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农牧业信息化专题

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前沿资讯

1. Agricultural robot shipments to increase sharply（农业机器人出货量将大幅增长）

简介：Global shipments of agricultural robots will increase at a fast pace over the next several years.

According to a new report from Tractica, global shipments of agricultural robots will increase at a fast pace over the next several years, rising from approximately 60,000 units annually in 2018 to more than 727,000 by 2025.

UAVs to top the list

The market intelligence firm anticipates that UAVs will top the list among agricultural robot categories, followed by driverless tractors, material management robots, soil management robots, and dairy management robots. Tractica forecasts that such shipments will drive a total annual market value of $ 87.9 billion worldwide by 2025.

"Robots and automation technologies have the potential to dramatically improve crop quality and yields, reduce the amount of chemicals used, solve labor shortages, and provide hope for the economic sustainability of smaller farming operations," says senior analyst Glenn Sanders.

Strong demand for robots

Sanders adds that these factors are driving strong demand for robots throughout the farming process, including planting, pruning, weeding, pick-and-place, sorting, seeding, spraying, harvesting, and materials handling.

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http://agri.ckcest.cn/file1/M00/00/01/CsgkOV1BXnaAbXhxAAXtBvaGSes375.pdf

2. Nauru 500C drone maps up to 16,000 ha in one flight（Nauru 500C无人机一次飞行可覆盖16000公顷土地）

简介：The Brazilian Nauru 500 C drone, made by XMobots, has a flying range of 4 hours. This capacity is perfect for over 2,400 big farms that have more than 10,000 ha all over the country.

Drone usage is revolutionising farms across the world and companies strive to fulfill the needs of producers. The XMobots Nauru 500C is designed for mapping and surveillance especially over large properties thanks to features as flight autonomy, hybrid operation, connectivity and cameras.

16,000 ha in one go

Recently released in Brazil, during Drone Show in São Paulo, the equipment allows flights of up to 4 hours, while covering 16,000 ha in one go. Those numbers are ensured under conditions such as 1,300 meters of altitude, 30º degrees and average windspeed of 18 km/h.

"This is the greatest capacity of all Brazilian civil drones. Nauru is perfect for breaking

barriers", according to Thatiana Miloso, commercial director of XMobots. The company operates in the Brazilian market since 2007 and is one of the most important developers and manufacturers of drones in the country.

2,400 farms larger than 10,000 hectares

According to IBGE (Brazilian Institute for Statistics), Brazil has 2,400 farms larger than 10,000 hectares, which cover a combined total of 51,8 million hectares for agriculture, livestock and original vegetation. Thus, that is an interesting solution for big players in soy, maize, sugar cane, cotton and even cattle, among others.

This drone weights 25 kg, is able to face winds of 60 km/h per hour and achieves 90 km/h of cruise speed. Its maximum speed is 110 km/h and it can reach an altitude of over 1,300 meters.

"Due to its high covering capacity, Nauru targets large farms, either private groups or private producers. Crops such as sugar cane, grains and forestry have been the most demanded to that technology", says Thatiana Miloso.

Vertical take-off and landing and fixed-wing design

The Nauru 500C combines the ability to take-off and land vertically (VTOL) with a fixed-wing design. This hybrid engineering makes for easy take-offs and landings, just like with a small multirotor drone, whilst it has the larger flying range of a fixed wing drone. "Nauru does not need a runway for landing or take-off, which can be a hurdle. In other words, it combines the best of both worlds", says Miloso.

Regarding images , this tool offers mapping sensors usage (2 24mm Pixels cameras equipped with 30mm fixed-lens RGB), or 2 Multispectral cameras (R, G, B, Nir and RedEdge with 24mm Pixels and 30mm fixed-lens) in order to provide great accuracy (within centimeters) without control points.

XMobots provides further details about the Nauru 500C image system. They use a direct connection to GNSS Trimble bases (Global Navigation Satellite System) as well a surveillance system with stabiliser gimbals and real time transmission of videos on RGB and Thermal spectra with 640x480 resolution.

Connectivity

Connectivity is pivotal for that. Nauru adopts an antenna and radio signal in order to reach at least 30 km, however, its maximum range can increase to 60 km under favourable weather conditions. Its primary frequency is homologated by XMobots and functions on 925 MHz. Further communications, as RTK base transmissions to the control station, use WiFi technology.

Prices start at R$ 338,000 (80,000 euros) and can go up to R$ 770,000 (182,000 euros) depending on the specifications. "The first Nauru 500C will be delivered to a client in August and we have a further 4 scheduled for delivery in 2019 for now. The product has been launched end of June", says Thatiana Miloso.

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3．Yanmar demonstrates autonomous tractors（Yanmar公司展示了自动拖拉机）

简介：Yanmar公司在泰国演示了自动拖拉机精确定位技术的应用。

Yanmar公司参加了由日本国际协力机构（JICA）和由泰国和日本组织组成的工作组举行的实地试验，以证明如何在自主农业设备中使用精确定位技术。在泰国首都曼谷东南部的春武里府斯里兰卡区举行的示范活动，引起了人们对农业自主技术节省劳动力潜力的关注。

维持和提高农业生产力所需的机器人

Yanmar说，随着农业人口的预计下降，即使在泰国，也需要机器人农业技术来维持和提高农业生产力。该示范活动是与泰国政府的合作举办，目的是进一步发展精确定位技术。Yanmar公司将在泰国进行这款2018年10月在日本上市的机器人拖拉机的测试。

Yanmar希望通过参与示范活动，进一步发展泰国的农业技术，同时通过提供省力、高效的农业机械和先进的IT和通信技术支持的服务，为实现可持续农业做出贡献。

YT5113A机器人拖拉机-主要特点

两种自主操作模式

除了前进，“自动模式”允许拖拉机自动倒车、停止和执行转弯。在“线性模式”下，拖拉机在耕地时，当用手进行某些驾驶操作（例如转弯）时，拖拉机可以在耕种土地时自行前后移动。在2系列中，可以在这两种模式之间切换，允许您为不同的操作员或根据个人技能和工作本身进行定制。

通过直观的操作和高精度的定位，提高了可操作性

操作和设置通过一个耐用的、防尘和防水的10英寸平板电脑来控制，以确保在恶劣的农业环境中的可靠性。此外，它允许1人操作2台拖拉机，因为在有人驾驶拖拉机的平板电脑上可以用来操作无人驾驶拖拉机，并使其与有人驾驶拖拉机并排，甚至反向操作。

广泛的安全设备让您安心

机器人拖拉机能够在操作员的监视下进行无人驾驶和操作，它的大量传感器和安全灯为接近它的人提供了安全保障。此外，用户还可以在控制面板上执行紧急停车等功能。

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http://agri.ckcest.cn/file1/M00/06/8D/CsgkOF1BVgeATXnaAAfZb6yx9Rs309.pdf

4．New, portable tech sniffs out plant disease in the field（新的便携式技术“嗅出”田间的植物病害）

简介：Researchers at North Carolina State University have developed portable technology that allows farmers to identify plant diseases in the field. The handheld device, which is plugged into a smartphone, works by sampling the airborne volatile organic compounds (VOCs) that plants release through their leaves.

"All plants release VOCs as they 'breathe,' but the type and concentration of those VOCs changes when a plant is diseased," says Qingshan Wei, an assistant professor of chemical and biomolecular engineering and corresponding author of a paper on the work. "Each disease has its own signature profile of VOCs. So, by measuring the type and concentration of VOCs being released by the plant, you can determine whether a plant is diseased and - if it is

diseased - which disease it has.

"Our contribution here is the creation of a device that can be plugged into a smartphone and used to make those VOC measurements quickly in the field," says Wei, who is also a faculty member in NC State's Emerging Plant Disease and Global Food Security cluster.

Current disease identification techniques rely on molecular assays, which take hours to perform and - most importantly - have to be done in a lab. Getting a sample to the lab, where the sample may have to wait to be tested, can delay disease identification by days or weeks.

"Our technology will help farmers identify diseases more quickly, so they can limit the spread of the disease and related crop damage," says Jean Ristaino, William Neal Reynolds Distinguished Professor of Plant Pathology at NC State, co-author of the paper and director of the cluster. "We are now ready to scale up the technology."

Here's how the technology works. If a farmer suspects that a plant may be diseased, he or she can take a leaf from the relevant plant and place it in a test tube. The test tube is then capped for at least 15 minutes to allow the relevant VOCs to accumulate. After this incubation period, the cap is removed and the farmer uses a narrow, plastic tube to pump the VOC-laden air into a "reader" device connected to a smartphone.

The air is pumped into a chamber in the reader that contains a paper strip. The paper is embedded with an array of chemical reagents that change color when they come into contact with a specific chemical group. By evaluating the resulting color pattern on the strip, users can determine the nature of any plant disease that may be affecting the plant.

"For this technology to work, we had to develop reagents that could be embedded in the paper strips," says Zheng Li, a postdoctoral researcher at NC State and first author of the paper. "About half of the reagents were off-the-shelf organic dyes, but the other half were gold nanoparticles that we functionalized to respond to specific chemical groups. These functionalized nanoparticles allow us to be more precise in detecting various types of VOCs."

"We also had to design and build the reader device, since there is nothing like it on the market," says Wei.

In proof-of-concept testing, the researchers demonstrated the device's ability to detect and classify 10 plant VOCs down to the parts-per-million level. They were able to detect the late blight pathogen that caused the Irish famine two days after tomato plants were inoculated with the pathogen. Researchers could also distinguish tomato late blight from two other important fungal pathogens that produce similar symptoms on tomato leaves. In addition, the researchers showed they could detect the pathogen Phytophthora infestans in tomato leaves with greater than 95% accuracy.

"We've shown that the technology works," Wei says. "There are two areas where we could make it even better. First, we would like to automate the pattern analysis using software for the smartphone, which would make it easier for farmers to make disease determinations.

"Second, we envision the development of customized reader strips that are designed to measure the VOCs associated with other diseases specific to a given crop. Different crops in different regions face different threats, and we could develop paper strips that are tailored to address those specific concerns.

"This kind of innovation is an integral part of the goals of the NC State Plant Sciences

Initiative, which aims to develop new technologies that will improve food production through interdisciplinary science," Wei says.

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学术文献

1．Computer vision-based phenotyping for improvement of plant productivity: a machine learning perspective（提高植物生产力的计算机视觉表型分析:一个机器学习的视角）

简介：Employing computer vision to extract useful information from images and videos is becoming a key technique for identifying phenotypic changes in plants. Here, we review the emerging aspects of computer vision for automated plant phenotyping. Recent advances in image analysis empowered by machine learning-based techniques, including convolutional neural network-based modeling, have expanded their application to assist high-throughput plant phenotyping. Combinatorial use of multiple sensors to acquire various spectra has allowed us to noninvasively obtain a series of datasets, including those related to the development and physiological responses of plants throughout their life. Automated phenotyping platforms accelerate the elucidation of gene functions associated with traits in model plants under controlled conditions. Remote sensing techniques with image collection platforms, such as unmanned vehicles and tractors, are also emerging for large-scale field phenotyping for crop breeding and precision agriculture. Computer vision-based phenotyping will play significant roles in both the nowcasting and forecasting of plant traits through modeling of genotype/phenotype relationships.

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