
PAO
ISS D/L 6 LOS

1
00:00:05,590 --> 00:00:03,909
so obviously there's a lot of systems in

2
00:00:07,829 --> 00:00:05,600
place onboard the international space

3
00:00:09,669 --> 00:00:07,839
station to make sure we have a safe and

4
00:00:11,509 --> 00:00:09,679
livable environment for the astronauts

5
00:00:13,270 --> 00:00:11,519
and cosmonauts on board

6
00:00:15,110 --> 00:00:13,280
here to tell me about one of the new

7
00:00:17,750 --> 00:00:15,120
systems that's just been coming online

8
00:00:19,109 --> 00:00:17,760
in the first past few weeks it's dr paul

9
00:00:20,790 --> 00:00:19,119
mudgett he's in the environmental

10
00:00:22,870 --> 00:00:20,800
sciences division here at the johnson

11
00:00:24,710 --> 00:00:22,880
space center and paul first off thanks

12
00:00:26,870 --> 00:00:24,720
for joining me here today now this new

13
00:00:29,589 --> 00:00:26,880

system is called the multi-gas monitor

14
00:00:31,910 --> 00:00:29,599
real quick what does it do correct it

15
00:00:33,990 --> 00:00:31,920
the multi-gas monitor is a

16
00:00:35,830 --> 00:00:34,000
laser spectroscopy based device to

17
00:00:38,869 --> 00:00:35,840
measure four gases

18
00:00:40,150 --> 00:00:38,879
four gases are oxygen carbon dioxide

19
00:00:42,229 --> 00:00:40,160
ammonia

20
00:00:43,590 --> 00:00:42,239
and water vapor

21
00:00:45,110 --> 00:00:43,600
and the way

22
00:00:47,590 --> 00:00:45,120
the way it works is

23
00:00:49,029 --> 00:00:47,600
different gases absorb light in

24
00:00:51,189 --> 00:00:49,039
different frequencies effect there's a

25
00:00:53,670 --> 00:00:51,199
fingerprint we call fingerprint for

26
00:00:55,510 --> 00:00:53,680
example there's a fingerprint for o2 a

27
00:00:58,150 --> 00:00:55,520
different one for co2

28
00:00:59,910 --> 00:00:58,160
a really complex one for water vapor and

29
00:01:02,229 --> 00:00:59,920
different from ammonia so

30
00:01:03,750 --> 00:01:02,239
they're all mixed together

31
00:01:07,510 --> 00:01:03,760
in addition to other gases in the

32
00:01:10,070 --> 00:01:07,520
atmosphere so the idea the trick is to

33
00:01:13,429 --> 00:01:10,080
pick a feature a spectral feature

34
00:01:16,469 --> 00:01:13,439
where co2 absorbs and nothing else

35
00:01:18,230 --> 00:01:16,479
so you can be very confident the device

36
00:01:20,390 --> 00:01:18,240
can be very selective to measure the

37
00:01:22,469 --> 00:01:20,400
gases give you the right answers not

38
00:01:23,270 --> 00:01:22,479

give you false positives

39
00:01:26,630 --> 00:01:23,280
and

40
00:01:28,149 --> 00:01:26,640
measure the concentrations of each of

41
00:01:30,789 --> 00:01:28,159
those four gases

42
00:01:32,710 --> 00:01:30,799
and we partnered with

43
00:01:34,550 --> 00:01:32,720
two small companies vista photonics in

44
00:01:37,270 --> 00:01:34,560
santa fe new mexico

45
00:01:38,630 --> 00:01:37,280
they're the expert spectroscopists they

46
00:01:40,710 --> 00:01:38,640
figured out how to do this and they

47
00:01:42,069 --> 00:01:40,720
developed it through the small business

48
00:01:43,910 --> 00:01:42,079
innovation

49
00:01:46,149 --> 00:01:43,920
research program

50
00:01:48,149 --> 00:01:46,159
we invested lots of money over the last

51
00:01:52,550 --> 00:01:48,159
10 years in this technology so we took

52
00:01:54,230 --> 00:01:52,560
advantage of it we foresaw a need

53
00:01:55,670 --> 00:01:54,240
and

54
00:01:57,590 --> 00:01:55,680
design you know help them design the

55
00:01:59,510 --> 00:01:57,600
system you said you kind of first saw a

56
00:02:01,190 --> 00:01:59,520
need what was kind of the driving force

57
00:02:03,350 --> 00:02:01,200
behind developing this

58
00:02:04,950 --> 00:02:03,360
several motivations one

59
00:02:06,550 --> 00:02:04,960
you know

60
00:02:08,150 --> 00:02:06,560
currently we're using commercial

61
00:02:10,389 --> 00:02:08,160
technologies electrochemical has

62
00:02:11,589 --> 00:02:10,399
weaknesses we have to supply

63
00:02:13,910 --> 00:02:11,599

that

64
00:02:16,150 --> 00:02:13,920
the devices much more often than we'd

65
00:02:18,390 --> 00:02:16,160
like to space station

66
00:02:20,949 --> 00:02:18,400
we have a box they're a device for

67
00:02:22,470 --> 00:02:20,959
carbon dioxide another one for oxygen we

68
00:02:25,110 --> 00:02:22,480
have another one for combustion products

69
00:02:27,510 --> 00:02:25,120
and the idea that the big picture goal

70
00:02:29,830 --> 00:02:27,520
and this is the first step

71
00:02:32,470 --> 00:02:29,840
the big picture goes is like a star trek

72
00:02:36,470 --> 00:02:32,480
tricorder right to be able to measure

73
00:02:38,550 --> 00:02:36,480
all the gases you want in one device and

74
00:02:40,070 --> 00:02:38,560
laser spectroscopy i think is going to

75
00:02:42,790 --> 00:02:40,080
take us there this is the first step

76
00:02:44,710 --> 00:02:42,800
this is for gas monitor we envision

77
00:02:46,710 --> 00:02:44,720
maybe another one for combustion

78
00:02:49,750 --> 00:02:46,720
products or combining eventually

79
00:02:51,830 --> 00:02:49,760
combining all gases that we want to know

80
00:02:53,509 --> 00:02:51,840
in the environment in one one unit okay

81
00:02:55,110 --> 00:02:53,519
so you're just kind of building and

82
00:02:56,949 --> 00:02:55,120
expanding constantly and it's been

83
00:02:58,550 --> 00:02:56,959
running for a couple of weeks now how's

84
00:02:59,830 --> 00:02:58,560
everything right this is a technology

85
00:03:02,070 --> 00:02:59,840
demonstration

86
00:03:02,790 --> 00:03:02,080
um it's a flight experiment

87
00:03:05,110 --> 00:03:02,800
and

88
00:03:07,750 --> 00:03:05,120

the idea is to let it run long term six

89
00:03:09,030 --> 00:03:07,760
months at least on on orbit and on

90
00:03:10,470 --> 00:03:09,040
orbits a different

91
00:03:12,229 --> 00:03:10,480
environment like for example in this

92
00:03:15,110 --> 00:03:12,239
room it's much more complex in terms of

93
00:03:17,430 --> 00:03:15,120
the chemicals that are in it

94
00:03:19,350 --> 00:03:17,440
and plus you have maybe micro vibrations

95
00:03:21,030 --> 00:03:19,360
and whatnot that could affect

96
00:03:23,110 --> 00:03:21,040
a device but

97
00:03:25,110 --> 00:03:23,120
it's been running great we had

98
00:03:27,030 --> 00:03:25,120
we're very pleased with its performance

99
00:03:28,710 --> 00:03:27,040
we're comparing it with other assets

100
00:03:30,550 --> 00:03:28,720
we're comparing oxygen and carbon

101
00:03:33,430 --> 00:03:30,560
dioxide measurements with

102
00:03:35,270 --> 00:03:33,440
with the major constituent analyzer and

103
00:03:36,149 --> 00:03:35,280
they match very well

104
00:03:37,990 --> 00:03:36,159
um

105
00:03:39,750 --> 00:03:38,000
part of the part of the demonstration is

106
00:03:41,350 --> 00:03:39,760
to take it out of the rack it's

107
00:03:42,470 --> 00:03:41,360
currently in the japanese experiment

108
00:03:44,390 --> 00:03:42,480
module

109
00:03:46,070 --> 00:03:44,400
and we'll be taking it out of that the

110
00:03:48,789 --> 00:03:46,080
crew will be taken out of that and then

111
00:03:51,110 --> 00:03:48,799
relocating it to several locations

112
00:03:52,869 --> 00:03:51,120
leaving them leaving it a week in each

113
00:03:53,830 --> 00:03:52,879

location then returning it to the rack

114
00:03:55,750 --> 00:03:53,840
for

115
00:03:58,869 --> 00:03:55,760
to download all the data

116
00:04:01,589 --> 00:03:58,879
okay and so what kind of makes it

117
00:04:03,350 --> 00:04:01,599
different than what's already monitoring

118
00:04:06,710 --> 00:04:03,360
on board the international space station

119
00:04:09,190 --> 00:04:06,720
our devices is smaller it's lighter

120
00:04:10,789 --> 00:04:09,200
it draws less power and we have as we

121
00:04:12,470 --> 00:04:10,799
read this one real quick the one that

122
00:04:13,990 --> 00:04:12,480
we're showing that one's here inside the

123
00:04:15,990 --> 00:04:14,000
room right now just kind of giving us

124
00:04:18,789 --> 00:04:16,000
what our atmosphere is here inside of

125
00:04:20,310 --> 00:04:18,799
mission control right it's fairly simple

126
00:04:24,550 --> 00:04:20,320
looking device at least from the outside

127
00:04:25,670 --> 00:04:24,560
it just draws air in with a simple fan

128
00:04:30,550 --> 00:04:25,680
it

129
00:04:32,710 --> 00:04:30,560
the cell is

130
00:04:34,950 --> 00:04:32,720
such that it's there's no alignments no

131
00:04:37,510 --> 00:04:34,960
mirrors no lenses no

132
00:04:40,230 --> 00:04:37,520
nothing that could get out of alignment

133
00:04:43,189 --> 00:04:40,240
from from vibration or from bumping it

134
00:04:45,030 --> 00:04:43,199
so it's very rugged technology

135
00:04:46,469 --> 00:04:45,040
okay well what are some of kind of

136
00:04:47,270 --> 00:04:46,479
looking towards the future you said you

137
00:04:49,510 --> 00:04:47,280
want to

138
00:04:51,830 --> 00:04:49,520

expand upon it and add in more gases

139
00:04:54,070 --> 00:04:51,840
what are some of the future applications

140
00:04:56,230 --> 00:04:54,080
for this device say on space flights to

141
00:04:57,749 --> 00:04:56,240
mars long duration things like that yeah

142
00:05:01,510 --> 00:04:57,759
so for

143
00:05:02,469 --> 00:05:01,520
for even for orion you know you need

144
00:05:04,710 --> 00:05:02,479
um

145
00:05:06,390 --> 00:05:04,720
very reliable systems anything beyond

146
00:05:07,990 --> 00:05:06,400
low earth orbit has to be

147
00:05:09,270 --> 00:05:08,000
incredibly reliable

148
00:05:12,150 --> 00:05:09,280
and that's that's one of the goals of

149
00:05:13,990 --> 00:05:12,160
this tech demo is to demonstrate that it

150
00:05:16,150 --> 00:05:14,000
doesn't need calibration it stays in

151
00:05:17,430 --> 00:05:16,160
calibration doesn't drift those are all

152
00:05:19,990 --> 00:05:17,440
the kind of problems we've had before

153
00:05:21,670 --> 00:05:20,000
with previous technologies

154
00:05:23,110 --> 00:05:21,680
um

155
00:05:24,710 --> 00:05:23,120
for uh

156
00:05:25,510 --> 00:05:24,720
you know as i said we want to combine

157
00:05:27,189 --> 00:05:25,520
yes

158
00:05:29,189 --> 00:05:27,199
we want to be able to shrink it this is

159
00:05:31,350 --> 00:05:29,199
not the limit to the miniaturization we

160
00:05:33,189 --> 00:05:31,360
can do

161
00:05:34,150 --> 00:05:33,199
so we're excited about it we we think it

162
00:05:35,909 --> 00:05:34,160
is the

163
00:05:37,990 --> 00:05:35,919

future

164
00:05:39,510 --> 00:05:38,000
so beyond spacecraft you know the navy

165
00:05:41,510 --> 00:05:39,520
the submarines are

166
00:05:42,550 --> 00:05:41,520
a great analogy to

167
00:05:44,070 --> 00:05:42,560
to um

168
00:05:46,150 --> 00:05:44,080
to the spacecraft so you have some

169
00:05:48,870 --> 00:05:46,160
applications down here on earth still

170
00:05:50,390 --> 00:05:48,880
correct and under the sea yeah so and

171
00:05:52,710 --> 00:05:50,400
then mining anywhere there's enclosed

172
00:05:54,150 --> 00:05:52,720
space you need to know build up of

173
00:05:55,670 --> 00:05:54,160
hazardous gases

174
00:05:56,950 --> 00:05:55,680
you know if you're it's a breathable

175
00:05:58,150 --> 00:05:56,960
atmosphere

176
00:05:59,749 --> 00:05:58,160
um

177
00:06:00,950 --> 00:05:59,759
you know early morning kind of kind of

178
00:06:02,469 --> 00:06:00,960
detection

179
00:06:03,909 --> 00:06:02,479
and there's there are applications i

180
00:06:05,909 --> 00:06:03,919
think everyone eventually will benefit

181
00:06:07,350 --> 00:06:05,919
from from laser spectroscopy it's just a

182
00:06:10,070 --> 00:06:07,360
matter of time

183
00:06:11,830 --> 00:06:10,080
okay well again dr paul mudgett the

184
00:06:13,590 --> 00:06:11,840
environmental sciences branch here at

185
00:06:15,909 --> 00:06:13,600
john the johnson space center talking to

186
00:06:17,909 --> 00:06:15,919
us about the multi-gas monitor

187
00:06:19,749 --> 00:06:17,919
thanks for checking in real quick and

188
00:06:21,830 --> 00:06:19,759

letting us know how you guys are keeping

189
00:06:23,909 --> 00:06:21,840
the crew safe really appreciate your