
JPL

1
00:00:04,160 --> 00:00:02,180
hey guys imagine a disaster situation

2
00:00:05,990 --> 00:00:04,170
that's so dangerous we can't send people

3
00:00:08,299 --> 00:00:06,000
in to fix the problem so what do you do

4
00:00:09,680 --> 00:00:08,309
about that well this is Robo simian and

5
00:00:11,570 --> 00:00:09,690
that's exactly what he's designed to do

6
00:00:20,740 --> 00:00:11,580
we're gonna talk all about that on this

7
00:00:24,230 --> 00:00:22,790
alright guys are here with Brett Kennedy

8
00:00:26,060 --> 00:00:24,240
he's leading the charge here on the Robo

9
00:00:27,470 --> 00:00:26,070
simian project hey Brett could you just

10
00:00:28,550 --> 00:00:27,480
tell us a little bit about Robo simian

11
00:00:30,200 --> 00:00:28,560
what were you guys trying to accomplish

12
00:00:32,630 --> 00:00:30,210
with the robot Robo see means actually a

13
00:00:34,490 --> 00:00:32,640

line of limbed robots that we've done

14
00:00:35,840 --> 00:00:34,500
here at JPL but specifically it was

15
00:00:37,820 --> 00:00:35,850
designed and built for the DARPA

16
00:00:40,010 --> 00:00:37,830
Robotics Challenge it's disaster

17
00:00:41,660 --> 00:00:40,020
response not life-saving so the exemplar

18
00:00:43,580 --> 00:00:41,670
that DARPA uses the Fukushima nuclear

19
00:00:45,830 --> 00:00:43,590
reactors after the earthquake and the

20
00:00:47,210 --> 00:00:45,840
tsunami there was a lot of damage to the

21
00:00:48,950 --> 00:00:47,220
reactor and they really needed to be

22
00:00:50,479 --> 00:00:48,960
able to get inside and do a few things

23
00:00:51,710 --> 00:00:50,489
that would made everything better and it

24
00:00:54,470 --> 00:00:51,720
could be as simple as flipping a switch

25
00:00:56,570 --> 00:00:54,480
or turning a valve so JPL is kind of

26
00:00:57,680 --> 00:00:56,580
known for making Rovers and you know

27
00:00:59,000 --> 00:00:57,690
everyone knows that Rovers have wheels

28
00:01:00,590 --> 00:00:59,010
and we kind of climb over rocks

29
00:01:02,119 --> 00:01:00,600
why did your team decide to go with

30
00:01:03,649 --> 00:01:02,129
limbs instead of wheels you know if you

31
00:01:05,000 --> 00:01:03,659
can get away with wheels wheels are

32
00:01:06,500 --> 00:01:05,010
great they're the most efficient way of

33
00:01:08,180 --> 00:01:06,510
getting around but once you get into the

34
00:01:10,130 --> 00:01:08,190
terrain that's too rough then we need to

35
00:01:11,930 --> 00:01:10,140
switch over to a different method so how

36
00:01:13,640 --> 00:01:11,940
does the robot know where it is and

37
00:01:15,649 --> 00:01:13,650
where it's going so if it can it's gonna

38
00:01:17,360 --> 00:01:15,659

use perception systems it's cameras in

39
00:01:19,010 --> 00:01:17,370
the lidar to actually build this 3d map

40
00:01:20,510 --> 00:01:19,020
and it sends that information back to

41
00:01:22,430 --> 00:01:20,520
the operator the operator then decides

42
00:01:24,530 --> 00:01:22,440
where it should go but even if it

43
00:01:26,120 --> 00:01:24,540
doesn't have good data about what its

44
00:01:28,010 --> 00:01:26,130
environment looks like it's also got

45
00:01:29,690 --> 00:01:28,020
four sensors and it's wrists and ankles

46
00:01:31,490 --> 00:01:29,700
so it can actually feel the terrain as

47
00:01:33,290 --> 00:01:31,500
it's walking as well so we have the

48
00:01:35,840 --> 00:01:33,300
capability of basically moving around by

49
00:01:37,010 --> 00:01:35,850
Braille so what exactly can it do given

50
00:01:38,900 --> 00:01:37,020
the fact that it's sort of human scale

51
00:01:40,760 --> 00:01:38,910
we can have the robot do a lot of things

52
00:01:41,720 --> 00:01:40,770
that a human can do actually as long as

53
00:01:43,970 --> 00:01:41,730
you're not too concerned about it moving

54
00:01:45,170 --> 00:01:43,980
fast what kinds of hands or end

55
00:01:46,460 --> 00:01:45,180
effectors can you put at the end of

56
00:01:48,680 --> 00:01:46,470
these limbs we went through a couple

57
00:01:51,530 --> 00:01:48,690
sets of hands and this is where we've

58
00:01:53,330 --> 00:01:51,540
ended up today it's not for dexterous

59
00:01:55,250 --> 00:01:53,340
manipulation of things but they can do

60
00:01:57,020 --> 00:01:55,260
most things you need which is to grab on

61
00:01:59,990 --> 00:01:57,030
to objects be able to pull them with a

62
00:02:03,620 --> 00:02:00,000
lot of force and also manipulate certain

63
00:02:05,060 --> 00:02:03,630

things and in particular human tools so

64
00:02:06,740 --> 00:02:05,070
look at this arm it looks pretty

65
00:02:08,839 --> 00:02:06,750
advanced actually this limb is actually

66
00:02:10,490 --> 00:02:08,849
very similar to yours and other ways

67
00:02:11,900 --> 00:02:10,500
particularly in the number of joints it

68
00:02:13,940 --> 00:02:11,910
has so even though it doesn't look like

69
00:02:15,860 --> 00:02:13,950
it it's actually about as dexterous as

70
00:02:17,720 --> 00:02:15,870
your own arm you've got seven joints I'm

71
00:02:18,920 --> 00:02:17,730
assuming seven independent motors you

72
00:02:20,270 --> 00:02:18,930
tell us a little bit about these motors

73
00:02:22,040 --> 00:02:20,280
what torque capability they have how

74
00:02:23,660 --> 00:02:22,050
fast they can go and every one of these

75
00:02:26,870 --> 00:02:23,670
joints they have exactly the same

76
00:02:30,550 --> 00:02:26,880
drivetrain this contains the electronics

77
00:02:32,800 --> 00:02:30,560
that run it the brake the motor itself

78
00:02:34,449 --> 00:02:32,810
the drivetrain which is a harmonic

79
00:02:35,260 --> 00:02:34,459
gearing in this case what's your gear

80
00:02:37,809 --> 00:02:35,270
ratio that you're getting out of that

81
00:02:39,340 --> 00:02:37,819
harmonic drive 162 one it's a pretty

82
00:02:40,960 --> 00:02:39,350
tight package really high gear ratio

83
00:02:42,670 --> 00:02:40,970
yeah I have this one little thing we can

84
00:02:45,370 --> 00:02:42,680
actually get as much torque as an f-150

85
00:02:46,540 --> 00:02:45,380
truck so I'm imagining Robo simian kind

86
00:02:48,460 --> 00:02:46,550
of crawling its way through building and

87
00:02:50,260 --> 00:02:48,470
then over difficult terrain and that's

88
00:02:52,180 --> 00:02:50,270

all happening here on the earth is it

89
00:02:54,130 --> 00:02:52,190
even possible to send us a space well

90
00:02:56,559 --> 00:02:54,140
the exact technology that goes into that

91
00:02:58,510 --> 00:02:56,569
would be different than what we haven't

92
00:03:00,640 --> 00:02:58,520
Rovers I mean today the basic robotics

93
00:03:02,500 --> 00:03:00,650
problem is the same and so yes

94
00:03:04,060 --> 00:03:02,510
absolutely we think that send these to

95
00:03:05,110 --> 00:03:04,070
the cliffs of Mars to the outside of

96
00:03:07,660 --> 00:03:05,120
asteroids a comment

97
00:03:09,430 --> 00:03:07,670
things of that nature all right we're

98
00:03:11,170 --> 00:03:09,440
all wishing the best for the Robo simian