



Vegetation management now occurs anytime, day or night

Renu Robotics, based in San Antonio, Texas, has developed innovative autonomous technology for the solar and energy industries, including an all-electric vehicle that can mow during the day or night, cutting vegetation management costs and carbon emissions. PES spoke to CEO Tim Matus to find out more.



of year. Even before the pandemic, labor shortages, reliability issues, damages, safety and environmental concerns were constant problems, so the Renubot has become the preferred solution.

Our Generation-3 all-electric fully autonomous vehicle is designed specifically for precision vegetation management on solar plants and other energy facilities. Real-time Kinematic GPS provides horizontal accuracy within one centimeter or less than an inch. The Renubot is safe, reliable, can mow during the day or night and significantly cuts vegetation management costs and carbon emissions.

The fact the Renubot can mow at night has been a game changer for some O&M managers, since it has never been done before. They like the fact the grass can be mown at night in a certain sector of the facility, before crews arrive in the morning for maintenance or repairs.

These are all major performance points new customers are interested in learning more about initially. We've developed artificial intelligence for autonomous navigation and multiple sensors for situational awareness. There are a number of other technological and communications capabilities that make it an autonomous vehicle unlike anything on the market today.

PES: So with your current growth, what has Renu learned collectively from its experiences in the field and how has that translated into the bot's performance and capability?

TM: We like to say Renu Robotics has an end-to-end understanding of vegetation management and how to meet utility solar plants' various needs, while increasing safety. As you know, every solar site is different in its design and specifications, so Renubot's ability to navigate precisely is a prerequisite, especially on utility-scale solar power plants, considering the limited space between the rows of panels and the wiring underneath.

The Renubot has a streamlined body frame that is only 28 inches high, to safely mow under panels and solar site infrastructure. It's powered by a sizeable lithium battery, so its weight is optimized by utilizing the latest battery storage techniques and rapid-charging capabilities, extending performance through seasonal changes and cutting requirements.

It can mow an estimated 100 acres or more per month. Each day the bot can mow six to seven acres during a six-hour cycle on a full charge.

A couple of other notable features include when its lidar detects something in its path, whether it's a ladder or equipment workers may have left behind, the bot stops, can go around it as well as wait for the object to be removed. It can mow a 15-degree incline easily, go through ditches and has a self-



Tim Matus

PES: Tim, it's good to talk to you again. Last time we interviewed you was late last Summer, 2021, so we're eager to hear about how Renu Robotics has been growing and the latest on the company.

Tim Matus: Thank you and it's great to talk to PES again. Yes, we've been growing at an accelerated rate since we last spoke and have been busy fulfilling orders for existing customers and talking to new ones. We're now four years old, have more than doubled in size and our primary core market remains US utility-scale solar power plants. We're operating in 14 states and will be in 17 by autumn. When we talk to new customers, one of the first things they say to us is 'We wish you guys had been around years ago.'

As the solar industry continues to grow and expand, so do the annual problems of vegetation management, especially this time



adjusting mowing deck, from 1.5 inches to 9.5 inches for rocky or uneven terrain.

Its innovative features include artificial intelligence and machine learning that controls energy usage optimization, self-diagnostics and operational area setup. The bot's enhanced environmental assessment capability will allow it to utilize data so it can learn and assess the topography it travels.

As we like to say, as the world's use of renewable energy increases toward a carbon-free economy, the Renubot is great for the environment and certainly helps in the fight against climate change.

PES: We noticed on your website that you've also expanded the company's capabilities. Your Recharge Pod and Mission Control rounds out a complete system for the bot, is that correct?

TM: Yes, that's right. It's like an ecosystem for the autonomous vehicle. We've responded to customers' requests on how Renubot can be a turn-key solution for their solar or energy facility and, at the same time, have continuous oversight and data collection that benefits their facility.

Think about it this way: you've heard of a SaaS model for software, but we've built a RaaS model, Robot As A Service.

Our system is complete with the Renubot mowing in the field anytime in a 24-hour

period and when it completes its cycle, it returns to its Recharge Pod to replenish its battery and can receive software updates there or in the field from Mission Control.

Mission Control is at Renu's corporate offices, where technicians continuously monitor, control and update the bots in the field. From a sales standpoint, we offer either ownership or a lease model, giving customers flexibility. But when they compare what they're currently paying for vegetation management, owning a fleet of Renubot makes fiscal sense.

So that's the overview of the RaaS model, but allow me to explain some components in more detail.

The Recharge Pod is 11 feet long and 7.5 feet wide. It's five feet in height, so the bot has plenty of room and it's tall enough that if someone needs to get in for some reason they can crouch and enter the pod. It weighs about 1,200 pounds and we coordinate with customers so there's a flat level surface where the pod will sit, preferably on concrete or a gravel base.

When the bot approaches the pod the doors are open and the bot slowly enters, connecting the charge contacts on the back of the bot and near the base of the pod to recharge in an eight-hour period or less until the next cycle. The pod provides protection in all climates and is normally equipped with three individual converters

for charging. A customer can add converters for a quicker charging cycle, up to six, in fact. But a pod with three converters is typical and its electrical setup can be either standard AC or DC or both, depending on the electrical availability.

If that's a problem, Renu has also designed and built its own solar skid that can be deployed anywhere, regardless of how remote the facility is in a carbon-free and stand-alone configuration. That's another environmentally friendly point, because owners and operators will never have to worry about fuel spills again.

The other critical piece we've built in the RaaS model is Mission Control. The operation continuously monitors, controls and updates the bots in the field. System access can allow for security checks, software updates and adjusting maintenance schedules.

Mission Control gives owners and operators peace of mind with a secure and encrypted data flow, allowing for a high-level overview of their facilities' maintenance plan. Whenever it's convenient, asset owners and O&M providers can monitor performance, location and schedules with computers, tablets or cell phones.

This center also allows for automatic reporting, triggering of alerts and allowing for text or email messages to be sent to any device. Mission Control is also linked to a Service Management System, allowing for a

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seamless transition for ‘trouble tickets’ and maintenance repair documentation.

You could say our RaaS model is taking vegetation management to an entirely new level.

PES: It certainly sounds like it. And with the growth of the solar industry in North America and worldwide, your market is exponentially expanding, isn’t it?

TM: No doubt about that. The US solar industry alone has a million acres of fields to maintain right now. Depending on the projection, the growth of the solar industry in North and South America, Europe and worldwide is expanding rapidly.

We have been so fortunate in that the timing for Renu Robotics was perfect, in retrospect. It’s as if the solar wave continues to gather momentum. About the time we started in

2018, the boom in interest in autonomous and electric cars was rapidly rising and the cost of the technology had dropped dramatically. Lidar and battery technology, though still costly, had reached a point where it made the opportunity and new business feasible.

We’re fortunate to be a part of it and are working hard to maintain our growth trajectory.

PES: So as busy as you’ve been since we last spoke, what’s next for Renu Robotics and what’s on the horizon?

TM: As we work hard to serve our existing customer base and fulfill new orders, we’re always looking ahead. All areas of the RaaS model I’ve described will continue to evolve.

There are several ideas being discussed about the future of Renubot. Most ideas range from possible tracks to concepts dealing with other vegetation management

measures, cleaning, inspection or security. When we’re talking to customers we’re also asking, ‘what do you need a bot to do for your facility?’ Sometimes the discussion is similar to the concepts I’ve mentioned and sometimes they’re not, but in the end, we’ll make market-driven decisions.

As far as the Recharge Pod is concerned, future development may center around anything from standardizing AC/DC charging capabilities to aesthetic design changes.

Mission Control will have the most extensive future expansion, from enhanced reporting and mapping to video and image capture from the Renubot. There will also be far more data collection possibilities to help O&M managers. Another aspect will be more real-time communications and chat capabilities between operators and a facility’s O&M staff.

So as you can tell, we’re not only solving problems in the field, but Mission Control is giving owners and operators more confidence with a secured and encrypted data flow about their facilities’ maintenance.

Overall, more and more asset owners and O&M managers are realizing that Renubot can cut maintenance costs significantly and give them an invaluable carbon-free solution to their annual maintenance issues.

A couple other points about Renu’s future. We have already entered other market verticals that we’ll be happy to discuss with anyone or company interested once we have non-disclosure agreements in place.

On the investment front, we are considering a Series A investment sometime in the future to serve the expanding utility-scale solar power industry and other verticals as well.

PES: Tim, thank you again for your time and telling us about Renu Robotics and the Robot As A Service model. You and your team really are putting innovation to work in solar and other industries. Good luck to you and Renu in the future.

TM: Thank you for the opportunity to discuss our recent growth and where Renu Robotics is headed. We believe our future’s bright and we’re looking forward to helping solar, energy and various other industries grow and prosper. I look forward to catching up again in the future.

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