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**Paul Thies:** From pods mounted on the underside of propeller planes, to orbital sensor systems on the International Space Station, remote sensing technology is providing us with a host of amazing images and data points with applications ranging from precision agriculture efforts to disaster response aid. When it comes to the possibilities that remote sensing provides today's data scientists, cartographers, aid responders, and climatologists, seeing really is believing.

Hello, I'm your host, Paul Tis. On this episode of *If Win*. I sat down with Scott Stetson, division Vice President for Growth and Strategy at Jacobs, and Andy Eichelberger, Remote Sensing Division Director at Jacobs, to discuss remote sensing technology and how it can be applied to address a variety of challenges. Scott and Andy also shared how remote sensing can be used for sustainability endeavors, how it might be combined with other emerging technologies such as artificial intelligence, and how it may evolve in the future.

Scott and Andy, thank you both so much for joining me today to talk about remote sensing. I know Jacobs is doing a lot of great work in this area. I've actually seen the product that has been built to support this technology. I think it's really fascinating and it is really cool what you all are doing. Really looking forward to diving in on this. Scott, to start us off, can you tell us a little bit about what remote sensing is and what are some of the applications that it can be used for?

**Scott Stetson:** Remote sensing is loosely defined as collecting data from a remote distance, and generally speaking, it's used to describe the activities done from satellites or aircraft and also from drones. Andy's group does a lot of work with aircraft obviously, maybe moving into drones at some point. It's also important though to nod the head to the satellite imagery world as well because they all have very important roles to play. In general, applications-wise, they range from wide area coverage of whole regions to do things like forestry management or crop yield predictions, all the way down to individual parcels with drones where they're doing 3D models of a building or doing inspections of smokestacks and things like that.

Some people could argue that that's not that actually remote and that might not fall into the remote sensing category, but that's more of a nuanced discussion. If you look at really wide area collections, they're used for things, again, like oil and gas exploration. There are public service programs such as the 3D elevation program that the US puts on in order to give basically a public service of provisioning a 3D map for everybody to use. It's a pretty low-grade map, but it's another public service thing that is useful across a lot of industries.

Remote sensing results in things like Google Maps, for example, which combines satellite imagery and aerial imagery to generate the high-rise maps that we all like to use when we navigate through the cities. Then there's a lot of coastline monitoring opportunities and facility planning, a really wide range of applications. In general, you could say if any activity or any site has a geographic location, and most activities do, there may be an application for remote sensing.

**Paul:** Right now, it's mostly airplane-borne technology, but I guess what drones is it just really a matter of like-- I've seen like for instance, the pods that we use or that

**Scott:** Absolutely. This is possibly one of the most exciting application spaces for

We're in an interesting phase there where everybody has their flashy demos and

synoptic view of the entire globe every day at 3.7 meters, for example. That continues to go on, but I think what we are seeing trend-wise is a push for better and better resolution, actually, because the commercial industry has had a hard time extracting value in some cases from some of these, we'll say, lesser quality, but higher volume systems.

They have an interesting role to play, particularly back to that sustainability question, particularly in terms of total coverage of the globe and what large changes are occurring to the land masses. We're seeing companies like Maxar launch satellites that are getting better and better resolution down to 50 centimeters. Other companies are launching even finer resolution. There's a company called Albedo, which got plans to launch a satellite that they claim will compete with aerial imagery at 10-centimeter resolution.

Now, their coverage rates and their tasking and a whole host of other complications are going to make it such that they're not really going to compete with aerial imagery. It's a fascinating trend to see what was an explosion of medium quality, low quality, shall we say, comparatively from a technical perspective, pushing towards higher quality satellites. Then a really interesting transition has occurred with respect to synthetic aperture radar, which is a radar that is collected over a period of time and from which you can generate imagery where you don't need sunlight, for example, to be able to take images. That's a major difference.

Synthetic aperture radar can see through clouds, can operate at night because it generates its own energy with which it then actually produces the imagery through some very sophisticated processing. Over the past five years, there've been four or five different synthetic aperture radar satellite providers coming out. That's probably

people use it more, but I'm really excited to see how the analytics can develop around it.

I think there's a lot you can get from a point cloud, and there's even more you can get from fusing information coming out of a point cloud with imagery. You get the highest resolution 2D view from your imagery and the 3D representation of the object much better from the Lidar. It really just comes down to your analytics need that full picture to be able to do the same thing that your human brain can do in interpreting what things are and what their condition is, and all that sort of thing. That's what I'm excited about, Lidar scaling up.

**Paul:** Excellent, Scott and Andy, I really appreciate you taking the time to sit down with me today and talk about remote sensing. I think it's a fascinating technology. Especially when you can combine it with some of the other emerging technologies, I think it's going to be a real game changer. Appreciate you both spending time and sharing your insights today.

**Andy:** Great. Thank you.

**Scott:** Yes, thanks.

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