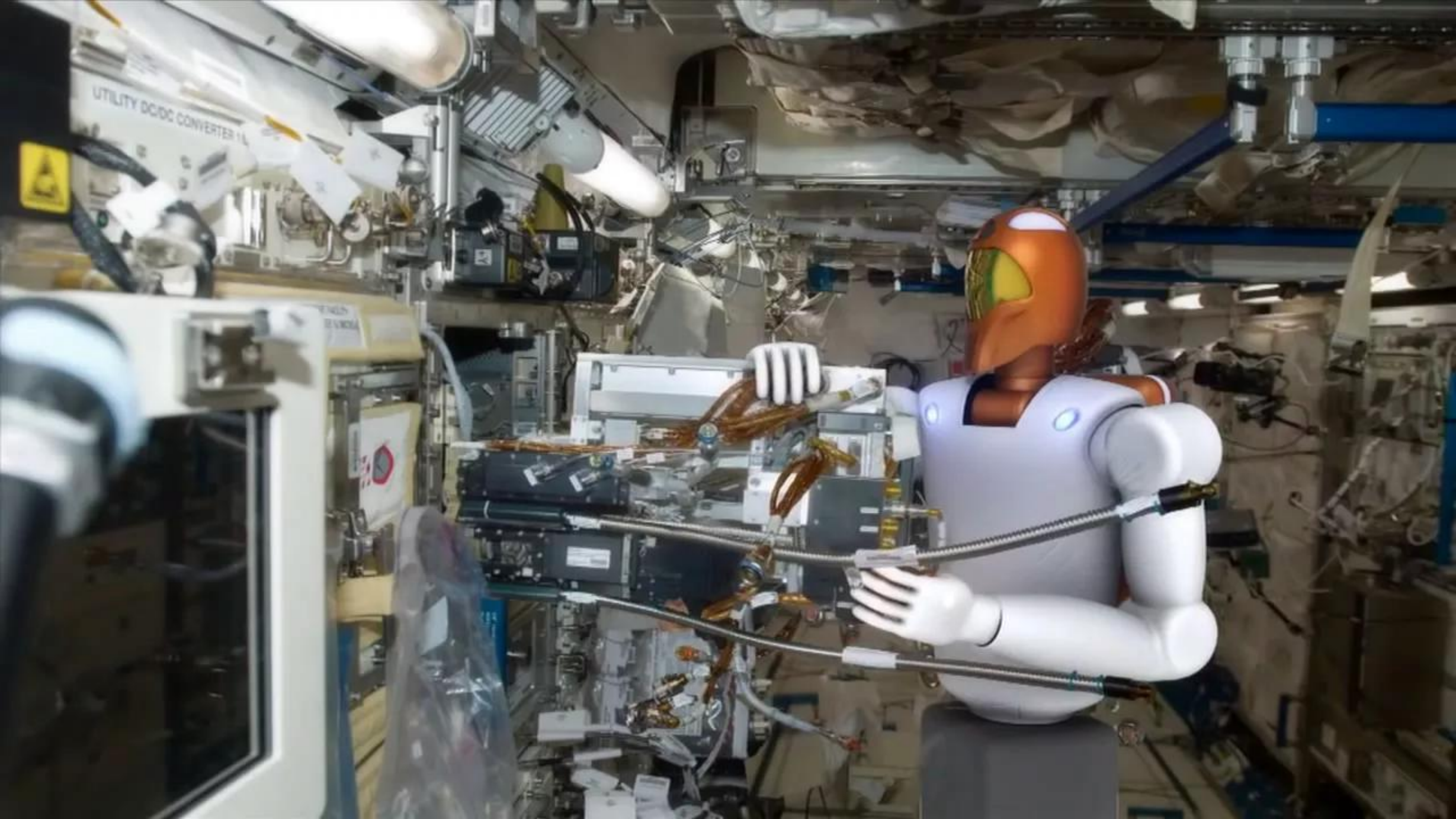
UTILITY DC/DC CONVERTER 1L

1
00:00:01,826 --> 00:00:03,296
>> In recent weeks, folks here

2
00:00:03,296 --> 00:00:05,606
in the Payload Operations
Integration Center have been

3
00:00:05,606 --> 00:00:07,406
busy with Robonaut activities.

4
00:00:07,706 --> 00:00:11,356
A Robonaut is a humanoid
designed to perform simple,

5
00:00:11,356 --> 00:00:13,746
repetitive, or even
dangerous crew tasks.

6
00:00:14,246 --> 00:00:16,916
Now for some, it's a technology
demonstration for robotics,

7
00:00:17,336 --> 00:00:19,196
while others, he's all too real.

8
00:00:19,726 --> 00:00:22,236
I spoke with someone who
really knows Robonaut.

9
00:00:23,096 --> 00:00:24,166
Tell us about Robonaut.

10
00:00:24,166 --> 00:00:25,106
How are things going?

11
00:00:25,796 --> 00:00:27,156
>> Things are going
great with Robonaut.

12
00:00:27,246 --> 00:00:29,636
Robonaut 2 is an upper
body humanoid that's

13
00:00:29,636 --> 00:00:31,296
on the International
Space Station.

14
00:00:31,556 --> 00:00:35,026
We are just about to send up
legs to make it mobile to go

15
00:00:35,026 --> 00:00:38,226
around and do really
interesting science, research,

16
00:00:38,226 --> 00:00:42,776
and hopefully help out the crew
with different tasks and things

17
00:00:42,846 --> 00:00:43,536
that it's going to do.

18
00:00:44,436 --> 00:00:46,046
>> Now as avionics and systems,

19
00:00:46,156 --> 00:00:48,166
you're kind of the heart
of the matter, right?

20
00:00:48,166 --> 00:00:49,546
You get to tell it
to do the cool stuff.

21
00:00:49,946 --> 00:00:51,776
>> We write all of
the controls systems,

22
00:00:51,926 --> 00:00:53,286

as well as the applications.

23
00:00:53,356 --> 00:00:56,286
So, some of the things I'm
really interested in working on,

24
00:00:56,286 --> 00:00:57,106
what we've been doing is,

25
00:00:57,456 --> 00:00:59,666
on Space Station right now we
have several different tasks

26
00:00:59,726 --> 00:01:01,766
that we do, such as
cleaning hand rails.

27
00:01:01,826 --> 00:01:02,726
Wipe manipulation.

28
00:01:02,726 --> 00:01:04,446
And soft-goods manipulation.

29
00:01:04,446 --> 00:01:06,836
Taking blankets off
of products to show

30
00:01:06,836 --> 00:01:08,356
that we can do that
sort of task.

31
00:01:08,356 --> 00:01:12,626
EDA so that the big robots can
then grab on to the different,

32
00:01:12,906 --> 00:01:15,826
or use the replacement
units outside the station.

33

00:01:16,196 --> 00:01:18,926
As well as it doing things
like inventory tasks.

34
00:01:19,546 --> 00:01:22,336
We have a cargo bag in front
of us, and we're going to scan

35
00:01:22,486 --> 00:01:24,626
that with the RFID tag reader.

36
00:01:24,796 --> 00:01:27,596
And do some simple
inventory tasks

37
00:01:27,796 --> 00:01:30,416
that the astronauts spend a lot
of time doing on the Station.

38
00:01:31,576 --> 00:01:35,426
>> So do you look at Robonaut
2 as another crew member?

39
00:01:35,746 --> 00:01:37,696
Is he almost human to you?

40
00:01:37,836 --> 00:01:38,706
How do you look at him?

41
00:01:38,706 --> 00:01:40,176
>> He's completely human to me,

42
00:01:40,176 --> 00:01:42,226
but I spend a lot
of time with him.

43
00:01:42,226 --> 00:01:46,186
We appreciate the fact that the
crew members seem to also kind

44
00:01:46,436 --> 00:01:49,526
of take the little brother
approach with Robonaut,

45
00:01:49,656 --> 00:01:51,316
and that, you know,
they, you know,

46
00:01:51,526 --> 00:01:53,466
treat it like a crew
member as well.

47
00:01:53,696 --> 00:01:55,806
We hope to be much more
like a crew member.

48
00:01:56,086 --> 00:01:58,516
The things that we're learning
right now, on a [inaudible],

49
00:01:58,856 --> 00:02:02,046
they're going to help us
when we have it go mobile

50
00:02:02,556 --> 00:02:04,236
and then be able to do things.

51
00:02:04,236 --> 00:02:07,446
And so we're actually
contributing to the crew.

52
00:02:07,446 --> 00:02:10,446
We think that they will
hopefully consider it even more

53
00:02:10,626 --> 00:02:13,386
part of the, you know,
a member of their crew.

54

00:02:14,626 --> 00:02:18,406
>> So, in the time that
Robonaut has been up there,

55
00:02:18,956 --> 00:02:20,416
what is something
fascinating that you learned

56
00:02:20,416 --> 00:02:22,676
that maybe you didn't know
you were going to see?

57
00:02:23,836 --> 00:02:26,056
>> There have been so
many interesting things.

58
00:02:26,086 --> 00:02:27,776
So the first thing,
when you send

59
00:02:27,776 --> 00:02:29,786
up this robot, it's
an upper body.

60
00:02:29,786 --> 00:02:32,476
It's doing things in the lab
that we like that it's doing.

61
00:02:32,476 --> 00:02:33,536
It's working great.

62
00:02:33,536 --> 00:02:35,246
We have a partnership
with General Motors,

63
00:02:35,376 --> 00:02:37,016
and they're happy
with what we're doing.

64
00:02:37,186 --> 00:02:38,396

We're safe around humans.

65
00:02:38,396 --> 00:02:39,556
We're able to do real work.

66
00:02:39,836 --> 00:02:42,836
We're able to, you know, do the
tasks that we'd expect on Earth.

67
00:02:43,226 --> 00:02:45,406
Then we send it to Space
Station, and they're like, wow,

68
00:02:45,406 --> 00:02:46,446
this is so much different.

69
00:02:46,446 --> 00:02:49,296
We're operating, you know,
over thousands of miles away.

70
00:02:49,296 --> 00:02:51,466
And it's got a, got
just different tasks

71
00:02:51,726 --> 00:02:52,396
that we want it to do.

72
00:02:52,396 --> 00:02:55,996
And so we've actually redone
the entire control system

73
00:02:56,066 --> 00:02:56,676
of Robonaut.

74
00:02:56,676 --> 00:02:58,566
We are keeping the
safety around humans.

75
00:02:58,566 --> 00:02:59,866

That's a really important
part of it.

76
00:03:00,156 --> 00:03:01,466
But we're adding a
lot more precision.

77
00:03:01,496 --> 00:03:02,806
We're adding a lot more,

78
00:03:02,936 --> 00:03:05,636
things that real manipulators
in factories can do.

79
00:03:05,636 --> 00:03:07,396
The real precision stuff.

80
00:03:07,396 --> 00:03:09,276
The nice thing is
is we're combining

81
00:03:09,276 --> 00:03:10,966
that with our [inaudible]
control safety.

82
00:03:11,306 --> 00:03:13,586
And so it's this amazing robot

83
00:03:13,906 --> 00:03:15,426
that you can only
find one place,

84
00:03:15,646 --> 00:03:17,506
you know, out of the world.

85
00:03:17,596 --> 00:03:18,356
Or in the world.

86
00:03:18,676 --> 00:03:21,256

To really be able to
combine those two things.

87
00:03:21,256 --> 00:03:22,836
And so I think that's
been the neatest thing is

88
00:03:22,896 --> 00:03:25,846
that we've really had to step
it up in figuring out how

89
00:03:25,976 --> 00:03:29,616
to control this robot so
that it can work around crew,

90
00:03:29,616 --> 00:03:31,316
but do it in an efficient
manner.

91
00:03:32,046 --> 00:03:34,086
>> Now as you say,
the legs are going up.

92
00:03:34,186 --> 00:03:36,536
So what new tasks
can we see with that?

93
00:03:36,576 --> 00:03:37,796
What's going to make
that different,

94
00:03:37,906 --> 00:03:39,166
other than making
it look more human?

95
00:03:39,366 --> 00:03:42,016
>> So everything we've done
so far is basically research

96
00:03:42,046 --> 00:03:44,606

and these technology
applications

97
00:03:44,606 --> 00:03:47,046
and understanding how we
can do this on Station.

98
00:03:47,756 --> 00:03:49,706
We'll talk a little
bit more today

99
00:03:49,706 --> 00:03:52,176
about how we're using
the vision system to try

100
00:03:52,176 --> 00:03:53,446
to identify hand rails.

101
00:03:53,446 --> 00:03:56,576
And to do the different
tasks that we want to do

102
00:03:56,576 --> 00:03:57,246
when we're moving around.

103
00:03:57,706 --> 00:04:00,696
When we send up legs, we hope to
be able to do everything better.

104
00:04:00,826 --> 00:04:04,146
So one of the tasks we've done
so far is we have a VelociCalc,

105
00:04:04,266 --> 00:04:06,036
it's a air flow measurement
tool.

106
00:04:06,036 --> 00:04:08,736
And we have the one air
vent that's really sort

107
00:04:08,736 --> 00:04:09,566
of close to us.

108
00:04:09,566 --> 00:04:10,816
It's still kind of far away.

109
00:04:11,046 --> 00:04:13,326
And so we can turn our
body just the right amount

110
00:04:13,326 --> 00:04:16,446
to actually reach out
and do the measurements.

111
00:04:16,446 --> 00:04:18,206
Which is something the
astronauts hate doing

112
00:04:18,206 --> 00:04:20,516
because you have to stay still
for, you know, a lot of time.

113
00:04:21,186 --> 00:04:22,886
Robots love that kind of stuff.

114
00:04:22,996 --> 00:04:26,146
So, once we're mobile, it'll
be easy enough for us to climb

115
00:04:26,146 --> 00:04:28,756
around and do that sort
of measurement anywhere.

116
00:04:29,096 --> 00:04:31,576
There's been a lot of technology
offshoots from the project.

117
00:04:31,576 --> 00:04:36,006

And so our partner General
Motors has always been a big

118
00:04:36,006 --> 00:04:37,366
supporter of what
we've been doing.

119
00:04:37,366 --> 00:04:39,166
They have a robot up
in Warren, Michigan,

120
00:04:39,166 --> 00:04:42,266
that they're researching for our
incorporation into factories.

121
00:04:42,266 --> 00:04:45,396
In fact, we have spun off
something called the Roboglove,

122
00:04:45,786 --> 00:04:49,356
which is a robot that you wear.

123
00:04:49,356 --> 00:04:51,546
It's based on the hand
technology from Robonaut.

124
00:04:51,786 --> 00:04:54,386
And it's an exoskeleton
for your hands.

125
00:04:54,676 --> 00:04:56,616
That basically you put it
on and it has a grip assist.

126
00:04:56,616 --> 00:04:59,316
And so if you're holding sheet
metal or something like that,

127
00:04:59,686 --> 00:05:02,676
it causes a lot of injuries

for factory workers because of

128
00:05:02,876 --> 00:05:04,786
that grip strength,
carpal tunnel syndrome.

129
00:05:05,136 --> 00:05:06,776
So we've already
spun off something

130
00:05:06,776 --> 00:05:08,826
that basically will
allow you to grab on

131
00:05:08,826 --> 00:05:10,566
and then the robot takes a hold.

132
00:05:10,696 --> 00:05:13,426
And you can kind of completely
relax your hands and fingers

133
00:05:13,836 --> 00:05:15,966
and just push a button
whenever you want it to release.

134
00:05:16,376 --> 00:05:20,446
So, the technology spinoffs that
we get from this are amazing.

135
00:05:20,446 --> 00:05:22,206
And we have many more in queue,

136
00:05:22,206 --> 00:05:25,216
and it's a very exciting
field to be a part of.

137
00:05:25,676 --> 00:05:28,726
>> Do you have one for typing
for me and my carpal tunnel?

138
00:05:28,896 --> 00:05:29,656
>> Hopefully someday.

139
00:05:31,326 --> 00:05:33,586
>> Are you surprised by
the popularity of Robot?

140
00:05:33,586 --> 00:05:35,566
Does he have his own
Twitter account or?

141
00:05:35,636 --> 00:05:38,676
>> And Facebook feed, and
you know, all of that stuff.

142
00:05:38,836 --> 00:05:41,986
I'm not super-surprised by it
because I'm a total robot nerd.

143
00:05:41,986 --> 00:05:44,426
So I think that everybody
should love robots.

144
00:05:44,766 --> 00:05:47,526
And, there's something
about a humanoid robot

145
00:05:47,576 --> 00:05:49,116
that really touches a person.

146
00:05:49,116 --> 00:05:51,656
That more than so even
like the Curiosity Rover,

147
00:05:51,656 --> 00:05:52,986
which has a huge following too.

148
00:05:52,986 --> 00:05:54,326
Because it is also awesome.

149
00:05:54,516 --> 00:05:57,746
But you almost get a sense of
this person belongs with us.

150
00:05:57,746 --> 00:05:59,566
This robot is almost
like a person.

151
00:05:59,786 --> 00:06:02,436
And you can really
give it a personality.

152
00:06:02,436 --> 00:06:04,716
Maybe even more so than you
can another [inaudible].

153
00:06:04,796 --> 00:06:07,296
So I'm not terribly
surprised by that.

154
00:06:08,136 --> 00:06:10,796
>> And if you'd like to find
out what Robonaut's up to

155
00:06:10,796 --> 00:06:14,816
through Twitter, you can connect
with him at AstroRobonaut.

156
00:06:15,156 --> 00:06:17,716
And he's also Robonaut
on Facebook.

157
00:06:18,596 --> 00:06:20,476
And Brian Blair is
leading the team here

158
00:06:20,476 --> 00:06:22,846
in the Payload Operations
Integration Center today

159
00:06:22,846 --> 00:06:23,696
as the pod.

160
00:06:24,086 --> 00:06:24,936
Busy at work.

161
00:06:25,046 --> 00:06:28,226
And that'll do it for us from
here in Huntsville, Alabama.