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《智慧农业发展战略研究》专题快报

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【动态资讯】

1．为乡村振兴添“专”加“力”——华为携智慧畜牧解决方案亮相2021畜博会

【中国农网】实施乡村振兴战略，既是畜牧业发展的重要任务，也是重大机遇。推动畜牧业在农业中率先实现现代化，是畜牧业助力“农业强”的重大责任，也是实现高质量发展的重要举措。5月18日，第十九届畜牧业博览会在江西南昌开幕。华为作为中国畜牧业协会信息分会的副会长单位，全方位参与本次畜牧盛会：在S5馆展示智慧畜牧解决方案，先后参与中国畜牧业数字化智能化解决方案专场会议、中国智慧猪场发展高峰论坛、养殖设备产业数字化发展峰会，并作主题分享。通过场景化展示、互动式体验、理论实践分享等形式，向业界展示华为智慧畜牧领域的最新方案及经验成果，与伙伴及客户共同探讨畜牧业数字化、现代化的发展方向。

链接:

http://agri.ckcest.cn/file1/M00/02/D5/Csgk0WCnPR2AOk1ZAAzkEp1z8P0402.pdf

2．新型全自动蔬菜移栽机破解传统移栽难题

【农民日报】针对整排迎面取苗出现的带苗现象，团队继续进行技术攻关，在国内最先研发使用气缸驱动四针取苗结构，完成夹取钵苗和释放钵苗，改整排取苗为间隔取苗、旋转分苗为固定分苗，提高取投苗精准度的同时，大大减少了夹带苗和对苗的损伤。除了可靠的给苗部件和取苗部件是实现全自动移栽的关键外，栽植深度也是衡量移栽机栽植性能的重要指标之一。团队首创的电动栽植器，通过传感器感知实现了株距任意调节。“机手只需在操作屏幕上输入相关数字，就可以实现栽插深度的调节，适应不同高度的垄面。”田间试验、数据分析、仿真计算、再试验与分析……通过与润禾（镇江）农业装备有限公司合作，第二代样机终于研制成功。胡建平介绍说，该台移栽机作业效率可达每小时6000-7200株，较半自动移栽机高逾两倍，达到国际先进水平。

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCoBviAcEx_AFOxAj6WCiQ848.pdf

【文献速递】

1．基于改进型YOLOv4的果园障碍物实时检测方法

文献源：农业工程学报,2021-05-23

摘要：针对农业机器人在复杂的果园环境中作业时需要精确快速识别障碍物的问题,该研究提出了一种改进型的YOLOv4目标检测模型对果园障碍物进行分类和识别。为了减少改进后模型的参数数量并提升检测速度,该研究使用了深度可分离卷积代替模型中原有的标准卷积,并将主干网络CSP-Darknet中的残差组件（Residual Unit）改进为逆残差组件（InvertedResidualUnit）。此外,为了进一步增强模型对目标密集区域的检测能力,使用了软性非极大值抑制（Soft DIo U-Non-MaximumSuppression,Soft-DIo U-NMS）算法。为了验证该研究所提方法的有效性,选取果园中常见的3种障碍物作为检测对象制作图像数据集,在Tensorflow深度学习框架上训练模型。然后将测试图片输入训练好的模型中检测不同距离下的目标障碍物,并在同一评价指标下,将该模型的测试结果与改进前YOLOv4模型的测试结果进行评价对比。试验结果表明,改进后的YOLOv4果园障碍物检测模型的平均准确率和召回率分别为96.92%和91.43%,视频流检测速度为58.5帧/s,相比于原模型,改进后的模型在不损失精度的情况下,将模型大小压缩了75%,检测速度提高了29.4%。且改进后的模型具有鲁棒性强、实时性更好、轻量化的优点,能够更好地实现果园环境下障碍物的检测,为果园智能机器人的避障提供了有力的保障。

链接:

http://agri.ckcest.cn/file1/M00/02/D5/Csgk0WCnOkuAUcs0AC0hshOUbao723.pdf

2．基于改进SSD的棉种破损检测

文献源：华中农业大学学报,2021-05-20

摘要：为实现群体棉籽的破损检测,以新路早G50#脱绒棉籽为研究对象,将群体棉籽随机摆放,使用CCD相机采集群体棉籽的图像,在经典的单步多框检测（singleshotmultiboxdetector,SSD）算法上进行改进.基于改进SSD,利用Res Net5 0网络代替经典SSD算法中的VGG网络,将Res Net50作为SSD的基础网络,用来快速提取群体棉籽图像的特征,最终对群体脱绒棉籽中的破损棉籽实现精准识别.试验结果表明:该方法建立的模型对群体棉籽的检测精度、召回率、漏检率分别达到96.1%、97.3%、0%;高于经典SSD网络模型（检测精度、召回率、漏检率分别为92.5%、96.4%、1.4%）。

链接:

http://agri.ckcest.cn/file1/M00/02/D5/Csgk0WCmO32AEruiAAlEra7rUHk352.pdf

3．基于轮毂电机驱动的山地林果茶园轮式运输车设计与试验

文献源：华中农业大学学报,2021-05-20

摘要：针对南方丘陵山地林果茶园复杂的地形地貌特点,在集中式电机驱动运输车基础上,开发了以轮毂电机驱动的山地林果茶园运输车;该运输车以36V铅酸蓄电池为能源,采用双后轮独立驱动方式并具备电子差速转向系统.运输车最大爬坡度、续驶里程试验、差速及制动性能等关键指标性能试验结果显示:运输车满载最大爬坡度为26.8%,最小转弯半径为2395mm,空载和满载状态下以常用车速20km/h行驶时平均里程分别可达66.97和46.33km;满载时运输车分别以初速度25、20、15、10km/h行驶时的紧急制动距离分别为5.83、4.11、2.68、1.57m,试验值与理论值的最大相对误差为8.2%;运输车还具备良好的差速转向性能.

链接:

http://agri.ckcest.cn/file1/M00/02/D5/Csgk0WCmN_2AOt2fAAxKE-rp-UQ768.pdf

4．基于粒子成像技术的陕南地区降雨雨滴特征分析

文献源：水土保持研究,2021-05-19

摘要：为了研究陕南地区自然降雨雨滴特征,利用自主研发的粒子成像瞬态测量可视化仪对陕南地区宁强县次降雨进行了观测分析。结果表明:雨滴平均直径为1.08 mm,平均终点速度为3.92 m/s,平均雨滴数密度为141.63个/m3。该次降雨过程中直径0～1 mm的雨滴数密度最大,占到总雨滴数密度的67.22%。直径1～2 mm的雨滴对降雨量的贡献率最大,达到59.31%。实测雨滴谱呈单峰结构,其中大雨及以上的雨滴谱最宽,其次为中雨,小雨的雨滴谱最窄。降雨强度波动范围为0.11～10.95 mm/h,在很大程度上受雨滴大小和数目的双重影响。该次降雨中雨滴直径与雨滴终点速度间存在密切的对数关系,其拟合曲线与Atlas-Ulbrich关系曲线非常相似。综上所述,该次降雨平均雨滴数密度相比南方地区较小,直径小于2 mm的雨滴对该次降雨贡献最大。实测雨滴谱宽度受降雨强度影响,随降雨强度的增大而增大。雨滴大小和数目共同决定降雨强度大小。雨滴直径与雨滴终点速度间关系与常用的经验关系相似。

链接:

http://agri.ckcest.cn/file1/M00/02/D5/Csgk0WCmOXqAfkg_AAS2_Yax0uw698.pdf

5．基于同步荧光光谱的鸡肉中甲磺酸达氟沙星和氧氟沙星残留快速检测方法研究

文献源：光谱学与光谱分析,2021-05-07

摘要：采用同步荧光技术结合化学计量学方法实现了鸡肉中甲磺酸达氟沙星（DFM）和氧氟沙星（OFL）残留的快速检测。首先,分析了DFM标准溶液、OFL标准溶液、空白鸡肉提取液和含DFM和OFL的鸡肉提取液的同步荧光光谱,确定了鸡肉中DFM和OFL残留的检测波长差（Δλ）分别为130和200nm,荧光激发峰分别为288和325nm。其次,采用单因素试验考察了氢氧化钠溶液浓度和表面活性剂种类对荧光强度的影响,确定了鸡肉中DFM和OFL残留的最佳检测条件为:氢氧化钠溶液浓度0.1mol·L^{-1}和SDS溶液浓度0.1mol·L^{-1}。最后,利用线性回归和偏最小二乘回归（PLSR）及多元线性回归（MLR）算法分别建立了鸡肉中DFM和OFL残留的预测模型。试验结果表明,与基于线性回归和MLR的DFM残留预测模型相比,基于PLSR的DFM残留预测模型的综合评价更好,其预测集决定系数（R2P）为0.978 3,预测集均方根误差（RMSEP）为1.934 2mg·kg^{-1},相对预测误差（RPD）为5.876 5。与基于线性回归和PLSR的OFL残留预测模型相比,基于MLR的OFL残留预测模型的综合评价更好,其R2P为0.895 0,RMSEP为3.859 8mg·kg^{-1},RPD为2.509 1。该方法操作简单、耗时短,可用于鸡肉中DFM和OFL残留的快速检测。

链接:

http://agri.ckcest.cn/file1/M00/02/D5/Csgk0WCmPkCAKUDlABu8Cn9yV_w872.pdf

6．田间除草机器人研究进展综述

文献源：机器人,2021-04-12

摘要：聚焦田间杂草清除领域，首先介绍了除草机器人的产生背景及其应用价值，并回顾了除草机器人国内外发展现状.然后，重点分析了除草机器人的结构组成及相关技术，并展望了除草机器人的未来发展趋势．最后，作了总结.

链接:

http://agri.ckcest.cn/file1/M00/02/D5/Csgk0WCnN3yAabw6ABOhjS87R24968.pdf

7．矮化密植果园多臂采摘机器人任务规划

文献源：农业工程学报,2021-01-23

摘要：为提高矮化密植果园多机械臂采摘机器人的协同作业效率,该研究对存在重叠访问域的多臂协同采摘机器人任务规划进行分析,将多臂协同任务规划问题归纳为异步重叠访问域的多旅行商问题,给出了基于遗传算法的优化求解方法。试验结果表明:该研究所提任务规划算法在求解4个机械臂采摘43和90颗果实的任务规划问题时,分别在500和2 000次迭代后收敛,相比于随机遍历算法,作业遍历时长可缩短40.97%和54.98%;采摘90颗果实,单机械臂的遍历时长约为该方法的4.28倍;采摘3种不同分布条件下的28颗果实,相比于顺序规划法和随机遍历法,该方法的作业遍历时长分别缩短10.69%和27.18%、

20.45%和23.33%以及12.94%和21.69%。综上,基于遗传算法的任务规划方法能够协调规划多臂采摘机器人系统的作业任务,确保各个机械臂避免发生冲突,以较短时间遍历所有目标果实,提升作业效率。研究结果可为其他多机械臂采摘机器人任务规划提供参考。

链接:

http://agri.ckcest.cn/file1/M00/02/D5/Csgk0WCnOyCAPGmKAEblpBaNI0E026.pdf

【相关专利】

1．温室作物生长巡检机器人

发布源：国家知识产权局

发布时间：2021-05-11

摘要：本实用新型公开了一种农业智能洒水装置。属于农业设备领域；包括：所述机器人车体包括车架,在所述车架上安设有主控制系统模块,在所述主控制系统模块的内部安置有主控制芯片；所述主控制系统模块通过有线线路连接有分别连接有超声波传感器、温度传感器、热释电红外传感器、避障传感器、电流传感器、角度传感器及驱动电机模块。本实用新型通过利用超声波、红外、温度、热释电红外传感器实现避障,利用电流传感器和PID阀位调节仪实现喷洒预警功能,利用角度传感器实现侧翻预警功能,利用摄像头和ARM处理器检测农田和路面边界,提高了机器的使用安全度和工作效率,更加灵活的适用于复杂的农田喷洒环境。

链接:

http://agri.ckcest.cn/file1/M00/02/D5/Csgk0WCmM9yAImDQAAUzjESj3uY626.pdf

2．果园直播机器人及果园直播系统

发布源：国家知识产权局

发布时间：2021-05-07

摘要：本发明实施例提供了一种果园直播机器人及果园直播系统,一方面,可以通过果园直播机器人自动获取到所需要的直播信息,避免了现有技术中通过人工实现对直播信息的获取；另一方面,由于直播信息采集模块中包括全景相机、微距相机以及彩色相机,可以获取到不同类别的图像及视频,满足对不同关键生长阶段对应的不同农事操作进行直播。

链接:

http://agri.ckcest.cn/file1/M00/02/D5/Csgk0WCmNNqAcJE1AAzWn-VAxwg763.pdf

3．用于执行任务的机器人系统和方法

发布源：国家知识产权局

发布时间：2021-04-23

摘要：一种机器人系统,包括：服务机器人和监控机器人,各自被配置为与控制中心通信；其中服务机器人被配置为通过修改环境的表面来在环境中执行服务任务；其中监控机器人被配置为获取表示确定位置处的环境状态的信息；并且其中该系统被配置为基于该信息确定需求；并且,对于所确认需求,控制中心向服务机器人传送命令以在确定位置处执行服务任务。一种用于利用前面提及的机器人系统在环境中执行任务的方法,包括：利用监控机器人获取信息；确定并确认需求；以及将命令传送给服务机器人以在确定位置处执行服务任务。

链接:

http://agri.ckcest.cn/file1/M00/02/D5/Csgk0WCmNpWAesGpAA235ja3pvo937.pdf

【会议论文】

1．IoT Based Smart Agriculture Automation in Artificial Intelligence

发布源：IEEE

发布时间：2021-03-31

摘 要： In advanced smart farming and the Internet of Things (IoT), conventional simple meters are extremely highly transmitted. In addition, it digitalizes the range of information, the meter readings. The data can be transmitted far away that manual works. The total population is expanding very fast and the demand for food is increasing vigorously with the population. Customary farmers' strategies are not sufficient to meet growing demand and therefore need to hinder the soil by increasingly using destructive pesticides. This has a lot to do with the farming practice and in the end the soil remains unfertile. This article addresses various classes of robotization, such as IoT, Wireless Communications, Machine Learning, Depp Learning, and Artificial Intelligence. There are a few areas that cause the horticulture sector problems, including crop diseases, absence of the board's capacity, control of pesticides, weeds, non-attendance of the water framework and watering the board, and these problems can be unraveled by previously mentioned various methods. Today, problems like the use of harmful pesticides must be decoded seriously, Controlled water system, pollution control and rural climate impacts. The robotization of crop rehearsals has proven to expand soil addition and has also enhanced the soil wealth. This article focuses to obtain a brief analysis on the current execution of computerization in agribusiness by various specialists, it also discusses about a proposed framework that can be actualized in plant ranch for blossom and leaf distinguishing proof and watering utilizing IoT.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCnyTOAXKQFAAZ4f9Ip6Ck828.pdf

2．Smart Agriculture Robotic System Based on Internet of Things to Boost Crop Production

发布源：IEEE

发布时间：2021-02-01

摘要：Agriculture is undoubtedly the largest livelihood source in Bangladesh, the backbone of the country's economy and provides to the total economic growth of Bangladesh. Agriculture in Bangladesh is constrained every year by challenges, such as Climate Changes and Population Growth. Matters concerning agriculture have been always hampering the advancement of the country. A revolution in agriculture is expected and IoT Based Smart Agriculture Robotic System is a part of it. Internet of Things (IoT) sensors have capability of providing meaningful information for agriculture making this concept more emerging and attractive day by day. In this work, we designed a system using smart technology which can do complex work easily. This work meets major factors of agriculture, field monitoring, automated system. The system designed in this work can monitor the humidity, moisture level, temperature, air quality and can even detect raining. According to the data received from all the sensors, the water pump and cutter get automatically activated or deactivated. This work not only focuses on the crop field but also stores the data in cloud using IoT for further analysis for doing precise agriculture. Using those data, forecast can be made about flood or drought. In this work, IoT is controlled by the mobile application, which can be operated from anywhere. Automation system works based on sensors and actuators. Using this system, farmers will be able to do efficient work and crop productivity will be at highest level. Smart Agriculture Robot using IoT can have a positive effect on today's agricultural growth.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCnx66APwp3AAvnSz-lvso930.pdf

3．Agriculture monitoring and prediction using Internet of Things (IoT)

发布源：IEEE

发布时间：2021-01-15

摘要：Agriculture has become the most significant growing sector all over the world because of increasing the population. The main challenge in the agriculture industry is to improving

farming efficiency and quality without constant physical monitoring to full fill the speedily increasing demand for the food. Apart from the mounting population, the climate circumstance is also a huge challenge in the agricultural industry. The aim of this research paper is to propose a smart farming model based on the Internet of Things using the clustering to deal with the adverse condition. in this model, we use the different types of the sensors like soil moisture, air pressure, rain detection and humidity sensors for a different purpose. The data will collect on the cloud and calculated automatically. The smart agriculture can be adopted from the crop control, collection of useful data, and analysis automatically. The purpose of this paper is how the implement the Internet of Things (IoT) in the monitoring of humidity, soil condition, temperature, and supply water to the field, level of water, climate condition. The IoT based Smart Farming System being planned via this report is integrated with different Sensors and a Wi-Fi module producing live data feed that can be obtained online.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCny6qAXuG1AAdb0J2tbh4658.pdf

4．IoT based Smart Agriculture using Machine Learning

发布源：IEEE

发布时间：2020-09-01

摘要：Agriculture balances both food requirement for mankind and supplies indispensable raw materials for many industries, and it is the most significant and fundamental occupation in India. The advancement in inventive farming techniques is gradually enhancing the crop yield making it more profitable and reduce irrigation wastages. The proposed model is a smart irrigation system which predicts the water requirement for a crop, using machine learning algorithm. Moisture, temperature and humidity are the three most essential parameters to determine the quantity of water required in any agriculture field. This system comprises of temperature, humidity and moisture sensor, deployed in an agricultural field, sends data through a microprocessor, developing an IoT device with cloud. Decision tree algorithm, an efficient machine learning algorithm is applied on the data sensed from the field in to predict results efficiently. The results obtained through decision tree algorithm is sent through a mail alert to the farmers, which helps in decision making regarding water supply in advance.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCn1PeAc9iYABVM6LKCG3s757.pdf

5．IoT based Smart System for Enhanced Irrigation in Agriculture

发布源：IEEE

发布时间：2020-08-04

摘要：Internet of Things (IoT) is an interconnection of devices that can transfer information over the internet and to control operations without human interference. Agriculture provides a rich source of parameters for data analysis which helps in better yielding of crops. The usage of IoT devices in agriculture helps in the modernizing of information and communication in smart farming. The key parameters that can be considered for better growth of crops are soil types, soil moisture), mineral nutrients, temperature, light, oxygen and so on. Various sensors have been used to sense these parameters and communicate the same to the cloud. This paper considers a few of these parameters for data analysis that helps in proposing the users to take better agricultural decisions using IoT. The proposed system performed better and is implemented atThingS peak IoT cloud platform.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCnzlCAXl0iAEBiRQ_N8D0630.pdf

6．Smart Agriculture with AI Sensor by Using Agrobot

发布源：IEEE

发布时间：2020-04-23

摘要：Smart agriculture is a developing idea on the concepts because IOT sensors are fit for providing information about agriculture fields. Presently days the vast majority of the agriculture completely automated by utilizing programming automatic robotics. In our paper the agrobot fully depends on sowing seed and furthermore observed by Arm processor and cloud based IoT agriculture. It is principally intended to limit the work of farmers. It plays out the rudimentary capacity by sowing of seeds and covering the seeds with soil and further more persistent by observing frameworks such as screen temperature, moistness, dampness and even the movements of animals which may give the yields in agriculture field. In our proposed paper solar technology which is replaced by power supply connected in ARM processor. AI Sensors along with IOT application can gives to monitoring a crop field and if there should be an occurrence of any error send a SMS warning to farmers. Cloud based agriculture can analyze and perform a crop which was stored in cloud

for future use. It is a hybrid method for sowing seed consequently to agrobot and continuously checked by monitoring a crop development by utilizing Arm and the performance and analysis was developed by using cloud based IOT agriculture.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCnzEiAGOTEAAJ0fKzPEAo280.pdf

【专业会议】

1．2021 International Conference on Computer Technology and GIS

发布源：AEIC

发布时间：2021-05-21

摘要：2021 International Conference on Computer Technology and GIS (CTGIS) will be held on May. 28-30, 2021 in Guangzhou, China. CTGIS 2021 is to bring together innovative academics and industrial experts in the field of computer technology and GIS(Geographic Information System) to a common forum. The primary goal of the conference is to promote research and developmental activities in advanced algorithms and control engineering. And another goal is to promote scientific information interchange between researchers, developers, engineers, students, and practitioners working all around the world.The conference will be held every year to make it an ideal platform for people to share views and experiences in omputer technology and GIS and related areas.

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCnvxuASzyUACDOBAdBRgk615.pdf

2．2021 2nd International Conference on Agricultural Science and Technology and Food Engineering（ASTFE 2021）

发布源：AEIC

发布时间：2021-05-21

摘要：2021 2nd International Conference on Agricultural Science and Technology and Food Engineering（ASTFE 2021）will be held on May 28-30 in Qingdao, China. ASTFE 2021 is to bring together innovative academics and industrial experts in the field of agricultural science and technology and food engineering to a common forum. The primary goal of the conference is to promote research and developmental activities in agricultural science and technology and food engineering and another goal is to promote scientific information interchange between researchers, developers, engineers, students, and practitioners

working all around the world. We warmly invite you to participate in ASTFE 2021 and look forward to seeing you in Qingdao!

链接:

http://agri.ckcest.cn/file1/M00/02/D6/Csgk0WCnvmGATf6CABtmIRfM13M818.pdf

3．2021首届国际畜禽种业科技创新峰会在南昌举办

发布源：中国农网

发布时间：2021-05-17

摘要：畜禽良种是畜牧业发展的基础和关键，我国是世界最大的动物食品生产国和消费国之一，也是畜禽养殖大国，生猪、蛋鸡等养殖量占世界首位。“在进口品种国产化过程中，我国的育种能力、种畜禽性能和国外仍差距较大，畜禽种业存在潜在风险。”中国农业科学院北京畜牧兽医研究所所长、国家畜牧科技创新联盟理事长秦玉昌在峰会上说，一是自主创新能力有待加强，白羽肉鸡还没有突破，我国能繁母猪年均提供育肥猪数量比发达国家低30%左右；奶牛水平也只有国际先进水平的80%。二是育种基础还有待夯实，生产性能测定规模小、性状少、自动化、智能化的程度还不太高，我国种猪平均测定的比例仅为发达国家的1/4左右。三是育种体系还有待完善，国家畜禽核心育种场发展水平参差不齐，实质性的联合育种推进比较缓慢。四是企业主体还有待强化，畜禽企业总体实力弱，竞争力不强。

链接:

http://agri.ckcest.cn/file1/M00/02/D5/Csgk0WCnQTqAAZ7TAKrSkP_vOT0010.pdf

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