



1
00:00:36,150 --> 00:00:34,069
they fly into space repeatedly

2
00:00:37,910 --> 00:00:36,160
so being able to determine the condition

3
00:00:43,750 --> 00:00:37,920
of shuttle components like the main

4
00:00:47,029 --> 00:00:45,910
designing sophisticated monitoring

5
00:00:49,430 --> 00:00:47,039
systems to do this

6
00:00:52,630 --> 00:00:49,440
is the goal of a nasa-sponsored research

7
00:00:55,029 --> 00:00:52,640
effort at the university of cincinnati

8
00:00:57,430 --> 00:00:55,039
a team of faculty members and graduate

9
00:00:57,990 --> 00:00:57,440
students is developing a series of micro

10
00:01:00,229 --> 00:00:58,000
sensors

11
00:01:01,670 --> 00:01:00,239
to indicate the health of space faring

12
00:01:03,750 --> 00:01:01,680
vehicles

13
00:01:06,310 --> 00:01:03,760

almost everything visible here is

14

00:01:09,109 --> 00:01:06,320

packaging used in testing

15

00:01:12,310 --> 00:01:09,119

the sensor itself is just the tiny speck

16

00:01:14,630 --> 00:01:12,320

in the center

17

00:01:17,350 --> 00:01:14,640

one of these sensors under a microscope

18

00:01:19,749 --> 00:01:17,360

reveals their sophistication

19

00:01:21,030 --> 00:01:19,759

advanced micro machining techniques make

20

00:01:23,910 --> 00:01:21,040

it possible to include

21

00:01:26,469 --> 00:01:23,920

valves heaters or even motors in a

22

00:01:31,749 --> 00:01:26,479

device with a diameter less than that of

23

00:01:36,550 --> 00:01:34,310

the goal is to embed these tiny flow

24

00:01:38,789 --> 00:01:36,560

sensors in the walls of critical shuttle

25

00:01:40,870 --> 00:01:38,799

engine and systems components to ensure

26

00:01:43,350 --> 00:01:40,880

their functioning properly

27

00:01:44,950 --> 00:01:43,360

and the sensors are so small that even

28

00:01:46,789 --> 00:01:44,960

if one came loose it would have

29

00:01:50,149 --> 00:01:46,799

negligible impact on engine

30

00:01:54,870 --> 00:01:52,550

uc researchers are also working on

31

00:01:56,550 --> 00:01:54,880

vibration and crack detection sensors

32

00:01:58,550 --> 00:01:56,560

for other parts of the shuttle which

33

00:02:00,950 --> 00:01:58,560

could point out existing defects

34

00:02:05,190 --> 00:02:00,960

or indicate fatigue in high stress areas

35

00:02:09,510 --> 00:02:07,350

there are a number of potential spin-off

36

00:02:10,550 --> 00:02:09,520

applications for micro sensors like

37

00:02:12,070 --> 00:02:10,560

these

38

00:02:13,830 --> 00:02:12,080

researchers at the university of

39

00:02:15,990 --> 00:02:13,840

cincinnati's medical center

40

00:02:18,390 --> 00:02:16,000

are already exploring their use in the

41

00:02:20,470 --> 00:02:18,400

care of premature infants

42

00:02:22,309 --> 00:02:20,480

a significant number of preemies suffer

43

00:02:24,390 --> 00:02:22,319

respiratory disorders

44

00:02:25,830 --> 00:02:24,400

many must be connected to a ventilator

45

00:02:27,750 --> 00:02:25,840

around the clock

46

00:02:30,309 --> 00:02:27,760

but setting the ventilator remains a

47

00:02:32,630 --> 00:02:30,319

relatively imprecise science

48

00:02:34,790 --> 00:02:32,640

and improper oxygen levels and pressures

49

00:02:37,350 --> 00:02:34,800

can contribute to more severe problems

50

00:02:39,509 --> 00:02:37,360

including mental retardation

51
00:02:40,710 --> 00:02:39,519
assistant professor of pediatrics

52
00:02:42,390 --> 00:02:40,720
michael donnelly

53
00:02:44,470 --> 00:02:42,400
you get into situations where you're

54
00:02:45,589 --> 00:02:44,480
looking at morbidity are these babies

55
00:02:48,790 --> 00:02:45,599
going to grow up to be

56
00:02:50,550 --> 00:02:48,800
normal fully functioning adults don't

57
00:02:52,710 --> 00:02:50,560
and his colleagues are studying the

58
00:02:55,350 --> 00:02:52,720
possibility of putting a microsensor

59
00:02:56,869 --> 00:02:55,360
inside the plastic tube inserted in a

60
00:02:58,390 --> 00:02:56,879
baby's trachea

61
00:03:00,390 --> 00:02:58,400
with this type of flow sensor we would

62
00:03:02,229 --> 00:03:00,400
have one of the vital numbers that we

63
00:03:06,070 --> 00:03:02,239

need which is volume

64

00:03:07,509 --> 00:03:06,080

related to each inspiration cycle

65

00:03:09,509 --> 00:03:07,519

so we're right now we're looking at

66

00:03:10,149 --> 00:03:09,519

averages over five minutes or multiple

67

00:03:11,830 --> 00:03:10,159

cycles

68

00:03:14,470 --> 00:03:11,840

this will actually take us down to look

69

00:03:17,910 --> 00:03:14,480

at breadth to bread activity

70

00:03:20,470 --> 00:03:17,920

advanced micro sensors enhancing the