
SPACEX CRS-16
WHAT'S ON BOARD

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00:00:15,460 --> 00:00:19,420
The ultimate goal of our RRM3 is to be
able to further enable NASA's

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00:00:19,420 --> 00:00:23,740
exploration programs, so that we can help
satellites to live longer go farther and

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00:00:23,740 --> 00:00:30,070
be able to facilitate the human
exploration of space. RRM3 is the 3rd,

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00:00:30,070 --> 00:00:33,460
obviously, of three payloads that have
been developed by the satellite

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00:00:33,460 --> 00:00:36,280
servicing projects division at NASA
Goddard Space Flight Center.

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00:00:36,280 --> 00:00:39,640
So RRM3 is designed to be the
culmination of that effort where we're

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00:00:39,640 --> 00:00:43,030
going to take everything that we learned
from RRM1 and RRM2, and do an

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00:00:43,030 --> 00:00:47,640
end-to-end cryogenic transfer. The whole
goal of RRM3 is to help further

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00:00:47,640 --> 00:00:53,440
exploration and help be able to get NASA
to Mars and beyond. The goal of GEDI is

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00:00:53,440 --> 00:00:57,910
really fairly simple, it's to use laser
beams to measure how tall trees are

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00:00:57,910 --> 00:01:01,329
globally. And Bryan and I have been
trying for over 20 years to get this

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00:01:01,329 --> 00:01:05,410
technology into space. One of the big
questions we have right now is, what is

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00:01:05,410 --> 00:01:09,610
this balance between deforestation
that's pumping Co2 into the atmosphere,

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00:01:09,610 --> 00:01:14,770
and then subsequent regrowth by these
young rapidly regrowing trees that pull

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00:01:14,770 --> 00:01:18,880
the carbon out of the atmosphere. As
Ralph mentioned, GEDI is a laser

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00:01:18,880 --> 00:01:23,650
altimeter which is an active optical
sensor technology for, normally for

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00:01:23,650 --> 00:01:27,670
measuring surface topography, but GEDI
takes it a little bit further by

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00:01:27,670 --> 00:01:32,320
capturing that entire waveform structure.
The shape of that reflected pulse that

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00:01:32,320 --> 00:01:36,010
represents the height of the canopy and
the internal structure as Ralph

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00:01:36,010 --> 00:01:40,180
mentioned. And this information is useful
not just for carbon, for carbon modeling,

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00:01:40,180 --> 00:01:44,409
but also for biodiversity and habitat
quality. Because as you have more

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00:01:44,409 --> 00:01:47,950
vertical diversity in forests, you create
more niches for species. And so by having

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00:01:47,950 --> 00:01:52,360
this information, we'll be able to attack
a lot of problems. So this project is our

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00:01:52,360 --> 00:01:56,290
first project launching to the space
station, and it's developing a

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00:01:56,290 --> 00:02:01,210
drug-eluting wound dressing to help
treat patients, whether they're civilians

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00:02:01,210 --> 00:02:07,869
or combat injured soldiers, and reduce
the overall cost burden of the effects

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00:02:07,869 --> 00:02:14,019
of sepsis. And so we are conducting two
separate experiments aboard station. One

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00:02:14,019 --> 00:02:18,130
is to look at the
gel structure and how the gel

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00:02:18,130 --> 00:02:22,840
structure changes, whether it's formed on
Earth or on station. We're also looking

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00:02:22,840 --> 00:02:28,900
at how the drug release profile of these
materials changes on Earth or on station.

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00:02:28,900 --> 00:02:33,850
The purpose of loading up the gels for a
wound dressing is to directly release it

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00:02:33,850 --> 00:02:37,390
to the wound site, so you can increase
the concentration of the drug that's

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00:02:37,390 --> 00:02:41,140
being released to that wound site, and
reduce the systemic effects of that drug

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00:02:41,140 --> 00:02:46,840
overall. We are developing a protein-based retinal implant to restore vision

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00:02:46,840 --> 00:02:50,080
to the millions of patients that are
blinded by macular degeneration and

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00:02:50,080 --> 00:02:54,160
retinitis pigmentosa,
so age-related macular degeneration. It

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00:02:54,160 --> 00:02:58,900
affects about 30 million people
worldwide. This disease works by

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00:02:58,900 --> 00:03:02,200
affecting the central part of your
vision first, and then over time that'll

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00:03:02,200 --> 00:03:06,580
start to expand until a patient is
completely blind. So LambdaVision has

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00:03:06,580 --> 00:03:12,280
developed a small flexible protein-based
retinal implant. And so our implant can

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00:03:12,280 --> 00:03:16,360
be in place - is placed in the back of the
eye through a procedure that is very

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00:03:16,360 --> 00:03:19,690
similar to a retinal detachment
procedure. Within the cube lab that's

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00:03:19,690 --> 00:03:23,470
shown here is a manufacturing apparatus
that sort of mimics our layer by layer

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00:03:23,470 --> 00:03:28,360
process, but in a very different way than
how we implement it on on Earth. So

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00:03:28,360 --> 00:03:33,520
ideally we're going to be exploiting the
effects of microgravity and this would

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00:03:33,520 --> 00:03:37,330
help us lead to more homogeneous films,
more uniform layers. And that's the

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00:03:37,330 --> 00:03:41,380
ultimate goal, right, is to accelerate our
path to market, and help these patients

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00:03:41,380 --> 00:03:45,630
that are blind to fight these retinal
degenerative diseases.

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00:03:50,360 --> 00:03:56,890
Hi, my name is Adia Bulawa and I'm the Team
Rocket finalists. I decided to go with

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00:03:56,890 --> 00:04:03,250
testing UV-activated dental glue and see
how that would react in microgravity, and

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00:04:03,250 --> 00:04:10,190
that would be helpful for space trips,
because they've done it before, and the

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00:04:10,190 --> 00:04:14,840
piece that they used actually fell out the
next day. And here's an actual diagram of

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00:04:14,840 --> 00:04:18,859
the apparatus, and what's going to happen
is they actually have real teeth that

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00:04:18,859 --> 00:04:22,750
they're putting on the bottom of it. And
they're going to kind of recently -

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00:04:22,750 --> 00:04:28,940
filling a cavity and using the UV dental
glue, and see if it will stick better

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00:04:28,940 --> 00:04:34,130
than the normal dental paste. I'm Sarina
Kopf, I'm a first-year at Grinnell

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00:04:34,130 --> 00:04:38,960
College and I represent the group side
of the challenge. So my project is

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00:04:38,960 --> 00:04:43,220
looking into aeroponics. Aeroponics is
the process of replacing traditional

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00:04:43,220 --> 00:04:48,620
irrigation systems with mist, in order to
grow plants on Earth. This system uses

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00:04:48,620 --> 00:04:53,419
98% less water
60% less fertilizer, and no pesticides.

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00:04:53,419 --> 00:04:57,380
But despite this efficacy on Earth, no
one's ever tried to grow plants in space

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00:04:57,380 --> 00:05:01,760
before like this. So from this experiment
we're going to collect data obviously,

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00:05:01,760 --> 00:05:05,660
and this will be in the form of
photographic data and readings on

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00:05:05,660 --> 00:05:09,470
temperature humidity and carbon dioxide.
We're going to analyze that data with an