
atv4
Einstein
esa
esa

1
00:00:08,390 --> 00:00:03,189
station this is houston are you ready

2
00:00:08,400 --> 00:00:14,789
houston station and ready for the event

3
00:00:18,230 --> 00:00:16,470
erasmus center this is mission control

4
00:00:23,269 --> 00:00:18,240
houston please call station for voice

5
00:00:32,470 --> 00:00:25,830
station this is issa moderator melanie

6
00:00:38,790 --> 00:00:34,229
good afternoon melanie i read you loud

7
00:00:44,869 --> 00:00:41,110
well good afternoon luca you are now

8
00:00:46,470 --> 00:00:44,879
connected with israel germany and italy

9
00:00:49,510 --> 00:00:46,480
could you please give them a short

10
00:00:56,630 --> 00:00:49,520
summary of your mission and atv and then

11
00:00:56,640 --> 00:01:04,149
well

12
00:01:08,149 --> 00:01:06,550
welcome on board the

13
00:01:10,550 --> 00:01:08,159

international space station this is the

14
00:01:12,070 --> 00:01:10,560
model columbus my name is luca parmitano

15
00:01:15,030 --> 00:01:12,080
and i'm really glad to have the

16
00:01:16,950 --> 00:01:15,040
opportunity to have uh

17
00:01:18,870 --> 00:01:16,960
this wonderful public

18
00:01:21,109 --> 00:01:18,880
uh today here onboard the space station

19
00:01:23,510 --> 00:01:21,119
it's an honor

20
00:01:25,270 --> 00:01:23,520
one thing about my mission is that

21
00:01:28,469 --> 00:01:25,280
he shares with with all the other

22
00:01:30,390 --> 00:01:28,479
missions that three main purposes of of

23
00:01:32,710 --> 00:01:30,400
our space flight which is

24
00:01:35,749 --> 00:01:32,720
it's science it's technology and

25
00:01:37,030 --> 00:01:35,759
exploration and very quickly i can give

26
00:01:39,990 --> 00:01:37,040
you a couple examples of how we

27
00:01:43,030 --> 00:01:40,000
accomplished that those two three uh

28
00:01:44,870 --> 00:01:43,040
important elements of of our research

29
00:01:46,870 --> 00:01:44,880
for science well you can tell that right

30
00:01:50,469 --> 00:01:46,880
now on my forehead

31
00:01:52,789 --> 00:01:50,479
i have a sensor that's uh that's been

32
00:01:54,630 --> 00:01:52,799
reading my temperature for the past 36

33
00:01:57,590 --> 00:01:54,640
hours and it will go on for another

34
00:02:00,389 --> 00:01:57,600
another 24 hours and what we're doing

35
00:02:02,469 --> 00:02:00,399
with this uh experiment one of

36
00:02:04,709 --> 00:02:02,479
150 experiments that are going on right

37
00:02:06,709 --> 00:02:04,719
now in the space station uh it's called

38
00:02:08,869 --> 00:02:06,719

the circadian rhythms and we're trying

39
00:02:11,990 --> 00:02:08,879
to figure out how living on a space

40
00:02:14,150 --> 00:02:12,000
station influences our circadian rhythms

41
00:02:16,390 --> 00:02:14,160
uh again this this is a european

42
00:02:18,869 --> 00:02:16,400
experiment and it's one of about 20

43
00:02:22,630 --> 00:02:18,879
european experiments right now on board

44
00:02:25,030 --> 00:02:22,640
and these 20 are part of about 150

45
00:02:26,790 --> 00:02:25,040
that on any on average every increment

46
00:02:30,229 --> 00:02:26,800
belong to the come up on the space

47
00:02:32,869 --> 00:02:30,239
station for technology well we do

48
00:02:34,150 --> 00:02:32,879
technology every day just living here on

49
00:02:35,910 --> 00:02:34,160
the space station

50
00:02:38,070 --> 00:02:35,920
we develop new technology that can be

51
00:02:40,390 --> 00:02:38,080
used on the ground new softwares even

52
00:02:42,710 --> 00:02:40,400
coming up on a soyuz uh uses new

53
00:02:45,190 --> 00:02:42,720
technology every single time in order to

54
00:02:47,830 --> 00:02:45,200
improve uh uh

55
00:02:50,150 --> 00:02:47,840
to improve that the quality of the of

56
00:02:53,110 --> 00:02:50,160
the flight and the capabilities and also

57
00:02:55,030 --> 00:02:53,120
reduce the risks and for exploration

58
00:02:56,710 --> 00:02:55,040
uh i think that this is this is

59
00:02:58,390 --> 00:02:56,720
sometimes hard to comprehend what we do

60
00:02:59,589 --> 00:02:58,400
here on the space station is exploration

61
00:03:00,949 --> 00:02:59,599
but

62
00:03:04,390 --> 00:03:00,959
if you think that

63
00:03:06,630 --> 00:03:04,400

our steps today are paving the way to to

64
00:03:09,270 --> 00:03:06,640
the exploration of the future and this

65
00:03:10,790 --> 00:03:09,280
is a very important time for our future

66
00:03:13,030 --> 00:03:10,800
exploration for space exploration

67
00:03:16,229 --> 00:03:13,040
because what we do today will open the

68
00:03:19,350 --> 00:03:16,239
doors to uh to be able to go to other

69
00:03:22,630 --> 00:03:19,360
worlds on a different day in the future

70
00:03:24,309 --> 00:03:22,640
now part of this exploration is also uh

71
00:03:26,869 --> 00:03:24,319
is also thanks to

72
00:03:28,470 --> 00:03:26,879
the fact that we have constant resupply

73
00:03:31,030 --> 00:03:28,480
from from earth

74
00:03:32,390 --> 00:03:31,040
and i like to say that the flagship of

75
00:03:34,229 --> 00:03:32,400
the fleet

76
00:03:35,910 --> 00:03:34,239
of the cargo ship that come from earth

77
00:03:37,910 --> 00:03:35,920
to the space station

78
00:03:39,030 --> 00:03:37,920
is atv

79
00:03:41,509 --> 00:03:39,040
and the reason why i say it's the

80
00:03:44,789 --> 00:03:41,519
flagship it's because

81
00:03:47,750 --> 00:03:44,799
we have uh we have three

82
00:03:48,710 --> 00:03:47,760
agencies that provide cargos one is uh

83
00:03:55,030 --> 00:03:48,720
uh

84
00:03:57,589 --> 00:03:55,040
progress and then we have we have two

85
00:03:59,110 --> 00:03:57,599
commercial uh spacecraft i recently

86
00:04:01,589 --> 00:03:59,120
captured the second one the first one is

87
00:04:03,429 --> 00:04:01,599
dragon the second one is cygnus but atv

88
00:04:06,070 --> 00:04:03,439

is bigger than any of them and it has

89
00:04:07,910 --> 00:04:06,080
one special characteristic that it docks

90
00:04:09,589 --> 00:04:07,920
completely automatic

91
00:04:11,270 --> 00:04:09,599
and it really

92
00:04:13,190 --> 00:04:11,280
reduces the amount of work and

93
00:04:14,550 --> 00:04:13,200
preparation needed by

94
00:04:16,629 --> 00:04:14,560
by the human

95
00:04:18,550 --> 00:04:16,639
interface which is which is good when

96
00:04:20,550 --> 00:04:18,560
you think that two and a half years

97
00:04:23,749 --> 00:04:20,560
are spent for training to come on the

98
00:04:26,150 --> 00:04:23,759
space station and uh really capturing

99
00:04:28,550 --> 00:04:26,160
atv assisting the capture atv is very

100
00:04:32,310 --> 00:04:28,560
very simple so it carries

101
00:04:34,629 --> 00:04:32,320
atv carries fuel food uh supplies

102
00:04:36,870 --> 00:04:34,639
experiments air water really anything

103
00:04:38,790 --> 00:04:36,880
you can come up with can be put in atv

104
00:04:39,909 --> 00:04:38,800
so it's really a fantastic machine and i

105
00:04:41,590 --> 00:04:39,919
was very

106
00:04:45,990 --> 00:04:41,600
privileged and very happy to have it on

107
00:04:49,909 --> 00:04:47,990
and uh

108
00:04:52,550 --> 00:04:49,919
now that i've shown you uh that i really

109
00:04:54,629 --> 00:04:52,560
am in space by letting atv float from

110
00:04:59,909 --> 00:04:54,639
one side to the other i'm open four

111
00:05:15,990 --> 00:05:02,310
thank you luca we'd like to call upon

112
00:05:23,189 --> 00:05:17,990
hey luca

113
00:05:29,189 --> 00:05:23,199

the five senses

114
00:05:33,029 --> 00:05:31,270
shalom welcome on board

115
00:05:35,350 --> 00:05:33,039
that's a very good question and it

116
00:05:37,510 --> 00:05:35,360
actually it's part of the of the ongoing

117
00:05:38,950 --> 00:05:37,520
investigations that we do constantly on

118
00:05:41,350 --> 00:05:38,960
the space station

119
00:05:44,310 --> 00:05:41,360
uh there are some of the senses do not

120
00:05:46,950 --> 00:05:44,320
change so for example the attacked the

121
00:05:50,150 --> 00:05:46,960
tactile sensations are exactly the same

122
00:05:51,830 --> 00:05:50,160
uh we haven't had uh i personally or

123
00:05:53,749 --> 00:05:51,840
most people don't have any changing in

124
00:05:56,469 --> 00:05:53,759
hearing because most of the time we do

125
00:05:57,749 --> 00:05:56,479
wear hearing protection

126
00:05:59,909 --> 00:05:57,759
for taste

127
00:06:02,309 --> 00:05:59,919
um i i've heard a lot of people saying

128
00:06:05,430 --> 00:06:02,319
that because of the fluid shift

129
00:06:07,670 --> 00:06:05,440
our taste changes in that um we we we

130
00:06:08,870 --> 00:06:07,680
don't feel the salt as much so

131
00:06:10,950 --> 00:06:08,880
some people

132
00:06:12,469 --> 00:06:10,960
like to eat a little spicier here on

133
00:06:14,629 --> 00:06:12,479
board the station

134
00:06:17,110 --> 00:06:14,639
i know that my colleague karen she she

135
00:06:19,670 --> 00:06:17,120
likes the spicer food uh while she's up

136
00:06:21,189 --> 00:06:19,680
here i personally eat very bland food

137
00:06:24,070 --> 00:06:21,199
even when i'm on the ground so i haven't

138
00:06:27,670 --> 00:06:24,080

had any any need to do that

139
00:06:29,670 --> 00:06:27,680
um now one of the one of the senses um

140
00:06:32,309 --> 00:06:29,680
that certainly has

141
00:06:33,189 --> 00:06:32,319
has a lot of effect on us is that is the

142
00:06:35,510 --> 00:06:33,199
site

143
00:06:38,150 --> 00:06:35,520
and the reason there is a study ongoing

144
00:06:39,029 --> 00:06:38,160
right now which i am part uh to study

145
00:06:44,710 --> 00:06:39,039
how

146
00:06:46,950 --> 00:06:44,720
microgravity because of uh difference in

147
00:06:49,589 --> 00:06:46,960
pressure in the in the bulb

148
00:06:51,270 --> 00:06:49,599
so if you imagine that the ocular bulb

149
00:06:52,710 --> 00:06:51,280
is affected by pressure on the ground

150
00:06:54,710 --> 00:06:52,720
well when you come up here on the space

151
00:06:57,110 --> 00:06:54,720
station gravity uh

152
00:07:00,070 --> 00:06:57,120
is is also part of the pressure in in

153
00:07:02,710 --> 00:07:00,080
that it changes the application point uh

154
00:07:03,749 --> 00:07:02,720
that that when that changes also the the

155
00:07:06,070 --> 00:07:03,759
eye

156
00:07:08,070 --> 00:07:06,080
shape may change and and also the fluid

157
00:07:10,230 --> 00:07:08,080
shift may affect that so there are

158
00:07:12,150 --> 00:07:10,240
ongoing studies on how that affects uh

159
00:07:14,309 --> 00:07:12,160
astronauts either temporary or

160
00:07:16,550 --> 00:07:14,319
permanently and and that is certainly

161
00:07:19,830 --> 00:07:16,560
one of the most important the last one

162
00:07:22,390 --> 00:07:19,840
would be would be smell uh i don't think

163
00:07:25,029 --> 00:07:22,400

it changes i noticed that when uh

164
00:07:27,029 --> 00:07:25,039
we get very used uh right away to the

165
00:07:29,270 --> 00:07:27,039
different smells on board the station

166
00:07:31,670 --> 00:07:29,280
and we get saturated and when new cargo

167
00:07:34,550 --> 00:07:31,680
arrives maybe with even atv with the

168
00:07:35,670 --> 00:07:34,560
apples or or fresh fruit that the smell

169
00:07:37,990 --> 00:07:35,680
really

170
00:07:39,909 --> 00:07:38,000
is is an enticing

171
00:07:41,510 --> 00:07:39,919
is very is enticing as intriguing as it

172
00:07:47,510 --> 00:07:41,520
is on the ground it's it's wonderful to

173
00:07:55,589 --> 00:07:50,309
thank you luca germany we'd like to have

174
00:07:58,629 --> 00:07:57,029
hello luca

175
00:08:01,430 --> 00:07:58,639
thanks for having me

176
00:08:04,070 --> 00:08:01,440
my question is would you like to have a

177
00:08:06,950 --> 00:08:04,080
robot as a colleague on station

178
00:08:13,830 --> 00:08:06,960
and in what ways could such a robot be

179
00:08:18,790 --> 00:08:17,350
good enough and welcome on board

180
00:08:21,270 --> 00:08:18,800
that's a great question we do have a

181
00:08:23,589 --> 00:08:21,280
robot on board we have we have a couple

182
00:08:26,390 --> 00:08:23,599
uh we have a robonaut which is a

183
00:08:27,589 --> 00:08:26,400
prototype of a humanoid robot robot to

184
00:08:28,309 --> 00:08:27,599
help us

185
00:08:33,350 --> 00:08:28,319
on

186
00:08:34,070 --> 00:08:33,360
then we have uh two robot manipulator

187
00:08:37,190 --> 00:08:34,080
two

188
00:08:39,670 --> 00:08:37,200

uh robotic arms that we use to help us

189
00:08:41,750 --> 00:08:39,680
work so the answer to your question is

190
00:08:43,750 --> 00:08:41,760
uh in a way

191
00:08:46,870 --> 00:08:43,760
already we have robotic features with

192
00:08:49,750 --> 00:08:46,880
which we interface uh constantly uh i

193
00:08:51,990 --> 00:08:49,760
was on top of the of the canadarm2 while

194
00:08:54,949 --> 00:08:52,000
karen was flying the arm uh during my

195
00:08:57,430 --> 00:08:54,959
eva and also a couple of weeks ago only

196
00:08:59,910 --> 00:08:57,440
two weeks ago i used the robotic the the

197
00:09:02,310 --> 00:08:59,920
current arm the the robotic arm to

198
00:09:05,350 --> 00:09:02,320
capture a cygnus and before me karen

199
00:09:07,750 --> 00:09:05,360
captured htv so we already have the use

200
00:09:09,590 --> 00:09:07,760
of powerful instrument powerful robotic

201
00:09:12,790 --> 00:09:09,600
instrument to help us here on the space

202
00:09:15,509 --> 00:09:12,800
station now um robonaut

203
00:09:17,670 --> 00:09:15,519
is a great experiment very cool because

204
00:09:19,670 --> 00:09:17,680
he's trying to figure out how a humanoid

205
00:09:22,550 --> 00:09:19,680
robot can help us doing an eva

206
00:09:25,590 --> 00:09:22,560
eventually maybe taking our place

207
00:09:28,070 --> 00:09:25,600
well um the study is still ongoing i

208
00:09:30,710 --> 00:09:28,080
think that in the future we we will have

209
00:09:32,310 --> 00:09:30,720
a lot of interface with rob our robotic

210
00:09:33,910 --> 00:09:32,320
friends and

211
00:09:35,750 --> 00:09:33,920
a lot of people think that maybe they

212
00:09:38,389 --> 00:09:35,760
will replace us that's not true we we

213
00:09:40,870 --> 00:09:38,399

will just interface more interact more

214
00:09:47,190 --> 00:09:40,880
and we will be more integrated as a crew

215
00:09:50,790 --> 00:09:49,750
thank you luca i'd now like to call upon

216
00:09:56,470 --> 00:09:50,800
italy

217
00:10:01,269 --> 00:09:58,470
is the human role during the docking

218
00:10:04,470 --> 00:10:01,279
maneuver fundamental or are we ready for

219
00:10:08,790 --> 00:10:04,480
autonomous assembly in orbit

220
00:10:13,750 --> 00:10:11,670
that's uh benvenuto bordeaux

221
00:10:15,829 --> 00:10:13,760
there is a there is a great uh great

222
00:10:19,509 --> 00:10:15,839
question are we ready for autonomous

223
00:10:21,750 --> 00:10:19,519
assembly well in a way we um

224
00:10:24,150 --> 00:10:21,760
part of the space station was built in

225
00:10:25,670 --> 00:10:24,160
in an autonomous mode

226
00:10:27,110 --> 00:10:25,680
if you remember

227
00:10:30,550 --> 00:10:27,120
the first part of the space station

228
00:10:32,310 --> 00:10:30,560
zarya came up by itself and then node

229
00:10:35,590 --> 00:10:32,320
one was attached to zarya which is

230
00:10:37,910 --> 00:10:35,600
called uh more mostly known by fgb

231
00:10:40,230 --> 00:10:37,920
and then the sm arrived and assembled

232
00:10:42,389 --> 00:10:40,240
autonomously so we have done autonomous

233
00:10:43,590 --> 00:10:42,399
operations and the next the next part of

234
00:10:45,269 --> 00:10:43,600
the space station which will be

235
00:10:46,870 --> 00:10:45,279
assembled autonomously

236
00:10:49,670 --> 00:10:46,880
is

237
00:10:53,030 --> 00:10:49,680
called mlm a new research module uh on

238
00:10:55,190 --> 00:10:53,040

the russian segment so in a way

239
00:10:58,069 --> 00:10:55,200
i think we are moving towards we we have

240
00:11:00,069 --> 00:10:58,079
had that experience and we moved into a

241
00:11:03,430 --> 00:11:00,079
different direction where we we

242
00:11:05,030 --> 00:11:03,440
assembled uh the space station orbit i

243
00:11:06,230 --> 00:11:05,040
i don't know what the future will bring

244
00:11:08,870 --> 00:11:06,240
it's going to be

245
00:11:11,910 --> 00:11:08,880
it will be interesting to see uh what

246
00:11:13,990 --> 00:11:11,920
will be the next phase of assembling

247
00:11:15,990 --> 00:11:14,000
space but i think that the experience

248
00:11:18,150 --> 00:11:16,000
has shown that we can do both and in a

249
00:11:21,110 --> 00:11:18,160
way that is the best lesson learned is

250
00:11:23,509 --> 00:11:21,120
that uh there are advantages to one and

251
00:11:26,150 --> 00:11:23,519
advantages to the other and we can

252
00:11:27,990 --> 00:11:26,160
probably we can pick the operation the

253
00:11:30,069 --> 00:11:28,000
options according to what is most

254
00:11:32,949 --> 00:11:30,079
necessary at the future in the future

255
00:11:35,030 --> 00:11:32,959
when we build our next uh either our

256
00:11:36,470 --> 00:11:35,040
next spacecraft our next station our

257
00:11:39,430 --> 00:11:36,480
next uh

258
00:11:41,350 --> 00:11:39,440
orbiting point and uh and only only the

259
00:11:43,670 --> 00:11:41,360
future we'll see will tell what we're

260
00:11:45,430 --> 00:11:43,680
capable of doing but the answer to your

261
00:11:50,949 --> 00:11:45,440
question is yes i think we can do that

262
00:11:55,750 --> 00:11:53,030
thank you very much luca we'd now like

263
00:12:00,710 --> 00:11:55,760

to go back to israel israel your next

264
00:12:04,389 --> 00:12:02,310
hi luca

265
00:12:07,829 --> 00:12:04,399
and my question is

266
00:12:10,310 --> 00:12:07,839
what was what was the biggest challenge

267
00:12:18,629 --> 00:12:10,320
you have experienced during your time in

268
00:12:23,750 --> 00:12:20,069
wow

269
00:12:25,670 --> 00:12:23,760
great question great great question

270
00:12:29,030 --> 00:12:25,680
it's hard to answer because

271
00:12:31,190 --> 00:12:29,040
uh because i like challenges and so

272
00:12:32,790 --> 00:12:31,200
sometimes i don't see them

273
00:12:34,629 --> 00:12:32,800
i don't see them as a problem as a

274
00:12:37,430 --> 00:12:34,639
challenge i see that and something

275
00:12:39,269 --> 00:12:37,440
really cool that i really want to do

276
00:12:40,230 --> 00:12:39,279
certainly i i think that

277
00:12:42,949 --> 00:12:40,240
um

278
00:12:44,870 --> 00:12:42,959
probably the the the things that give us

279
00:12:47,190 --> 00:12:44,880
more satisfactions are also the most

280
00:12:49,190 --> 00:12:47,200
challenging and for me that that would

281
00:12:51,190 --> 00:12:49,200
be probably

282
00:12:54,230 --> 00:12:51,200
going through the training to qualify as

283
00:12:56,230 --> 00:12:54,240
a a a as a left seater on the soyuz

284
00:12:58,310 --> 00:12:56,240
spacecraft it was very challenging there

285
00:13:00,310 --> 00:12:58,320
were a lot of examples that i had to go

286
00:13:02,870 --> 00:13:00,320
through it took me the best the the

287
00:13:05,990 --> 00:13:02,880
better part of two years to qualify and

288
00:13:07,590 --> 00:13:06,000

then um

289
00:13:09,030 --> 00:13:07,600
you know getting getting on the rocket

290
00:13:10,389 --> 00:13:09,040
being launched was a fantastic

291
00:13:11,509 --> 00:13:10,399
experience but certainly very

292
00:13:12,310 --> 00:13:11,519
challenging

293
00:13:15,269 --> 00:13:12,320
and

294
00:13:17,350 --> 00:13:15,279
but uh maybe if i if i had to pick one

295
00:13:18,949 --> 00:13:17,360
that would say that would summarize the

296
00:13:21,509 --> 00:13:18,959
pickleball challenges here on the space

297
00:13:23,509 --> 00:13:21,519
station i think that that my eva not not

298
00:13:24,550 --> 00:13:23,519
necessarily the one that with the with

299
00:13:27,509 --> 00:13:24,560
the with the

300
00:13:31,509 --> 00:13:27,519
emergency but uh with the inconvenient

301
00:13:35,269 --> 00:13:31,519
uh but uh just in general in eva uh

302
00:13:37,590 --> 00:13:35,279
when you put it in term of of the uh

303
00:13:40,150 --> 00:13:37,600
amount of work and amount of preparation

304
00:13:41,829 --> 00:13:40,160
that you need in order to do an eva i

305
00:13:44,870 --> 00:13:41,839
think that would be that would be

306
00:13:46,550 --> 00:13:44,880
probably uh the biggest uh and strongest

307
00:13:49,030 --> 00:13:46,560
challenge and

308
00:13:50,069 --> 00:13:49,040
was i expecting it i think i was

309
00:13:53,189 --> 00:13:50,079
i spent

310
00:13:56,069 --> 00:13:53,199
over 120 hours underwater on earth

311
00:13:57,829 --> 00:13:56,079
preparing for the eva and uh

312
00:13:59,990 --> 00:13:57,839
pretty much the same in the same amount

313
00:14:01,910 --> 00:14:00,000

of hours in a simulator training to

314
00:14:04,230 --> 00:14:01,920
become the left seeder on the soyuz so i

315
00:14:06,230 --> 00:14:04,240
think that yes i i expected it to be a

316
00:14:08,629 --> 00:14:06,240
challenge i wanted it to be a challenge

317
00:14:13,829 --> 00:14:08,639
and i think i was ready and prepared for

318
00:14:19,829 --> 00:14:16,949
thank you luca we now go back to germany

319
00:14:22,870 --> 00:14:19,839
germany your next question please

320
00:14:24,790 --> 00:14:22,880
so hello so my question is what is for

321
00:14:30,470 --> 00:14:24,800
you the most impressive thing about the

322
00:14:34,389 --> 00:14:32,710
okay can you um can you say that again i

323
00:14:40,150 --> 00:14:34,399
i know that you you said something about

324
00:14:47,189 --> 00:14:42,230
yeah what is the most impressive thing

325
00:14:51,590 --> 00:14:49,670
okay copy i got it what

326
00:14:53,590 --> 00:14:51,600
what is the most impressive thing well

327
00:14:55,189 --> 00:14:53,600
let me tell you

328
00:14:57,750 --> 00:14:55,199
the iss

329
00:15:00,949 --> 00:14:57,760
just just just the fact that he's such

330
00:15:04,069 --> 00:15:00,959
an incredibly sized spacecraft is is

331
00:15:06,230 --> 00:15:04,079
incredibly impressive uh the sheer

332
00:15:07,670 --> 00:15:06,240
the sheer size and and the thought of

333
00:15:10,470 --> 00:15:07,680
the effort

334
00:15:13,350 --> 00:15:10,480
of all the humans that that had to work

335
00:15:15,829 --> 00:15:13,360
in order to assemble this incredibly

336
00:15:18,069 --> 00:15:15,839
technological laboratory orbiting around

337
00:15:20,470 --> 00:15:18,079
the earth i think just the thought is

338
00:15:22,310 --> 00:15:20,480

impressive and

339
00:15:24,949 --> 00:15:22,320
you know right now i'm in columbus

340
00:15:27,590 --> 00:15:24,959
straight in front of me about at least

341
00:15:30,069 --> 00:15:27,600
uh 25 feet meters away i see the airlock

342
00:15:32,470 --> 00:15:30,079
of the of the kibo module and i know

343
00:15:34,069 --> 00:15:32,480
that if i go to my left uh this is the

344
00:15:35,749 --> 00:15:34,079
direction of flight right now if i go to

345
00:15:38,790 --> 00:15:35,759
my left towards the outside of the space

346
00:15:41,509 --> 00:15:38,800
station i can fly for about two minutes

347
00:15:44,550 --> 00:15:41,519
slowly and i'm passing all the different

348
00:15:47,350 --> 00:15:44,560
modules 100 meters far back we still

349
00:15:49,590 --> 00:15:47,360
have uh space station it's it's the atv

350
00:15:52,069 --> 00:15:49,600
module all the way at the at the back of

351
00:15:54,150 --> 00:15:52,079
the other space station it's really

352
00:15:57,910 --> 00:15:54,160
really big and he flies at 400

353
00:15:59,990 --> 00:15:57,920
kilometers 28 000 kilometers an hour

354
00:16:02,470 --> 00:16:00,000
if that isn't impressive i really don't

355
00:16:03,509 --> 00:16:02,480
know what else could be impressive um

356
00:16:04,710 --> 00:16:03,519
however

357
00:16:06,949 --> 00:16:04,720
um

358
00:16:09,590 --> 00:16:06,959
if you want something that really really

359
00:16:12,150 --> 00:16:09,600
touched me uh deeply and and maybe

360
00:16:14,230 --> 00:16:12,160
changed me as a person uh that would be

361
00:16:16,230 --> 00:16:14,240
uh the cupola

362
00:16:19,030 --> 00:16:16,240
uh when i when i first opened the

363
00:16:20,470 --> 00:16:19,040

windows or coupon on a sunrise it i

364
00:16:22,230 --> 00:16:20,480
thought that maybe the world had changed

365
00:16:24,069 --> 00:16:22,240
forever for me because it was an

366
00:16:27,350 --> 00:16:24,079
incredibly extraordinary moment and

367
00:16:29,509 --> 00:16:27,360
cupola is european technology uh

368
00:16:31,350 --> 00:16:29,519
probably one of the most beloved parts

369
00:16:32,550 --> 00:16:31,360
of the space station for all all the

370
00:16:34,629 --> 00:16:32,560
crew members

371
00:16:38,790 --> 00:16:34,639
from all the different countries over to

372
00:16:43,110 --> 00:16:40,870
thank you luca our time is getting short

373
00:16:47,189 --> 00:16:43,120
we have just a few minutes left italy

374
00:16:53,189 --> 00:16:50,710
ciao luca i'd like to ask you from the

375
00:16:55,509 --> 00:16:53,199
station keeping point of view attitude

376
00:16:58,629 --> 00:16:55,519
uh depletable checking

377
00:17:00,629 --> 00:16:58,639
power management and trusted maneuvers

378
00:17:03,430 --> 00:17:00,639
how much of it requires the human

379
00:17:05,829 --> 00:17:03,440
intervention and how much is devoted to

380
00:17:11,669 --> 00:17:05,839
onboard the automation and is that

381
00:17:15,510 --> 00:17:13,990
ciao beverly bordeaux there is a there

382
00:17:16,309 --> 00:17:15,520
is a great question what you guys are

383
00:17:18,150 --> 00:17:16,319
really

384
00:17:19,510 --> 00:17:18,160
you're giving me the greatest questions

385
00:17:21,270 --> 00:17:19,520
ever so

386
00:17:23,909 --> 00:17:21,280
um

387
00:17:25,669 --> 00:17:23,919
a lot of what we're talking about is uh

388
00:17:27,909 --> 00:17:25,679

there are different parts so for

389
00:17:31,270 --> 00:17:27,919
aptitude um

390
00:17:33,430 --> 00:17:31,280
attitude we have four huge

391
00:17:35,510 --> 00:17:33,440
gyros that keep the station attitude

392
00:17:37,110 --> 00:17:35,520
most the time and then when when they

393
00:17:39,750 --> 00:17:37,120
saturate and they can they cannot

394
00:17:41,590 --> 00:17:39,760
control anymore the space station

395
00:17:43,110 --> 00:17:41,600
we have an intervention from the engines

396
00:17:44,070 --> 00:17:43,120
to desaturate

397
00:17:45,430 --> 00:17:44,080
now

398
00:17:47,590 --> 00:17:45,440
that means that

399
00:17:49,669 --> 00:17:47,600
the normal orientation space station is

400
00:17:51,990 --> 00:17:49,679
kept automatically but then we need

401
00:17:55,110 --> 00:17:52,000
human intervention when when we need to

402
00:17:56,630 --> 00:17:55,120
do specific maneuvers like a

403
00:17:58,710 --> 00:17:56,640
debris avoidance maneuver or at the

404
00:18:00,789 --> 00:17:58,720
saturation

405
00:18:02,870 --> 00:18:00,799
some of those maneuvers actually happen

406
00:18:04,390 --> 00:18:02,880
on their own uh commanded by the the

407
00:18:07,830 --> 00:18:04,400
onboard system like a normal

408
00:18:09,510 --> 00:18:07,840
desaturation just happens on its own um

409
00:18:10,549 --> 00:18:09,520
but it's always supervised from the

410
00:18:14,230 --> 00:18:10,559
ground

411
00:18:16,310 --> 00:18:14,240
uh for power management so our solar

412
00:18:18,789 --> 00:18:16,320
arrays are fully automatic they track

413
00:18:20,789 --> 00:18:18,799

they track the sun they rotate

414
00:18:22,630 --> 00:18:20,799
following the sun in both in alpha and

415
00:18:25,270 --> 00:18:22,640
beta angle and

416
00:18:27,190 --> 00:18:25,280
that's a completely automated work

417
00:18:29,909 --> 00:18:27,200
however sometimes we need human

418
00:18:31,669 --> 00:18:29,919
intervention for uh for specific reasons

419
00:18:34,150 --> 00:18:31,679
for example when we when we change the

420
00:18:36,390 --> 00:18:34,160
orbit when we boost we need to put the

421
00:18:37,750 --> 00:18:36,400
the wings the solar arrays in special

422
00:18:40,230 --> 00:18:37,760
configurations so that they are

423
00:18:42,390 --> 00:18:40,240
protected so again there is a lot of

424
00:18:44,310 --> 00:18:42,400
inte there is a lot of supervised

425
00:18:45,990 --> 00:18:44,320
supervision and integration from the

426
00:18:49,909 --> 00:18:46,000
ground

427
00:18:53,830 --> 00:18:52,150
so for for the power management you know

428
00:18:56,549 --> 00:18:53,840
also how um

429
00:18:58,150 --> 00:18:56,559
how the systems are performing

430
00:19:00,230 --> 00:18:58,160
everything the space station is

431
00:19:01,909 --> 00:19:00,240
automatic in that it checks

432
00:19:04,150 --> 00:19:01,919
constantly what is the status of the

433
00:19:06,630 --> 00:19:04,160
space station in terms of safety in

434
00:19:08,549 --> 00:19:06,640
terms of the security but from the

435
00:19:10,390 --> 00:19:08,559
ground they also have the telemetry and

436
00:19:13,110 --> 00:19:10,400
they can pick up a lot of those signals

437
00:19:15,430 --> 00:19:13,120
even before the space station can so um

438
00:19:17,909 --> 00:19:15,440

to answer your question in few

439
00:19:19,110 --> 00:19:17,919
dirty words the space station is mostly

440
00:19:22,230 --> 00:19:19,120
automated

441
00:19:23,830 --> 00:19:22,240
however we feel a lot more secure and we

442
00:19:25,110 --> 00:19:23,840
have this fuzzy for warm feeling because

443
00:19:27,190 --> 00:19:25,120
we know that on the ground there are a

444
00:19:28,710 --> 00:19:27,200
lot of people that can take over and are

445
00:19:34,310 --> 00:19:28,720
watching us and are monitoring us and

446
00:19:38,630 --> 00:19:36,549
thank you so much luca we heard we only

447
00:19:40,710 --> 00:19:38,640
have 30 seconds left so that was the

448
00:19:42,789 --> 00:19:40,720
last question we'd like to give you the

449
00:19:45,110 --> 00:19:42,799
chance to say goodbye to everyone in

450
00:19:50,070 --> 00:19:45,120
israel germany and italy thank you for

451
00:19:52,390 --> 00:19:51,669
thank you so much for coming on board

452
00:19:55,110 --> 00:19:52,400
today

453
00:19:57,669 --> 00:19:55,120
it was such a such a pleasure such

454
00:20:00,710 --> 00:19:57,679
intelligence good questions from israel

455
00:20:03,430 --> 00:20:00,720
from germany from italy uh three three

456
00:20:06,310 --> 00:20:03,440
good great countries that cooperate and

457
00:20:07,669 --> 00:20:06,320
do fantastic work together you students

458
00:20:09,110 --> 00:20:07,679
are the future

459
00:20:10,630 --> 00:20:09,120
thank you for coming on board today

460
00:20:12,149 --> 00:20:10,640
thank you for listening to my answers

461
00:20:13,830 --> 00:20:12,159
and thank you for asking those questions

462
00:20:33,190 --> 00:20:13,840
thank you very much and i'll see you

463
00:20:37,590 --> 00:20:35,029

station this is houston acr that

464
00:20:39,510 --> 00:20:37,600
concludes the event thank you

465
00:20:41,110 --> 00:20:39,520
thank you eastern students station we