



1  
00:00:11,450 --> 00:00:08,990  
it's pretty desolate but at the same

2  
00:00:13,129 --> 00:00:11,460  
time to you what we're doing here is

3  
00:00:21,109 --> 00:00:13,139  
we're testing a sensor that is gonna be

4  
00:00:24,019 --> 00:00:21,119  
used for lunar landing over one just

5  
00:00:26,420 --> 00:00:24,029  
right down to build a road okay the

6  
00:00:28,339 --> 00:00:26,430  
situation that was faced by Apollo was

7  
00:00:31,460 --> 00:00:28,349  
going into what we consider very benign

8  
00:00:33,049 --> 00:00:31,470  
landing sites a lot of people think that

9  
00:00:35,360 --> 00:00:33,059  
the new lunar lander ease will be just

10  
00:00:37,490 --> 00:00:35,370  
like Apollo but the new landing sites

11  
00:00:40,639 --> 00:00:37,500  
are very challenging the illumination at

12  
00:00:43,010 --> 00:00:40,649  
the poles is very dim sun angle is very

13  
00:00:45,500 --> 00:00:43,020

low to horizon because the moon has no

14

00:00:49,850 --> 00:00:45,510

atmosphere shadows are absolute and

15

00:00:51,920 --> 00:00:49,860

there's no diffusion of light Jeff to

16

00:00:53,299 --> 00:00:51,930

Moonraker one well this project is

17

00:00:55,160 --> 00:00:53,309

called al hat which stands for

18

00:00:57,500 --> 00:00:55,170

autonomous landing and hazard avoidance

19

00:00:59,389 --> 00:00:57,510

technology and we're testing out a

20

00:01:02,180 --> 00:00:59,399

helicopter that's flying over a lunar a

21

00:01:03,740 --> 00:01:02,190

strange in our analog seeing how good

22

00:01:12,109 --> 00:01:03,750

the sensor is at detecting these rocks

23

00:01:14,570 --> 00:01:12,119

up copy that all hat is a technology

24

00:01:17,570 --> 00:01:14,580

task that is building sensors and

25

00:01:20,359 --> 00:01:17,580

algorithms for landing on the moon and

26  
00:01:22,480 --> 00:01:20,369  
in particular for detecting hazards

27  
00:01:25,249 --> 00:01:22,490  
during landing and as well as

28  
00:01:27,530 --> 00:01:25,259  
automatically estimating the spacecraft

29  
00:01:29,240 --> 00:01:27,540  
position by looking at the surface of

30  
00:01:31,789 --> 00:01:29,250  
the moon to see features and then

31  
00:01:34,550 --> 00:01:31,799  
matching them to an onboard reference to

32  
00:01:36,920 --> 00:01:34,560  
compute position kind of like people

33  
00:01:38,539 --> 00:01:36,930  
when they navigate they look at a map we

34  
00:01:40,130 --> 00:01:38,549  
want to have the computer and the

35  
00:01:43,940 --> 00:01:40,140  
sensors do that automatically on the

36  
00:01:45,800 --> 00:01:43,950  
moon this is all autonomous assisting

37  
00:01:48,080 --> 00:01:45,810  
the pilot helping them determine

38  
00:01:50,929 --> 00:01:48,090

automatically where hazards are in real

39

00:01:53,060 --> 00:01:50,939

time you know it's really a new

40

00:01:57,370 --> 00:01:53,070

capability that wasn't possible at all

41

00:02:02,029 --> 00:01:59,330

when you're getting lower in altitude

42

00:02:04,010 --> 00:02:02,039

and doing your final descent into the

43

00:02:05,389 --> 00:02:04,020

lunar surface those are the types of

44

00:02:07,880 --> 00:02:05,399

trajectories we're trying to test here

45

00:02:09,380 --> 00:02:07,890

we've got what we call a gyro-stabilized

46

00:02:11,509 --> 00:02:09,390

mount that the Hollywood industry uses

47

00:02:13,280 --> 00:02:11,519

for the movies get there nice smooth

48

00:02:15,050 --> 00:02:13,290

aerial shots so we take the movie

49

00:02:16,910 --> 00:02:15,060

cameras off and we put our instruments

50

00:02:18,800 --> 00:02:16,920

on so that instrument and the gimbal is

51  
00:02:20,930 --> 00:02:18,810  
the flashlight arm which is amazing

52  
00:02:23,449 --> 00:02:20,940  
we're testing right now flashlights are

53  
00:02:25,339 --> 00:02:23,459  
is an instrument that as a burst of

54  
00:02:28,130 --> 00:02:25,349  
light that comes out very very short

55  
00:02:29,690 --> 00:02:28,140  
bursts of light ejected from a laser

56  
00:02:33,020 --> 00:02:29,700  
aperture eight times the second

57  
00:02:34,670 --> 00:02:33,030  
derivative we have a receive optics

58  
00:02:38,030 --> 00:02:34,680  
exactly like a camera so you're getting

59  
00:02:39,860 --> 00:02:38,040  
a 3d picture so I'm in the back I have

60  
00:02:41,449 --> 00:02:39,870  
four computers back there to look at it

61  
00:02:42,809 --> 00:02:41,459  
as simultaneously so it's a little bit

62  
00:02:44,699 --> 00:02:42,819  
hectic sometimes

63  
00:02:46,619 --> 00:02:44,709

you never really know it's something

64

00:02:48,599 --> 00:02:46,629

until we try to see how well it really

65

00:02:50,160 --> 00:02:48,609

works it's been a good test so far we're

66

00:02:53,099 --> 00:02:50,170

looking forward to getting into the meat

67

00:02:55,080 --> 00:02:53,109

ladies of the day night I'm very excited

68

00:02:57,270 --> 00:02:55,090

to be working on this project because I

69

00:02:59,190 --> 00:02:57,280

really think it has a chance of being on

70

00:03:01,709 --> 00:02:59,200

the next lunar lander and that's really

71

00:03:03,390 --> 00:03:01,719

why I work for NASA as to you know

72

00:03:05,789 --> 00:03:03,400

building technology that actually gets

73

00:03:08,399 --> 00:03:05,799

its use going back to the moon and

74

00:03:10,470 --> 00:03:08,409

possibly on to Mars is really what I

75

00:03:12,929 --> 00:03:10,480

want to be working on when you're

76

00:03:14,610 --> 00:03:12,939

operating up there it's it's pretty

77

00:03:16,379 --> 00:03:14,620

amazing to look down especially out here

78

00:03:17,819 --> 00:03:16,389

in the valley and no vegetation you're

79

00:03:19,830 --> 00:03:17,829

looking at this surface and thinking

80

00:03:21,509 --> 00:03:19,840

this could be the moon you know some

81

00:03:23,879 --> 00:03:21,519

future astronaut a couple years down the

82

00:03:25,259 --> 00:03:23,889

line when that happens it's going to be