1
00:00:04,230 --> 00:00:02,389
welcome back to mission control here in

2
00:00:06,070 --> 00:00:04,240
houston uh we just mentioned a moment

3
00:00:07,829 --> 00:00:06,080
ago about the arrival of the george le

4
00:00:10,470 --> 00:00:07,839
matra automated transfer vehicle

5
00:00:14,390 --> 00:00:10,480
launched a few weeks ago by the european

6
00:00:17,189 --> 00:00:14,400
space agency one of the items uh that is

7
00:00:20,790 --> 00:00:17,199
in the atv awaiting transfer and uh set

8
00:00:23,109 --> 00:00:20,800
up for uh scientific research is a very

9
00:00:24,950 --> 00:00:23,119
unique and novel uh experiment called

10
00:00:27,189 --> 00:00:24,960
haptics one

11
00:00:30,710 --> 00:00:27,199
joining us today to discuss all of that

12
00:00:33,030 --> 00:00:30,720
is dr andre sheila who is the head of

13
00:00:35,510 --> 00:00:33,040

the european space agency's telerobotics

14
00:00:37,270 --> 00:00:35,520
laboratory at s-tech and an associate

15
00:00:39,830 --> 00:00:37,280
professor of mechanical materials in

16
00:00:42,389 --> 00:00:39,840
maritime engineering at delft university

17
00:00:44,069 --> 00:00:42,399
of technology in the netherlands dr

18
00:00:45,910 --> 00:00:44,079
sheila thank you very much for joining

19
00:00:47,830 --> 00:00:45,920
us today it's a pleasure to have you on

20
00:00:49,750 --> 00:00:47,840
space station live

21
00:00:51,189 --> 00:00:49,760
thank you rob naviers thank you for

22
00:00:53,270 --> 00:00:51,199
inviting me

23
00:00:55,350 --> 00:00:53,280
first off uh give us a

24
00:00:57,990 --> 00:00:55,360
sort of an overview as to what haptics

25
00:01:00,150 --> 00:00:58,000
one is all about and how excited are you

26
00:01:02,709 --> 00:01:00,160
personally to get this experiment on

27
00:01:05,509 --> 00:01:02,719
board and get it going

28
00:01:08,950 --> 00:01:05,519
oh i'm very excited actually haptics one

29
00:01:11,830 --> 00:01:08,960
is really a first timer in the sense of

30
00:01:13,590 --> 00:01:11,840
uh the fact that never before a force

31
00:01:16,070 --> 00:01:13,600
reflecting device has been flown to

32
00:01:18,550 --> 00:01:16,080
space so we have been given the

33
00:01:21,109 --> 00:01:18,560
opportunity at my laboratory to build a

34
00:01:23,830 --> 00:01:21,119
force reflecting joystick that would

35
00:01:24,710 --> 00:01:23,840
find its way up to the station and allow

36
00:01:27,749 --> 00:01:24,720
crew

37
00:01:30,469 --> 00:01:27,759
in the future to control robotic systems

38
00:01:32,870 --> 00:01:30,479

on the planet of earth from the orbiting

39
00:01:34,870 --> 00:01:32,880
station and you're seeing here a first

40
00:01:37,670 --> 00:01:34,880
test run that we did with some of the

41
00:01:39,749 --> 00:01:37,680
astronauts alexander gerst and barry

42
00:01:42,630 --> 00:01:39,759
wilmore during the crown training

43
00:01:44,870 --> 00:01:42,640
sessions so that is a joystick

44
00:01:47,190 --> 00:01:44,880
similar to a normal gaming joystick that

45
00:01:49,109 --> 00:01:47,200
you would imagine but very highly

46
00:01:52,389 --> 00:01:49,119
advanced it includes a real-time

47
00:01:55,270 --> 00:01:52,399
computer it includes some very high

48
00:01:57,910 --> 00:01:55,280
sensitivity force sensors in there that

49
00:02:00,709 --> 00:01:57,920
allows to actually perform position and

50
00:02:03,270 --> 00:02:00,719
force tasks by humans uh haptics one

51
00:02:05,670 --> 00:02:03,280
also has a tablet pc and we implemented

52
00:02:08,309 --> 00:02:05,680
a revolutionary new approach on how to

53
00:02:10,469 --> 00:02:08,319
actually do crew guided procedures uh

54
00:02:13,350 --> 00:02:10,479
you're seeing here barry wilmore during

55
00:02:15,430 --> 00:02:13,360
the btc runs how he actually tracks an

56
00:02:17,830 --> 00:02:15,440
experiment and the tablet pc actually

57
00:02:20,309 --> 00:02:17,840
guides the astronaut entirely through

58
00:02:22,309 --> 00:02:20,319
the experiment so it is very similar to

59
00:02:24,309 --> 00:02:22,319
your usual iphone that you have in an

60
00:02:26,229 --> 00:02:24,319
app that actually controls you

61
00:02:29,430 --> 00:02:26,239
automatically through through all the

62
00:02:31,750 --> 00:02:29,440
menu items and for space this is pretty

63
00:02:34,229 --> 00:02:31,760

unique and it sets the path for novel

64
00:02:36,229 --> 00:02:34,239
control stations in the future to come

65
00:02:38,309 --> 00:02:36,239
in order to allow astronauts to really

66
00:02:41,110 --> 00:02:38,319
interact intuitively with robotic

67
00:02:43,670 --> 00:02:41,120
systems on planetary surface or also

68
00:02:45,670 --> 00:02:43,680
outside the space station

69
00:02:47,110 --> 00:02:45,680
dr andrei sheila the principal

70
00:02:49,589 --> 00:02:47,120
investigator of the haptics one

71
00:02:52,869 --> 00:02:49,599
experiment joining us today dr sheila

72
00:02:56,470 --> 00:02:52,879
what prompted uh your desire to develop

73
00:02:59,670 --> 00:02:56,480
such a novel and unique experiment

74
00:03:01,990 --> 00:02:59,680
oh actually there are two two really um

75
00:03:03,750 --> 00:03:02,000
basic needs that that we had one was

76
00:03:05,750 --> 00:03:03,760
really a practical one

77
00:03:08,149 --> 00:03:05,760
my laboratory has been tasked to

78
00:03:10,869 --> 00:03:08,159
conceive a more advanced robotic control

79
00:03:13,350 --> 00:03:10,879
station in the future uh allowing to

80
00:03:16,229 --> 00:03:13,360
control complex robotic systems in the

81
00:03:19,750 --> 00:03:16,239
years to come and in this frame we will

82
00:03:21,830 --> 00:03:19,760
design an exoskeleton controller so we

83
00:03:24,390 --> 00:03:21,840
decided it would be good to have first

84
00:03:26,789 --> 00:03:24,400
test first test of the technology to

85
00:03:28,390 --> 00:03:26,799
actually implement on the station to run

86
00:03:30,830 --> 00:03:28,400
through the entire processes of

87
00:03:33,830 --> 00:03:30,840
verification safety medical

88
00:03:36,309 --> 00:03:33,840

certification um my laboratory is a

89
00:03:38,630 --> 00:03:36,319
rather small agile laboratory within esa

90
00:03:41,030 --> 00:03:38,640
so we are eight to ten people and we

91
00:03:42,470 --> 00:03:41,040
were thrilled to actually test out uh

92
00:03:44,309 --> 00:03:42,480
part of the development of that

93
00:03:46,550 --> 00:03:44,319
exoskeleton on a force reflecting

94
00:03:48,630 --> 00:03:46,560
joystick which already has all the

95
00:03:50,630 --> 00:03:48,640
computing infrastructure the motor

96
00:03:52,789 --> 00:03:50,640
controls and all the electronics for the

97
00:03:55,509 --> 00:03:52,799
later more complex exoskeleton

98
00:03:57,670 --> 00:03:55,519
controller in place

99
00:03:59,429 --> 00:03:57,680
secondly there was also a scientific

100
00:04:01,990 --> 00:03:59,439
rationale for this

101
00:04:05,350 --> 00:04:02,000
being the lack of data of how humans

102
00:04:07,030 --> 00:04:05,360
behave in microgravity when controlling

103
00:04:09,190 --> 00:04:07,040
forces and positions

104
00:04:11,589 --> 00:04:09,200
so we have a lot of experience on earth

105
00:04:14,229 --> 00:04:11,599
how to use haptic feedback in robotic

106
00:04:17,110 --> 00:04:14,239
control but we have not a single data

107
00:04:19,349 --> 00:04:17,120
point in space and actually microgravity

108
00:04:21,189 --> 00:04:19,359
so we wanted to understand the principal

109
00:04:23,670 --> 00:04:21,199
mechanisms on how this works in a

110
00:04:25,830 --> 00:04:23,680
microgravity environment

111
00:04:27,590 --> 00:04:25,840
when are we expected to see haptics one

112
00:04:30,550 --> 00:04:27,600
up and running

113
00:04:33,909 --> 00:04:30,560

currently the planning is to take place

114
00:04:36,629 --> 00:04:33,919
around 28 and 29 of september uh by

115
00:04:38,629 --> 00:04:36,639
alexander gerst the the esa astronaut

116
00:04:41,189 --> 00:04:38,639
who will be the first crew member to

117
00:04:43,590 --> 00:04:41,199
execute that set of product calls are

118
00:04:45,510 --> 00:04:43,600
seven protocols that he will conduct

119
00:04:47,430 --> 00:04:45,520
that range from measuring all types of

120
00:04:50,070 --> 00:04:47,440
physical properties and technology

121
00:04:53,590 --> 00:04:50,080
technical uh properties of the system

122
00:04:56,629 --> 00:04:53,600
and we hope that we we will take those

123
00:04:58,150 --> 00:04:56,639
measurements on those dates but knowing

124
00:05:00,230 --> 00:04:58,160
the the infrastructure of the space

125
00:05:01,830 --> 00:05:00,240
station some tasks are very high

126
00:05:03,909 --> 00:05:01,840
priority tasks so there is some

127
00:05:07,270 --> 00:05:03,919
flexibility that it might take

128
00:05:09,590 --> 00:05:07,280
place a little bit later or even earlier

129
00:05:12,390 --> 00:05:09,600
and finally dr sheila what ultimately

130
00:05:15,670 --> 00:05:12,400
will be the earth based application of

131
00:05:17,590 --> 00:05:15,680
this revolutionary technology

132
00:05:20,230 --> 00:05:17,600
well in earth there there are a lot of

133
00:05:21,830 --> 00:05:20,240
applications basically any application

134
00:05:24,390 --> 00:05:21,840
that requires

135
00:05:27,510 --> 00:05:24,400
uh tasks to be carried out in places

136
00:05:30,150 --> 00:05:27,520
where humans shouldn't be uh imagine uh

137
00:05:33,430 --> 00:05:30,160
the the catastrophic events of fukushima

138
00:05:35,990 --> 00:05:33,440

or genobil or also activities deep in

139
00:05:38,310 --> 00:05:36,000
the ocean like deepwater horizon where

140
00:05:40,550 --> 00:05:38,320
robotic systems can go but humans can't

141
00:05:43,830 --> 00:05:40,560
go for these sort of applications we

142
00:05:45,830 --> 00:05:43,840
need robotic technology that allows to

143
00:05:48,070 --> 00:05:45,840
make the human feel present at a work

144
00:05:50,070 --> 00:05:48,080
site even though it's only a technical

145
00:05:52,310 --> 00:05:50,080
system that is actually there

146
00:05:55,430 --> 00:05:52,320
so the technology we are developing for

147
00:05:59,510 --> 00:05:55,440
iss being very intuitive to use will

148
00:06:01,270 --> 00:05:59,520
directly benefit to those areas

149
00:06:03,029 --> 00:06:01,280
well it sounds like a fabulous

150
00:06:04,550 --> 00:06:03,039
opportunity and a great experiment

151
00:06:06,870 --> 00:06:04,560
coming up and we can't wait to see the

152
00:06:09,990 --> 00:06:06,880
results and share them with you as they

153
00:06:12,150 --> 00:06:10,000
unfold dr andrei sheila of the european

154
00:06:13,670 --> 00:06:12,160
space agency's telerobotics laboratory

155
00:06:15,350 --> 00:06:13,680
thank you so much for joining us today