
00:33:07,590 --> 00:33:05,840
cool someone's doing their research

930
00:33:10,070 --> 00:33:07,600
so on orbit we have these little

931
00:33:12,470 --> 00:33:10,080
satellites known as spheres of course

932
00:33:14,549 --> 00:33:12,480
it's an acronym but basically these tiny

933
00:33:16,310 --> 00:33:14,559
little satellites about this this big

934
00:33:19,909 --> 00:33:16,320
there are three of them and they run um

935
00:33:21,669 --> 00:33:19,919
on carbon dioxide propulsion and you can

936
00:33:23,269 --> 00:33:21,679
communicate with them via algorithms

937
00:33:25,509 --> 00:33:23,279
that you can program from the ground and

938
00:33:27,350 --> 00:33:25,519

the the point of them originally is to

939
00:33:30,230 --> 00:33:27,360
try different algorithms to test out

940
00:33:32,870 --> 00:33:30,240
formation flying so that you can look at

941
00:33:34,549 --> 00:33:32,880
improvements in automatic docking or

942
00:33:37,190 --> 00:33:34,559
satellite control and things that help

943
00:33:40,310 --> 00:33:37,200
us uh in in space uh with autonomous

944
00:33:42,710 --> 00:33:40,320
vehicles um but we have applied it to

945
00:33:44,310 --> 00:33:42,720
educational use as well and so we have

946
00:33:46,389 --> 00:33:44,320
students that participate in design

947
00:33:47,750 --> 00:33:46,399
competitions around the world um a

948
00:33:49,190 --> 00:33:47,760
couple times a year so that's another

949
00:33:51,669 --> 00:33:49,200
student

950
00:33:53,830 --> 00:33:51,679
investigation that's participatory but

951
00:33:54,870 --> 00:33:53,840
the slosh investigation is going to

952
00:33:57,029 --> 00:33:54,880
actually

953
00:33:58,549 --> 00:33:57,039
modify one of these sphere satellites

954
00:34:01,029 --> 00:33:58,559
it's going to be modified

955
00:34:02,230 --> 00:34:01,039
with a fitting that can hold fluid

956
00:34:04,549 --> 00:34:02,240
inside of it

957
00:34:06,870 --> 00:34:04,559
and we know from lots of models that

958
00:34:08,550 --> 00:34:06,880
have been or lots of investigations that

959
00:34:10,310 --> 00:34:08,560
have created models on fluid behavior in

960
00:34:12,550 --> 00:34:10,320
on the space station we know that fluids

961
00:34:14,149 --> 00:34:12,560
behave differently they prefer capillary

962
00:34:16,790 --> 00:34:14,159
flow they like to climb the walls and

963
00:34:18,950 --> 00:34:16,800

hide in corners and don't behave as it

964
00:34:20,550 --> 00:34:18,960
would here on the ground and so this

965
00:34:23,430 --> 00:34:20,560
particular investigation is going to use

966
00:34:25,109 --> 00:34:23,440
the spheres satellite to program uh its

967
00:34:26,950 --> 00:34:25,119
movement and then we will be able to

968
00:34:29,349 --> 00:34:26,960
watch changes in the fluid sloshing

969
00:34:30,790 --> 00:34:29,359
around and how fluid would behave

970
00:34:33,430 --> 00:34:30,800
in a moving

971
00:34:35,750 --> 00:34:33,440
vehicle so to speak or a moving

972
00:34:38,230 --> 00:34:35,760
container which we haven't done before

973
00:34:39,829 --> 00:34:38,240
so this is new and it's pretty cool it's

974
00:34:40,790 --> 00:34:39,839
going to give us new models by which we

975
00:34:42,389 --> 00:34:40,800
can

976
00:34:43,829 --> 00:34:42,399
you know learn more about fluid behavior

977
00:34:45,510 --> 00:34:43,839
it's important for space flight of

978
00:34:46,869 --> 00:34:45,520
course for obvious reasons we're talking

979
00:34:49,270 --> 00:34:46,879
about creating

980
00:34:51,030 --> 00:34:49,280
any kind of fluid container whether it's

981
00:34:53,109 --> 00:34:51,040
propellant or water

982
00:34:54,470 --> 00:34:53,119
you name it it's it's all uh critical

983
00:34:57,750 --> 00:34:54,480
and it's applicable to understanding

984
00:35:11,750 --> 00:34:59,589
let's go back here to the audience

985
00:35:20,230 --> 00:35:14,470
i think the microphone may be off

986
00:35:25,030 --> 00:35:23,589
you have an experiment uh flying to uh

987
00:35:28,230 --> 00:35:25,040
experiment flying tomorrow go ahead i'll

988
00:35:30,470 --> 00:35:28,240

relay yeah and meanwhile we've also been

989
00:35:32,470 --> 00:35:30,480
teaching teachers to work with arduino

990
00:35:34,950 --> 00:35:32,480
sensors and doing million launches we're

991
00:35:37,670 --> 00:35:34,960
very interested in what mana satisfied

992
00:35:40,390 --> 00:35:37,680
is up to and i'm curious whether

993
00:35:48,310 --> 00:35:40,400
satisfy is doing anything with sub-orbit

994
00:35:51,829 --> 00:35:50,150
so the question is how is neon satisfy

995
00:35:54,230 --> 00:35:51,839
doing is nano satisfied doing anything

996
00:35:56,870 --> 00:35:54,240
suborbitally uh yeah we actually don't

997
00:35:58,790 --> 00:35:56,880
do anything uh suborbital or with high

998
00:36:01,030 --> 00:35:58,800
altitude balloon flights

999
00:36:02,790 --> 00:36:01,040
we feel there is like a very very active

1000
00:36:05,910 --> 00:36:02,800
community already out there which does

1001
00:36:09,030 --> 00:36:05,920
some high altitude uh balloon flights

1002
00:36:11,349 --> 00:36:09,040
um suborbital

1003
00:36:14,069 --> 00:36:11,359
in in our feeling it's right now

1004
00:36:15,670 --> 00:36:14,079
actually easier to get access to space

1005
00:36:18,390 --> 00:36:15,680
through the iss and through those

1006
00:36:20,950 --> 00:36:18,400
programs then it actually is

1007
00:36:22,310 --> 00:36:20,960
possible to get access to suborbital the

1008
00:36:24,870 --> 00:36:22,320
other problem with suborbital is that

1009
00:36:26,630 --> 00:36:24,880
it's severely time limited like the

1010
00:36:28,310 --> 00:36:26,640
satellites that where you saw on that

1011
00:36:30,150 --> 00:36:28,320
picture beforehand they're going to be

1012
00:36:33,510 --> 00:36:30,160
up there for 10 months this is going to

1013
00:36:35,190 --> 00:36:33,520

be up there for a year right so one year

1014
00:36:37,589 --> 00:36:35,200
that gives like literally tens of

1015
00:36:39,990 --> 00:36:37,599
thousands of students a possibility to

1016
00:36:41,829 --> 00:36:40,000
interact with it and and do experiments

1017
00:36:43,750 --> 00:36:41,839
and interact with the sensors which is

1018
00:36:46,470 --> 00:36:43,760
much much harder to do on a sub-orbital

1019
00:36:48,470 --> 00:36:46,480
flight where right now the um the launch

1020
00:36:50,630 --> 00:36:48,480
vehicles are actually not available they

1021
00:36:51,829 --> 00:36:50,640
will become available but it's actually

1022
00:36:54,069 --> 00:36:51,839
not there

1023
00:36:56,550 --> 00:36:54,079
so we don't do suborbital we don't do

1024
00:36:58,790 --> 00:36:56,560
high altitude balloon flights um our

1025
00:37:01,670 --> 00:36:58,800
curriculum however

1026
00:37:03,349 --> 00:37:01,680
is is just as applicable um the sensor

1027
00:37:04,710 --> 00:37:03,359
packages that we have are just as

1028
00:37:06,870 --> 00:37:04,720
applicable

1029
00:37:09,190 --> 00:37:06,880
and we have considered

1030
00:37:11,430 --> 00:37:09,200
taking our sensor package that we put

1031
00:37:13,270 --> 00:37:11,440
onto the satellite and work with people

1032
00:37:14,870 --> 00:37:13,280
who want to use the same sensor package

1033
00:37:16,630 --> 00:37:14,880
which is arduino based and you know we

1034
00:37:19,030 --> 00:37:16,640
have you know put together

1035
00:37:23,670 --> 00:37:19,040
to use it for sub-orbital or for for

1036
00:37:26,870 --> 00:37:25,109
tony if we have questions on the phone

1037
00:37:28,790 --> 00:37:26,880
line i'm happy to go ahead and take the

1038
00:37:35,589 --> 00:37:28,800

first one if not we'll uh we'll go ahead

1039
00:37:39,190 --> 00:37:37,670
okay any additional questions here show

1040
00:37:41,510 --> 00:37:39,200
hints

1041
00:37:43,589 --> 00:37:41,520
uh let's take one from social media

1042
00:37:47,190 --> 00:37:43,599
if we have a live mic if not just

1043
00:37:47,200 --> 00:37:53,990
microphones coming to you jason

1044
00:37:58,310 --> 00:37:56,550
this comes from twitter user rammix

1045
00:38:00,710 --> 00:37:58,320
how long will it take for results of

1046
00:38:02,950 --> 00:38:00,720
experiments to be made public

1047
00:38:05,829 --> 00:38:02,960
okay good good question

1048
00:38:09,270 --> 00:38:05,839
so in a regular ground functioning

1049
00:38:11,109 --> 00:38:09,280
laboratory you can start an experiment

1050
00:38:12,150 --> 00:38:11,119
and not publish until three to five

1051
00:38:13,589 --> 00:38:12,160
years out

1052
00:38:15,589 --> 00:38:13,599
because that's what science is it takes

1053
00:38:17,589 --> 00:38:15,599
time right it's not just one and done

1054
00:38:19,109 --> 00:38:17,599
it's usually repetitive

1055
00:38:20,470 --> 00:38:19,119
because you want to validate the science

1056
00:38:22,550 --> 00:38:20,480
that you found you want to validate your

1057
00:38:24,870 --> 00:38:22,560
results and then come to a reasonable

1058
00:38:26,150 --> 00:38:24,880
conclusion before you publish anything

1059
00:38:29,750 --> 00:38:26,160
that has actually been the rate that

1060
00:38:32,790 --> 00:38:29,760
we've seen for station already so far

1061
00:38:35,190 --> 00:38:32,800
so we're still getting results from

1062
00:38:37,910 --> 00:38:35,200
investigations that occurred in the

1063
00:38:40,470 --> 00:38:37,920

early assembly phase of space station

1064
00:38:42,550 --> 00:38:40,480
and today we've got we've received over

1065
00:38:44,550 --> 00:38:42,560
600 publications that have been

1066
00:38:46,550 --> 00:38:44,560
published in peer review

1067
00:38:48,150 --> 00:38:46,560
so on average i guess that's a long

1068
00:38:49,910 --> 00:38:48,160
answer to uh what should have been a

1069
00:38:52,790 --> 00:38:49,920
short one on average it's about three to

1070
00:38:54,710 --> 00:38:52,800
five years from the start

1071
00:38:56,710 --> 00:38:54,720
wonderful this twitter question comes

1072
00:38:58,150 --> 00:38:56,720
from marcia smith

1073
00:38:59,990 --> 00:38:58,160
where does the

1074
00:39:02,310 --> 00:39:00,000
money for the cases experiments come

1075
00:39:04,069 --> 00:39:02,320
from is it 100 non-government who does

1076
00:39:05,510 --> 00:39:04,079
pay

1077
00:39:07,030 --> 00:39:05,520
uh so

1078
00:39:08,550 --> 00:39:07,040
the way that the cases has been

1079
00:39:10,630 --> 00:39:08,560
structured is we are a not-for-profit

1080
00:39:12,950 --> 00:39:10,640
organization however we do receive every

1081
00:39:15,829 --> 00:39:12,960
year 15 million dollars a year from nasa

1082
00:39:18,630 --> 00:39:15,839
as far as seed money is concerned

1083
00:39:20,470 --> 00:39:18,640
right now most of the projects that are

1084
00:39:22,230 --> 00:39:20,480
going up under the cases manifest have

1085
00:39:23,589 --> 00:39:22,240
been either brokered through that seed

1086
00:39:25,750 --> 00:39:23,599
funding money

1087
00:39:28,630 --> 00:39:25,760
however we are starting to morph into a

1088
00:39:30,470 --> 00:39:28,640

more partnership model where we are

1089
00:39:32,390 --> 00:39:30,480
working with organizations that might be

1090
00:39:33,670 --> 00:39:32,400
able to do matching dollars or things of

1091
00:39:34,870 --> 00:39:33,680
that nature

1092
00:39:36,310 --> 00:39:34,880
additionally

1093
00:39:37,990 --> 00:39:36,320
we also work with a lot of companies

1094
00:39:39,670 --> 00:39:38,000
that in some in some instances they

1095
00:39:41,349 --> 00:39:39,680
don't need any additional funding that

1096
00:39:43,349 --> 00:39:41,359
they can fund their own experiments so

1097
00:39:44,230 --> 00:39:43,359
it really does vary depending upon how

1098
00:39:46,150 --> 00:39:44,240
it is

1099
00:39:47,750 --> 00:39:46,160
we interact with companies and the types

1100
00:39:52,630 --> 00:39:47,760
of funds that are necessary for them to

1101
00:39:56,870 --> 00:39:55,270
okay i think that's going to wrap us up

1102
00:39:58,390 --> 00:39:56,880
if you weren't able to get a question in

1103
00:40:00,950 --> 00:39:58,400
just please tweet at us using the

1104
00:40:02,470 --> 00:40:00,960
hashtag asknasa we'll get you a response

1105
00:40:04,470 --> 00:40:02,480
as soon as possible as a reminder you

1106
00:40:06,230 --> 00:40:04,480
can find out more information about all

1107
00:40:07,349 --> 00:40:06,240
the science is headed up on the orbital

1108
00:40:11,030 --> 00:40:07,359
one mission as well as the mission

1109
00:40:12,069 --> 00:40:11,040
itself at www.nasa

1110
00:40:13,910 --> 00:40:12,079
station

1111
00:40:15,829 --> 00:40:13,920
please stay tuned to nasa tv for the

1112
00:40:18,309 --> 00:40:15,839
next hour we'll uh we'll have a look

1113
00:40:20,950 --> 00:40:18,319

ahead to the to the mission a preview of

1114
00:40:23,190 --> 00:40:20,960
tomorrow's 1 32 pm launch

1115
00:40:25,510 --> 00:40:23,200
as well as us a weather report which may

1116
00:40:27,270 --> 00:40:25,520
be cold but i hear it's looking good

1117
00:40:36,390 --> 00:40:27,280
please help me thank our panelists if