



1  
00:00:02,710 --> 00:00:01,590  
about that all right we're going to see

2  
00:00:04,630 --> 00:00:02,720  
how they're putting this technology to

3  
00:00:06,309 --> 00:00:04,640  
work thank you fred

4  
00:00:07,829 --> 00:00:06,319  
i'm here now with ken fernandez from the

5  
00:00:10,310 --> 00:00:07,839  
science and mission systems office and

6  
00:00:12,150 --> 00:00:10,320  
ken you've got a surface mobility

7  
00:00:13,270 --> 00:00:12,160  
operation here that

8  
00:00:14,470 --> 00:00:13,280  
looks like you're just playing with toy

9  
00:00:16,310 --> 00:00:14,480  
cars right

10  
00:00:19,429 --> 00:00:16,320  
what we're doing is we're working on

11  
00:00:21,429 --> 00:00:19,439  
technologies that will be needed to

12  
00:00:22,950 --> 00:00:21,439  
field the next generation of surface

13  
00:00:25,189 --> 00:00:22,960

mobility systems

14

00:00:26,310 --> 00:00:25,199

these systems go beyond what we did in

15

00:00:28,790 --> 00:00:26,320

apollo

16

00:00:31,189 --> 00:00:28,800

which was a system the lunar rover was a

17

00:00:33,670 --> 00:00:31,199

system that just ferry net astronauts

18

00:00:35,750 --> 00:00:33,680

around the systems in the future will

19

00:00:37,750 --> 00:00:35,760

have to work with a higher degree of

20

00:00:39,350 --> 00:00:37,760

autonomy

21

00:00:44,310 --> 00:00:39,360

to do that

22

00:00:46,950 --> 00:00:44,320

because we have gps we have

23

00:00:48,869 --> 00:00:46,960

communication satellites but on on a

24

00:00:51,029 --> 00:00:48,879

place like the moon

25

00:00:53,270 --> 00:00:51,039

none of that is uh present

26  
00:00:55,270 --> 00:00:53,280  
so we're working on one technology here

27  
00:00:57,670 --> 00:00:55,280  
that we're actually going to demonstrate

28  
00:01:00,229 --> 00:00:57,680  
in the september october time frame near

29  
00:01:02,549 --> 00:01:00,239  
building 4614

30  
00:01:04,710 --> 00:01:02,559  
this is a system that provides both

31  
00:01:08,230 --> 00:01:04,720  
navigational information

32  
00:01:09,030 --> 00:01:08,240  
and communications for a rover okay

33  
00:01:10,469 --> 00:01:09,040  
and

34  
00:01:13,350 --> 00:01:10,479  
for any system it could work with a

35  
00:01:14,070 --> 00:01:13,360  
lander also but we deploy these around

36  
00:01:17,109 --> 00:01:14,080  
and

37  
00:01:18,230 --> 00:01:17,119  
the system works just like gps

38  
00:01:20,469 --> 00:01:18,240

and

39

00:01:22,310 --> 00:01:20,479

it's far less costly than trying to

40

00:01:24,469 --> 00:01:22,320

implement that on the moon so you deploy

41

00:01:26,789 --> 00:01:24,479

those around and then you send these

42

00:01:29,030 --> 00:01:26,799

yeah this is a this is a system that

43

00:01:33,109 --> 00:01:29,040

we're adapting for nasa use it's

44

00:01:37,190 --> 00:01:33,119

originally a military robot that uh they

45

00:01:38,710 --> 00:01:37,200

use to examine ieds in in the in the war

46

00:01:41,270 --> 00:01:38,720

uh areas

47

00:01:44,149 --> 00:01:41,280

and uh we're going to develop computer

48

00:01:45,190 --> 00:01:44,159

control for this so that we can

49

00:01:47,109 --> 00:01:45,200

operate it

50

00:01:49,030 --> 00:01:47,119

autonomously and we're going to mount

51  
00:01:50,870 --> 00:01:49,040  
one of the navigation sensors that is

52  
00:01:52,789 --> 00:01:50,880  
associated with this and do the

53  
00:01:55,030 --> 00:01:52,799  
autonomous navigation

54  
00:01:57,749 --> 00:01:55,040  
other technologies that we're working on

55  
00:01:59,510 --> 00:01:57,759  
are you know various uh

56  
00:02:01,190 --> 00:01:59,520  
trailing uh

57  
00:02:04,550 --> 00:02:01,200  
operations one of the things you might

58  
00:02:07,510 --> 00:02:04,560  
want to do with a rover is to go out and

59  
00:02:09,430 --> 00:02:07,520  
find a payload a nuclear reactor hook up

60  
00:02:11,990 --> 00:02:09,440  
to it and move it to a safe location

61  
00:02:14,150 --> 00:02:12,000  
without expo exposing the crew

62  
00:02:15,430 --> 00:02:14,160  
so this is the mechanisms are an

63  
00:02:16,710 --> 00:02:15,440

important part

64

00:02:19,589 --> 00:02:16,720

we're also

65

00:02:21,270 --> 00:02:19,599

working on various sensors this is a

66

00:02:23,910 --> 00:02:21,280

sick lidar

67

00:02:25,270 --> 00:02:23,920

we're also looking at flash lidars we're

68

00:02:29,750 --> 00:02:25,280

looking at

69

00:02:34,869 --> 00:02:32,470

algorithms for providing guidance and

70

00:02:37,509 --> 00:02:34,879

then the big daddy the big daddy is an

71

00:02:39,910 --> 00:02:37,519

irobot our gator and

72

00:02:42,790 --> 00:02:39,920

we're using a system that was developed

73

00:02:45,509 --> 00:02:42,800

for the military and because systems

74

00:02:49,190 --> 00:02:45,519

like this are available it saves us a

75

00:02:51,430 --> 00:02:49,200

lot of money in developing a test bed

76

00:02:54,150 --> 00:02:51,440

capability so this is a larger platform

77

00:02:57,350 --> 00:02:54,160

that allows us to put more sensors on

78

00:02:58,630 --> 00:02:57,360

and a lot a lot more capabilities

79

00:03:02,790 --> 00:02:58,640

the little

80

00:03:04,869 --> 00:03:02,800

but it's very limited but it provides us

81

00:03:05,910 --> 00:03:04,879

an initial first cut so this is really

82

00:03:07,830 --> 00:03:05,920

going to get us to the moon and see

83

00:03:09,430 --> 00:03:07,840

what's there before we get there well

84

00:03:12,070 --> 00:03:09,440

hopefully and it'll help us do a lot of

85

00:03:13,509 --> 00:03:12,080

things that we couldn't do otherwise all

86

00:03:14,949 --> 00:03:13,519

right thanks ken so much for showing us

87

00:03:15,910 --> 00:03:14,959

your technology thanks laurie for coming

88

00:03:17,509 --> 00:03:15,920

by

89

00:03:19,190 --> 00:03:17,519

we're here with jim richard who is the

90

00:03:20,869 --> 00:03:19,200

team lead of the valve actuators and

91

00:03:22,070 --> 00:03:20,879

ducks branch and jim before we get to

92

00:03:23,830 --> 00:03:22,080

some of the new technology you've been

93

00:03:25,270 --> 00:03:23,840

developing what is this large hunk of

94

00:03:27,670 --> 00:03:25,280

hardware you've got here

95

00:03:30,949 --> 00:03:27,680

this is the pre-valve locks pre-valve

96

00:03:32,390 --> 00:03:30,959

for the saturn s4b rocket we've borrowed

97

00:03:34,390 --> 00:03:32,400

this from the space and rocket center

98

00:03:36,309 --> 00:03:34,400

and are using it to evaluate new

99

00:03:38,070 --> 00:03:36,319

technologies against for this area's

100

00:03:40,149 --> 00:03:38,080

vehicle so you pulled this right out of

101

00:03:41,990 --> 00:03:40,159

the saturn rocket that is correct how

102

00:03:43,430 --> 00:03:42,000

much does that weigh this valve weighs

103

00:03:44,949 --> 00:03:43,440

about 40 pounds that's currently

104

00:03:46,869 --> 00:03:44,959

configured well we'll let you set that

105

00:03:48,149 --> 00:03:46,879

down then because it's pretty heavy and

106

00:03:49,509 --> 00:03:48,159

you can uh show us some of the new

107

00:03:52,149 --> 00:03:49,519

technology you're working on here sure

108

00:03:53,990 --> 00:03:52,159

um the upper part of this valve is a

109

00:03:56,229 --> 00:03:54,000

pneumatic actuator with a large spring

110

00:03:57,990 --> 00:03:56,239

return system in it and this part of the

111

00:03:59,270 --> 00:03:58,000

valve contributes about half the weight

112

00:04:01,589 --> 00:03:59,280

of the valve

113

00:04:02,390 --> 00:04:01,599

the new technologies we're working on

114

00:04:04,710 --> 00:04:02,400

are

115

00:04:07,030 --> 00:04:04,720

paysio systems such as these

116

00:04:07,990 --> 00:04:07,040

this payzeo system weighs about four

117

00:04:09,830 --> 00:04:08,000

pounds

118

00:04:11,830 --> 00:04:09,840

and we can substantially reduce the

119

00:04:13,910 --> 00:04:11,840

weight of this valve and increase its

120

00:04:16,550 --> 00:04:13,920

reliability in the process that would

121

00:04:17,749 --> 00:04:16,560

definitely be a good thing so show us a

122

00:04:20,629 --> 00:04:17,759

little bit about what you're working on

123

00:04:21,670 --> 00:04:20,639

now with the the valve section of this

124

00:04:24,469 --> 00:04:21,680

okay

125

00:04:26,710 --> 00:04:24,479

this valve has a

126

00:04:29,189 --> 00:04:26,720

large disc that's in the flow path

127

00:04:30,230 --> 00:04:29,199

and that causes flow perturbations to

128

00:04:32,150 --> 00:04:30,240

the engine

129

00:04:33,670 --> 00:04:32,160

we're evaluating that using new cfd

130

00:04:35,830 --> 00:04:33,680

analysis tools

131

00:04:37,830 --> 00:04:35,840

to evaluate how to better design that

132

00:04:39,990 --> 00:04:37,840

disc for the new vehicle

133

00:04:41,430 --> 00:04:40,000

and get better engine performance great

134

00:04:43,350 --> 00:04:41,440

thanks very much jim

135

00:04:45,270 --> 00:04:43,360

we're here now with michelle monk she is

136

00:04:46,790 --> 00:04:45,280

the aero capture lead engineer here at

137

00:04:48,150 --> 00:04:46,800

marshall and michelle i find it

138

00:04:49,590 --> 00:04:48,160

interesting that at a center that

139

00:04:51,350 --> 00:04:49,600

concentrates so hard on propulsion

140

00:04:53,270 --> 00:04:51,360

you're actually working on stopping

141

00:04:55,350 --> 00:04:53,280

spacecraft not making them go that's

142

00:04:57,670 --> 00:04:55,360

right we're actually propellantless

143

00:04:59,830 --> 00:04:57,680

propulsion when a spacecraft is

144

00:05:01,990 --> 00:04:59,840

approaching a planet needs to slow down

145

00:05:04,390 --> 00:05:02,000

to get into a science orbit and so you

146

00:05:07,029 --> 00:05:04,400

can either do that with very expensive

147

00:05:08,710 --> 00:05:07,039

heavy fuel or you can use the atmosphere

148

00:05:10,550 --> 00:05:08,720

to slow you down and so that's what we

149

00:05:13,029 --> 00:05:10,560

do we take one pass through the

150

00:05:14,710 --> 00:05:13,039

atmosphere and we use the drag to slow

151

00:05:16,629 --> 00:05:14,720

our vehicle down and put it directly

152

00:05:18,629 --> 00:05:16,639

into its science orbit and that's where

153

00:05:20,629 --> 00:05:18,639

this very large heat shield comes into

154

00:05:23,749 --> 00:05:20,639

play tell us a little bit about this

155

00:05:25,909 --> 00:05:23,759

this is a two meter diameter

156

00:05:28,550 --> 00:05:25,919

carbon composite heat shield made by

157

00:05:30,950 --> 00:05:28,560

lockheed martin and it's a manufacturing

158

00:05:33,350 --> 00:05:30,960

demonstration of making a heat shield of

159

00:05:35,189 --> 00:05:33,360

this size in one piece and this isn't

160

00:05:37,270 --> 00:05:35,199

made of metal so this this makes it much

161

00:05:39,430 --> 00:05:37,280

lighter right right this is a carbon

162

00:05:41,510 --> 00:05:39,440

composite and this system is about 40

163

00:05:43,510 --> 00:05:41,520

percent lighter than the genesis sample

164

00:05:45,270 --> 00:05:43,520

return capsule system also it means you

165

00:05:46,550 --> 00:05:45,280

can put more science inside that's right

166

00:05:48,790 --> 00:05:46,560

well let's take a look at one of the

167

00:05:51,270 --> 00:05:48,800

prototypes you have over here

168

00:05:53,749 --> 00:05:51,280

can you tell us a little bit about this

169

00:05:56,629 --> 00:05:53,759

we've been doing about four years of

170

00:05:58,790 --> 00:05:56,639

technology development on the ground

171

00:06:01,749 --> 00:05:58,800

led by marshall and we've done lots of

172

00:06:04,790 --> 00:06:01,759

material testing and guidance algorithm

173

00:06:07,270 --> 00:06:04,800

development and simulation and now we're

174

00:06:09,830 --> 00:06:07,280

proposing to do a validation of the

175

00:06:12,950 --> 00:06:09,840

aerocapture maneuver at earth and this

176

00:06:15,749 --> 00:06:12,960

is a full-scale prototype vehicle that

177

00:06:18,469 --> 00:06:15,759

we would use to do that and if selected

178

00:06:20,469 --> 00:06:18,479

marshall will supply the flight heat

179

00:06:24,070 --> 00:06:20,479

shield and the back shell

180

00:06:25,830 --> 00:06:24,080

for that space vehicle and jpl will

181

00:06:28,309 --> 00:06:25,840

supply the spacecraft for that and will

182

00:06:29,590 --> 00:06:28,319

fly in 2010. 2010 not too far away

183

00:06:31,110 --> 00:06:29,600

that's right well michelle thanks very

184

00:06:32,309 --> 00:06:31,120

much for showing us your technology here

185

00:06:34,629 --> 00:06:32,319

today and we look forward to seeing it

186

00:06:36,070 --> 00:06:34,639

fly thanks

187

00:06:36,790 --> 00:06:36,080

hey bill look at all this cool stuff i

188

00:06:38,550 --> 00:06:36,800

got

189

00:06:40,790 --> 00:06:38,560

well i guess it has been a neat day here

190

00:06:42,309 --> 00:06:40,800

at the research and technology expo yeah

191

00:06:44,469 --> 00:06:42,319

it has but it's also been interesting to

192

00:06:45,749 --> 00:06:44,479

find out how someone has an idea and

193

00:06:47,350 --> 00:06:45,759

then turns that into hardware and

194

00:06:48,950 --> 00:06:47,360

technology that may take us back to the

195

00:06:50,230 --> 00:06:48,960

moon and even to mars someday that's

196

00:06:52,390 --> 00:06:50,240

right and all of it designed or

197

00:06:54,230 --> 00:06:52,400

developed right here at marshall well