



2019年第12期总179期

## 农业与资源环境信息工程专题

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## ▶ 前沿资讯

### 1 . Tracking satellites by laser (用激光追踪卫星)

简介: Over the next two years, the GFZ spin-off DiGOS will build a satellite laser ranging (SLR) station for the Japanese space agency JAXA at the space centre in Tsukuba, Japan. With SLR it is possible to measure the distance between a ground station and a satellite with extreme precision using laser pulses. The orbits of satellites are determined and predicted from the data obtained. The GFZ German Research Centre for Geosciences operates its own SLR station on the Potsdam Telegrafenberg and is thus part of a network of around 35 stations worldwide, most of which are used for geodesy.

来源: 德国地球科学研究中心 (GFZ)

发布日期:2019-03-11

全文链接:<https://www.gfz-potsdam.de/en/media-and-communication/news/all/article/tracking-satellites-by-laser/>

### 2 . The Data Revolution Hasn't Yet Hit Agriculture (数据革新尚未在农业领域中兴起)

简介: 世界资源研究所最新的世界资源报告的发布凸显了未来创造可持续粮食的紧迫性。到2050年,全球人口预计将超过90亿,目前作物产量的增长将不足以满足每个人的需求。如果我们要在未来几年养活世界人口并且在不破坏地球的情况下这样做 - 我们就需要在粮食生产方面进行范式转变。大数据对于实现这种转变至关重要。根据2016年的一项研究估计,世界上有超过5.7亿个农场,全世界近87%的农业用地由小规模或家庭农民持有。通过从农民那里收集有关作物投入和产出的信息,开发组织和其他人可以就何时何地种植,使用多少种肥料以及最有效的土壤耕作方式提高产量而不降低成果提出更好的建议。如果没有农场层面数据带来的见解,可持续发展的道路将是不确定的。

来源: 世界资源研究所 (WRI)

发布日期:2019-03-05

全文链接:<https://www.wri.org/blog/2019/03/data-revolution-hasnt-yet-hit-agriculture>

## ▶ 学术文献

### 1 . A Parallel FPGA Implementation of the CCSDS-123 Compression Algorithm (CCSDS-123压缩算法的FPGA实现)

简介: Satellite onboard processing for hyperspectral imaging applications is characterized by large data sets, limited processing resources and limited bandwidth of communication links. The CCSDS-123 algorithm is a specialized compression standard assembled for space-related applications. In this paper, a parallel FPGA implementation of CCSDS-123 compression algorithm is presented. The proposed design can compress any number of samples in parallel allowed by resource and I/O bandwidth constraints. The CCSDS-123

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processing core has been placed on Zynq-7035 SoC and verified against the existing reference software. The estimated power use scales approximately linearly with the number of samples processed in parallel. Finally, the proposed implementation outperforms the state-of-the-art implementations in terms of both throughput and power.

来源: Remote Sensing

发布日期: 2019-03-21

全文链接: [http://agri.ckcest.cn/file1/M00/06/61/Csgk0FyTXnuAI\\_skAAvNoB1QRz8631.pdf](http://agri.ckcest.cn/file1/M00/06/61/Csgk0FyTXnuAI_skAAvNoB1QRz8631.pdf)

## 2 . Remote Sensing Techniques for Soil Organic Carbon Estimation: A Review (用于土壤有机碳评估的遥感技术: 综述)

简介: Towards the need for sustainable development, remote sensing (RS) techniques in the Visible-Near Infrared/Shortwave Infrared (VNIR/SWIR, 400-2500 nm) region could assist in a more direct, cost-effective and rapid manner to estimate important indicators for soil monitoring purposes. Soil reflectance spectroscopy has been applied in various domains apart from laboratory conditions, e.g., sensors mounted on satellites, aircrafts and Unmanned Aerial Systems. The aim of this review is to illustrate the research made for soil organic carbon estimation, with the use of RS techniques, reporting the methodology and results of each study. It also aims to provide a comprehensive introduction in soil spectroscopy for those who are less conversant with the subject. In total, 28 journal articles were selected and further analysed. It was observed that prediction accuracy reduces from Unmanned Aerial Systems (UASs) to satellite platforms, though advances in machine learning techniques could further assist in the generation of better calibration models. There are some challenges concerning atmospheric, radiometric and geometric corrections, vegetation cover, soil moisture and roughness that still need to be addressed. The advantages and disadvantages of each approach are highlighted and future considerations are also discussed at the end.

来源: Remote Sensing

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全文链接: <http://agri.ckcest.cn/file1/M00/06/61/Csgk0FyTXeqAGttNABIEBH-Z1Fo077.pdf>

## 3 . An automated low cost IoT based Fertilizer Intimation System for smart agriculture (基于自动化低成本物联网的智能农业肥料评估系统)

简介: This paper presents an Internet of Things (IoT) based system by designing a novel Nitrogen-Phosphorus-Potassium (NPK) sensor with Light Dependent Resistor (LDR) and Light Emitting Diodes (LED). The principle of colorimetric is used to monitor and analyze the nutrients present in the soil. The data sensed by the designed NPK sensor from the selected agricultural fields are sent to Google cloud database to support fast retrieval of data. The concept of fuzzy logic is applied to detect the deficiency of nutrients from the sensed data. The crisp value of each sensed data is discriminated into five fuzzy values namely very low,

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low, medium, high and very high during fuzzification. A set of If-then rules are framed based on individual chemical solutions of Nitrogen (N), Phosphorous (P) and Potassium (K). Mamdani inference procedure is used to derive the conclusion about the deficiency of N, P and K available in soil chosen for testing and accordingly an alert message is sent to the farmer about the quantity of fertilizer to be used at regular intervals. The proposed hardware prototype and the software embedded in the microcontroller are developed in Raspberry pi 3 using Python. The developed model is tested in three different soil samples like red soil, mountain soil and desert soil. It is observed that the developed system results in linear variation with respect to the concentration of the soil solution. A sensor network scenario is created using Qualnet simulator to analyze the performance of designed NPK sensor in terms of throughput, end to end delay and jitter. From the different variety of experiments conducted, it is noticed that the developed IoT system is found to be helpful to the farmers for high yielding of crops.

来源: Sustainable Computing: Informatics and Systems

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全文链接: <http://agri.ckcest.cn/file1/M00/06/61/Csgk0FyTXxKAfxXiADmiFRKafSc547.pdf>