
PAO
NASA
Brandi Dean
NASA PUBLIC AFFAIRS OFFICER
Gary Cox
EPIC PROJECT MANAGER

1
00:00:01,490 --> 00:00:02,130
>> Good morning.

2
00:00:02,130 --> 00:00:05,550
Welcome to the flight International
Space Station Flight Control Room

3
00:00:05,550 --> 00:00:07,330
in the Mission Control Center in Houston.

4
00:00:07,330 --> 00:00:11,730
I'm Brandi Dean, I'm public affairs officer
here and I've got here with me Gary Cox

5
00:00:11,730 --> 00:00:14,450
who is the EPIC Project Manager,

6
00:00:14,450 --> 00:00:18,450
that's a station computer upgrade
project that he's been working on.

7
00:00:18,450 --> 00:00:23,430
So, he knows a lot about the stations'
computers and I hear we've got some questions

8
00:00:23,430 --> 00:00:28,510
from students in Georgia that
we're going to try and answer.

9
00:00:28,510 --> 00:00:32,500
[Pause]

10
00:00:32,500 --> 00:00:39,080
>> When you're giving tasks to the astronauts
and cosmonauts, how do you go about doing that?

11
00:00:39,080 --> 00:00:43,710
Do you just tell them or is there a
specific order that you have to do it?

12
00:00:43,710 --> 00:00:44,230
>> I'm sorry?

13
00:00:44,230 --> 00:00:45,740
Can you repeat the question?

14
00:00:45,740 --> 00:00:49,900
When we get tasks that we have to
go through is that what you said?

15
00:00:49,900 --> 00:00:50,310
>> Yes ma'am.

16
00:00:50,310 --> 00:00:57,420
When you're giving tasks to the astronauts
and cosmonauts is there a specific way

17
00:00:57,420 --> 00:00:59,680
that you have to go about doing that?

18
00:00:59,680 --> 00:01:01,400
>> Okay. That's probably
a great question for Gary.

19
00:01:01,400 --> 00:01:05,050
He just got finished giving the
astronauts a really complicated task

20
00:01:05,050 --> 00:01:08,500
about upgrading the stations' computers so he
can tell us a little bit about how that works.

21
00:01:08,500 --> 00:01:13,320
>> Sure. [Clears throat] there's a lot of
training and rehearsal that goes on prior

22
00:01:13,320 --> 00:01:17,670
to the the mission or the task that's

actually asked to be completed.

23
00:01:17,670 --> 00:01:22,150
Often times we write procedures
on papers and and send the files

24
00:01:22,150 --> 00:01:27,110
up to the space station computers to allow the
astronauts to read what their next task has

25
00:01:27,110 --> 00:01:31,020
to be, and then they follow these
procedures as they perform the task itself.

26
00:01:31,020 --> 00:01:34,980
And, there's a lot of communication
as well between the ground sys --

27
00:01:34,980 --> 00:01:37,520
people here and the crew up on board.

28
00:01:37,520 --> 00:01:39,910
>> So we give them a detailed
instruction list basically right?

29
00:01:39,910 --> 00:01:43,030
>> Right. A detailed instruction
list and there's a lot of training

30
00:01:43,030 --> 00:01:45,500
that happens beforehand to make sure
they understand what they're going

31
00:01:45,500 --> 00:01:46,660
to be doing once they're up there.

32
00:01:46,660 --> 00:01:50,640
>> And I guess even when when we do need
to talk to them, we have a special person

33
00:01:50,640 --> 00:01:54,540
in the mission control center that talks to them
and they get training just to talk to the crew.

34
00:01:54,540 --> 00:01:57,370
So, there's a there's a lot that goes
into getting ready to do something.

35
00:01:57,370 --> 00:02:00,050
>> Right. And all this happens before
the astronauts even launch into space.

36
00:02:00,050 --> 00:02:02,170
A lot of this training is
is occurring on the ground.

37
00:02:02,170 --> 00:02:04,690
Before they get up there they already
know what they're going to be working on.

38
00:02:04,690 --> 00:02:04,990
>> Right. Okay.

39
00:02:04,990 --> 00:02:07,670
So does that answer your question?

40
00:02:07,670 --> 00:02:08,070
>> Yes ma'am.

41
00:02:08,070 --> 00:02:09,330
Thank you.

42
00:02:12,990 --> 00:02:17,850
>> I wanted to ask what is the mo --
what is the closest thing you've found

43
00:02:17,850 --> 00:02:20,070
to life on Mars currently?

44
00:02:20,070 --> 00:02:23,150
>> The closest thing we've
found to life on Mars?

45
00:02:23,150 --> 00:02:29,100
Well we've got some really cool rovers that are
on Mars right now and looking for signs of life

46
00:02:29,100 --> 00:02:32,780
on Mars, and I think let's see they've they've
maybe found signs of water is that right?

47
00:02:32,780 --> 00:02:37,010
>> Yeah found signs of water, ice, and some
evidence of where there was flowing water

48
00:02:37,010 --> 00:02:39,190
and ice, which could lead you to
believe there might be something there.

49
00:02:39,190 --> 00:02:42,250
But, right now they you know they're
just finding the basics at this point.

50
00:02:42,250 --> 00:02:43,730
>> So no little green aliens yet?

51
00:02:43,730 --> 00:02:45,310
>> Yeah nothing yet.

52
00:02:46,540 --> 00:02:51,720
>> Is it hard for astronauts
to go to sleep in space?

53
00:02:51,720 --> 00:02:55,210
>> Is it hard for astronauts to what in space?

54
00:02:55,210 --> 00:02:56,700
>> Sleep.

55
00:02:56,700 --> 00:02:57,680
>> To sleep.

56
00:02:57,680 --> 00:02:59,090
>> To sleep?

57
00:03:00,190 --> 00:03:00,860
>> Yes.

58
00:03:00,860 --> 00:03:05,850
>> Okay. Well I I think they work really hard
so they're probably pretty sleepy at the end

59
00:03:05,850 --> 00:03:08,510
of the day, but they do have to do
some special stuff to be able to sleep

60
00:03:08,510 --> 00:03:12,510
because without gravity holding you down
to the to the bed you just float away

61
00:03:12,510 --> 00:03:14,840
so they've got kind of special sleeping bags.

62
00:03:14,840 --> 00:03:15,630
>> Sleeping bags right.

63
00:03:15,630 --> 00:03:20,850
>> Right. That are attached to by Velcro I think
to the to the stations' space stations' wall

64
00:03:20,850 --> 00:03:23,840
so they don't float away and they've
got a special pillow that they kind

65
00:03:23,840 --> 00:03:28,070
of strap their head onto so that
they can rest like they do at home.

66
00:03:31,430 --> 00:03:38,360
>> What's the main goal for the
space center for the year 2012 2013?

67
00:03:38,360 --> 00:03:43,640
>> The main goal for the space
center for 2012 and 2013?

68
00:03:43,640 --> 00:03:44,730
>> Yes ma'am.

69
00:03:44,730 --> 00:03:46,840
>> Okay, well we've got a few
different goals that we're working on.

70
00:03:46,840 --> 00:03:50,760
Of course the big one is always to keep
the space station and its crew safe

71
00:03:50,760 --> 00:03:54,190
because we've got a lot of really cool
experiments that are going on up there

72
00:03:54,190 --> 00:03:56,920
that we definitely want to get
good good information from.

73
00:03:56,920 --> 00:04:00,730
So, that's that's always the big one, but
we've also got a lot of cool new projects

74
00:04:00,730 --> 00:04:05,880
that we're working on as well that we're
going to use to to go further out into space.

75
00:04:05,880 --> 00:04:09,180
So, we're we're doing a lot of
interesting work with that too.

76
00:04:12,440 --> 00:04:16,700
>> What process what what pro
-- processes do you have to go

77
00:04:16,700 --> 00:04:18,530
through [inaudible] the different planets?

78
00:04:20,120 --> 00:04:20,410
>> I'm sorry?

79
00:04:20,410 --> 00:04:22,790
Can you repeat that one a little louder?

80
00:04:22,790 --> 00:04:23,010
>> Louder.

81
00:04:23,010 --> 00:04:28,050
>> Hey hey guys, you may want to stand up and
the microphone is right beside the projector,

82
00:04:28,050 --> 00:04:29,310
so if you'd kind of speak towards

83
00:04:29,310 --> 00:04:31,890
that microphone they can
hear you a little bit better.

84
00:04:31,890 --> 00:04:32,120
>> Right here.

85
00:04:32,120 --> 00:04:34,830
Right there okay.

86
00:04:34,830 --> 00:04:39,730
>> What processes do you go through
to send a rover to different planets?

87
00:04:39,730 --> 00:04:44,390

>> What processes do we go through
to send a rover to the planet?

88
00:04:44,390 --> 00:04:50,090
Okay. Well there there's a lot of work
that goes into sending anything into space,

89
00:04:50,090 --> 00:04:54,520
and I haven't personally sent a rover to
a planet, we don't really do that here

90
00:04:54,520 --> 00:04:58,590
at Johnson Space Center because we send
astronauts to the space station and to --

91
00:04:58,590 --> 00:05:00,330
we've sent them to the moon of course.

92
00:05:00,330 --> 00:05:03,130
But, Gary can maybe talk about
what what goes into that.

93
00:05:03,130 --> 00:05:06,570
>> Yeah. There's there's a list it's a long
process a lot of coordination has to happen.

94
00:05:06,570 --> 00:05:10,320
You have to be able to design the rover
that's going to work in that environment

95
00:05:10,320 --> 00:05:14,590
that you're going to, that planet that
you're going to be putting this rover onto.

96
00:05:14,590 --> 00:05:18,430
You have to find a launch vehicle that
will take the rover to it for you.

97
00:05:18,430 --> 00:05:20,600
So, there's a lot of planning

and coordination that has

98
00:05:20,600 --> 00:05:23,610
to happen many many years in advance of that.

99
00:05:23,610 --> 00:05:27,630
A lot of times when you do send rovers to
these other planets it takes months or years

100
00:05:27,630 --> 00:05:32,760
to actually arrive there as well, so there's
a lot of foresight, again planning that takes

101
00:05:32,760 --> 00:05:35,410
and the coordination to get that accomplished.

102
00:05:35,410 --> 00:05:40,950
>> Like right now, we actually here in Houston
are working on a rover for people to to stay

103
00:05:40,950 --> 00:05:45,420
in when they go to say the Mars or
as asteroid that they would live

104
00:05:45,420 --> 00:05:47,490
in for a few weeks at a time
as they're exploring.

105
00:05:47,490 --> 00:05:52,360
So, right now we've got a version that that
we're using here on the ground to try and test

106
00:05:52,360 --> 00:05:57,180
out oh where do the windows need to be so that
you can really see what what you need to see

107
00:05:57,180 --> 00:06:00,810
as you're exploring, and how is it going
to be controlled, and all sorts of things.

108
00:06:00,810 --> 00:06:03,510
So, you've got to look at every little
detail before it actually goes into space.

109
00:06:03,510 --> 00:06:09,040
[Pause]

110
00:06:09,040 --> 00:06:13,500
>> How many projects are being
done to the space center as of now?

111
00:06:13,500 --> 00:06:14,500
>> How many projects?

112
00:06:14,500 --> 00:06:17,630
I don't know that we have an exact
number on hand, but it's a lot.

113
00:06:17,630 --> 00:06:21,470
We've got thousands of people working
just here at Johnson Space Center

114
00:06:21,470 --> 00:06:23,860
and there are ten NASA centers
across the country.

115
00:06:23,860 --> 00:06:27,510
So, there are lots and lots of
projects going on right now.

116
00:06:27,510 --> 00:06:34,620
[Pause]

117
00:06:34,620 --> 00:06:39,030
>> How many people usually
work in mission control?

118
00:06:39,030 --> 00:06:39,790
>> How many --

119
00:06:44,990 --> 00:06:43,540
>> How many people work in mission control?

120
00:06:44,990 --> 00:06:46,740
It kind of depends on what you count.

121
00:06:46,740 --> 00:06:52,610
We've got a lot of people that work here in
the front room that you that we're in right now

122
00:06:52,610 --> 00:06:55,880
that are the ones who who
you usually see on TV a lot,

123
00:06:55,880 --> 00:07:01,600
but behind behind the scenes there's a whole
lot of other people working in the same building

124
00:07:01,600 --> 00:07:04,610
to do some of the some of
the behind the scenes work.

125
00:07:04,610 --> 00:07:05,770
And, I don't know Gary you probably --

126
00:07:05,770 --> 00:07:11,250
>> I we have other rooms similar to this
room and we have some we we that perform many

127
00:07:11,250 --> 00:07:15,880
of the same tasks and duplication of tasks to
tell the people up here in in front be ready

128
00:07:15,880 --> 00:07:17,720
for any occurrence of any issues or anything.

129
00:07:17,720 --> 00:07:19,280
They help them be ready for that.

130
00:07:19,280 --> 00:07:23,930
So, we have a lot of folks in different rooms
in this building supporting the people up here.

131
00:07:23,930 --> 00:07:26,890
>> And it also depends on the kind of
the time of day and things like that,

132
00:07:26,890 --> 00:07:27,990
so there are a lot of different factors, but --

133
00:07:27,990 --> 00:07:28,180
>> Um hum.

134
00:07:28,180 --> 00:07:29,510
>> A lot more than you would think.

135
00:07:29,510 --> 00:07:35,380
[Pause]

136
00:07:35,380 --> 00:07:39,270
>> Where would you say where
astronauts usually train at?

137
00:07:39,270 --> 00:07:40,170
>> Where do they train?

138
00:07:40,170 --> 00:07:42,120
>> Where do astronauts train?

139
00:07:43,720 --> 00:07:42,570
>> Yes ma'am.

140
00:07:43,720 --> 00:07:46,260
>> They train right here in
Johnson Space Center for one thing.

141

00:07:46,260 --> 00:07:51,410
They train a lot of places but they
actually live and work here in Houston and,

142
00:07:51,410 --> 00:07:54,860
I think Gary has been involved in training
them for some of the work we were talking

143
00:07:54,860 --> 00:07:57,300
about earlier with the stations computers
so maybe you can talk about that.

144
00:07:57,300 --> 00:08:00,920
>> Right. We have a a facility here in
Houston that has what we call mock ups.

145
00:08:00,920 --> 00:08:03,660
They look like the space station,
they're extra modules on the ground

146
00:08:03,660 --> 00:08:06,540
that the astronauts can train
as if they were in space.

147
00:08:06,540 --> 00:08:10,730
We also have some in this giant swimming pool
where they can act like train as though they're

148
00:08:10,730 --> 00:08:12,410
in space, they're floating
around inside the pool.

149
00:08:12,410 --> 00:08:17,130
So, we have different facilities here at
Johnson Space Center that allow them to train

150
00:08:17,130 --> 00:08:20,120
and get ready for their task
when they get on board.

151

00:08:20,120 --> 00:08:21,220
>> Right.

152
00:08:24,690 --> 00:08:27,650
>> How many computers do
you have at mission control

153
00:08:27,650 --> 00:08:31,890
and does a certain computer do a certain
task or do all of the computers work

154
00:08:31,890 --> 00:08:34,300
on the same task or something like that?

155
00:08:34,300 --> 00:08:37,110
>> Do you want to take that one?

156
00:08:37,110 --> 00:08:39,200
>> I I don't know a number
of how many computers.

157
00:08:39,200 --> 00:08:40,270
There's many many computers.

158
00:08:40,270 --> 00:08:45,230
We have rooms full of computers
that help us manage the vehicle.

159
00:08:45,230 --> 00:08:49,670
We have a lot of data that comes down from
the vehicle itself that's processed here

160
00:08:49,670 --> 00:08:50,840
on the ground.

161
00:08:50,840 --> 00:08:54,630
Many many different rooms with different
computers, different ways to look at the data.

162

00:08:54,630 --> 00:08:57,920
All of them are doing different
tasks in many cases.

163
00:08:57,920 --> 00:09:00,110
Here in the front room all of
these computers that you see

164
00:09:00,110 --> 00:09:03,370
on the television have access
to all of those, all the data.

165
00:09:03,370 --> 00:09:06,810
Anybody can see anything pretty much
they want to see at any one time.

166
00:09:06,810 --> 00:09:09,100
But, we have a lot of computers
a lot of computing power here.

167
00:09:09,100 --> 00:09:12,930
>> I think there there's at least
two just behind me right here

168
00:09:12,930 --> 00:09:17,370
and that's just just one little part of this
room in mission control and there's lots

169
00:09:17,370 --> 00:09:20,120
of rooms and they all have lots of computers.

170
00:09:21,670 --> 00:09:28,360
>> What are the effects on astronauts
going into space on their human body?

171
00:09:28,360 --> 00:09:32,970
>> What are the effects of astronauts
going into space on the human body?

172
00:09:32,970 --> 00:09:34,820

>> Correct.

173
00:09:34,820 --> 00:09:37,270
>> Okay. Well they're that's
one of the things we're studying

174
00:09:37,270 --> 00:09:38,680
with the International Space Station.

175
00:09:38,680 --> 00:09:44,530
What we want to learn is exactly how living
in microgravity affects human bodies so that

176
00:09:44,530 --> 00:09:49,720
when we want to send them further out and
they're away longer we know how to how to deal

177
00:09:49,720 --> 00:09:52,480
with them and be ready to
to fix them if we need to.

178
00:09:52,480 --> 00:09:57,720
So, one of the things that we we know happens
is that when you don't have to use your muscles

179
00:09:57,720 --> 00:10:02,200
because you're just floating around all
day, you start to lose lose muscle mass.

180
00:10:02,200 --> 00:10:05,230
And so, one of the things we do
is we keep the astronauts working

181
00:10:05,230 --> 00:10:07,380
and exercising while they're in space.

182
00:10:07,380 --> 00:10:10,610
They have to exercise so much
each day and they've got a bunch

183
00:10:10,610 --> 00:10:14,940
of really interesting cool equipment that
they use to do that on the space station,

184
00:10:14,940 --> 00:10:19,110
ways that they are able to pretend
like they're running on a treadmill,

185
00:10:19,110 --> 00:10:22,170
even though if they were just running
on a regular treadmill they'd float up

186
00:10:22,170 --> 00:10:25,250
and that wouldn't [inaudible] they've
got tethers that hold them down

187
00:10:25,250 --> 00:10:29,430
and then they've got things that help them
kind of act like they're lifting weights

188
00:10:29,430 --> 00:10:31,510
in space, and an exercise bicycle too.

189
00:10:31,510 --> 00:10:39,040
[Pause]

190
00:10:39,040 --> 00:10:43,660
>> What type of degree do you have
to have to work in mission control?

191
00:10:43,660 --> 00:10:44,470
>> What kind of degree --

192
00:10:44,470 --> 00:10:44,840
>> Degree.

193
00:10:44,840 --> 00:10:45,840
>> Do you have to have?

194
00:10:45,840 --> 00:10:47,420
Why don't you talk about that Gary?

195
00:10:47,420 --> 00:10:49,780
>> Mostly the science degrees
are are what you're looking for.

196
00:10:49,780 --> 00:10:51,000
Science and engineering.

197
00:10:51,000 --> 00:10:55,950
I have an electrical engineering degree so it's
electronics, aerospace is another good type

198
00:10:55,950 --> 00:11:01,520
of degree to get, computers, but very technical
degrees are are the key ones to look at.

199
00:11:01,520 --> 00:11:04,810
>> Anything in science or technology,
or math is usually a good bet.

200
00:11:04,810 --> 00:11:05,150
>> Um hum.

201
00:11:05,150 --> 00:11:06,970
>> But not not everybody does.

202
00:11:06,970 --> 00:11:09,430
I have a a journalism degree
because I I write things.

203
00:11:09,430 --> 00:11:10,070
>> Um hum.

204
00:11:10,070 --> 00:11:12,250
>> So, there's a bunch of
different things we can use.

205
00:11:12,250 --> 00:11:17,430
>> Right. Better.

206
00:11:17,430 --> 00:11:19,230
>> Does equipment ever break
down while in orbit?

207
00:11:19,230 --> 00:11:21,910
And if so, how do they fix things?

208
00:11:21,910 --> 00:11:24,380
>> Equipment definitely breaks
down and Gary might be able to talk

209
00:11:24,380 --> 00:11:26,340
about that a little bit with the computers?

210
00:11:26,340 --> 00:11:29,370
>> Yeah we do we do have to main --
make sure we maintain the vehicle

211
00:11:29,370 --> 00:11:33,040
to make sure things don't -- when they do break
down we have limitations because, you know,

212
00:11:33,040 --> 00:11:35,980
we don't have all the tools
that we have on the ground to go

213
00:11:35,980 --> 00:11:37,800
in there and make the modifications.

214
00:11:37,800 --> 00:11:43,410
So, the the first thing we have to do is
try to prevent the things from breaking down

215
00:11:43,410 --> 00:11:44,930
and the upgrade project we just did --

216
00:11:44,930 --> 00:11:45,020
>> Right.

217
00:11:45,020 --> 00:11:46,020
>> Is is one of those things we've done.

218
00:11:46,020 --> 00:11:48,020
We try to upgrade and keep the compu --

219
00:11:48,020 --> 00:11:51,550
the equipment modern or up to date so that we
don't have to worry about it breaking down.

220
00:11:51,550 --> 00:11:55,770
But, once it does, we we have to get the
crew involved, heavily involved in trying

221
00:11:55,770 --> 00:11:57,670
to help repair their the equipment on board.

222
00:11:57,670 --> 00:12:02,680
We have a lot of spares up there, so if one
computer breaks down we can take a spare

223
00:12:02,680 --> 00:12:07,510
up there that's already up there and install
it and keep the the space station operating.

224
00:12:07,510 --> 00:12:12,560
[Pause]

225
00:12:12,560 --> 00:12:17,390
>> Okay so how has the government
affected the space center?

226
00:12:17,390 --> 00:12:19,340
>> Say that one again?

227

00:12:26,200 --> 00:12:24,110
>> How has the government
affected the space center?

228
00:12:26,200 --> 00:12:28,120
Well the space center is part of the government.

229
00:12:28,120 --> 00:12:36,110
We're a federal agency, so we we are part of the
government and we get our our money our budget

230
00:12:36,110 --> 00:12:42,170
from the US Government, so that affects
everything we do, everything from, you know,

231
00:12:42,170 --> 00:12:48,040
how many rockets we can send into space to how
many computers we can work on all of that sort

232
00:12:48,040 --> 00:12:51,860
of thing, so, it's all very much interconnected.

233
00:12:54,880 --> 00:13:01,950
>> Do you plan to do you plan to send
rovers to any other planet than Mars?

234
00:13:01,950 --> 00:13:03,670
>> Do we plan to send rovers where?

235
00:13:03,670 --> 00:13:06,840
>> To any other planet than Mars?

236
00:13:06,840 --> 00:13:09,780
>> Do I'm sorry?

237
00:13:09,780 --> 00:13:12,050
>> To any other planet other than Mars?

238
00:13:12,050 --> 00:13:13,650

>> To other planets other than Mars okay.

239
00:13:13,650 --> 00:13:19,840
We actually have kind of flying rovers that are
already going all over the the solar system,

240
00:13:19,840 --> 00:13:24,070
and you can find out about a lot of them on
NASA.gov if you want to want to take a look.

241
00:13:24,070 --> 00:13:26,970
But, I think yeah, that we we
definitely have thought to do that.

242
00:13:26,970 --> 00:13:27,040
>>

243
00:13:27,040 --> 00:13:33,490
[Pause]

244
00:13:33,490 --> 00:13:35,420
>> How do you keep satellites from ramming

245
00:13:35,420 --> 00:13:40,560
into each other during during the
time period that they're in space?

246
00:13:40,560 --> 00:13:40,960
>> I'm sorry?

247
00:13:40,960 --> 00:13:42,780
We can't hear you very --
oh did you hear that Gary?

248
00:13:42,780 --> 00:13:42,850
>> Yeah.

249
00:13:42,850 --> 00:13:43,990
>> How do you --

250
00:13:43,990 --> 00:13:45,110
>> I think Gary got it go ahead.

251
00:13:45,110 --> 00:13:48,940
>> Yeah how do you keep satellites
from hitting one another in space?

252
00:13:48,940 --> 00:13:49,690
>> Correct.

253
00:13:49,690 --> 00:13:54,090
>> Right. So, we have a monitoring system here
on Earth where we monitor all the satellites

254
00:13:54,090 --> 00:13:58,840
that are orbiting the Earth itself, including
space station as just another big satellite,

255
00:13:58,840 --> 00:14:04,250
and we understand it can map their
locations everyday every moment of the day.

256
00:14:04,250 --> 00:14:08,520
So, we know where they are and each
satellite has a way of maneuvering

257
00:14:08,520 --> 00:14:12,680
in space you can fire a little jet engine on
that satellite to make it move out of the way

258
00:14:12,680 --> 00:14:17,100
and a lot of the pre-planning happens before
the satellites' launched to make sure it's going

259
00:14:17,100 --> 00:14:20,510
to go into a location in space that
won't interfere with anybody else.

260

00:14:20,510 --> 00:14:26,040
[Pause]

261
00:14:26,040 --> 00:14:28,350
>> How was some of the science
[inaudible] research done

262
00:14:28,350 --> 00:14:34,410
on board [inaudible] the space
station help people living on Earth?

263
00:14:34,410 --> 00:14:36,310
>> Did you hear that?

264
00:14:36,310 --> 00:14:37,780
>> How how does --

265
00:14:37,780 --> 00:14:37,850
>> [Inaudible]

266
00:14:37,850 --> 00:14:40,720
>> Oh okay well there are lots of
different types of research going

267
00:14:40,720 --> 00:14:43,810
on on the International Space Station right now.

268
00:14:43,810 --> 00:14:46,260
So, there are lots of different ways
that that could be affecting Earth, but,

269
00:14:46,260 --> 00:14:48,240
for instance you know one
of the things we talked

270
00:14:48,240 --> 00:14:53,290
about earlier was how space affects
astronauts and how they have to exercise.

271

00:14:53,290 --> 00:14:58,250
Another thing that we've found out that that
astronauts tend to experience when they've been

272
00:14:58,250 --> 00:15:02,300
in space for a long time is they start to
lose bone density and that's also something

273
00:15:02,300 --> 00:15:07,910
that is a problem for people who are confined
to bed rest here on earth, so things that that

274
00:15:07,910 --> 00:15:13,370
that we can figure out to do for for astronauts
to help them combat that can also be used here

275
00:15:13,370 --> 00:15:20,890
on earth to help people who are confined to
bed rest also avoid avoid bone density loss.

276
00:15:20,890 --> 00:15:23,590
Not just one way, there are a bunch of
different different experiments going

277
00:15:23,590 --> 00:15:26,240
on that all have lots of
different uses here on earth.

278
00:15:26,240 --> 00:15:32,660
>> When is the next time you're
going to send an astronaut

279
00:15:32,660 --> 00:15:37,380
like to the moon or to a different planet?

280
00:15:37,380 --> 00:15:41,760
>> Well we're still working on the system
that would help us go to an asteroid

281
00:15:41,760 --> 00:15:44,640

or Mars or a moon, things like that.

282
00:15:44,640 --> 00:15:46,460
But, we send the astronauts
into space all the time.

283
00:15:46,460 --> 00:15:50,370
We've got six, and you probably know, living
at the international space station right now

284
00:15:50,370 --> 00:15:55,620
and in a a few months three of them will
come home and then we'll send up three more,

285
00:15:55,620 --> 00:15:59,110
so we keep people, people in space
all the time and there's been somebody

286
00:15:59,110 --> 00:16:01,510
in space for more than ten years now.

287
00:16:01,510 --> 00:16:06,800
[Pause]

288
00:16:06,800 --> 00:16:11,380
>> What is your more efficient
fuel for shuttles?

289
00:16:12,490 --> 00:16:16,220
>> The most efficient fuel for a shuttle?

290
00:16:16,220 --> 00:16:17,520
>> Yes.

291
00:16:17,520 --> 00:16:21,530
>> Well, I think it depends on
the kind of engines you have

292
00:16:21,530 --> 00:16:24,780

as to what what fuel you'll use, but
one of the things we're looking at here

293
00:16:24,780 --> 00:16:29,380
at Johnson Space Center is how we can use
what we're calling kind of green fuels,

294
00:16:29,380 --> 00:16:33,720
things that aren't bad for the
environment to to fuel rockets.

295
00:16:33,720 --> 00:16:39,670
And, things also we could find say if we went to
Mars or the moon things that we could find there

296
00:16:39,670 --> 00:16:45,910
that we could use to fuel the rockets as well so
that we could not have to carry all of our fuel

297
00:16:45,910 --> 00:16:50,450
into space because it takes a lot of fuel
to get any amount of weight into space.

298
00:16:50,450 --> 00:16:56,090
You want to weigh as little as possible, so if
we can carry less fuel, then we can we can get

299
00:16:56,090 --> 00:16:59,700
into space easier and then
if we can get the fuel --

300
00:16:59,700 --> 00:17:03,510
more fuel where we're going then then
that makes it easier to get in space.

301
00:17:03,510 --> 00:17:07,810
[Pause]

302
00:17:07,810 --> 00:17:12,960
>> What do astronauts do

for fun up there in space?

303
00:17:12,960 --> 00:17:15,770
>> I'm sorry we didn't hear that one?

304
00:17:21,380 --> 00:17:19,390
>> What do astronauts do for fun up in space?

305
00:17:21,380 --> 00:17:24,700
Well, they've got a lot of things they can do.

306
00:17:24,700 --> 00:17:30,610
They, actually, are connected to the
internet and they blog and they send

307
00:17:30,610 --> 00:17:32,330
down tweets and they can watch movies.

308
00:17:32,330 --> 00:17:32,830
>> Watch movies right?

309
00:17:32,830 --> 00:17:34,500
>> And read books and --

310
00:17:34,500 --> 00:17:37,830
>> They can also talk to their families
on the ground with these laptop computers

311
00:17:37,830 --> 00:17:41,500
that they have they can have video conferences
with their families in their free time.

312
00:17:41,500 --> 00:17:43,070
>> Now have you all done that before?

313
00:17:43,070 --> 00:17:45,620
Had a a video chat with your computer?

314

00:17:45,620 --> 00:17:47,740
They can do that in space too.

315
00:17:49,660 --> 00:17:58,500
>> Has space debris ever seriously ever
seriously I guess messed up a satellite

316
00:17:58,500 --> 00:18:02,280
or something that was important
you were trying to get into space?

317
00:18:02,280 --> 00:18:06,170
>> Space debris did it ever mess up
a satellite or anything important?

318
00:18:06,170 --> 00:18:09,820
>> There have been some instances
in the past, many years ago,

319
00:18:09,820 --> 00:18:13,370
where some satellites have
actually collided yes.

320
00:18:13,370 --> 00:18:15,720
>> And then they break up and
they cause more space debris --

321
00:18:15,720 --> 00:18:15,980
>> They they they --

322
00:18:15,980 --> 00:18:16,700
>> That we have to watch out for.

323
00:18:16,700 --> 00:18:20,580
>> Break up and they do create more space
debris that we have to worry about and we track

324
00:18:20,580 --> 00:18:23,970
on a daily basis to make sure they
don't interfere with anybody else.

325
00:18:23,970 --> 00:18:27,540
>> We've got a lot of people keeping really
close track on all the the debris that's

326
00:18:27,540 --> 00:18:30,900
in space so that we can move the
space station and other satellites

327
00:18:30,900 --> 00:18:32,350
around and make sure we avoid it.

328
00:18:32,350 --> 00:18:35,800
>> Um hum.

329
00:18:35,800 --> 00:18:41,420
>> What are the foods that astronauts
eat to keep healthy and strong?

330
00:18:41,420 --> 00:18:42,580
>> Food.

331
00:18:42,580 --> 00:18:43,930
>> Astronauts food?

332
00:18:43,930 --> 00:18:44,490
What do they eat?

333
00:18:44,490 --> 00:18:48,730
They have a lot of different things they
can eat, but what we do is we send it up,

334
00:18:48,730 --> 00:18:51,240
we call it dehydrated, we take
all the moisture out of it

335
00:18:51,240 --> 00:18:53,480
and it gets not it looks kind of gross.

336
00:18:53,480 --> 00:18:58,450
But when they get on orbit they have a special
kind of kitchen that they hook it up to

337
00:18:58,450 --> 00:19:02,960
and it puts hot water back into it to
re-moisturize it and then it tastes good.

338
00:19:02,960 --> 00:19:05,650
So, they have a bunch of different choices.

339
00:19:05,650 --> 00:19:09,570
They've got American food and Russian food and
also when they have an international partner

340
00:19:09,570 --> 00:19:14,220
up there from Europe or Japan or Canada,
they bring some food sometimes as well,

341
00:19:14,220 --> 00:19:20,020
so they have a a wide variety and they don't get
so tired of eating the same thing over and over.

342
00:19:20,020 --> 00:19:20,720
>> All right.

343
00:19:20,720 --> 00:19:21,740
Thank you so much.

344
00:19:21,740 --> 00:19:25,530
And South Effingham can you hear
me at the Digital Learning Network?

345
00:19:25,530 --> 00:19:26,570
>> Yes.

346
00:19:26,570 --> 00:19:27,060
>> All right.

347
00:19:27,060 --> 00:19:30,630
It looks like we're just about out of
time for questions to mission control,

348
00:19:30,630 --> 00:19:34,750
but I wanted to thank Brandi
and Gary for participating today

349
00:19:34,750 --> 00:19:37,650
and answering all these great questions.

350
00:19:37,650 --> 00:19:42,080
Brandy, would you like to say good bye to the
students at South Effingham Middle School?

351
00:19:42,080 --> 00:19:43,910
>> Sure. Thank you all so
much for your questions.

352
00:19:43,910 --> 00:19:45,530
We had a lot of fun talking
with you, right Gary?