



1
00:00:07,829 --> 00:00:02,070
station this is danielle from the royal

2
00:00:07,839 --> 00:00:11,350
i hear loud and clear

3
00:00:15,270 --> 00:00:13,190
excellent

4
00:00:16,870 --> 00:00:15,280
hi samantha it's great to be talking to

5
00:00:21,349 --> 00:00:16,880
you from the royal institution christmas

6
00:00:24,950 --> 00:00:23,349
hello hello everybody great talking to

7
00:00:25,750 --> 00:00:24,960
you

8
00:00:27,670 --> 00:00:25,760
now

9
00:00:29,509 --> 00:00:27,680
one of the most fascinating things about

10
00:00:31,990 --> 00:00:29,519
this for me is i'm actually talking to

11
00:00:33,590 --> 00:00:32,000
you on my mobile phone

12
00:00:36,069 --> 00:00:33,600
but i'm guessing that your mobile phone

13
00:00:41,590 --> 00:00:36,079

doesn't work up there so how do you

14

00:00:45,110 --> 00:00:43,190

it's funny that you mentioned that

15

00:00:46,950 --> 00:00:45,120

because i've been up here for about

16

00:00:49,590 --> 00:00:46,960

three weeks and i have never thought

17

00:00:51,670 --> 00:00:49,600

about my mobile phone once while when

18

00:00:53,990 --> 00:00:51,680

i'm on earth i'm constantly checking my

19

00:00:56,069 --> 00:00:54,000

mobile phone so i guess i am getting

20

00:00:57,910 --> 00:00:56,079

over my mobile phone addiction

21

00:01:00,069 --> 00:00:57,920

but we are not disconnected from our

22

00:01:02,389 --> 00:01:00,079

family and friends up here we have uh

23

00:01:05,670 --> 00:01:02,399

access to the internet it's uh

24

00:01:07,830 --> 00:01:05,680

somewhat slow but we do have it and then

25

00:01:10,630 --> 00:01:07,840

we have the possibility of giving them a

26

00:01:12,870 --> 00:01:10,640

call over an ip a voiceover ip phone

27

00:01:15,109 --> 00:01:12,880

and once a week typically on the weekend

28

00:01:17,270 --> 00:01:15,119

we can even see them we have a two-way

29

00:01:20,469 --> 00:01:17,280

video conference where we can see them

30

00:01:25,190 --> 00:01:22,630

that's amazing and is it a weird feeling

31

00:01:27,670 --> 00:01:25,200

for you to be to be very distant to be

32

00:01:29,190 --> 00:01:27,680

literally the most distant woman

33

00:01:36,149 --> 00:01:29,200

from earth at the moment but actually

34

00:01:40,469 --> 00:01:38,710

i i guess you know i've come to expect

35

00:01:42,950 --> 00:01:40,479

it to be this way because

36

00:01:46,310 --> 00:01:42,960

the the iss the space station has been

37

00:01:49,429 --> 00:01:46,320

very well connected for for years now

38

00:01:51,910 --> 00:01:49,439

so sometimes i find it

39

00:01:53,749 --> 00:01:51,920

even paradoxical when people

40

00:01:55,190 --> 00:01:53,759

think about my job as being an astronaut

41

00:01:57,270 --> 00:01:55,200

on the space station as being very

42

00:01:59,830 --> 00:01:57,280

isolated and it's true that physically

43

00:02:01,749 --> 00:01:59,840

of course i am very far away but

44

00:02:03,429 --> 00:02:01,759

compared to many other jobs i actually

45

00:02:05,590 --> 00:02:03,439

have really good possibilities of

46

00:02:06,870 --> 00:02:05,600

connections uh you know i'm thinking

47

00:02:09,109 --> 00:02:06,880

about people who i don't know are

48

00:02:11,510 --> 00:02:09,119

deployed on submarines or

49

00:02:13,750 --> 00:02:11,520

doing winter overs in antarctica i think

50

00:02:16,309 --> 00:02:13,760

we on the space station are way more

51
00:02:17,830 --> 00:02:16,319
connected uh with earth and with our

52
00:02:21,270 --> 00:02:17,840
fellow human beings and friends and

53
00:02:23,430 --> 00:02:21,280
family than those folks are

54
00:02:26,790 --> 00:02:23,440
yes i think you're right

55
00:02:29,030 --> 00:02:26,800
um so in in these lectures

56
00:02:31,990 --> 00:02:29,040
we are talking about communication and

57
00:02:32,790 --> 00:02:32,000
and the limitations of communication

58
00:02:35,030 --> 00:02:32,800
and

59
00:02:37,509 --> 00:02:35,040
it's really wonderful that we can hear

60
00:02:39,830 --> 00:02:37,519
and see you from space

61
00:02:41,910 --> 00:02:39,840
but that's just using two of our senses

62
00:02:44,390 --> 00:02:41,920
and so what we're trying to explore in

63
00:02:46,470 --> 00:02:44,400

the lectures is can we go to the next

64

00:02:47,990 --> 00:02:46,480

level and use our other senses to

65

00:02:49,750 --> 00:02:48,000

communicate so

66

00:02:52,229 --> 00:02:49,760

would it wouldn't it be great to be able

67

00:02:53,430 --> 00:02:52,239

to reach out and touch somebody who

68

00:02:56,309 --> 00:02:53,440

wasn't there

69

00:02:58,390 --> 00:02:56,319

um and share share an experience of all

70

00:03:01,270 --> 00:02:58,400

of the rest of their senses

71

00:03:02,229 --> 00:03:01,280

uh for you in in space what is the next

72

00:03:03,990 --> 00:03:02,239

big

73

00:03:06,070 --> 00:03:04,000

goal or challenge in terms of

74

00:03:11,670 --> 00:03:06,080

communication

75

00:03:13,910 --> 00:03:11,680

well i can think of simple things like

76
00:03:16,149 --> 00:03:13,920
for example right now we we don't have

77
00:03:19,110 --> 00:03:16,159
continuous coverage on board in terms of

78
00:03:21,750 --> 00:03:19,120
satellites sometimes our antennas are

79
00:03:23,270 --> 00:03:21,760
just not be able are not able uh to pick

80
00:03:26,949 --> 00:03:23,280
up a satellite for a few minutes

81
00:03:29,430 --> 00:03:26,959
sometimes even 10 15 minutes and so we

82
00:03:31,509 --> 00:03:29,440
for that period of time we say we are in

83
00:03:32,949 --> 00:03:31,519
lots of signals so we lose communication

84
00:03:35,830 --> 00:03:32,959
so one next step could be to have

85
00:03:38,390 --> 00:03:35,840
continuous coverage um another next step

86
00:03:40,710 --> 00:03:38,400
could be to to make it easier on board

87
00:03:43,589 --> 00:03:40,720
for example having uh wireless headsets

88
00:03:45,350 --> 00:03:43,599

uh well now most of the time we use

89

00:03:48,789 --> 00:03:45,360

headsets that are or microphones that

90

00:03:50,070 --> 00:03:48,799

are connected via a long cable

91

00:03:52,149 --> 00:03:50,080

but then of course what you say is

92

00:03:54,550 --> 00:03:52,159

interesting to be able to see uh the

93

00:03:56,949 --> 00:03:54,560

world through somebody else's eyes or

94

00:03:58,550 --> 00:03:56,959

or even being able to touch them

95

00:04:00,630 --> 00:03:58,560

i think there is an interesting

96

00:04:01,589 --> 00:04:00,640

technology demonstration which

97

00:04:05,670 --> 00:04:01,599

is

98

00:04:07,910 --> 00:04:05,680

fly with a fellow european astronaut of

99

00:04:09,670 --> 00:04:07,920

mine under morgansen next year so i'm

100

00:04:12,390 --> 00:04:09,680

not

101
00:04:14,070 --> 00:04:12,400
seeing

102
00:04:15,910 --> 00:04:14,080
anything misleading but i think the

103
00:04:18,949 --> 00:04:15,920
point is is really that to try and

104
00:04:20,710 --> 00:04:18,959
demonstrate a technology um sort of an

105
00:04:22,469 --> 00:04:20,720
augmented reality technology where

106
00:04:25,430 --> 00:04:22,479
people on the ground can see what the

107
00:04:27,030 --> 00:04:25,440
astronaut sees and um and the astronaut

108
00:04:30,150 --> 00:04:27,040
can have um

109
00:04:31,670 --> 00:04:30,160
overlays um that augment reality with

110
00:04:34,390 --> 00:04:31,680
with information that can be sent from

111
00:04:37,909 --> 00:04:35,670
well that all sounds absolutely

112
00:04:40,230 --> 00:04:37,919
fantastic and very very fascinating and

113
00:04:42,390 --> 00:04:40,240

i'm i'm sure it would inspire

114

00:04:45,270 --> 00:04:42,400

the next generation of scientists and

115

00:04:46,870 --> 00:04:45,280

engineers um to get into that work which

116

00:04:48,390 --> 00:04:46,880

is what we want to do in in the

117

00:04:49,749 --> 00:04:48,400

christmas lectures

118

00:04:51,270 --> 00:04:49,759

uh so

119

00:04:53,110 --> 00:04:51,280

from your point of view what should the

120

00:04:55,670 --> 00:04:53,120

next generation of engineers and

121

00:04:57,670 --> 00:04:55,680

scientists be working on to help achieve

122

00:05:03,670 --> 00:04:57,680

those communication goals that you need

123

00:05:07,670 --> 00:05:06,070

well i think the next generation of

124

00:05:09,029 --> 00:05:07,680

engineers and scientists should be

125

00:05:11,270 --> 00:05:09,039

working on stuff that i cannot even

126

00:05:12,550 --> 00:05:11,280

imagine right now because uh that's

127

00:05:14,390 --> 00:05:12,560

really the cool thing about being the

128

00:05:17,270 --> 00:05:14,400

next generation you know i i think you

129

00:05:19,749 --> 00:05:17,280

should uh um

130

00:05:20,870 --> 00:05:19,759

you know if try find your own path and

131

00:05:22,390 --> 00:05:20,880

especially at the beginning of your

132

00:05:23,350 --> 00:05:22,400

career when you're not

133

00:05:25,270 --> 00:05:23,360

into the

134

00:05:26,870 --> 00:05:25,280

um that professional environment for for

135

00:05:29,110 --> 00:05:26,880

that long you can really think out of

136

00:05:31,990 --> 00:05:29,120

the box and come up with new solutions

137

00:05:33,749 --> 00:05:32,000

so um i don't wanna um

138

00:05:35,670 --> 00:05:33,759

you know shed any light on any

139

00:05:37,110 --> 00:05:35,680

preconceived path but on the contrary i

140

00:05:38,550 --> 00:05:37,120

would encourage people to really think

141

00:05:41,749 --> 00:05:38,560

out of the box and maybe come up with

142

00:05:43,029 --> 00:05:41,759

some revolutionary ideas

143

00:05:45,029 --> 00:05:43,039

that's brilliant i'm sure that'll be

144

00:05:47,270 --> 00:05:45,039

very very inspiring for them as well

145

00:05:49,270 --> 00:05:47,280

thank you so um

146

00:05:51,270 --> 00:05:49,280

you've only been in space for for a few

147

00:05:58,950 --> 00:05:51,280

weeks now what have you found most

148

00:06:04,469 --> 00:06:01,350

i guess i'm surprised but how much i

149

00:06:05,830 --> 00:06:04,479

have enjoyed it i am enjoying it

150

00:06:07,830 --> 00:06:05,840

i thought you know it would be something

151
00:06:09,430 --> 00:06:07,840
that uh would be fun for a few days and

152
00:06:11,990 --> 00:06:09,440
then i would just get used to it and get

153
00:06:13,909 --> 00:06:12,000
over it but um you know it's just i keep

154
00:06:16,629 --> 00:06:13,919
enjoying it so much this this feeling of

155
00:06:19,590 --> 00:06:16,639
floating it's something so new and and

156
00:06:20,550 --> 00:06:19,600
different from what we're used to um and

157
00:06:22,390 --> 00:06:20,560
you know

158
00:06:23,749 --> 00:06:22,400
sometimes i find myself thinking that it

159
00:06:25,029 --> 00:06:23,759
had never been different that i've been

160
00:06:26,469 --> 00:06:25,039
floating all my life but of course

161
00:06:27,510 --> 00:06:26,479
that's not the case

162
00:06:31,749 --> 00:06:27,520
and

163
00:06:32,870 --> 00:06:31,759

i find myself exploring new ways of

164

00:06:35,270 --> 00:06:32,880

you know

165

00:06:36,710 --> 00:06:35,280

controlling my body and and my attitude

166

00:06:38,710 --> 00:06:36,720

and my orientation and flying through

167

00:06:40,550 --> 00:06:38,720

the station so it's been a lot of fun

168

00:06:42,469 --> 00:06:40,560

i'm not very good at it yet so that

169

00:06:45,430 --> 00:06:42,479

that's fun too that i'm

170

00:06:49,510 --> 00:06:47,270

that's good so can you do some practice

171

00:06:51,510 --> 00:06:49,520

now because i'm sure all of the audience

172

00:06:57,670 --> 00:06:51,520

would like to know have you perfected

173

00:07:01,029 --> 00:06:59,270

well to be honest i've done only one

174

00:07:03,990 --> 00:07:01,039

somersault the other day and that was by

175

00:07:06,550 --> 00:07:04,000

mistake i didn't intend to so

176

00:07:07,990 --> 00:07:06,560

i will uh i will hold off from that um

177

00:07:09,510 --> 00:07:08,000

it was wonderful it was really great i

178

00:07:11,830 --> 00:07:09,520

mean everybody was impressed except that

179

00:07:14,550 --> 00:07:11,840

i didn't intend to do it but

180

00:07:15,670 --> 00:07:14,560

so i will hold up from that um for now

181

00:07:18,629 --> 00:07:15,680

and

182

00:07:20,309 --> 00:07:18,639

it'll be for a later call

183

00:07:22,469 --> 00:07:20,319

so yeah you can keep perfecting it and

184

00:07:24,230 --> 00:07:22,479

then we'll we'll um keep tracking you on

185

00:07:29,510 --> 00:07:24,240

twitter and you can tell us when you

186

00:07:34,230 --> 00:07:32,230

yes definitely i will

187

00:07:35,909 --> 00:07:34,240

okay now obviously these are the

188

00:07:37,270 --> 00:07:35,919

christmas lectures so we're very close

189

00:07:39,110 --> 00:07:37,280

to christmas so

190

00:07:40,710 --> 00:07:39,120

how do you celebrate christmas on the on

191

00:07:46,070 --> 00:07:40,720

the international space station it must

192

00:07:50,469 --> 00:07:48,230

well of course it's definitely a day in

193

00:07:52,230 --> 00:07:50,479

which we have time set aside to um to

194

00:07:53,670 --> 00:07:52,240

talk to our family and friends um as

195

00:07:55,749 --> 00:07:53,680

i've mentioned before we have this

196

00:07:57,909 --> 00:07:55,759

opportunities of um video conferences

197

00:07:59,749 --> 00:07:57,919

and on special holidays like christmas

198

00:08:01,589 --> 00:07:59,759

uh of course uh there's time set aside

199

00:08:02,790 --> 00:08:01,599

for that and then of course we'll spend

200

00:08:05,430 --> 00:08:02,800

a time together we have a little

201
00:08:07,510 --> 00:08:05,440
christmas tree here which is uh planted

202
00:08:08,710 --> 00:08:07,520
so to speak upside down in the in our

203
00:08:11,110 --> 00:08:08,720
main lab

204
00:08:15,749 --> 00:08:11,120
and um our commander butch wilmer has

205
00:08:19,990 --> 00:08:17,270
some um

206
00:08:21,510 --> 00:08:20,000
i guess i'm missing the words but uh um

207
00:08:23,749 --> 00:08:21,520
you know things for us to gather gifts

208
00:08:26,230 --> 00:08:23,759
for each other so that on on christmas

209
00:08:28,230 --> 00:08:26,240
day hopefully um all of us will have

210
00:08:29,670 --> 00:08:28,240
gifts from our crewmates and it can be

211
00:08:31,830 --> 00:08:29,680
something simple like somebody's

212
00:08:34,389 --> 00:08:31,840
favorite drink that you come across and

213
00:08:36,070 --> 00:08:34,399

and you put it aside for them so that uh

214

00:08:38,149 --> 00:08:36,080

it's gonna be a fun

215

00:08:39,670 --> 00:08:38,159

experience on christmas day to to see

216

00:08:41,750 --> 00:08:39,680

what your crewmates have set aside for

217

00:08:43,589 --> 00:08:41,760

you

218

00:08:45,030 --> 00:08:43,599

oh that's fantastic and it'd be

219

00:08:46,790 --> 00:08:45,040

interesting to see what sort of gifts

220

00:08:48,310 --> 00:08:46,800

that you give each other if they're sort

221

00:08:50,870 --> 00:08:48,320

of the normal gifts that you would give

222

00:08:52,150 --> 00:08:50,880

each other on on earth or

223

00:08:53,269 --> 00:08:52,160

they have a sort of a

224

00:08:59,509 --> 00:08:53,279

space

225

00:09:03,829 --> 00:09:00,949

well you know some of us might have

226

00:09:06,470 --> 00:09:03,839

thought um ahead um i have for example

227

00:09:08,949 --> 00:09:06,480

and uh and sent up some little things to

228

00:09:11,670 --> 00:09:08,959

as christmas gifts for for uh for the

229

00:09:14,310 --> 00:09:11,680

crewmates but as i said it might just be

230

00:09:16,389 --> 00:09:14,320

that uh you know of the supplies that

231

00:09:18,630 --> 00:09:16,399

are on board you know that one of your

232

00:09:20,230 --> 00:09:18,640

crewmates really enjoys for example a

233

00:09:21,829 --> 00:09:20,240

special dessert

234

00:09:23,910 --> 00:09:21,839

that you normally would only come across

235

00:09:25,829 --> 00:09:23,920

maybe once a month and then you you set

236

00:09:27,590 --> 00:09:25,839

that aside when you find it and then

237

00:09:30,870 --> 00:09:27,600

that person is gonna be able to enjoy

238

00:09:32,949 --> 00:09:30,880

their favorite dessert for christmas

239

00:09:35,829 --> 00:09:32,959

yeah that's really nice

240

00:09:37,750 --> 00:09:35,839

so um in the in the lectures that we've

241

00:09:40,389 --> 00:09:37,760

already filmed so far we've been looking

242

00:09:43,509 --> 00:09:40,399

at some wonderful pieces of technology

243

00:09:45,910 --> 00:09:43,519

and one of them is haptic technology

244

00:09:48,230 --> 00:09:45,920

and we have seen how it can be used for

245

00:09:50,710 --> 00:09:48,240

training vets for example and it was

246

00:09:53,190 --> 00:09:50,720

just amazing i i was using this piece of

247

00:09:55,110 --> 00:09:53,200

haptic technology and it was fantastic

248

00:09:56,949 --> 00:09:55,120

and i'm guessing that haptic plays quite

249

00:09:59,110 --> 00:09:56,959

a lot of quite a big role

250

00:10:02,949 --> 00:09:59,120

in the technology for the iss is that

251

00:10:07,430 --> 00:10:04,949

uh not quite but definitely something

252

00:10:09,430 --> 00:10:07,440

for the future and uh i'm not directly

253

00:10:11,430 --> 00:10:09,440

involved with it but i know that uh

254

00:10:13,190 --> 00:10:11,440

there is an experiment that um

255

00:10:15,750 --> 00:10:13,200

specifically um

256

00:10:17,269 --> 00:10:15,760

studies the this or aims at developing

257

00:10:20,230 --> 00:10:17,279

haptic technology so definitely

258

00:10:22,230 --> 00:10:20,240

something for the future

259

00:10:25,990 --> 00:10:22,240

that's great and i think that will also

260

00:10:27,670 --> 00:10:26,000

inspire the next generation of engineers

261

00:10:29,430 --> 00:10:27,680

and scientists as well

262

00:10:31,350 --> 00:10:29,440

so it's been absolutely wonderful

263

00:10:33,590 --> 00:10:31,360

talking to you samantha thank you so

264

00:10:35,829 --> 00:10:33,600

much for all your time i think you're

265

00:10:38,069 --> 00:10:35,839

you're truly inspiring all of the next

266

00:10:42,949 --> 00:10:38,079

generation of engineers and scientists

267

00:10:46,630 --> 00:10:44,710

well thank you so much i really enjoyed

268

00:10:48,949 --> 00:10:46,640

this conversation and

269

00:10:51,269 --> 00:10:48,959

well happy christmas

270

00:10:52,470 --> 00:10:51,279

and happy christmas to you too samantha

271

00:11:00,310 --> 00:10:52,480

thank you

272

00:11:04,470 --> 00:11:00,320

station this is houston acr that

273

00:11:08,710 --> 00:11:06,550

thank you isaan the royal institution