
PAO

1
00:00:05,030 --> 00:00:02,790
well welcome back uh inside mission

2
00:00:06,869 --> 00:00:05,040
control you're now close up at the

3
00:00:09,350 --> 00:00:06,879
public affairs console and as i

4
00:00:12,310 --> 00:00:09,360
mentioned a few minutes ago um laura

5
00:00:15,270 --> 00:00:12,320
lucier who is the robotics officer is

6
00:00:17,990 --> 00:00:15,280
actually on console all day today

7
00:00:18,710 --> 00:00:18,000
and uh of course she's keenly interested

8
00:00:21,429 --> 00:00:18,720
in

9
00:00:23,750 --> 00:00:21,439
all of the activities associated with

10
00:00:26,950 --> 00:00:23,760
the robotic arm of the station canadarm2

11
00:00:29,429 --> 00:00:26,960
but also of course the the eba that you

12
00:00:31,750 --> 00:00:29,439
just saw ernie bell describe

13
00:00:34,069 --> 00:00:31,760

as part of his press conference a week

14
00:00:35,830 --> 00:00:34,079
or so ago so laura thanks a lot for

15
00:00:37,510 --> 00:00:35,840
stepping off over there and coming over

16
00:00:38,950 --> 00:00:37,520
here and joining us i appreciate it my

17
00:00:40,709 --> 00:00:38,960
pleasure kyle it's always nice to have a

18
00:00:43,590 --> 00:00:40,719
little break

19
00:00:45,910 --> 00:00:43,600
well um i was describing earlier you

20
00:00:49,430 --> 00:00:45,920
know the robotics function is uh

21
00:00:52,869 --> 00:00:49,440
integral to just about every spacewalk

22
00:00:54,790 --> 00:00:52,879
um but you guys uh have a a very big

23
00:00:56,790 --> 00:00:54,800
task associated with this flight but i

24
00:00:59,349 --> 00:00:56,800
it's it's no better to hear from the

25
00:01:01,270 --> 00:00:59,359
experts so um and of course you you've

26
00:01:03,750 --> 00:01:01,280
been here you you sent me a note you've

27
00:01:05,109 --> 00:01:03,760
been here 11 years now have you been a

28
00:01:07,830 --> 00:01:05,119
front room how long have you been front

29
00:01:10,550 --> 00:01:07,840
room flight controller i've been a front

30
00:01:12,950 --> 00:01:10,560
room flight controller since oh boy

31
00:01:16,550 --> 00:01:12,960
you put me on the spot there um four or

32
00:01:18,070 --> 00:01:16,560
five years now so so no stranger to uh

33
00:01:20,149 --> 00:01:18,080
what happens in the front room and of

34
00:01:22,390 --> 00:01:20,159
course we you know everybody has uh

35
00:01:24,230 --> 00:01:22,400
backroom support but

36
00:01:27,030 --> 00:01:24,240
talk a little bit about

37
00:01:28,710 --> 00:01:27,040
uh specifically what this eva has in

38
00:01:30,390 --> 00:01:28,720

store for you guys

39
00:01:32,230 --> 00:01:30,400
and there's some little nuances that

40
00:01:34,630 --> 00:01:32,240
we'll talk about too but talk to me

41
00:01:35,910 --> 00:01:34,640
about what you guys have planned for

42
00:01:37,270 --> 00:01:35,920
tomorrow

43
00:01:40,310 --> 00:01:37,280
well for those of you who are just

44
00:01:42,069 --> 00:01:40,320
watching the eva briefing video overview

45
00:01:45,109 --> 00:01:42,079
you saw the animations of what we'll be

46
00:01:47,510 --> 00:01:45,119
doing and the big thing about canadarm2

47
00:01:49,590 --> 00:01:47,520
is it gives the eva crew a good stable

48
00:01:51,030 --> 00:01:49,600
work platform so if they need to reach

49
00:01:53,350 --> 00:01:51,040
things that otherwise they couldn't

50
00:01:55,030 --> 00:01:53,360
easily reach or in this case maneuver a

51
00:01:57,030 --> 00:01:55,040
big piece of hardware so we've got these

52
00:01:59,510 --> 00:01:57,040
two big grapple bars they need to be

53
00:02:01,830 --> 00:01:59,520
moved from the payload or you

54
00:02:04,069 --> 00:02:01,840
accommodation or the poa as we call it

55
00:02:07,590 --> 00:02:04,079
taken off of there and move to their

56
00:02:09,990 --> 00:02:07,600
permanent stow locations on the iss

57
00:02:11,830 --> 00:02:10,000
truss so those are big pieces of

58
00:02:13,110 --> 00:02:11,840
hardware they're tough to move around so

59
00:02:15,110 --> 00:02:13,120
we're going to

60
00:02:17,110 --> 00:02:15,120
put luca on the end of the arm and we'll

61
00:02:19,030 --> 00:02:17,120
be able to use the arm to help maneuver

62
00:02:23,030 --> 00:02:19,040
him while he's holding those big pieces

63
00:02:24,949 --> 00:02:23,040

of hardware into position do you um

64
00:02:26,790 --> 00:02:24,959
when you have a new crew member like

65
00:02:28,150 --> 00:02:26,800
luca is of course you all

66
00:02:31,509 --> 00:02:28,160
i assume y'all all worked together

67
00:02:33,670 --> 00:02:31,519
before they even launched so um when you

68
00:02:36,229 --> 00:02:33,680
have a new crew member you tend to

69
00:02:39,030 --> 00:02:36,239
train with that person on the on the end

70
00:02:41,990 --> 00:02:39,040
of the arm for stability just for

71
00:02:43,750 --> 00:02:42,000
maybe for familiarization uh but once

72
00:02:45,910 --> 00:02:43,760
they get past that like their second or

73
00:02:46,869 --> 00:02:45,920
third eva they they may be a free

74
00:02:48,309 --> 00:02:46,879
floater

75
00:02:50,150 --> 00:02:48,319
that's what i've seen in the past is

76
00:02:53,270 --> 00:02:50,160
that kind of how that was planned for

77
00:02:55,110 --> 00:02:53,280
him or or does it matter

78
00:02:58,390 --> 00:02:55,120
i don't know what decision making went

79
00:02:59,990 --> 00:02:58,400
into this specific eva uh certainly free

80
00:03:01,589 --> 00:03:00,000
float tasks are have their own

81
00:03:03,509 --> 00:03:01,599
complexities especially because of the

82
00:03:05,830 --> 00:03:03,519
size of the oru that you mentioned

83
00:03:08,470 --> 00:03:05,840
absolutely and you know moving on the

84
00:03:10,149 --> 00:03:08,480
arm also has its own nuances

85
00:03:12,149 --> 00:03:10,159
in particular one of the big things is

86
00:03:14,309 --> 00:03:12,159
the coordination and the communication

87
00:03:17,030 --> 00:03:14,319
between the arm operator who will be

88
00:03:18,470 --> 00:03:17,040

karen inside and luca on the end of the

89
00:03:20,390 --> 00:03:18,480
arm they have to make sure that they've

90
00:03:22,470 --> 00:03:20,400
rehearsed all of their communication all

91
00:03:24,869 --> 00:03:22,480
their coordination there'll be points

92
00:03:28,070 --> 00:03:24,879
during the eva where luca will be asking

93
00:03:31,110 --> 00:03:28,080
karen okay move me one meter to my left

94
00:03:33,190 --> 00:03:31,120
or two meters forward or backwards or to

95
00:03:34,869 --> 00:03:33,200
the side and so all of those calls and

96
00:03:36,309 --> 00:03:34,879
communications are what we really

97
00:03:37,750 --> 00:03:36,319
rehearse ahead of time and we need to

98
00:03:39,750 --> 00:03:37,760
make sure our crew members are working

99
00:03:41,750 --> 00:03:39,760
well together on all of that now you

100
00:03:43,270 --> 00:03:41,760
mentioned the rus you you have a couple

101
00:03:45,190 --> 00:03:43,280
of images i don't know if you want to

102
00:03:47,110 --> 00:03:45,200
talk to those now but

103
00:03:49,190 --> 00:03:47,120
there's your first one

104
00:03:51,110 --> 00:03:49,200
yes that's right and here you can see

105
00:03:53,270 --> 00:03:51,120
this is kind of just a screenshot

106
00:03:54,710 --> 00:03:53,280
similar to the briefing overview

107
00:03:56,789 --> 00:03:54,720
animations that i know you guys have

108
00:04:00,550 --> 00:03:56,799
been showing recently and this is a

109
00:04:02,550 --> 00:04:00,560
picture of well an animated picture of

110
00:04:04,149 --> 00:04:02,560
luca on the end of the arm reaching out

111
00:04:05,509 --> 00:04:04,159
to grab those grapple bars and you can

112
00:04:06,789 --> 00:04:05,519
kind of see the grapple bars in the

113
00:04:08,550 --> 00:04:06,799

center of the arm of course we've

114
00:04:10,390 --> 00:04:08,560
highlighted luca in bright red there so

115
00:04:11,830 --> 00:04:10,400
he's easy to pick out you can see how

116
00:04:13,990 --> 00:04:11,840
he's perched on the end of the arm

117
00:04:16,229 --> 00:04:14,000
reaching out to grab these big pieces of

118
00:04:17,990 --> 00:04:16,239
equipment

119
00:04:20,150 --> 00:04:18,000
in the next picture you can see a shot

120
00:04:22,870 --> 00:04:20,160
of him holding the grapple bars in

121
00:04:24,710 --> 00:04:22,880
position at their permanent stow place

122
00:04:26,870 --> 00:04:24,720
this is the grapple bars that are going

123
00:04:28,629 --> 00:04:26,880
on to the starboard truss

124
00:04:30,710 --> 00:04:28,639
and of course chris will be free flow as

125
00:04:33,510 --> 00:04:30,720
you mentioned and coming in to help bolt

126
00:04:35,189 --> 00:04:33,520
those down into place

127
00:04:37,590 --> 00:04:35,199
and the third shot is just a similar

128
00:04:38,469 --> 00:04:37,600
position of the second grapple bars

129
00:04:40,550 --> 00:04:38,479
being

130
00:04:41,749 --> 00:04:40,560
stowed over on the port side of the

131
00:04:43,909 --> 00:04:41,759
truss

132
00:04:46,469 --> 00:04:43,919
so this is a

133
00:04:49,510 --> 00:04:46,479
a real good example of the

134
00:04:52,230 --> 00:04:49,520
choreography if you will between

135
00:04:54,230 --> 00:04:52,240
robotics and the humans obviously the

136
00:04:55,590 --> 00:04:54,240
two crew members that perform the space

137
00:04:57,590 --> 00:04:55,600
walk

138
00:05:00,070 --> 00:04:57,600

and you talked about the training but

139
00:05:02,469 --> 00:05:00,080
how much do you have an idea of how much

140
00:05:04,550 --> 00:05:02,479
you guys trained knowing this was coming

141
00:05:06,150 --> 00:05:04,560
how much you trained before they

142
00:05:09,110 --> 00:05:06,160
actually flew

143
00:05:10,310 --> 00:05:09,120
absolutely uh well over a year ago we

144
00:05:12,310 --> 00:05:10,320
started working on the detailed

145
00:05:14,550 --> 00:05:12,320
procedures of course as you and i'm sure

146
00:05:17,029 --> 00:05:14,560
your viewers know we spend a lot of time

147
00:05:19,189 --> 00:05:17,039
sussing out every single little detail

148
00:05:21,110 --> 00:05:19,199
and we develop for the crew line by line

149
00:05:23,350 --> 00:05:21,120
instructions or procedures on how to

150
00:05:25,510 --> 00:05:23,360
perform these operations so we started

151
00:05:26,950 --> 00:05:25,520
working on those well over a year ago

152
00:05:28,390 --> 00:05:26,960
and then of course we started training

153
00:05:29,990 --> 00:05:28,400
the crew

154
00:05:32,310 --> 00:05:30,000
as you probably also know our crew

155
00:05:34,950 --> 00:05:32,320
members spend a lot of time traveling so

156
00:05:36,710 --> 00:05:34,960
in between their various trips to russia

157
00:05:38,550 --> 00:05:36,720
japan europe

158
00:05:41,110 --> 00:05:38,560
we had training sessions with them here

159
00:05:43,189 --> 00:05:41,120
in the united states and we taught them

160
00:05:45,670 --> 00:05:43,199
first of all generically how the arm

161
00:05:47,590 --> 00:05:45,680
operates how to fly the canadarm2 but

162
00:05:49,350 --> 00:05:47,600
then also the details of the specific

163
00:05:51,510 --> 00:05:49,360

task and we use a lot of different

164
00:05:53,590 --> 00:05:51,520
facilities to do that we did a lot of

165
00:05:55,830 --> 00:05:53,600
training sessions in the virtual reality

166
00:05:57,590 --> 00:05:55,840
laboratory together with the eva crew

167
00:06:00,150 --> 00:05:57,600
members they wear their helmets and they

168
00:06:03,350 --> 00:06:00,160
get to see a visualization of the space

169
00:06:05,350 --> 00:06:03,360
station and with karen at simulated arm

170
00:06:07,430 --> 00:06:05,360
controls actually moving them around and

171
00:06:09,830 --> 00:06:07,440
that's one of our biggest opportunities

172
00:06:11,590 --> 00:06:09,840
to rehearse it we also use

173
00:06:13,590 --> 00:06:11,600
the neutral buoyancy laboratory which

174
00:06:16,629 --> 00:06:13,600
has a mock-up of the arm an actual

175
00:06:18,070 --> 00:06:16,639
operating hydraulic arm and we practice

176
00:06:19,909 --> 00:06:18,080
maneuvering the crew members around in

177
00:06:21,590 --> 00:06:19,919
there so all of those things together

178
00:06:23,029 --> 00:06:21,600
give us a chance to rehearse both that

179
00:06:25,590 --> 00:06:23,039
coordination that i was talking about

180
00:06:26,950 --> 00:06:25,600
earlier but also to time everything out

181
00:06:29,430 --> 00:06:26,960
because we need to know down to the

182
00:06:32,469 --> 00:06:29,440
minute how quickly all of these tasks

183
00:06:34,150 --> 00:06:32,479
are going to go right so so

184
00:06:35,749 --> 00:06:34,160
you mentioned the vr lab that's here at

185
00:06:37,990 --> 00:06:35,759
the johnson space center in another

186
00:06:40,390 --> 00:06:38,000
building um over in the space vehicle

187
00:06:43,270 --> 00:06:40,400
mock-up facility um

188
00:06:45,350 --> 00:06:43,280

another uh activity of course is you

189
00:06:46,950 --> 00:06:45,360
know after they get up there you guys

190
00:06:49,029 --> 00:06:46,960
aren't all together anymore in terms of

191
00:06:51,670 --> 00:06:49,039
face to face that is

192
00:06:53,350 --> 00:06:51,680
but they they have a robotic simulator

193
00:06:55,589 --> 00:06:53,360
on board that they can

194
00:06:57,029 --> 00:06:55,599
basically rehearse as well right that's

195
00:06:59,670 --> 00:06:57,039
right we actually have a couple of

196
00:07:01,830 --> 00:06:59,680
different ones one is called robot which

197
00:07:04,150 --> 00:07:01,840
actually has joystick hand controllers

198
00:07:06,230 --> 00:07:04,160
just like the real canadarm2 does and

199
00:07:08,469 --> 00:07:06,240
the crew can actually practice moving

200
00:07:10,629 --> 00:07:08,479
around a virtual arm in a virtual

201
00:07:13,670 --> 00:07:10,639
environment we also have a simulator

202
00:07:16,150 --> 00:07:13,680
called doug and doug provides

203
00:07:18,469 --> 00:07:16,160
purely graphics not an opportunity to

204
00:07:21,350 --> 00:07:18,479
fly a simulated arm but an opportunity

205
00:07:24,230 --> 00:07:21,360
for the crew to step through or jump

206
00:07:26,950 --> 00:07:24,240
this uh arm and simulate flying it

207
00:07:29,670 --> 00:07:26,960
through the various positions and so

208
00:07:31,830 --> 00:07:29,680
just recently in fact last friday we had

209
00:07:33,990 --> 00:07:31,840
a session for karen where she had was

210
00:07:35,589 --> 00:07:34,000
scheduled for some time to go in and fly

211
00:07:37,830 --> 00:07:35,599
through the robotics procedure and

212
00:07:38,629 --> 00:07:37,840
revisit them and freshen her memory

213
00:07:40,390 --> 00:07:38,639

right

214
00:07:41,990 --> 00:07:40,400
now one of the things i want to mention

215
00:07:44,710 --> 00:07:42,000
to everyone is

216
00:07:46,150 --> 00:07:44,720
laura is works for the canadian space

217
00:07:48,390 --> 00:07:46,160
agency

218
00:07:52,070 --> 00:07:48,400
she has a mechanical engineering and

219
00:07:55,189 --> 00:07:52,080
aerospace engineering degrees right

220
00:07:57,110 --> 00:07:55,199
the one things i'm fascinated by is

221
00:07:58,629 --> 00:07:57,120
i don't know if telerobotics is the

222
00:08:02,150 --> 00:07:58,639
right word but

223
00:08:04,070 --> 00:08:02,160
um typically uh when we have uh crew

224
00:08:05,189 --> 00:08:04,080
members on board

225
00:08:07,350 --> 00:08:05,199
if there's

226
00:08:08,869 --> 00:08:07,360
enough crew members in terms of like u.s

227
00:08:10,710 --> 00:08:08,879
members or

228
00:08:12,469 --> 00:08:10,720
over in the u.s segment i guess that are

229
00:08:14,150 --> 00:08:12,479
robotically trained

230
00:08:16,950 --> 00:08:14,160
you might have the two folks outside and

231
00:08:18,550 --> 00:08:16,960
you have a robotics person and and as we

232
00:08:21,830 --> 00:08:18,560
did back in shuttle we would have a

233
00:08:23,990 --> 00:08:21,840
backup robotics officer that could spell

234
00:08:25,909 --> 00:08:24,000
the person if it's a long eva they take

235
00:08:27,830 --> 00:08:25,919
turns right over tat or they train for

236
00:08:29,270 --> 00:08:27,840
different tasks or take turns

237
00:08:30,790 --> 00:08:29,280
i guess for this one the thing i'm

238
00:08:33,430 --> 00:08:30,800

fascinated by is

239
00:08:35,670 --> 00:08:33,440
karen has no backup on board

240
00:08:38,870 --> 00:08:35,680
so her backup is sitting right here next

241
00:08:40,469 --> 00:08:38,880
to me and so i want you to describe

242
00:08:44,149 --> 00:08:40,479
you know with your background this has

243
00:08:45,750 --> 00:08:44,159
got to be something that's uh

244
00:08:48,310 --> 00:08:45,760
maybe like the super bowl for i don't

245
00:08:50,070 --> 00:08:48,320
know for robotics is getting to operate

246
00:08:52,470 --> 00:08:50,080
an arm that's you know circling the

247
00:08:55,350 --> 00:08:52,480
earth 250 miles up

248
00:08:57,430 --> 00:08:55,360
absolutely that's by far my favorite

249
00:08:59,829 --> 00:08:57,440
part of my job is that we do have the

250
00:09:02,070 --> 00:08:59,839
capability to operate canadarm2 and of

251
00:09:04,790 --> 00:09:02,080
course dexter which is the two-armed

252
00:09:07,509 --> 00:09:04,800
robot from the ground and for a lot of

253
00:09:08,389 --> 00:09:07,519
our operations moving pieces of hardware

254
00:09:11,030 --> 00:09:08,399
around

255
00:09:13,350 --> 00:09:11,040
swapping out various payloads we do that

256
00:09:15,190 --> 00:09:13,360
completely 100 from the ground so the

257
00:09:17,430 --> 00:09:15,200
crew might go to sleep one night wake up

258
00:09:19,190 --> 00:09:17,440
the next morning and the robot is in a

259
00:09:21,190 --> 00:09:19,200
completely different place from where

260
00:09:22,870 --> 00:09:21,200
they left it which is i'd always like to

261
00:09:24,630 --> 00:09:22,880
go and you know tap on the window and

262
00:09:27,110 --> 00:09:24,640
look inside we're not quite at that

263
00:09:28,710 --> 00:09:27,120

stage but it's a it's a lot of fun and

264
00:09:30,790 --> 00:09:28,720
you're right it's very surreal to be

265
00:09:34,150 --> 00:09:30,800
able to sit here in mission control and

266
00:09:35,430 --> 00:09:34,160
send commands and move this

267
00:09:37,670 --> 00:09:35,440
enormous

268
00:09:40,550 --> 00:09:37,680
robot way up there on the space station

269
00:09:43,269 --> 00:09:40,560
so is karen's back up now for this eva

270
00:09:44,710 --> 00:09:43,279
uh we won't actually be moving the arm

271
00:09:46,710 --> 00:09:44,720
from the ground

272
00:09:48,550 --> 00:09:46,720
obviously when you have a crew member on

273
00:09:51,430 --> 00:09:48,560
the end of the arm and

274
00:09:53,269 --> 00:09:51,440
the time pressures of a spacewalk going

275
00:09:55,350 --> 00:09:53,279
on you want to make sure everything goes

276
00:09:57,430 --> 00:09:55,360
as smoothly as possible so it will all

277
00:09:59,269 --> 00:09:57,440
be karen moving the arm unfortunately

278
00:10:01,110 --> 00:09:59,279
she won't have anyone to spell her off

279
00:10:03,430 --> 00:10:01,120
but that second person

280
00:10:05,910 --> 00:10:03,440
performs a lot of checks they're making

281
00:10:07,829 --> 00:10:05,920
sure that

282
00:10:11,110 --> 00:10:07,839
the cameras are set up the way you would

283
00:10:13,190 --> 00:10:11,120
need to monitor tight clearances or

284
00:10:15,509 --> 00:10:13,200
tough positions that you're getting into

285
00:10:17,190 --> 00:10:15,519
they also make sure that appropriate

286
00:10:19,430 --> 00:10:17,200
software

287
00:10:21,190 --> 00:10:19,440
files are loaded for the command

288
00:10:23,590 --> 00:10:21,200

parameters for the arm

289
00:10:26,230 --> 00:10:23,600
additionally when we move the arm a lot

290
00:10:28,790 --> 00:10:26,240
of the time we move it using joysticks

291
00:10:30,630 --> 00:10:28,800
but a lot of time we'll also type in a

292
00:10:33,269 --> 00:10:30,640
final position that we want the arm to

293
00:10:35,509 --> 00:10:33,279
maneuver to and essentially press a big

294
00:10:37,430 --> 00:10:35,519
go button and the arm will maneuver to

295
00:10:40,230 --> 00:10:37,440
that position and of course as you can

296
00:10:42,310 --> 00:10:40,240
imagine making sure you type in that

297
00:10:43,590 --> 00:10:42,320
destination position accurately is a

298
00:10:46,389 --> 00:10:43,600
very big deal

299
00:10:50,069 --> 00:10:46,399
and so that is the kind of thing that

300
00:10:52,069 --> 00:10:50,079
the backup person what we call the m2

301
00:10:53,590 --> 00:10:52,079
would do and so we'll be performing

302
00:10:55,990 --> 00:10:53,600
those functions from the ground so

303
00:10:57,910 --> 00:10:56,000
there'll be various points in uh

304
00:10:59,509 --> 00:10:57,920
in the procedure tomorrow where karen

305
00:11:01,750 --> 00:10:59,519
will be holding

306
00:11:02,870 --> 00:11:01,760
and waiting to get a call

307
00:11:04,230 --> 00:11:02,880
from myself

308
00:11:05,829 --> 00:11:04,240
through the capcom

309
00:11:07,670 --> 00:11:05,839
to say yes

310
00:11:09,670 --> 00:11:07,680
that destination looks good or the

311
00:11:11,269 --> 00:11:09,680
appropriate file is loaded your go to

312
00:11:12,870 --> 00:11:11,279
proceed and so that's how we'll be doing

313
00:11:14,710 --> 00:11:12,880

that function from the ground tomorrow

314
00:11:16,949 --> 00:11:14,720
great so quite a bit of

315
00:11:18,069 --> 00:11:16,959
choreography between

316
00:11:21,030 --> 00:11:18,079
the ground

317
00:11:22,310 --> 00:11:21,040
you may not hear it on nasa tv but

318
00:11:25,030 --> 00:11:22,320
through the flight director through

319
00:11:27,110 --> 00:11:25,040
capcom up so you'll hear a lot of

320
00:11:29,430 --> 00:11:27,120
interaction not only between the eva

321
00:11:31,910 --> 00:11:29,440
officer ernie bell obviously and his

322
00:11:34,230 --> 00:11:31,920
team but also with with you and and your

323
00:11:37,030 --> 00:11:34,240
team as well that's right

324
00:11:39,590 --> 00:11:37,040
so it's a it's a very intricate process

325
00:11:43,350 --> 00:11:39,600
and and obviously robotics is a big part

326
00:11:45,190 --> 00:11:43,360
of what you'll see tomorrow and um

327
00:11:47,750 --> 00:11:45,200
laura was kind enough to take a few

328
00:11:49,910 --> 00:11:47,760
minutes as she is on duty in the room

329
00:11:52,870 --> 00:11:49,920
right now on this shift so she's on

330
00:11:54,870 --> 00:11:52,880
until 3 3 30 this afternoon so

331
00:11:57,190 --> 00:11:54,880
it was great of you to stop by and

332
00:11:58,790 --> 00:11:57,200
describe what's in store for tomorrow

333
00:12:00,629 --> 00:11:58,800
and we're looking forward to seeing it

334
00:12:02,230 --> 00:12:00,639
all thanks a lot for coming by so am i

335
00:12:05,110 --> 00:12:02,240
my pleasure

336
00:12:06,710 --> 00:12:05,120
that's laura lucier she's the robotics

337
00:12:08,389 --> 00:12:06,720
officer here in the room on the current

338
00:12:09,590 --> 00:12:08,399

shift and she'll be on duty tomorrow

339
00:12:12,230 --> 00:12:09,600
throughout the

340
00:12:14,310 --> 00:12:12,240
eva that chris cassidy and luca