

Crazy Engineering: CubeSats

Hey everybody! Technology is always getting smaller. A computer used to take up an entire room but now it fits in the palm of your hand. Well, spacecraft aren't all that different. They're traditionally very large and difficult to build but we're working on ways to miniaturize them. We're going to talk all about that on this episode of Crazy Engineering.

(Music)

Hey everybody, we're here with Andy Klesh in one of JPL's smaller clean rooms. We're building CubeSats in here. Andy, what exactly is a CubeSat?

A CubeSat is really just a standard small spacecraft and we're talking a very small spacecraft; 10 by 10 by 10 centimeters at their smallest down here and yet they go up to about 30 by 20 by 10 centimeters; and we've launched hundreds into low Earth orbit for the last 10 to 15 years.

So, this really is a big contrast to how we normally operate at JPL with our larger clean rooms and our larger spacecraft.

It is, we're trying things a little bit different over here. It's much more rapid development. Trying things out with 3-D printing and building things up a lot quicker because these missions are a lot smaller.

If I were to build Voyager today, could I miniaturize it? Could I make it really small?

Absolutely not, Voyager has so many different capabilities and these CubeSats are very, very, limited but they're very focused on what they do so they can do one thing and do it very, very, well.

You're the chief engineer of one of these CubeSat projects. Could you tell us a little bit about the one you're working on? I work on MarCO, or Mars Cube One.

Can we take a look at the spacecraft? Absolutely, it's right here.

This looks more like a computer to me than a spacecraft. Can you explain a little bit about how it works?

We have a propulsion system to actually steer us to Mars; a radio to talk back to Earth; and the computer and electronics so that we can actually operate. So MarCO is actually going to Mars?

That's right, we're launching with InSight.

So MarCO will travel along with InSight all the way to Mars?

Actually, there are two identical MarCO spacecraft and they separate from InSight at Earth. Each spacecraft will then travel to Mars on its own over six-and-a-half months. MarCO's single purpose is to relay data back from InSight during its entry, descent and landing at Mars. We're really excited about this. It's the first interplanetary CubeSats that we'll have.

What do you see for the future of CubeSats?

Because these are low cost, we see them going to many cool places throughout the solar system. We also see them working together. What we call fractionated space. Where the spacecraft is really broken up into all individual instruments each with a focused task and together they perform the entire mission. We're hoping to see all kinds of new technology with CubeSats down the road.

Andy, thank you so much for showing this to us and hope you guys had a lot of fun learning about it and check back soon for some more Crazy Engineering.

NASA Jet Propulsion Laboratory, California Institute of Technology