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前沿资讯

1．Deep Sand Technology, GEODNET Foundation Join Forces to Bring Affordable Precision Ag RTK Services to Rural North America(Deep Sand Technology、GEODNET Foundation联手为北美农村地区提供经济实惠的精准农业RTK服务)

简介：Deep Sand Technology and the GEODNET Foundation have joined forces to bring affordable precision agriculture Real-Time Kinematic (RTK) services to rural North America. Over the last two years, Deep Sand Technology (DST) has become the go-to source for affordable Autosteering and GPS Guidance for new and older equipment. Today, it announces the immediate availability of a GEODNET-compatible RTK base-station, supporting centimeter-accurate operations without the need to install a UHF radio link. Customers selecting the new GEODNET RTK base-station may reduce the total cost to retrofit a tractor by up to $2500, making it the most affordable RTK tractor steering system on the market.

The GEODNET RTK network comprises more than 3,600 stations globally, covering over 1,800 cities in 100+ countries today. The partnership between DST and GEODNET will rapidly extend affordable high-accuracy RTK-based GPS access into key US agricultural and rural areas, facilitating not only precision agriculture but also advanced cruise control systems in passenger cars, automated highway trucking operations, and eco-friendly electric robotic lawnmowers.

“Here at DST, we are always working to bring more affordable and simple precision agriculture technology to help improve farmers’ farming operations, regardless of how new or old their equipment is! DST started by introducing the FJ Dynamics Universal Autosteering System to the United States market, quickly becoming the largest dealer in North America. Unlike other systems sold in the United States, DST’s systems are all RTK unlocked, avoiding expensive unlock fees. However, even with an RTK unlocked solution, many farmers opt to avoid costly RTK network fees and base stations by using the less accurate and less repeatable free WAAS signal. For quite some time now, DST has been searching for an affordable and easy option to provide farmers with RTK accuracy, eliminating steering overlap and opening the door to other farming practices they couldn’t do before! It was an easy decision to partner with the GEODNET Foundation because GEODNET’s affordable RTK is both easy to use and works on all major brands,” said Joey Koebelen, CEO of Deep Sand Technology.

“On behalf of the GEODNET Foundation community, we are delighted to welcome Deep Sand and its customers to experience the benefits of a fully modernized triple-frequency, four-constellation RTK network that provides reliable centimeter accuracy for autosteering operations. With farm operations facing limited labor resources and rising input costs, emerging technologies, such as those provided by GEODNET and Deep Sand Technology, are key to keeping healthy, affordable food on the table,” said Mike Horton, Creator of the GEODNET Foundation.

来源：Business Wire；Global Ag Tech Initiative；

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2．The First Robotics Plant Dedicated to Agriculture to Begin Production in the American Midwest(美国中西部第一家致力于农业的机器人工厂开始生产)

简介：Solinftec, a global leader in artificial intelligence solutions and sustainable agricultural practices, strengthened its partnership with Wabash Heartland Innovation Network (WHIN) and expanded its manufacturing capacity in the U.S. through collaboration with Still Waters Manufacturing. The production of the Solix robot in the WHIN region of Indiana strengthens Solinftec's presence in the United States from the last quarter.

The collaboration and efforts of the companies will make robotic technology more accessible to American producers, leading to a significant reduction in herbicide use and promoting sustainable agriculture. "This partnership represents a significant milestone for the U.S. agricultural industry, and it's gratifying to see two companies from our network bringing innovation to our region. Collaboration among all parties was crucial to the success of this project," says Johnny Park, CEO of WHIN.

The factory, with the capacity to produce up to 20 Solix robots per day, benefits from the experience of Jake Church, CEO of Still Waters Manufacturing. "There's something truly special about building these robots in rural Indiana. They will come out of what used to be a school, where many farmers and livestock producers in this area received their primary education. This venture is an opportunity to 'rewrite' history. A dear friend of mine often says, 'If you want to know the future, go build it,'" Church states. The business received an initial investment of over 2 million dollars from Solinftec for the next two harvests, ensuring continued annual growth.

"This will be the first agricultural robotics factory in the American Midwest," added the CEO of Still Waters Manufacturing. The team involved in Solix manufacturing will consist of workers living near the region served by Still Waters Manufacturing, with many of them being local farmers. "This work brings the community close, seeking to develop and innovate agriculture in the region with technology," says Guilherme Guiné, Chief Operations Officer of Solinftec for North America.

The use of Solinftec solutions has already led to a reduction of up to 97% in herbicide volume on properties using the Solix robot in the United States. The key differentiator is that, through the collaboration of the three companies, the solutions will be adapted to the reality of the American Midwest.

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3．North Carolina Is Sowing Seeds of Success for AgTech Startups(北卡罗来纳州正在为农业科技创业公司播下成功的种子)

简介：There is a powerful competitive advantage for AgTech startups located in North Carolina, with the key determinant of success being proximity to a healthy ecosystem that provides access to talent, patient capital, entrepreneurial development, and existing market opportunities in the context of a supportive and committed legislature. It is by no accident, reports AgReads, that North Carolina is one of the most fertile AgTech startup ecosystems in the world; the state's government in collaboration with some of the top research and agriculture institutions in the US, alongside the world's largest agricultural companies, have worked diligently to leverage the human and natural capital abundant in the region. Agribusiness is the number one industry in North Carolina, contributing in excess of $100B last year towards the state's economy. As such, North Carolina is one of the top agricultural producers in the US through its broadly diverse offerings, including hogs and poultry, sweet potatoes, tobacco, soybean and Christmas trees. For the second year in a row, North Carolina is ranked as the #1 state for business in the US, scoring highest in the nation for its workforce and near the top of the list in the areas of the economy, technology, innovation, and education, bolstered by a business-friendly corporate tax rate currently at 2.5% that will be eliminated by 2030.

Indeed, North Carolina is now a global powerhouse in the AgTech innovation space, showcasing Research Triangle Park (RTP), which places in the top 10 Global AgTech & New Food Startup Ecosystems lauded for its knowledge base, startup experience, talent, and performance. In 1959, a public-university-industry collaborative effort to leverage the state's rich farming heritage and large talent pool, resulted in the formation of the RTP in Durham, currently the largest high-tech research and development park in the US, that coalesced into a force of attraction drawing in the world's largest agricultural corporations the first step in anchoring and driving the development of the AgTech ecosystem in North Carolina. Ryan Combs, Executive Director of the Research Triangle Regional Partnership (RTRP), champions Central North Carolina and the surrounding region, "Being the best comes naturally to us. The Research Triangle Region is not only where innovation is made, it's where innovation is put to work."

Since 1960, North Carolina has been home, at one time or other, to the world's largest agricultural companies including BASF, Syngenta, Novozymes, Bayer, Monsanto, UPL, Corteva (DuPont), ADAMA, NuFarm Americas, Verdesian, Plant Health Care and Mosaic Biotech, in large part the result of the preeminent US example of a state-led recruitment effort to attract high-tech companies. This laid the foundation for a powerful business platform on which nearly 200 AgTech and new food sector companies currently operating in North Carolina have built their successes.

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学术文献

1．Introduction to the special section on emerging technologies in navigation, control and sensing for agricultural robots: Computational intelligence and artificial intelligence solutions（农业机器人导航、控制和传感新兴技术专题介绍；计算智能和人工智能解决方案）

简介：Driven by the agricultural modernization and continuous popularization of big data, Internet of Things (IoT), machine learning, 5 G networks, electronics and automation technology, agricultural robots have been widely applied to both indoor and outdoor environments in smart agriculture, such as sowing, fertilization, weeding, plant protection, pesticide spraying, harvesting, sorting and so on. Agricultural robots have great potential to improve agricultural productivity and replace human labor in times of labor scarcity in the coming decades.

Navigation, control and sensing as core techniques of agricultural robots are of great importance in ensuring the satisfactory performance of agricultural robots in practical applications. Due to the complexity of external static and dynamic environment such as weather, soil, crops and unpredicted obstacles as well as the parameter uncertainties and disturbances, not only will the operation performance of agricultural robots be affected, but also their robustness and reliability become weak. In recent years, in order to further address the above concerns and improve the performance of agricultural robots, various computational intelligence (CI) and artificial intelligence (AI)-based methodologies have been adopted to assist with the navigation, control and sensing of agricultural robots.

This special section intends to address the latest designs and methodologies of the CI & AI-based navigation, control and sensing for agricultural robots.

A total of 18 papers were submitted. Each paper was reviewed by three or more experts during the assessment process. After evaluating the overall scores, nine papers were selected for inclusion in this special section. The selected papers present in-depth studies of practical issues and challenging problems in CI & AI-based navigation, control and sensing for agricultural robots.

We hope that this special section provides researchers with most recent advances and developments of navigation, control and sensing for agricultural robots via CI and AI solutions. Meanwhile, practical technical concerns and challenges of the CI and AI technologies in agricultural robots are also addressed. The guest editors hope that the topics covered in this special section can greatly assist the readers, researchers and engineers in enhancing their knowledge and skills in CI and AI-based navigation, control and sensing for agricultural robots.

The guest editors would like to thank the authors for their contributions and all the reviewers for their constructive comments. We also sincerely thank the Editor-in-Chief for his great support and encouragements, as well as the Journal's editorial staff for their help in the preparation of this special section.

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2．Recent Advancements in Agriculture Robots: Benefits and Challenges(农业机器人的最新进展：优势与挑战)

简介：In the development of digital agriculture, agricultural robots play a unique role and confer numerous advantages in farming production. From the invention of the first industrial robots in the 1950s, robots have begun to capture the attention of both research and industry. Thanks to the recent advancements in computer science, sensing, and control approaches, agricultural robots have experienced a rapid evolution, relying on various cutting-edge technologies for different application scenarios. Indeed, significant refinements have been achieved by integrating perception, decision-making, control, and execution techniques. However, most agricultural robots continue to require intelligence solutions, limiting them to small-scale applications without quantity production because of their lack of integration with artificial intelligence. Therefore, to help researchers and engineers grasp the prevalent research status of agricultural robots, in this review we refer to more than 100 pieces of literature according to the category of agricultural robots under discussion. In this context, we bring together diverse agricultural robot research statuses and applications and discuss the benefits and challenges involved in further applications. Finally, directional indications are put forward with respect to the research trends relating to agricultural robots.
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3．Incorporating Artificial Intelligence Technology in Smart Greenhouses: Current State of the Art(将人工智能技术融入智能温室：当前技术现状)

简介：This article presents the current state-of-the-art research on applying artificial intelligence (AI) technology in smart greenhouses to optimize crop yields, water, and fertilizer use efficiency, to reduce pest and disease, and to enhance agricultural sustainability. The key technologies of interest were robotic systems for pesticide application, irrigation, harvesting, bio-inspired algorithms for the automation of greenhouse processes, energy management, machine path planning and operation of UAVs (unmanned aerial vehicles), resolution of scheduling problems, and image signal processing for pest and disease diagnosis. Additionally, the review investigated the cost benefits of various energy-management and AI-based energy-saving technologies, the integration of photovoltaics and dynamic pricing based on real-time and time-of-use metrics, and the cost benefits of LoRa, Wi-Fi, Bluetooth, ZigBee, mobile, and RFID (radiofrequency identification) technologies. The review established that commercially viable AI technologies for agriculture had increased exponentially. For example, AI-based irrigation and soil fertilizer application

enabled farmers to realize higher returns on investment on fertilizer application and gross returns above the fertilizer cost, higher yields, and resource use efficiency. Similarly, AI image detection techniques led to the early diagnosis of powdery mildew. The precise operation of agricultural robots was supported by the integration of light imaging, detection, and ranging (LIDAR) optical and electro-optical cameras in place of the traditional GPS (geographic positioning systems) technologies, which are prone to errors. However, critical challenges remained unresolved, including cost, disparities between research and development (R&D) innovations and technology commercialization, energy use, the tradeoff between accuracy and computational speeds, and technology gaps between the Global North and South. In general, the value of this review is that it surveys the literature on the maturity level of various AI technologies in smart greenhouses and offers a state-of-the-art picture of how far the technologies have successfully been applied in agriculture and what can be done to optimize their usability.

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