1
00:00:05,269 --> 00:00:03,830
hi we're here in the robonaut 2 lab

2
00:00:07,269 --> 00:00:05,279
today at the johnson space center

3
00:00:09,030 --> 00:00:07,279
talking with lyndon bridgewater who is

4
00:00:11,270 --> 00:00:09,040
the chief mechanical engineer for the

5
00:00:12,789 --> 00:00:11,280
robonaut 2 project and also for a new

6
00:00:14,230 --> 00:00:12,799
project that he's actually wearing on

7
00:00:15,910 --> 00:00:14,240
his hand can you tell us what this is

8
00:00:17,349 --> 00:00:15,920
lyndon this is the grasp assist device

9
00:00:19,029 --> 00:00:17,359
that we're using for

10
00:00:21,590 --> 00:00:19,039
developing technologies for assisting

11
00:00:22,790 --> 00:00:21,600
astronauts on suited gloves or assembly

12
00:00:25,109 --> 00:00:22,800
line workers down here on earth so that

13
00:00:27,349 --> 00:00:25,119

they can handle uh repetitive tasks and

14
00:00:29,669 --> 00:00:27,359
heavy lift tasks okay grasp assist

15
00:00:31,269 --> 00:00:29,679
device what i mean it's a robot on your

16
00:00:33,670 --> 00:00:31,279
hand right exactly it is a robot on your

17
00:00:36,069 --> 00:00:33,680
hand um it is basically assisting me or

18
00:00:38,470 --> 00:00:36,079
its operator in order to carry an object

19
00:00:40,869 --> 00:00:38,480
or grasp an object why would we need

20
00:00:43,270 --> 00:00:40,879
that so from nasa's perspective

21
00:00:44,709 --> 00:00:43,280
spacesuits are like a pressure bubble

22
00:00:46,389 --> 00:00:44,719
that astronauts are trying to squeeze

23
00:00:47,910 --> 00:00:46,399
down and pull on every time they're

24
00:00:49,670 --> 00:00:47,920
doing an eva

25
00:00:52,310 --> 00:00:49,680
in order to help

26
00:00:54,630 --> 00:00:52,320
take that burden away we've put

27
00:00:57,029 --> 00:00:54,640
mechanical actuation systems on board

28
00:00:58,869 --> 00:00:57,039
with computers and sensors that allow an

29
00:01:00,950 --> 00:00:58,879
operator to

30
00:01:02,630 --> 00:01:00,960
trigger the device and make it close the

31
00:01:04,549 --> 00:01:02,640
hand down instead of the astronaut

32
00:01:05,830 --> 00:01:04,559
having to fight it himself can yeah

33
00:01:07,830 --> 00:01:05,840
close it open a few times so they can

34
00:01:11,429 --> 00:01:07,840
hear that

35
00:01:13,270 --> 00:01:11,439
going on that's what is that what's

36
00:01:14,870 --> 00:01:13,280
doing that those are several actuators

37
00:01:17,510 --> 00:01:14,880
that are located back here on the in the

38
00:01:19,190 --> 00:01:17,520

forearm of the of the glove um

39
00:01:21,749 --> 00:01:19,200
they are triggered by a sensor within

40
00:01:22,550 --> 00:01:21,759
the glove that tells it when to open and

41
00:01:24,070 --> 00:01:22,560
close

42
00:01:25,429 --> 00:01:24,080
and all that's processed by computers

43
00:01:27,510 --> 00:01:25,439
that are on board and you've got it

44
00:01:30,149 --> 00:01:27,520
attached to a battery here on your back

45
00:01:32,230 --> 00:01:30,159
and correct okay so it basically makes

46
00:01:34,230 --> 00:01:32,240
your grip stronger it does

47
00:01:35,429 --> 00:01:34,240
it either makes me stronger or it allows

48
00:01:37,510 --> 00:01:35,439
me to hold an object that i could

49
00:01:39,910 --> 00:01:37,520
normally hold longer and with less

50
00:01:41,749 --> 00:01:39,920
effort and we hear that spacewalks are

51
00:01:43,190 --> 00:01:41,759
really hard on your hands because the

52
00:01:44,389 --> 00:01:43,200
the gloves are hard to use and they're

53
00:01:46,469 --> 00:01:44,399
you just use your hands a lot in

54
00:01:48,230 --> 00:01:46,479
spacewalk that is absolutely correct um

55
00:01:49,510 --> 00:01:48,240
an astronaut in order to move around

56
00:01:51,190 --> 00:01:49,520
they're not moving around by walking

57
00:01:52,710 --> 00:01:51,200
they're having to climb so everywhere

58
00:01:55,030 --> 00:01:52,720
they're moving they're using their hands

59
00:01:57,429 --> 00:01:55,040
the entire time so astronauts before an

60
00:01:58,709 --> 00:01:57,439
eva are working their hands out a lot

61
00:02:00,069 --> 00:01:58,719
you see them around campus walking

62
00:02:00,870 --> 00:02:00,079
around squeezing tennis balls all the

63
00:02:02,469 --> 00:02:00,880

time

64
00:02:04,149 --> 00:02:02,479
this is something that we're working on

65
00:02:06,069 --> 00:02:04,159
in order to try and take away some of

66
00:02:08,229 --> 00:02:06,079
that brutal effort that comes with the

67
00:02:10,229 --> 00:02:08,239
eva walks it doesn't make you superhuman

68
00:02:12,150 --> 00:02:10,239
right it doesn't make you superhuman

69
00:02:14,070 --> 00:02:12,160
we're only adding about five to ten

70
00:02:16,390 --> 00:02:14,080
pounds worth of extra force

71
00:02:18,470 --> 00:02:16,400
in this design right here we can change

72
00:02:19,270 --> 00:02:18,480
that to to be a little higher a little

73
00:02:20,790 --> 00:02:19,280
less

74
00:02:23,750 --> 00:02:20,800
we can change the way that it closes

75
00:02:26,229 --> 00:02:23,760
down so if you're trying to hold a drill

76
00:02:28,070 --> 00:02:26,239
grab down on the the grip fingers and

77
00:02:30,390 --> 00:02:28,080
then allows the the trigger to still be

78
00:02:31,910 --> 00:02:30,400
actuated so we can do quite a lot of

79
00:02:34,390 --> 00:02:31,920
things with this very interesting and

80
00:02:35,830 --> 00:02:34,400
how is this related to robonaut so this

81
00:02:37,270 --> 00:02:35,840
is a direct offshoot of some of the

82
00:02:39,430 --> 00:02:37,280
technology that we were developing for

83
00:02:41,350 --> 00:02:39,440
robonaut one of the nice things about

84
00:02:43,670 --> 00:02:41,360
what we were doing is a lot of the stuff

85
00:02:45,190 --> 00:02:43,680
for robonaut was inspired based on human

86
00:02:48,309 --> 00:02:45,200
anatomy because we were developing a

87
00:02:49,990 --> 00:02:48,319
robotic hand just like ours and through

88
00:02:51,990 --> 00:02:50,000

that development we realized that not

89
00:02:53,990 --> 00:02:52,000
only can we use the same technology to

90
00:02:56,229 --> 00:02:54,000
make a robot move but we can put that

91
00:02:57,830 --> 00:02:56,239
same technology onto a human to make our

92
00:02:59,270 --> 00:02:57,840
movements easier

93
00:03:01,190 --> 00:02:59,280
so when we were talking earlier you said

94
00:03:02,949 --> 00:03:01,200
basically the human hand inspired the

95
00:03:04,790 --> 00:03:02,959
robot hand and now that design on the

96
00:03:08,149 --> 00:03:04,800
robot hand is is helping human hand

97
00:03:10,070 --> 00:03:08,159
again exactly very nice so um

98
00:03:12,550 --> 00:03:10,080
space walks are what we're thinking but

99
00:03:14,550 --> 00:03:12,560
there are other uses right correct

100
00:03:15,990 --> 00:03:14,560
for here on the ground correct um more

101
00:03:18,710 --> 00:03:16,000
terrestrial applications we're looking

102
00:03:21,110 --> 00:03:18,720
at um general motors is a direct

103
00:03:22,470 --> 00:03:21,120
application for assembly line workers

104
00:03:24,630 --> 00:03:22,480
they have to carry relatively heavy

105
00:03:26,229 --> 00:03:24,640
objects their tools can be relatively

106
00:03:28,229 --> 00:03:26,239
heavy some of the grasp that they're

107
00:03:29,830 --> 00:03:28,239
required can be relative relatively

108
00:03:32,070 --> 00:03:29,840
burdensome on the

109
00:03:33,990 --> 00:03:32,080
assembly line workers so this is to take

110
00:03:36,470 --> 00:03:34,000
off a lot of that so that they can do a

111
00:03:38,949 --> 00:03:36,480
repetitive task for longer without any

112
00:03:39,910 --> 00:03:38,959
uh inherent injury to their arms okay

113
00:03:42,630 --> 00:03:39,920

and i think we're going to talk with

114
00:03:44,390 --> 00:03:42,640
somebody from gm next so real quick can

115
00:03:47,190 --> 00:03:44,400
if i shake your hand will it crush me no