

The Renubot, an all-electric autonomous vehicle

Vegetation management has a robotic future

Renu Robotics, based in San Antonio, Texas, is developing new innovations in autonomous technology for the renewable energy industry. PES spoke to CEO Tim Matus to learn more.

PES: Tim, tell us how Renu Robotics is serving the renewable energy industry – particularly solar – and what's the latest on the company's innovations?

Tim Matus: Certainly, and thanks for the opportunity to tell you about Renu Robotics. As the solar industry continues to grow, so do the annual problems of vegetation management. Not only are expenses increasing, but there are also labor shortages, reliability issues, damages and safety and environmental concerns. These are not easy problems to solve and can be a constant headache. It's one of those problems that if left unsolved, only grows worse with time.

The really good news is we've developed an innovative solution that puts technology to work for owners and operators of utility-scale solar power plants that solves all these issues. Renubot is our first all-electric fully autonomous vehicle that is designed specifically for precision vegetation management on solar plants and other energy facilities.

It can mow during the day or night, is safe, reliable and significantly cuts vegetation management costs and carbon emissions. As the world's use of renewable energy increases toward a carbon-free economy, such innovations are great for the environment, joining the fight in reversing climate change.

PES: On Renu's website we noticed the headline: our technology is a cut above the rest. Tell us more about those innovations.

TM: The Generation-3 Renubot has multiple innovative features that we have developed or enhanced from experience in the field. We've developed artificial intelligence for autonomous navigation and situational awareness via sensors. There are a number of other technological and communications capabilities that result in an autonomous vehicle unlike anything on the market today.

Its innovative features include artificial intelligence and machine learning that controls energy usage optimization, self-diagnostics and operational area setup.

The vehicle's enhanced environmental assessment capability allows the bot to utilize data so it can actually learn and assess the topography it travels.

PES: Earlier you mentioned Renubot is designed for precision vegetation management for solar plants and other energy facilities. That has to be a prerequisite, especially on utility-scale solar power plants, considering the limited space between the rows of panels and the wiring underneath, is that correct?

TM: Yes, absolutely and it has a streamlined body frame that is only 28-inches high to safely mow under panels and solar site infrastructure. Plus, being powered by lithium batteries, its weight is optimized by utilizing the latest battery storage techniques and rapid-charging capabilities, extending performance through seasonal changes and cutting requirements.

Plus, with Renu's success in the field, the company has an end-to-end understanding of vegetation management and how to meet utility solar plants' various needs, while increasing safety.

A couple of notable highlights of Renubot's capabilities are when it detects something in its path, whether it's a ladder or some 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 with no problem, go through ditches and wet areas and has a self-adjusting mowing deck for rocky or uneven terrain.

PES: We also see that your innovations don't stop at the Renubot, because you've also developed the Recharge Pod and a Mission Control Center. Are these part of an ecosystem for the autonomous vehicle?

TM: Yes, in essence, that's exactly what they are and also our response to customers' requests on how Renu Robotics can be a turn-key system for their solar or energy facility.

When the Renubot has finished mowing for that cycle it returns to its Recharge Pod where it recharges, is given updates for the next mowing cycle and is always protected from changing climate conditions or storage in the off-season.

The pod is equipped with three individual converters, but can be upgraded with nine individual converters for fast charging, allowing 24/7 mowing schedules with multiple tractors to be deployed.

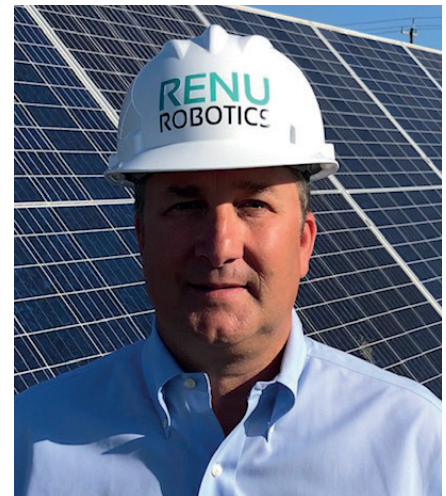
Plus, our solar charging skids allow the bots to be deployed anywhere, regardless of how remote the facility is in a carbon-free and stand-alone configuration.

In addition, we've built another department called Mission Control, in which the center continuously monitors, controls and updates the bots in the field. System access can allow for updates programming and adjusting maintenance schedules.

Mission Control gives owners and operators peace of mind with a secured and encrypted data flow indicating how their facilities are being maintained. At any time, asset owners and operation managers can monitor performance, location and schedules with computers, tablets or cell phones.

PES: The technology advancements are impressive. So tell us how you got started and what's next?

TM: We've grown quickly in the past three years, from an initial conversation I had with an old acquaintance, Mike Eyman. I'm a mechanical engineer and serial entrepreneur



Tim Matus

and in early 2018 I was thinking about starting an engineering and manufacturing company.

My background includes research and development at a Fortune 200 company in the Midwest along with several other successful start-ups. So while I was researching a few ideas, I became increasingly interested in the renewable energy industry.

Mike is a retired US Navy pilot and has been working in the solar industry for several years and he identified several new business ideas, including the cost and difficulty in maintaining large solar facilities, particularly in the vegetation management sector.

He has a strong belief that the process can be automated, which would translate to better costs and facility performance. I began to research and assess the business potential around the idea, including the size of the market, its potential growth and the technology available to achieve the task.

This revealed a sizable market opportunity with light competition. The technology to achieve this considerable feat had existed for years, but the cost traditionally was too expensive to use commercially.

But, as so often the case for new companies, the timing was right. With the boom in interest in autonomous and electric cars, the cost of the technology had dropped dramatically.

So, for instance, lidar and battery technology, though still costly, had reached a point where it would make this opportunity and new business feasible. About two months after the initial discussion between me and Mike, the business was launched.

I started putting together a development team, while Mike searched for initial investors. Both of us funded the development of the initial prototype of the autonomous mowing machine. The company was created in August 2018 and the initial prototype – Generation 1.0 – was completed a month later.



Mission Control technicians monitoring Renubots in the field



Another Recharge Pod on its way to a customer

Our first investor was a former top executive of SunPower, who could see the vision in the new technology. His investment in the fall of 2018 jumpstarted Renu Robotics.

Today, we're producing the Generation 3 Renubot, currently employ 24 people and are projected to double in size by mid-2022.

On the investment front, the company is actively preparing for a Series A investment round next year, as we're building to service the rapidly expanding utility-scale solar power industry.

PES: That's a great backstory, so has the company continued to gain momentum as

the word spreads about?

TM: Yes, it certainly has and more and more asset owners and O&M providers are realizing the Renubot can cut maintenance costs significantly and give them an invaluable carbon-free solution to their maintenance issues.

Not only are we solving problems in the field, but as I mentioned earlier, Mission Control also gives owners and operators peace of mind with a secured and encrypted data flow about their facilities' maintenance.

We will be at Solar Power International's annual convention in New Orleans in

September and if you're an owner or manager of a solar or other energy facility please stop by Booth 1507.

PES: Thank you for chatting to us, it's great to see innovation put to work in the renewable energy industry.

TM: Thanks again for the opportunity. We're excited about our disruptive role in shaping the future of vegetation management for the solar industry. As we like to say: renewable and carbon-free energy will power the future.

www.renubot.com



Renu Robotics' Mission Control