2019年第23期总190期

农牧业信息化专题

本期导读

前沿资讯

1. 宜昌农业实现“机器换人” 田野上的革命静悄悄

2. 无人驾驶飞机改善灌溉

3. 荷兰耕作农业中无人机的使用翻了一番

学术文献

1.利用与上下文独立的逐像素分割实现精准农业的作物和杂草分类

2. 一种多传感器机器人平台，用于地面测绘和超出可见光谱的估算

中国农业科学院农业信息研究所
联系人：王晶静
联系电话：
邮箱：agri@ckcest.cn
2019年6月10日

前沿资讯

1．宜昌农业实现“机器换人” 田野上的革命静悄悄

简介：今年“三夏”农忙时节，宜东平原上，鲜见低头劳作的农民，取而代之的是一台台轰鸣的农用机械。从种植到收获、从粮油到菜果，农业生产全过程“机器换人”革命加速推进，“面朝黄土背朝天”的传统农业时代渐行渐远。连日来，我们深入当阳、枝江等地的田间地头，近距离感受“机器换人”给传统农业带来的深刻变革。

6万余台铁牛“三抢”显身手。5月上旬以来，宜昌市110多万亩油菜、59万亩小麦等夏收作物陆续成熟，100余万亩中稻等夏种作物播栽在即。然而，天公不作美，在此期间，全市阴雨天气频繁，给夏收夏种带来一定困难。抢晴天、战阴雨，与时间赛跑，保颗粒归仓，在夏收夏种的各个环节，各式农机在广袤田间大显身手——犁田有旋耕机、栽秧有育秧机、收获有收割机、除湿有烘干机。近段时间，枝江市信达农机专业合作社农机手郭明勇忙得不可开交，他每天驾着“铁牛”，穿梭于田间地头，为农户抢收抢播。“正常情况下，一人一台收割机1小时可收割大小麦3至5亩，比人工收割效率高30倍左右。”信达合作社负责人易玉林告诉我们，合作社为农户提供耕地、播种、田管、收获、统一防治病虫害、统一配方施肥等一条龙全程机械化服务，服务面积达3万多亩。在宜昌，像信达这样的农机社会化服务组织遍地开花，数量达503家，从业人员达9900余人，承担了全市30%以上的农机作业量。日渐健全的农机社会化服务体系，让农机走进更多农户家中。农忙时节，服务主体数量多，农户需求急，信息如何有效对接？宜昌市接入了全省智慧农机服务平台，农机手只要在手机上关注微信公众号“荆楚农机服务版”，哪里有作业需求、需要什么机械一目了然。今年“三夏”生产期间，全市组织联合收割机、插秧机、耕整机等各类农业机械6万余台（套），加上河南、安徽等跨区作业农机1000多台（套），基本满足了夏收夏种需求。

现代农机让传统农业渐行渐远。高效植保机、插秧机、收割机、中小型拖拉机……在位于枝江市百里洲镇的国家级示范社—守华农机专业合作社的大院里，100多台（套）农机整齐排列，仿佛等待检阅的士兵方阵。“这些农用机械是咱的宝贝，本领大着呢。”合作社负责人朱守华幽默的话语中洋溢着自豪。科技化、智能化、集约化的农机装备，正改变着千百年来传统农业手工劳动的作业方式，大大减轻了农民的劳动强度，显著提升了劳动效率。“农业机械化是农业现代化的重要标志，推进农业机械化对改造提升传统农业、促进传统农业向现代农业转变具有重要作用。”市农业农村局农业机械化管理科科长彭欣介绍，截至目前，全市农机总动力达301.87万千瓦，拖拉机保有量达9.21万台，拖拉机配套农机具达26.82万台（套），主要农作物耕种收机械化综合作业率达70.1%，基本实现了农业机械化。种田大户、合作社、家庭农场等新型经营主体如雨后春笋般涌现，对新型实用农机的需求更加旺盛。在补贴政策的激励下，宜昌市农民购买农机的热情高涨。据统计，今年前5个月，全市农机购置补贴资金使用近2000万元，共补贴各类农机具5360台，4401个农户受益。农机总量增加的同时，结构也在不断优化。宜昌市大力引进推广高效、低耗、智能、绿色的农机装备和技术，“互联网+北斗+农机”实现了农机化与信息化高度融合。近年来，全市累计推广北斗农机终端400套，铺设山地轨道运输线100条，农机装备的科技化、智能化、集约化水平不断提升。

靶向发力加快“机器换人”步伐。宜昌市的农机化事业在经历了“黄金十年”的发展后，农机化装备、作业、安全、管理和社会化服务水平得到了大幅提升，但依然存在拖拉机总量呈小型化配套比较低、机械化作业与基础设施不配套的矛盾加剧等问题。尤其是占全市国土面积大半以上的丘陵山区县，按现有的农机化综合水平考核办法，县域

主要农作物农机化综合作业水平低于50%，是制约全市农机化水平的突出短板。丘陵山区，土地碎片化，人均耕地少，土壤条件差且含大量石块，农机作业时易损坏机具，机具上山下山都不方便，许多大型农机难以施展拳脚，茶叶、林果、马铃薯等经济作物机械化运用进程缓慢。如何补齐短板？宜昌市将目光聚焦“薄弱环节”，从更新换代农机装备、推进全程机械化等方面寻找突破口。开展农机装备提升行动，在提高农机装备总量的前提下，引导农户和新型农业经营主体购买大功率、高性能、复式作业机械，把农机装备提高到一个新水平。因地制宜推动农机化加快向经济作物、养殖业、林果业、加工业扩展，从产中向产前产后延伸，向全面、全程化迈进，促进一二三产业融合，实现高质量发展。土地的适度规模化，是农业机械化的基础。宜昌市农业农村局党组成员、工会主任覃虎挺表示，宜昌市将整合利用高标准农田建设、农业综合开发等项目资金，进行平田整地、建设机耕道，打通机器进田的“最后一公里”，加快“机器换人”步伐。（供稿：宜昌市农业农村局 通讯员方素珍）

来源：新浪湖北

发布日期:2019-06-03

全文链接:

http://hb.sina.com.cn/yichang/2019-06-03/detail-ihvhiqay2792094.shtml

2. Autonomous drone improves irrigation（无人驾驶飞机改善灌溉）

简介：Engineers from Australian Monash University in Melbourne are using autonomous drone technology to improve irrigation practices. Eventually the drone technology will be used to reduce the use of water and optimise yield. Professor Jeff Walker from the Australian Monash University has been working on soil moisture mapping through remote sensing for more than 15 years. “Nasa, European Space Agency and the Japanese space agencies have had soil moisture teams for their various satellites,” he explains. “But the challenge of these satellite missions has been course resolution. It was really too course for agriculture. My idea was: how can we help agriculture and improve on this?”

Global warming. Walker emphasises that Australia is one of the driest continents on earth and is becoming even drier with global warming. “We were wondering how we could bring improved mapping technology to farmers in a way that they need it. Basically the way to improve this spacial resolution is moving the technology closer to the ground.”

Optical technology. The team of Monash University started with optical technology to make sure the concept worked. “We used it as a stepping stone to microwave technology,” says Prof Walker. He explains that the full system should work autonomous. “I am not focusing on the flying function at the moment, although I think that is an important step and can be easily done. Having said that, there are regulations at the moment that preclude this. But hopefully going forward we will be able to go around those regulations.”

Autonomous soil moisture mapping system. In the tests with optical technology Prof Walker and his team have been focusing on an autonomous soil moisture mapping system for irrigated paddocks. There were tests at a dairy farm using a centre pivot irrigator and at a crop farm using a linear shift irrigator. Prof Walker: “We made some moisture maps and compared those to ground measurements. We demonstrated that it is possible to get autonomous maps.”

Microwave sensing technology on drones. In the past 2 years Prof Walker and his

team performed tests with optical cameras. Now the team focusses on passive microwave sensing technology on drones, using L-band waves. The team is planning to start tests with a L-band microwave system in September. “It will give us a far more accurate picture than the optical mapping did. Vegetation will not affect the picture of the soil too much.” In the long run the team wants to use P-band microwave technology. “The P-band is a longer wave again,” he says. “The vegetation will be almost entirely transparent using P-band. Also the depth into the soil will be greater. We will see 10 to 15 centimetres into the soil.”

来源： Future Farming

发布日期:2019-05-30

全文链接:

http://agri.ckcest.cn/file1/M00/06/70/CsgkOFOCDbiAWcVBAAbUdNLxxbg307.pdf

3. Use of drones doubled in Dutch arable farming(荷兰耕作农业中无人机的使用翻了一番)

简介：2019年，荷兰4%的农民使用无人机。与2018年相比，无人机的使用增加了一倍多。根据AgriDirect的数据，2018年，荷兰只有1.8%的耕地农民使用无人机。这家荷兰农业营销机构向荷兰农民询问了有关其农业活动、未来计划和未来投资的问题。大约1000名农民回答了有关无人机使用的问题。毫不奇怪，大型农场部署无人机的频率要高于小型农场；超过100公顷的农民中有12.3%使用无人机；在10到20公顷的农场中，只有1.8%的农场使用无人机。19.2%的受访农民表示，他们有兴趣使用无人机优化作业，而在2018年，13.4%的人对无人机感兴趣。同样，规模较大的农场比规模较小的农场对无人机表现出更大的兴趣。在100公顷或以上的农场中，有31.2%对使用无人机有兴趣；拥有10到20公顷土地的农场表现出最低的兴趣:11.7%。

来源： Future Farming

发布日期:2019-05-28

全文链接:

http://agri.ckcest.cn/file1/M00/06/70/CsgkOFOCDoqAe7WYAAHz7xC1YRM306.pdf

学术文献

1. Crop and Weeds Classification for Precision Agriculture using Context-Independent Pixel-Wise Segmentation(利用与上下文独立的逐像素分割实现精准农业的作物和杂草分类)

简介：Precision agriculture is gaining increasing attention because of the possible reduction of agricultural inputs (e.g., fertilizers and pesticides) that can be obtained by using high-tech equipment, including robots. In this paper, we focus on an agricultural robotics system that addresses the weeding problem by means of selective spraying or mechanical removal of the detected weeds. In particular, we describe a deep learning based method to allow a robot to perform an accurate weed/crop classification using a sequence of two Convolutional Neural Networks (CNNs) applied to RGB images. The first network, based on an encoder-decoder segmentation architecture, performs a pixel-wise, plant-type agnostic, segmentation between

vegetation and soil that enables to extract a set of connected blobs representing plant instances. We show that such network can be trained also using external, ready to use pixel-wise labeled data sets coming from different contexts. Each plant is hence classified between crop and weeds by using the second network. Quantitative experimental results, obtained on real world data, demonstrate that the proposed approach can achieve good classification results also on challenging images.

来源：2019 THIRD IEEE INTERNATIONAL CONFERENCE ON ROBOTIC COMPUTING (IRC 2019)

发布日期:2019-03-28

全文链接:

http://agri.ckcest.cn/file1/M00/06/70/CsgkOFz4w4-APlzyABvaF75UjTY469.pdf

2. A multi-sensor robotic platform for ground mapping and estimation beyond the visible spectrum（一种多传感器机器人平台，用于地面测绘和超出可见光谱的估算）

简介：Accurate soil mapping is critical for a highly-automated agricultural vehicle to successfully accomplish important tasks including seeding, ploughing, fertilising and controlled traffic, with limited human supervision, ensuring at the same time high safety standards. In this research, a multi-sensor ground mapping and characterisation approach is proposed, whereby data coming from heterogeneous but complementary sensors, mounted on-board an unmanned rover, are combined to generate a multi-layer map of the environment and specifically of the supporting ground. The sensor suite comprises both exteroceptive and proprioceptive devices. Exteroceptive sensors include a stereo camera, a visible and near-infrared camera and a thermal imager. Proprioceptive data consist of the vertical acceleration of the vehicle sprung mass as acquired by an inertial measurement unit. The paper details the steps for the integration of the different sensor data into a unique multi-layer map and discusses a set of exteroceptive and proprioceptive features for soil characterisation and change detection. Experimental results obtained with an all-terrain vehicle operating on different ground surfaces are presented. It is shown that the proposed technologies could be potentially used to develop all-terrain self-driving systems in agriculture. In addition, multi-modal soil maps could be useful to feed farm management systems that would present to the user various soil layers incorporating colour, geometric, spectral and mechanical properties.

来源：PRECISION AGRICULTURE

发布日期:2018-09-10

全文链接:

http://agri.ckcest.cn/file1/M00/06/70/CsgkOFz4w46AMLDtAFPZDlsD6zg649.pdf