1
00:00:13,419 --> 00:00:11,540
one of the the main targets for this

2
00:00:16,609 --> 00:00:13,429
demonstration is we're going to

3
00:00:19,370 --> 00:00:16,619
demonstrate navigation demonstrate

4
00:00:21,320 --> 00:00:19,380
capable navigation solar sails have been

5
00:00:25,099 --> 00:00:21,330
used before and they've flown before but

6
00:00:27,140 --> 00:00:25,109
what we offer is something that a

7
00:00:28,730 --> 00:00:27,150
mission planner could then pick off a

8
00:00:31,220 --> 00:00:28,740
shelf and he say that's a technology

9
00:00:34,069 --> 00:00:31,230
that would work for flying my instrument

10
00:00:36,049 --> 00:00:34,079
right the solar sails have only that it

11
00:00:38,780 --> 00:00:36,059
flown before I've only been you know to

12
00:00:41,060 --> 00:00:38,790
demonstrate the concept of solar thrust

13
00:00:42,770 --> 00:00:41,070

and solar propulsion but what we what

14
00:00:44,959 --> 00:00:42,780
we're aiming to do is take that next

15
00:00:47,150 --> 00:00:44,969
step and go into navigation and actually

16
00:00:50,119 --> 00:00:47,160
fly to someplace useful that only a

17
00:00:51,319 --> 00:00:50,129
solar sail can do we have a radiation

18
00:00:52,819 --> 00:00:51,329
pressure and then we have solar wind

19
00:00:56,060 --> 00:00:52,829
what we're going to use is the radiation

20
00:00:58,520 --> 00:00:56,070
pressure this is a phenomenon in which a

21
00:01:00,709 --> 00:00:58,530
photon which is massless but still has

22
00:01:03,709 --> 00:01:00,719
momentum reacts with the surface and

23
00:01:05,870 --> 00:01:03,719
bounces back off it creates a very tiny

24
00:01:08,539 --> 00:01:05,880
tiny pressure but it is a pressure

25
00:01:10,520 --> 00:01:08,549
nonetheless and once we're in the the

26
00:01:12,950 --> 00:01:10,530
weightlessness of space any pressure

27
00:01:15,590 --> 00:01:12,960
will turn into you know turn into a

28
00:01:17,960 --> 00:01:15,600
force and F equals MA will get a small

29
00:01:20,600 --> 00:01:17,970
acceleration so what the solar sail

30
00:01:23,450 --> 00:01:20,610
consists of is a great giant area of

31
00:01:25,760 --> 00:01:23,460
reflective material that's capturing all

32
00:01:28,370 --> 00:01:25,770
of that solar pressure and using it to

33
00:01:31,550 --> 00:01:28,380
impart an acceleration on a small craft

34
00:01:33,950 --> 00:01:31,560
so what we're targeting for this program

35
00:01:36,890 --> 00:01:33,960
is a solar sail with an area of roughly

36
00:01:38,210 --> 00:01:36,900
1,200 square meters so we're in the

37
00:01:40,390 --> 00:01:38,220
neighborhood of about a quarter of a

38
00:01:45,469 --> 00:01:40,400

football field if you will with that

39
00:01:47,420 --> 00:01:45,479
will create roughly 1 gram of thrust so

40
00:01:50,569 --> 00:01:47,430
it's it's very low right it's equivalent

41
00:01:53,270 --> 00:01:50,579
to the weight of a pink sweet and low

42
00:01:54,830 --> 00:01:53,280
sugar packet but what we can do with

43
00:01:56,630 --> 00:01:54,840
that is if we're careful we can

44
00:01:59,030 --> 00:01:56,640
integrate that thrust over a very long

45
00:02:04,060 --> 00:01:59,040
period of time and we can do some useful

46
00:02:09,190 --> 00:02:07,030
the solar flares from the Sun obviously

47
00:02:11,260 --> 00:02:09,200
wreak havoc or can wreak havoc on

48
00:02:14,500 --> 00:02:11,270
satellites and even the power grid on

49
00:02:16,300 --> 00:02:14,510
the earth so what NOAA offers to

50
00:02:18,730 --> 00:02:16,310
operators and to the power grid

51
00:02:20,200 --> 00:02:18,740
operators is advanced warning through

52
00:02:22,030 --> 00:02:20,210
the means of this satellite that they

53
00:02:24,210 --> 00:02:22,040
have positioned at l1 which is a

54
00:02:26,740 --> 00:02:24,220
Lagrangian in between Earth and the Sun

55
00:02:28,450 --> 00:02:26,750
they offer this advanced warning as a

56
00:02:31,420 --> 00:02:28,460
result of the data they get from this

57
00:02:34,480 --> 00:02:31,430
satellite called ace now that's at l1

58
00:02:36,370 --> 00:02:34,490
now what the solar sail could offer and

59
00:02:39,040 --> 00:02:36,380
this is one of the areas that we want to

60
00:02:41,170 --> 00:02:39,050
we want to fly to is that we could

61
00:02:44,740 --> 00:02:41,180
create a pseudo LeBrons point that's

62
00:02:46,480 --> 00:02:44,750
farther in towards the Sun than l1 we'd

63
00:02:50,530 --> 00:02:46,490

actually double the distance from the

64
00:02:53,530 --> 00:02:50,540
earth as aces so if they have X minutes

65
00:02:55,990 --> 00:02:53,540
of warning time from Ace we could double

66
00:02:57,850 --> 00:02:56,000
that and we could offer you know offer

67
00:03:00,699 --> 00:02:57,860
satellite operators and power grid

68
00:03:04,390 --> 00:03:00,709
operators twice the warning time the

69
00:03:05,770 --> 00:03:04,400
LaGrant exists because this earth is

70
00:03:08,140 --> 00:03:05,780
pulling on if the Sun is pulling on it

71
00:03:09,970 --> 00:03:08,150
and there's some centripetal force

72
00:03:11,590 --> 00:03:09,980
that's you know swinging out away from

73
00:03:13,210 --> 00:03:11,600
the Sun too so it's the it's the

74
00:03:14,770 --> 00:03:13,220
amalgamation of those three forces that

75
00:03:17,440 --> 00:03:14,780
create that gravitationally neutral

76
00:03:20,310 --> 00:03:17,450
point now we're going to offset some of

77
00:03:23,289 --> 00:03:20,320
that sun's gravity with that one gram of

78
00:03:25,780 --> 00:03:23,299
thrust and we can fly a little closer to

79
00:03:26,920 --> 00:03:25,790
the Sun and create that extra neutral

80
00:03:29,560 --> 00:03:26,930
point there and we'll be a little

81
00:03:31,150 --> 00:03:29,570
farther in we last built a solar sail

82
00:03:34,539 --> 00:03:31,160
the one that was deployed in the phone

83
00:03:36,100 --> 00:03:34,549
book chamber there in 2004-2005 is when

84
00:03:39,729 --> 00:03:36,110
we assembled it I think the test was in

85
00:03:42,640 --> 00:03:39,739
2005 so our first goal is to to

86
00:03:44,910 --> 00:03:42,650
revitalize that this is no no mean feat

87
00:03:48,460 --> 00:03:44,920
to create something that gossamer and

88
00:03:51,070 --> 00:03:48,470

controllably deploy it our flight right

89
00:03:54,160 --> 00:03:51,080
now we're scheduling somewhere in the

90
00:03:56,710 --> 00:03:54,170
the fourth quarter of 2014 now the

91
00:04:00,880 --> 00:03:56,720
flight is supposed to be on a secondary

92
00:04:02,949 --> 00:04:00,890
Falcon 9 GTO launch hopefully Falcon I

93
00:04:04,780 --> 00:04:02,959
did query the tower you know we would

94
00:04:07,660 --> 00:04:04,790
take any other secondary flight we can

95
00:04:11,230 --> 00:04:07,670
get but the the GTO launch offers us