

# 计算机测量与控制

2018年 第26卷 第4期 (总第235期)  
月刊 公开发行 1993年创刊

主管单位:中国航天科工集团有限公司  
主办单位:中国计算机自动测量与控制技术协会  
编辑出版:《计算机测量与控制》杂志社

资深顾问: 李恩杰院士 张履谦院士 陈定昌院士  
社长: 奚全生  
副社长: 肖登伟  
编委会主任: 于滨  
编委会副主任: 奚全生 杨俊  
编委会委员(按姓氏笔画排序):

于功敬 王迎春 王国峰 王军政 王海亮  
王海涛 王茜 邓璐娟 支超有 孙肖南  
付平 付梦印 叶廷东 左毅 史红卫  
兰智高 任喜录 任祥顺 许川佩 刘嘉  
刘才学 刘广武 刘文怡 刘亚斌 朱纪洪  
朱培灿 华更新 李杰 李学锋 李绪志  
乔立岩 吕翔 张友鹏 张琼 张宏军  
何怡刚 汪祖民 应怀樵 苏中严 潘涛  
肖明清 杨军 陈建云 陈建辉 周永彬  
周德云 郭阳明 席震东 胡昌华 赵雯  
徐忠东 莫为铭 夏开建 栾咏红 阎芳  
常天庆 谢维程 进鲍 斌路 辉  
蔡小斌 蔡远文 潘安君

主编:苟永明  
副主编:孟汉城  
英文编辑:杨力生  
编辑部:任旺芳 唐德生 白春安 顾捷  
广告部:孙颖  
通讯地址:北京市海淀区阜成路甲8号  
航天科工大厦四层

邮政编码:100048  
电 话:主编室: (010) 68371578  
编辑部: (010) 68371556转12-23  
广告部: (010) 68767886  
传 真: (010) 68372068  
电子邮箱:ck@chinamca.com  
投稿网址:www.chinamca.com  
印 刷:北京强华印刷厂  
总发行处:北京报刊发行局  
订 阅 处:全国各地邮局  
邮发代号:82-16

刊 号: ISSN 1671-4598  
刊 号: CN 11-4762/TP  
国外代号:M1480  
广告经营许可证:京海工商广字第8179号(1-1)  
帐 户:《计算机测量与控制》杂志社  
帐 号:11001085400059612076  
开户银行:建行北京阜成路支行  
出版日期:2018年4月25日  
国内定价:每期定价40.00元/册

责任编辑:任旺芳  
版权所有 未经同意 不得转载

## 目 次

### • 综述与评论 •

BIT技术发展及应用综述 ..... 王鉴渊, 李光升 (1)

### • 测试与故障诊断 •

便携式雷达综合检测平台及智能故障诊断系统的设计 ..... 俞茂超, 刘倩倩, 凤宏晓, 杨咚咚 (5)

装备BIT和故障案例融合诊断方法研究 ..... 蔡德咏, 徐弘源, 陈福红, 刘福军 (9)

电压频控中抗强干扰软件关联缺陷检测 ..... 刘欣, 张楠, 孙辰军 (11)

遥测网络时间同步技术实现及检测方法研究 ..... 袁炳南, 张国旺 (15)

基于LabVIEW的冲击力检测系统设计 ..... 王玉华, 黄凯明 (19)

基于Intel Real Sense 3D实感技术的三维脚型测量与重构 ..... 陈超奇, 李新华, 梅星宇, 许平 (23)

三维打印牙领模型的计算机辅助测量与精确度研究 ..... 陈一炜, 朱建明 (28)

广播电视信号的自动监测系统设计 ..... 段永良, 卜言彬 (32)

基于FC-AE-ASM协议仿真测试系统设计与实现 ..... 吴传贵 (35)

基于小波分析的传感器故障诊断方法仿真研究 ..... 张伟鹏, 李光升, 李国强 (39)

基于TTCN-3的宽带载波通信一致性测试系统设计 ..... 张海龙, 刘宣, 李然, 唐悦 (44)

Hadoop云平台下基于HOG特征和Adaboost分类器的快速行人检测算法 ..... 黄金国, 刘涛, 周先春 (49)

基于PMU的小型集成电路测试系统实现及性能分析 ..... 祝新军, 纪效礼, 何少佳 (52)

基于LabView的装备故障设置与排除训练系统设计 ..... 李林宏, 李萍, 张耀辉, 门志远 (56)

高温条件下材料表面电阻率测试方法研究 ..... 王雷, 魏明 (60)

飞机无线电设备总装测试系统研制 ..... 王少轩, 陈雪峰 (63)

基于动态二进制翻译技术的数据软件虚拟测试环境设计 ..... 韦涌泉, 张红军, 董振辉, 朱剑冰 (66)

Java自动化基本路径测试技术研究 ..... 冯俊池, 赵颖, 连尧, 尹党辉, 安丰亮 (70)

基于物联网的空间飞行器姿态监测系统设计 ..... 郭永玲 (74)

### • 控制技术 •

基于Lyapunov直接法差动驱动机器人控制算法研究 ..... 尚伟, 程维明, 付本刚 (78)

基于嵌入式的移动图像监控系统设计 ..... 熊四昌, 周贊涛 (82)

基于ARM联合DE算法的监控方案设计与实现 ..... 王艳红 (85)

基于V模式开发插电式混合动力汽车整车热管理控制策略研究 ..... 卢山, 卢桂萍, 李馨 (88)

基于分数阶PI<sup>λ</sup>D<sup>μ</sup>控制在混合自动定量给料器中的研究 ..... 刘韬, 李桂叶 (92)

基于DSP的Stewart平台控制系统研制 ..... 邓哲, 尹涛, 王家乐, 张静, 侯京峰 (97)

小型压制去污喷洒机控制系统设计 ..... 马新宝, 李坚, 吴中坚, 谢薇薇 (101)

基于cRIO的快速伺服控制原型系统设计 ..... 王卿, 王汀, 胡贞 (104)

### • 军事装备测控技术 •

基于改进TOPSIS法的装备维修任务优先级确定方法 ..... 王雄伟, 陈春良, 曹艳华, 翁翔, 梅勇飞 (108)

基于日志挖掘的装备健康管理设计与实现 ..... 王国林, 介阳阳, 叶君好, 叶彬 (112)

某型舰空导弹武器系统训练保障系统设计与应用 ..... 单时卓, 张艳 (116)

温枪弹道中光电靶灵敏度控制系统优化设计 ..... 赵轶男, 蔡荣立 (120)

### • 测试软件工程 •

基于字典查询的卫星并行自动化测试软件设计 ..... 封家鹏, 朱永生, 何涛, 刘洋, 冯志强 (124)

## • 设计与应用 •

- 高频微震震源预测系统设计 ..... 陈彦昇, 俞 键, 林煌超, 张水兵, 孙 永, 孙 凯(128)  
基于递推最小二乘的吊舱推进无人水面艇建模与辨识研究 ..... 慕东东, 王国峰, 范云生, 赵永生(131)  
基于人工蜂群优化的K均值聚类算法 ..... 廖伍代, 朱范炳, 王海泉, 孙雪凯(136)  
锂电池内阻参数的研究 ..... 杨冬进, 娄建安(139)  
一种检测微弱光电流信号的锁相放大器设计 ..... 崔智军, 刘 红(143)  
基于温度空间分布的传感节点部署最优化研究 ..... 罗 恒, 郭爱煌, 倪启东, 邹优敏, 陆家欣(148)  
北斗系统伪随机码的硬件仿真与演化设计 ..... 刘 伟, 陈利军(152)  
基于Thevenin的锂离子动力电池建模实验研究 ..... 于 跃, 李 昊, 杨燕霞, 徐今强(157)  
ka频段片式一体化发射组件的设计与实现 ..... 石海然, 张 槿, 倪子楠, 薛 欣, 刘亚峰(160)  
基于改进A\*算法的分拣搬运机器人路径规划 ..... 蔡 昊, 刘士凡, 陶重舜, 李春光, 孙云飞, 班建民(164)  
失稳网络医保信息欺诈检测算法研究 ..... 吴 剑(167)  
基于内容的SIFT+LSH管道缺陷检索算法研究 ..... 李 静, 孙 坚, 徐红伟, 方 欣, 钟绍俊, 凌张伟(171)  
基于理论最短距离变权重A\*算法的路径规划 ..... 刘 源, 王海泉(175)  
叶型前缘对损伤的敏感性研究 ..... 李超东, 朱家友(179)  
Relief和SVMRFE在高超声速进气道不起动预测中的应用 ..... 刘 欢, 黄 俊, 张 勇, 刘志勤, 王耀彬(183)  
基于QNN的图像特征提取字符识别系统设计 ..... 王金环, 黄玉雷(187)  
航天发射场电磁环境仿真模型研究 ..... 王 雷(191)  
支持多种飞船交会对接的数据分级管理方法 ..... 陆 岚, 詹盼盼, 王红光, 孙 勇(194)  
基于VR和Kinect的定制鞋设计 ..... 强 璐, 李鹏飞, 苏泽斌, 景军锋(198)  
基于双边滤波和NSST的红外与可见光图像融合 ..... 徐丹萍, 王海梅(201)  
基于Cesium平台中车辆的碰撞识别跟踪 ..... 杨东远, 王瑞奎(205)  
小型柴油机EGR+富氧燃烧排放特性模拟分析 ..... 王 芳, 雷菊阳, 丁长委(208)  
基于PCI-76C2多功能卡的RVDT信号分配器的设计与实现 ..... 段宝利, 葛 玥, 李鹏刚(212)  
改进的HMM模型在特征抽取上的应用 ..... 陈昌浩, 范太华(217)  
基于ARM平台的高清视频信号编解码器优化设计 ..... 张大禹(221)  
基于Hadoop平台的数据迁移方法研究实现 ..... 王 铭, 田 茂, 赵 鑫, 金山城(225)  
基于最佳候选的蜂窝网络低能耗基站部署算法 ..... 朱 明, 李跃新(231)  
基于GIS矿产资源分布区域定位系统 ..... 李兴良, 金永明, 陈 伟(235)  
基于Camera Link的高速图像采集技术研究与应用 ..... 邱扬刚, 邱 琦, 赵民伟, 董 赫(239)  
一种红外仿真图像数据流播放器设计与实现 ..... 邱 琦, 邱扬刚, 谷锁林, 赵民伟(243)  
基于误差分布估计的机器人手眼标定方法研究 ..... 张 强, 曲道奎, 徐 方, 邹风山(246)  
基于SOA的海量准实时数据服务平台接入/访问研究 ..... 李绍飞, 汤朝波, 茅海泉(250)  
基于图像数据挖掘的有向图模型检索方法 ..... 龚 晖, 夏开建, 金兆岩(254)  
抢修任务多目标动态调度的动态驱动策略研究 ..... 陈伟龙, 陈春良, 刘 彦, 王雄伟, 张立君(258)  
基于VCS的固存坏块仿真系统设计与应用 ..... 刘国斌, 祝周荣, 宁 静, 刘 攀, 陈恩耀(264)

## • 试验与评价技术 •

- 18650型锂电池荷电状态的估计 ..... 杨冬进, 娄建安(268)  
基于大数据分析的潜射武器健康状态评估 ..... 郑帮涛(272)

## • 智能仪器与传感技术 •

- 某型航空离合器试验台的研制 ..... 段宝利, 陈 康(276)  
气体传感器校准装置设计 ..... 梁 杰, 晏 天(281)  
基于Gocator视觉传感器的轨头参数计算 ..... 刘 旭, 郑树彬, 叶华平, 安小雪(285)  
基于RSSI测距修正的无线传感器网络四边形加权质心定位 ..... 陈业海, 郑日荣, 许 亮(289)  
小型高可靠分体式多冗余线位移传感器研制 ..... 熊 伟, 刘小勇, 张 洋, 孙 楠, 高秀敏(294)

# Computer Measurement & Control

Vol.26 No.4 Apr.2018(Series 235)  
Monthly Started in 1993

**Competent Authority:**

China Aerospace Science and Industry Corporation Limited

**Sponsor:**

China Association of Computer Automated Measurement and Control Technology

**Edited and Published by:**

Magazine Agency of Computer Measurement & Control

**Senior Consultants:**

Luan Enjie Academician  
Zhang Lüqian Academician  
Chen Dingchang Academician

**Publisher:**

Xi Quansheng

**Vice Publisher:**

Xiao Dengwei

**Chief Editor:**

Gou Yongming

**Vice Chief Editor:**

Meng Hancheng

**English Editor:**

Yang Lisheng

**Address:**

4th floor, China Aerospace Mansion No.a8  
Fucheng road, Haidian district, Beijing  
100048, China

**Tel:** 010-68372068

**Fax:** 010-68372068

**E\_mail:** ck@chinamca.com

**Http:** www.chinamca.com

**General Issue:**

Beijing Bureau for Distribution of Newspapers and Journals

**Domestic Distributor:**

All Local Post Office in China

**Code Name:** 82-16

**Publication Number:**

ISSN 1671-4598 , CN 11-4762/TP

**Overseas Distributor:**

China International Book Trading Corporation,  
P.O.Box 399, Beijing, 100044, China

**Overseas Postal Code Name:** M1480

**Publishing Date:** 25th /Apr.2018

**Domestic Price:** ¥40/Each

**Overseas Price:** \$12/Each

# Contents

● Summary and Comment ●

A Summary of BIT Technology and Its Application.....Wang Jianyuan,Li Guangsheng(1)

● Test and Fault Diagnosis ●

Design of Portable Radar Comprehensive Detection Platform and Intelligent Fault Diagnosis System .....Yu Maochao,Liu Qianqian,Feng Hongxiao,Yang Dongdong(5)

Research on BIT and Fault Cases Fusion Diagnosis Method for Equipment.....Cai Deyong,Xu Honyuan,Chen Fuhong,Liu Fujun(9)

Detection of Anti Strong Interference Software Associated Defects in Voltage frequency control.....Liu Xin,Zhang Nan,Sun Chenjun(11)

Realizations and Detection Method of Telemetry Network Time Synchronization Technology.....Yuan Bingnan,Zhang Guowang(15)

Design of Impact Detection System Based on LabVIEW.....Wang Yuhua,Huang Kaiming(19)

Three-Dimensional Foot-type Measurement and Reconstruction Based on Intel's Real Sense 3d Technology.....Chen Chaoqi,Li Xinhua,Mei Xingyu,Xu Ping(23)

Research of Computer-aided Measurement and Accuracy of 3D Printing Dental Casts.....Chen Yiwei,Zhu Jianming(28)

Automatic Monitoring System Design of Broadcast Television Signals.....Duan Yongliang,Bu Yanbin(32)

Design and Realization of Simulate and Testing System Based on FC-AE-ASM.....Wu Chuanggui(35)

Simulation Research on Fault Diagnosis Method of Sensor Based on Wavelet Analysis.....Zhang Weipeng,Li Guosheng,Li Guoqiang(39)

Design of Broadband PLC Conformance Testing System Based on TTCN-3.....Zhang Hailong,Liu Xuan,Li Ran,Tang Yue(44)

Fast Pedestrian Detection Based on HOG Feature and Adaboost Classifier in Hadoop Cloud Platform.....Huang Jinguo,Liu Tao,Zhou Xianchun(49)

Implementation and Performance Analysis of Small Scale Integrated Circuit Test System Based on PMU.....Zhu Xinjun,Ji Xiaoli,He Shaojia(52)

Design of Equipment Fault Setting Up and Removing Training System Based on LabView.....Li Linhong,Li Ping,Zhang Yaohui,Men Zhiyuan(56)

Researching the Test Method of Surface Resistivity in High Temperature Conditions.....Wang Lei,Wei Ming(60)

Development of Assembly Test System for Aircraft Radio Equipment.....Wang Shaoxuan,Chen Xuefeng(63)

Design of OBDII Software Test Platform Based on Dynamic Binary Translation.....Wei Yongquan,Wang Xianghui,Zhang Hongjun,Dong Zhenhui,Zhu Jianbing(66)

Research on Automated Basis Path Testing of Java.....Feng Junchi,Zhao Ying,Lian Yao,Yin Danghui,An Fengliang(70)

Design of Attitude Monitoring System for Space Vehicle Based on Internet of Things.....Guo Yongling(74)

● Control Technology ●

Research on Control Algorithm of Differential Drive Robot Based on Lyapunov Direct Method.....Shang Wei,Cheng Weiming,Fu Bengang(78)

Design of Motion Images Monitoring System Based on Embedded Linux.....Xiong Sichang,Zhou Yuntao(82)

Design and Implementation of Monitoring Scheme Based on ARM Joint DE Algorithm.....Wang Yanhong(85)

Thermal Management Control Strategy Development for Plug-in Hybrid Electric Vehicle Based on V Model.....Lu Shan,Lu Guiiping,Li Xin(88)

Application Research of Fractional Order PI<sup>λ</sup>D<sup>μ</sup> Control in a Mix Automatic Ration Feeder.....Liu Tao,Li Guiye(92)

Control System of the Stewart Platform Based On DSP.....Deng Zhe,Yin Tao,Wang Jiale,Zhang Jing,Hou Jingfeng(97)

Design of Control System for Small Decontamination Spraying Machine.....Ma Xinbao,Li Jian,Wu Zhongjian,Xie Weiwei(101)

Design of Rapid Position Servo Control Prototype System Based on cRIO.....Wang Qing,Wang Ting,Hu Zhen(104)

## ● Military Equipment Technology in Measurement and Control ●

- Priority Determination Method of Armored Equipment Maintenance Task Based on Improved TOPSIS Method.....Wang Xiongwei,Chen Chunliang,Cao Yanhua,Zan Xiang,Mei Yongfei(108)  
Designing and Realizing of Equipment Health Management System Based on Log Mining.....Wang Guolin,Jie Yangyang,Ye Junhao,Ye Bin(112)  
Design of Training Guarantee System of a Kind of Ship to Air Missile Weapon System.....Shan Shizhuo,Zhang Yan(116)  
Optimization Design of Sensitivity Control System of Photoelectric Target in Temperature Gun Trajectory.....Zhao Yinan,Cai Rongli(120)

## ● Test Software Engineering ●

Design of Satellite Parallel Automated Test Software Based on Dictionary Query.....Feng Jiapeng,Zhu Yongsheng,He Tao,Liu Yang,Feng Zhiqiang(124)

## ● Design and Application ●

- Design of High Frequency Microseismic Source Prediction System.....Chen Yansheng,Yu Jian,Lin Huangchao,Zhang Shuibing,Sun Yong,Sun Kai(128)  
Research on Modelling and Identification of POD Propulsion Unmanned Surface Vehicle Based on Recursive Least Squares.....Mu Dongdong,Wang Guofeng,Fan Yunsheng,Zhao Yongsheng(131)  
A K-Means Clustering Algorithm Based on Artificial Bee Colony Optimization.....Liao Wudai,Zhu Fanbing,Wang Haiquan,Sun Xuekai(136)  
Study on Parameters of Lithium Battery Internal Resistance.....Yang Dongjin,Lou Jianan(139)  
Design of a Lock-In Amplifier for Detecting Weak Light Current Signal.....Cui Zhijun,Liu Hong(143)  
Research on Spatial Distribution of Indoor Temperature with Limited Number of Sensors.....Luo Heng,Guo Aihuang,Ni Qidong,Zou Youmin,Lu Jiaxin(148)  
Hardware Simulation and Design of EHW for BDS' Pseudo-random Noise Code.....Liu Wei,Chen Lijun(152)  
Experimental Research on Modeling of Lithium Power Battery Based on Thevenin.....Yu Yue,Li Hao,Yang Yanxia,Xu Jinqiang(157)  
Design of a ka Band Integrated Tile-type Transmit Module.....Shi Hairan,Zhang Lu,Ni Zinan,Xue Xin,Liu Yafeng(160)  
Research on Information Fraud Detection Algorithm for Unstable Network Medical Insurance.....Wu Jian(167)  
Research on Content Based SIFT+LSH Pipeline Defect Retrieval Algorithm.....Li Jing,Sun Jian,Xu Hongwei,Fang Xin,Zhong Shaojun,Ling Zhangwei(171)  
Path Planning Based on Theoretical Minimum Distance of A\* Algorithm.....Liu Yuan,Wang Haiquan(175)  
A Study on Sensitivity of Compressor Blade Leading Edge to Damage.....Li Chaodong,Zhu Jiayou(179)  
Application of Relief and SVMRFE in Predicting Unstart of Hypersonic Inlet.....Liu Huan,Huang Jun,Zhang Yong,Liu Zhiqin,Wang Yaobin(183)  
Character Recognition System Design Based on Image Feature Extraction And QNN.....Wang Jinhuan,Huang Yulei(187)  
Researching the Simulation Model for Electromagnetic Environment of Aerospace Launch Sites.....Wang Lei(191)  
A Multi-networks Stage Data Handling Method Supporting Rendezvous and Docking with Various Spaceships.....Lu Lan,Zhan Panpan,Wang Hongguang,Sun Yong(194)  
Custom Shoes Design Based on VR and Kinect.....Qiang Lu,Li Pengfei,Su Zebin,Jing Junfeng(198)  
Infrared and Visible Image Fusion Based on Bilateral Filters and NSST.....Xu Danping,Wang Haimei(201)  
Collision Recognition and Tracking of Vehicles Based on Cesium Platform.....Yang Dongyuan,Wang Ruixi(205)  
Numerical Simulation of Emission Characteristics for Single-cylinder Diesel Engine.....Wang Fang,Lei Juyang,Ding Changwei(208)  
Design and Realization of RVDT Signal Distributor Based on PCI-76C2 Multifunctional Card.....Duan Baoli,Ge Yue,Li Penggang(212)  
MHMM Used in Feature Extracting.....Chen Changhao,Fan Taihua(217)  
Optimization Design of High Definition Video Signal Codec Based on ARM Platform.....Zhang Dayu(221)  
Research and Realization of Data Migration Tool Based on Hadoop Platform.....Wang Ming,Tian Mao,Zhao Xin,Jin Shancheng(225)  
Low Energy Base Station Deployment Algorithm for Cellular Networks Based on the Best Candidate.....Zhu Ming,Li Yuexin(231)  
Regional Positioning System of Mineral Resources Distribution Based on GIS.....Li Xingliang,Jin Yongming,Chen Wei(235)  
Research and Application of High Speed Image Acquisition Technology Based on Camera Link.....Qiu Yanggang,Qiu Qi,Zhao Minwei,Dong He(239)  
Design and Implementation of a Data Stream Player for Infrared Simulation Image.....Qiu Qi,Qiu Yanggang,Gu Suolin,Zhao Minwei(243)  
Error Distribution Estimation Based Robot Hand-eye Calibration.....Zhang Qiang,Qu Daokui,Xu Fang,Zou Fengshan(246)  
Research on Mass Real-time Data Service Platform Access/requirement Based on SOA.....Li Shaofei,Tang Chaobo,Mao Haiquan(250)  
A retrieval Method Based on Directed Graph Model for Image Data Mining.....Gong Hui,Xia Kaijian,Jin Zhaoyan(254)  
Research on the Dynamic Driven Strategy of the Multi-objective and Dynamic Scheduling of Battlefield Rush-repair Tasks.....Chen Weilong,Chen Chunliang,Liu Yan,Wang Xiongwei,Zhang Lijun(258)  
Design and Application of Simulation System for Solid-state Memory Invalid Blocks Based on VCS.....Liu Guobin,Zhu Zhourong,Ning Jing,Liu Pan,Chen enyao(264)

## ● Test & Evaluation Technology ●

- SOC Estimation of 18650 Lithium Battery.....Yang Dongjin,Lou Jianan(268)  
Health State Evaluation of Submarine-launched Weapons Based on Big Data Analysis.....Zheng Bangtao(272)

## ● Intelligent Instruments and Sensing Technology ●

- Development of a Certain Type of Aero Clutch Test Bench.....Duan Baoli,Chen Kang(276)  
Design of Gas Sensor Calibration System.....Liang Jie,Yan Tian(281)  
Calculation of Rail Head Parameters Based on Gocator Vision Sensor.....Liu Xu,Zheng Shubin,Ye Huaping,An Xiaoxue(285)  
Quadrilateral Weighted Centroid Localization Based on Range Correction of RSSI for Wireless Sensor Networks....Chen Yehai,Zheng Rirong,Xu Liang(289)  
Development of Split Multi-redundant Line Displacement Transducer with Small and Highly Reliable.....Xiong Wei,Liu Xiaoyong,Zhang Yang,Sun Nan,Gao Xumin(294)