

# 计算机测量与控制

# 10

## COMPUTER MEASUREMENT & CONTROL

## 2016

### 中国计算机自动测量与控制技术协会主办

### 第24卷

源于航天 精于测控  
服务国防 产业利民

## 工艺智能管理和执行平台

工艺智能管理和执行平台面向大型复杂装备的生产、装配、调试和检修等过程，是一个集任务规划、工艺文件设计、工艺过程管理和工艺活动控制为一体的综合平台。



数字化调试线

### 精准调试 保障生产

### 装备制造的护航者



调试现场

- 智能传感器
- 三维可视化
- 流程控制
- 故障诊断
- 大数据分析

### 工艺智能管理和执行平台-管理平台

### 工艺智能管理和执行平台-便携式终端

- ◆ 项目策划与部署
- ◆ 工艺流程编辑
- ◆ 工艺文件设计
- ◆ 进度与状态监控
- ◆ 质量检查与记录
- ◆ 故障统计与分析
- ◆ 技术资料管理
- ◆ BOM信息管理
- ◆ 工装工具管理
- ◆ 教学评估系统
- ◆ 系统外部接口 (PLM、ERP等)

- ◆ 任务下载与数据维护
- ◆ 任务执行过程记录与提交
- ◆ 试验设备交互
- ◆ 电子手册指导
- ◆ 技术资料管理与查看
- ◆ 故障信息管理
- ◆ 人员权限管理与操作监控



欢迎来电垂询，更多信息请访问：[www.casic-amc.com](http://www.casic-amc.com)



北京航天测控技术有限公司  
BEIJING AEROSPACE MEASUREMENT & CONTROL TECHNOLOGY CO.,LTD

科技产业园  
电话：010-8879 6066

市场营销中心  
电话：400 0675 509

西安办事处  
电话：029-8187 9982

2016年 第24卷 第10期 (总第217期)  
月刊 公开发行人 1993年创刊

主管单位:中国航天科工集团公司  
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: 栾恩杰院士 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 于劲松 马好东 马建伟 王迎春  
王国峰 王军政 王海亮 王晓雷 王 茜  
邓璐娟 汪祖民 支超有 巨永锋 付 平  
付梦印 左 毅 卢 皓 任喜录 许川佩  
朱 杰 刘 嘉 刘国强 刘才学 刘广武  
朱纪洪 华更新 李 杰 李学锋 李树盛  
李绪志 李 东 张 波 张友鹏 张云龙  
张 琼 张宏军 张海瑞 何怡刚 孟 新  
应怀樵 苏 中 杜承烈 吴 强 严 涛  
肖明清 杨 军 陈建云 陈建辉 周永彬  
周召发 周德云 郭阳明 席震东 胡昌华  
侯 建 赵 雯 徐忠东 徐立军 莫为铭  
阎 芳 曹 菲 常天庆 谢 东 谢 维  
程 进 韩 翳 蒲建军 鲍 斌 裴海龙  
蔡小斌 蔡远文 潘安君 魏纳新

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 晋超

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

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: 2016年10月25日

国内定价: 每期定价30.00元/册

责任编辑: 任旺芳

版权所有 未经同意 不得转载

万方数据

## 目 次

### • 综述与评论 •

智能机械全覆盖路径规划算法综述.....徐 博, 徐 旻, 陈立平, 谭 曈(1)

### • 测试与故障诊断 •

航天器数字化测试模式设计与应用.....杨 硕, 潘顺良, 李鸿飞, 刘武通, 闻 佳(6)

基于图像的树木测量方法.....宋江雪, 王波涛(9)

基于虚拟仪器的核电站主管道振动监测系统设计.....杨泰波, 刘才学, 何 攀(13)

中药口服液中可见异物检测系统研究.....钟芳松, 陶少华(18)

基于DSP芯片的高速数字电路模块BIT设计.....詹进雄, 杜舒明(21)

基于贝叶斯网络推理的起落架系统故障诊断技术研究.....

.....陈新霞, 刘煜原, 黄加阳, 陈 曦(24)

基于DPHM的民用飞机地面支持系统设计.....刘煜原, 陈 曦, 任 和, 姜宏伟(28)

船舶运动状态下风速风向测量补偿与数字仿真.....

.....于永清, 范云生, 王国峰, 赵永生, 刘彦东(32)

基于改进核主元分析的TE故障诊断.....刘春燕, 于春梅(36)

光伏阵列伏安特性测试系统设计.....冯 霏, 吴访升, 陈鉴富, 王为善(39)

基于信息增益率的WNB水下机器人故障分类.....周 悦, 邢妍妍, 郭 威(42)

基于OTSU分割和HOG特征的行人检测与跟踪方法.....

.....徐守坤, 王 斌, 石 林, 瞿诗齐(45)

基于GTM900-B的化学工业区气体检测终端设计与实现.....罗 奎, 谢 玮(50)

基于开源的分布式山洪监测数据系统设计.....邓 欣, 宁 芊(54)

透明液体中低对比度杂质检测方法的研究.....王一丁, 买热哈巴·优素甫江(57)

分布式网络异常攻击检测模型仿真分析.....王芳芳(61)

基于动车组MVB网络的故障分析算法研究与应用.....徐 顺(64)

基于4G通信的民机试飞遥测监控技术架构.....冯晓林, 郭世伟, 彭国金(68)

### • 控制技术 •

飞行器遥测设备与综控机一体化设计.....蔡敬坤, 吴 健, 吕兵兵(71)

基于预测控制的非连续路段下移动机器人的轨迹跟踪.....吴 菁, 陈 罡, 孟 静(74)

模糊神经网络PID在数字舵机控制中的应用.....和 江, 彭舒钰, 侯 文(79)

多电机直流配电系统电压监控策略研究.....周 迪, 周洁敏, 姜春燕, 杨钟鼎(82)

物联网嵌入式智能设备实时控制系统设计.....田建立, 倪 斌(87)

语音控制的四旋翼飞行器设计与实现.....曹鹏飞, 郝矿荣, 林 都(90)

基于FPGA的空间倾斜角测量控制系统研究.....杨华晖, 冯伟利, 刘 福(93)

基于无线传感网的温室花卉自适应调控系统.....

.....朱剑峰, 郑增威, 孙 霖, 陈汉群, 蔡建平, 田丹青(96)

航空发动机控制系统仿真平台设计.....崔 凯, 缙林峰(101)

航空发动机无模型自适应生物智能控制方法研究.....史东烨, 缙林峰(104)

基于电机辅助的纯电动汽车模式切换控制策略...李东卫, 宋 璐, 付主木, 宋书中(108)

基于AFSMC算法的四旋翼飞行器控制策略研究.....赵维斌, 张丽香, 樊民革(113)

基于CR10的机械臂测控系统设计.....倪汉华, 汤涛林, 徐志强(118)

感应淬火综合监控系统设计.....叶 硕, 叶献方(122)

### • 军事装备测控技术 •

融入模糊推理的新型故障树诊断方法.....王久崇, 位占杰(125)

基于PHM的舰艇装备视情维修技术研究.....胡 浩, 周 浩(128)

X86军用平板电脑电磁兼容性设计.....余泽茂, 张晓晓, 康文东, 王晓雷(131)

故障树模块化在装甲车辆灭火系统故障诊断中的应用.....

.....李光升, 王天祺, 谢永成, 魏 宁(135)

## • 测试软件工程 •

- 基于ARM Cortex-M4的构件化汇编框架的研究.....蔡伯峰,王宜怀(138)
- 定制Linux LiveCD的研究与实现.....戚惠丹,李泽平(142)
- 基于S7-200PLC的CEMS系统程序设计及优化研究.....庞海宇,白永刚,姜永宽,白伟,庞占洲(145)

## • 设计与应用 •

- 变形镜驱动器参数自动标定系统的设计.....李正东,袁学文,周志强,刘章文(150)
- 基于WSSRC单样本人脸识别及样本扩充方法研究.....彭帆,徐志京,叶丽(154)
- 基于北斗的高精度时空服务设备的研制.....刘萍,李海洋,朱晓红,崔乐(158)
- 强干扰环境下网络情报数据滤波通信系统设计.....何晓冬(162)
- 无线传感中的WPSO-DVHOP算法在节点定位中的研究.....周成纲(165)
- 城市道路交通智能照明系统设计.....秦波,刘颖,亢红波(169)
- 基于FPGA的跳频通信系统开发.....苏扬,钱皓(171)
- 电子油门踏板的动态特性建模和实验研究.....徐源,郭斌,袁月峰(175)
- 同步卫星扫描视锥与轨道的绘制算法.....姜泽坤,曹静,王元(178)
- 基于摄像头的近距离手势识别系统的设计.....徐健,许开开,瞿阳,周洲(181)
- 基于Google Earth的无人机任务规划设计.....卢春燕,周英博,汤易,张艳粉(183)
- 语音识别技术在电子货架标签系统中的应用.....丁磊,蒋东国,王志韬(186)
- 一种公共网络攻击数据挖掘智能算法研究.....余国清,周兰蓉(190)
- 四旋翼飞行器姿态解算与滤波.....龙云露,陈洋,滕雄(194)
- 基于大数据分析的移动对象轨迹预测方法.....李倩伟,唐丙寅(198)
- 基于二维激光雷达的避障系统的设计与实现.....唐文响,严华(202)
- 基于四轴飞行器的短距离低空运输系统的设计.....马正华,孙斌(205)
- 未标定相机的高精度位姿估计方法.....曹芳,张静静,朱永康(209)
- 基于SRIO传输的高速时钟电路的优化设计.....杜金艳,叶旭鸣(213)
- 基于多块模式决策的边信息生成方法.....赵晓侠,檀会娟,束军(215)
- 改进粒子群算法在云计算负载均衡中的应用研究.....李明阳,严华(219)
- 基于GPU的并行加速渲染算法的研究.....张晓芬,薛国新,陆柯彤,张宸铭(222)
- 基于PX1总线的小卫星扩频应答机模拟器的设计与实现.....高茹,曹丽君,曾鸿,卢若虚(226)
- X波段的圆极化微带共形阵天线的仿真与设计.....裴畔,丁永红,尤文斌,马铁华(230)
- 基于滑动峭度相关性准则的局部特征尺度分解分量筛选方法.....崔伟成,许爱强,李伟,孟凡磊(233)
- 一种组合式甚高频全向信标和仪表着陆系统信号模拟器研制.....牛强军,张强,缙朋帅(236)
- 基于图像处理的变电站中隔离开关的状态研究.....赵锐,尚文,王桐,邹小峰(240)
- 基于LPC2214的嵌入式轮机模拟器PPU的设计.....刘泊江,李燕彪,郭蒙,卢兴泉,郑恒持(242)
- 探地雷达目标回波信号双曲线提取算法研究.....张旭,龚钢军,郝建红(247)
- 改进人工蜂群算法优化ELM分类模型.....赵虎,左开伟,覃永震(251)
- 基于数据挖掘的高校管理信息系统设计与实现.....任高举,王宏伟(255)
- 车载自组织网络中基于蚁群算法的簇路由协议.....赵悦,陈雷,程子傲,王丹华(259)
- 基于ARM Cortex-M3的声磁商品电子防盗系统设计.....康雪娟,马文华,林钰人(263)
- 复杂背景下配电柜线号定位与识别方法研究.....郑启亮(267)

## • 试验与评价技术 •

- 基于层次分析法的风洞试验装备全寿命健康因素量化评价方法研究.....何福,范金磊,徐涛,李春彦(271)
- 基于贝叶斯的智能电能表可靠性评估方法.....田正其,祝宇楠,刘建,徐晴(274)
- 面向LRM体系的测试性验证指标体系研究.....陈然,连光耀,王凯,蔡丽影,李会杰(278)
- 冲压空气涡轮地面试验台设计.....卢媛,杨晓,芦维崙,李振水(282)

## • 智能仪器与传感技术 •

- 数字化电能表检测与“溯源”系统解决方案研究.....穆小星(285)

**Competent Authority:**

China Aerospace Science & Industry Corp.

**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 Oct.2016

**Domestic Price:** ¥30/Each

**Overseas Price:** \$10/Each

# Contents

## ● Summary and Comment ●

Review on Coverage Path Planning Algorithm for Intelligent Machinery.....  
.....Xu Bo,Xu Min,Chen Liping,Tan Yu(1)

## ● Test and Fault Diagnosis ●

Design and Application of Spacecraft Digital Test Mode.....  
.....Yang Shuo,Pan Shunliang,Li Hongfei,Liu Wutong,Wen Jia(6)  
Method of Tree Measurement Based on Image.....Song Jiangxue,Wang Botao(9)  
Design of Main Pipe Vibration Monitoring for Nuclear Power Plants Based on Virtual  
Instrument.....Yang Taibo,Liu Caixue,He Pan(13)  
Study on Detection System for Visible Foreign Substances in Oral Liquids of Traditional Chinese  
Medicine.....Zhong Fangsong,Tao Shaohua(18)  
BIT Design of High-speed Digital Circuit Module Based on DSP Chips.....  
.....Zhan Jinxiong,Du Shuming(21)  
Fault Diagnosis of Landing Gear System Based on Bayesian Network Inference.....  
.....Chen Xinxia,Liu Yuyuan,Huang Jiayang,Chen Xi(24)  
Design of Civil Aircraft Ground Support System Based on DPHM.....  
.....Liu Yuyuan,Chen Xi,Ren He,Jiang Hongwei(28)  
Compensation and Digital Simulation for Measurement of Wind Speed and Direction with Ships  
Motion.....Yu Yongqing,Fan Yunsheng,Wang Guofeng,Zhao Yongsheng,Liu Yandong(32)  
TE Fault Diagnosis Based on Improved Kernel Principal Component Analysis.....  
.....Liu Chunyan,Yu Chunmei(36)  
Measurement System of Photovoltaic Volt-ampere Characteristic.....  
.....Feng Fei,Wu Fangsheng,Chen Jianfu,Wang Weishan(39)  
WNB algorithm Based on Information gain Ratio for AUV Fault Classification.....  
.....Zhou Yue,Xing Yanyan,Guo Wei(42)  
Pedestrian Detection and Tracking Method based on OTSU Segmentation and HOG Feature.....  
.....Xu Shoukun,Wang Bin,Shi Lin,Qu Shiqi(45)  
Design and Implementation of gas Detection System Based on GPRS in Chemical Industrial Zone.  
.....Luo Kui,Xie Wei(50)  
Distributed Flash Flood Monitoring System Design based on Open Source.....  
.....Deng Xin,Ning Qian(54)  
Study on Detection Method of Low Contrast Impurities in Transparent Liquid.....  
.....Wang Yiding,Mai Rehaba-Yousufujiang(57)  
Istributed Network Anomaly Detection Model in the Simulation Analysis.....Wang Fangfang(61)  
Research and Application of Fault Analysis Algorithm Based on MVB Network.....Xu Shun(64)  
Flight Test Telemetry Monitoring Technology Architecture for Civil Aircraft Based on 4G  
Communication.....Feng Xiaolin,Guo Shiwei,Peng Guojin(68)

## ● Control Technology ●

Integration Design of Telemetry Equipment and Comprehensive Control Machine.....  
.....Cai Jingkun,Wu Jian,Lyu Bingbing(71)  
Trajectory Tracking of Mobile Robot Under Discontinuous Stretch Based on Predictive Controller.....  
.....Wu Jing,Chen Gang,Meng Jing(74)  
Application of Fuzzy Neural Network PID in Digital Servo Control.....  
.....He Jiang,Peng Shuyu,Hou Wen(79)  
Research on DC Voltage Supervision Strategies of More Electric Aircraft Distribution System.....  
.....Zhou Di,Zhou Jiemin,Jiang Chunyan,Yang Zhongding(82)  
Iot Embedded Intelligent Equipment Real-time Control System Design.....Tian Jianli,Ni Bin(87)  
Design and Implementation of Voice Control of Four-rotor Aircraft.....  
.....Cao Pengfei,Hao Kuangrong,Lin Du(90)  
Measurement and Control System Research of Spatial Inclined Angle Based on FPGA.....  
.....Yang Huahui,Feng Weili,Liu Fu(93)  
Adaptive Control System of Flower Greenhouse Based on Wireless Sensor Network.....  
.....Zhu Jianfeng,Zheng Zengwei,Sun Lin,Chen Hanqun,Cai Jianping,Tian Danqing(96)  
A Performance Simulation Platform for Aero-Engine Control System.....Cui Kai,Gou Linfeng(101)  
Aero-Engine Model Free Adaptive Intelligent Control Research.....Shi Dongye,Gou Linfeng(104)  
A Mode Switching Control Strategy for Electric Vehicles Assisted with Electric Machine.....  
.....Li Dongwei,Song Lu,Fu Zhumu,Song Shuzhong(108)  
Research on Control Strategy of Quad Rotor Based on AFSMC.....  
.....Zhao Weibin,Zhang Lixiang,Fan Minge(113)

Design of Mechanical Arm Measurement and Control System Based on CRIO.....Ni Hanhua,Tang Taolin,Xu Zhiqiang,Shen Zhixin(118)  
Design of Integrated Monitoring and Control System for Induction Quenching.....Ye Shuo,Ye Xianfang(122)

### ● Military Equipment Technology in Measurement and Control ●

A New Method of the Fault Tree Diagnosis Fusing Fuzzy Inference Engine.....Wang Jiuchong,Wei Zhanjie(125)  
Research on Condition Based Maintenance Technology of Warship Equipment Based on PHM.....Hu Hao,Zhou Hao(128)  
EMC Design for X86 Military Tablet PC.....Yu Zemao,Zhang Xiaoxiao,Kang Wendong,Wang Xiaolei(131)  
Application of Modularity of Fault Tree in Armored Vehicle Fire Hydrant System Fault Diagnosis.....  
.....Li Guangsheng,Wang Tianqi,Xie Yongcheng,Wei Ning(135)

### ● Test Software Engineering ●

Research on Component-based Assembly Framework Based on Cortex-M4.....Cai Bofeng,Wang Yihuai(138)  
Research and Implementation of Custom Linux LiveCD.....Qi Huidan,Li Zeping(142)  
CEMS System Based on S7-200 PLC Program Design and Optimization Research.....  
.....Pang Haiyu,Bai Yonggang,Jiang Yongkuan,Bai Wei,Pang Zhanzhou(145)

### ● Design and Application ●

Design of Automatic Parameter Calibration System for Deformer Mirror Driver.....  
.....Li Zhengdong,Yuan Xuewen,Zhou Zhiqiang,Liu Zhangwen(150)  
Single-sample Face Recognition Based on WSSRC and Expanding Sample.....Peng Fan,Xu Zhijing,Ye Li(154)  
Design of High-Precision Space-time Service Device Based on Beidou.....Liu Ping,Li Haiyang,Zhu Xiaohong,Cui Le(158)  
Design of Network Intelligence Data Filtering and Communication System in Strong Interference Environment.....He Xiaodong(162)  
Research into WPSO-DVHOP Algorithm in Node Positioning in Wireless Sensing.....Zhou Chenggang(165)  
Design of Urban Traffic Intelligent Lighting System.....Qin Bo,Liu Ying,Kang Hongbo(169)  
Development of Frequency-Hopping Communication System Based on FPGA.....Su Yang,Qian Hao(171)  
Electronic Accelerator Pedal's Dynamic Characteristic Modeling and Experimental Research.....Xu Yuan,Guo Bin,Yuan Yuefeng(175)  
Mapping Algorithm of Scanning Cone and Orbit of Synchronous Satellite.....Lou Zekun,Cao Jing,Wang Yuan(178)  
Design of Embedded Camera-based Gesture Recognition System in Short Distance.....Xu Jian,Xu Kaikai,Qu Yang,Zhou Zhou(181)  
Design of an Mission Planning for Unmanned Air Vehicle Based on Google Earth.....Lu Chunyan,Zhou Yingbo,Tang Yi,Zhang Yanfen(183)  
Application of Speech Recognition Technology in Electronic Shelf Label System.....Ding Lei,Jiang Dongguo,Wang Zhitao(186)  
Research on an Intelligent Algorithm for Public Network Attack Data Mining.....Yu Guoqing,Zhou Lanrong(190)  
Quadrotor Attitude Calculation and Filtering.....Long Yunlu,Chen Yang,Teng Xiong(194)  
Moving Object Trajectory Prediction Method Based on Large Data Analysis.....Li Qianwei,Tang Bingyin(198)  
Design and Implementation of Obstacle Avoidance Control System Based on 2D Laser Radar.....Tang Wenxiang,Yan Hua(202)  
Design of Transport System of Short Distance and Low Altitude Based on Quadrotor.....Ma Zhenghua,Sun Bin(205)  
An Accurate Algorithm for Uncalibrated Camera Pose Estimation.....Cao Fang,Zhang Jingjing,Zhu Yongkang(209)  
Design Optimization of High-speed Clock Circuit on SPIO transfers.....Du Jinyan,Ye Xuming(213)  
Side Information Generating Based on Multi-Block Mode Decision.....Zhao Xiaoxia,Tan Huijuan,Shu Jun(215)  
Research on Cloud Computing System Resource Load Balancing Based on Improved PSO Algorithm.....Li Mingyang,Yan Hua(219)  
Research of Parallel Rendering Algorithm Based on GPU.....Zhang Xiaofen,Xue Guoxin,Lu Ketong,Zhang Chenming(222)  
Design and Implementation of Small Satellite Spread Transponder Simulator Based on PXI.....Gao Ru,Cao Lijun,Zeng Hong,Hu Ruoxu(226)  
Circularly Polarized X-band Microstrip Conformal Array Antenna Simulation and Design.....Pei Pan,Ding Yonghong,You Wenbin,Ma Tiehua(230)  
A Method for Determining Effective Components of Local Characteristic-scale Decomposition Based on Sliding Kurtosis Correlation Coefficients.....Cui Weicheng,Xu Aiqliang,Li Wei,Meng Fanlei(233)  
Development of a Combined Very High Frequency Omnidirectional Range and Instrument Landing System Signal Simulator.....  
.....Niu Qiangjun,Zhang Qiang,Gou Pengshuai(236)  
State Evaluation of Isolating Switch in Transformer Substation Based on Image Processing.....Zhao Rui,Shang Wen,Wang Tong,Zou Xiaofeng(240)  
Design of Embedded Marine Simulation Device PPU Based on LPC2214.....Liu Bojiang,Li Yanbiao,Guo Meng,Lu Xingquan,Zheng Hengchi(242)  
Research on Radar Target Echo Signal Algorithm.....Zhang Xu,Gong Gangjun,Hao Jianhong(247)  
Improved Artificial Bee Colony Optimize ELM Classification Model.....Zhao Hu,Zuo Kaiwei,Qin Yongzhen(251)  
Design and Implementation of University Management Information System Based on Data Mining.....Ren Gaoju,Wang Hongwei(255)  
Ant Colony Algorithm Based Cluster Routing Protocol Vehicular Ad hoc Networks.....Zhao Yue,Chen Lei,Cheng Ziao,Wang Danhua(259)  
Design of Acoustic-Magnetic Electronic Article Surveillance System Based on ARM Cortex-M3.....Kang Xuejuan,Ma Wenhua,Lin Yuren(263)  
Study of Line Number Location and Recognition for Distribution Cabinet with Complex Background.....Zheng Qiliang(267)

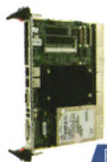
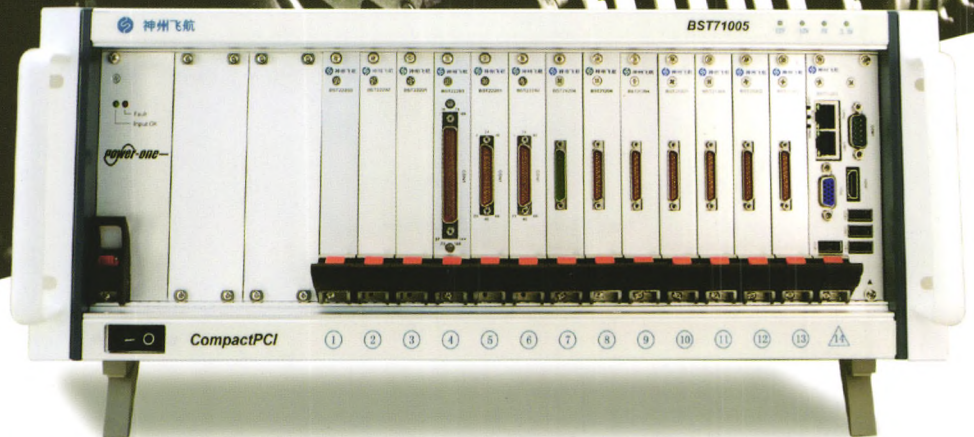
### ● Test & Evaluation Technology ●

Method for Quantitative Evaluation of Wind Tunnel Test Equipment full Lifecycle Health Based on Analytical Hierarchy Process.....  
.....He Fu,Fan Jinlei,Xu Tao,Li Chuanyan(271)  
Reliability Assessment Method for Smart Meter based on Bayesian.....Tian Zhengqi,Zhu Yunan,Liu Jian,Xu Qing(274)  
Research on Index System of Testability Verification for LRM System.....Chen Ran,Lian Guangyao,Wang Kai,Cai Liying,Li Huijie(278)  
Design of Ram Air Operated Turbine Ground Testbed.....Lu Yuan,Yang Xiao,Lu Weilun,Li Zhenshui(282)

### ● Intelligent Instruments and Sensing Technology ●

Research on the Solution to the Testing and "Tracing" System of Digital Watt-hour Meter.....Mu Xiaoxing(285)

# 工业计算机产品



**BST11202**

CPCI总线控制器, Intel® Core™ i7 2.1G/2.2G/2.5GHz



**BST11205**

CPCI总线控制器, Intel® Core™ i7 1.7G/2.3G/2.5GHz



**BST11H01**

PXle总线控制器, Intel® Core™ i7 2.1GHz



**BST11201**

CPCI总线控制器 Intel® ATOM™ 1.66GHz



**BST11203**

CPCI总线控制器 Intel® i5/i7 2.2G/2.5GHz



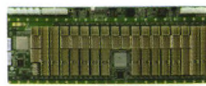
**BST11G02**

ETX总线单板计算机 Intel® ATOM™ 1.66GHz



**BST11G01**

COMe总线单板计算机 Intel® ATOM™ 0.6/1.0G/1.3G/1.6GHz



**BST84007**

18槽PXle背板



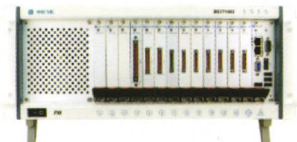
**BST20H01**

PXle总线扩展桥主卡

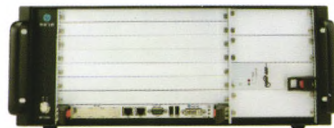


**BST20H02**

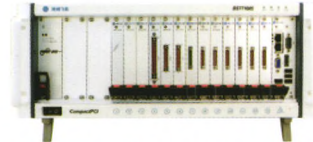
PXle总线扩展桥从卡



**BST71003** 3U 14槽PXle机箱



**BST71004** 6U 8槽CPCI机箱



**BST71005** 3U 14槽CPCI机箱

欲了解更多详情, 请访问神州飞航公司网站或致电销售部

[www.senfetech.com](http://www.senfetech.com)



北京神州飞航科技有限责任公司  
BEIJING SENFETECH CORPORATION

地址: 北京市海淀区西三环北路21号久凌大厦北楼10层

邮编: 100089 电话: 400-099-8818 010-68403305/67/8 传真: 010-68403309

■ 西安办事处  
电话: 029-88339041/42  
传真: 029-88331458

■ 上海办事处  
电话: 021-64956968  
传真: 021-54234279

■ 武汉办事处  
电话: 027-87415992  
传真: 027-87415997

■ 成都办事处  
电话: 028-87715721/22  
传真: 028-87794499

ISSN 1671-4598



9 771671 459169

万方数据



关注 赠阅

主管单位: 中国航天科工集团公司

编辑出版: 《计算机测量与控制》杂志社

原刊名: 《计算机自动测量与控制》

刊号: ISSN 1671-4598  
CN 11-4762/TP

邮发代号: 82-16

定 价: 30.00元