2014 全国嵌入式仪表及系统技术会议

2014 China Conference of Embedded Instrument and System Technology

程序册

Final Program

主办单位：

中国仪器仪表学会嵌入式仪表及系统技术分会(Embedded Instrument and System TC of China Instrument and Control Society)

上海市仪器仪表学会(Shanghai Instrument Society)

承办单位：

上海工程技术大学(Shanghai University of Engineering Science)

上海大学(Shanghai University)

2014 年 10 月 17-19 日，中国·上海

Oct. 17-19, 2014, Shanghai, China

目录(Contents)

前言(Preface)

第六届全国嵌入式仪表及系统技术会议(CCEIST'2014) 将于 2014 年 10 月 17 日至 19 日在现代化大都市上海举行，在此我们谨代表会议组织方对所有投稿作者及参会人员表示最衷心的感谢与最热烈的欢迎！

该系列会议从 2009 年开始，第一届会议主题是"嵌入式仪表、系统及应用研讨会"，第二届会议主题是"嵌入式工控设备的网络化与智能化发展研讨会"，第三届会议主题是"信息物理融合系统理论及物联网应用专家论坛"，第四届会议主题是"高性能嵌入式系统与智能装备专家论坛"。第五届会议主题是"嵌入式技术应用与智慧城市发展专家论坛"。本届会议由中国仪器仪表学会嵌入式仪表及系统技术分会和上海市仪器仪表学会主办，上海工程技术大学和上海大学承办。大会的主题是——"嵌入式系统网络化与智能传感器专家论坛"，旨在讨论嵌入式系统及网络、嵌入式仪表、智能传感器等领域的最新研究成果和发展趋势，为全国嵌入式系统及相关领域的学者和业内人士提供一个交流最新研究成果以及进行广泛学术讨论的平台。

本届会议收到投稿论文共计 77 篇，经专家评审，其中 42 篇被会议录用，并将择优推荐到《仪器仪表学报》、《仪表技术》、《电子测量技术》等期刊上发表。本届会议特邀中国仪器仪表学会名誉理事长庄松林院士、南京邮电大学长江学者岳东教授、湖南大学 863 计划智能机器人主题专家王耀南教授、中国商用飞机有限责任公司国家千人屠晓伟教授、浙江大学长江杰青苏宏业教授、上海工程技术大学市领军人才程武山教授、太原理工大学省五一劳动奖章获得者常晓明教授、上海嵌入式系统应用工程技术研究中心常务副主任丁志刚研究员、上海仪器仪表研究所所长滕华强教授级高工、《仪器仪表学报》出版人崔建平高工等嵌入式系统相关领域知名学者和专家莅临指导和作大会报告。会议将就嵌入式系统理论与技术、应用研究成果推广以及嵌入式系统网络化与智能传感等问题进行广泛而深入的学术交流和技术研讨，展示近年来嵌入式系统技术研究和产品开发的最新成果，对促进我国嵌入式系统研究与应用开发具有重要的现实意义。

在此，我们谨向所有为本届会议顺利召开做出贡献的同仁致以最真诚的谢意！感谢程序委员会委员对会议投稿论文的严格评审，感谢组委会和志愿者为会议提供的周到服务，感谢大会报告人、各位嘉宾接受会议邀请并与大家一同分享他们最新的研究成果。最后，我们代表组织方向所有投稿作者和参会人员对全国嵌入式仪表及系统技术会议的支持表示衷心的感谢！

中国仪器仪表学会嵌入式仪表及系统技术分会、上海市仪器仪表学会

上海工程技术大学、上海大学

2014 年 10 月

会议组织结构(Conference Committees)

主办单位(Sponsors)：

中国仪器仪表学会嵌入式仪表及系统技术分会

上海市仪器仪表学会

承办单位(Organizing Institutions)：

上海工程技术大学　　上海大学

协办单位(Co-Organizing Institutions)：

《仪器仪表学报》杂志社

《仪表技术》杂志社

《电子测量技术》杂志社

上海市自动化学会

上海市电子电器技术协会

安徽工程大学

大会荣誉主席(Honorary Chairman)：

庄松林院士，中国仪器仪表学会名誉理事长

总主席(General Chairmans)：

费敏锐教授，中国仪器仪表学会嵌入式仪表及系统技术分会理事长

程维明教授，上海工程技术大学副校长

程序委员会(Program Committee)：

主席(Chairmens)：（按姓氏拼音字母顺序排列）

卜雄洙　程武山　丁志刚　付敬奇　胡大可　胡国奋

马世伟　潘　颖　吴建国　吴晓峰　许大庆　章泉兴

委员(Members)：（按姓氏拼音字母顺序排列）

蔡忠勇　曹建安　常晓明　陈　静　陈荣保　陈其工　高守玮　顾　仁
韩学政　江　明　姜　平　李　刚　李同涛　李　霞　李欣生　林海鸥
凌志浩　刘文波　刘献忠　欧阳名三　彭　晨　瞿国庆　沈春山　沈敬梓
孙光民　陶肖明　滕华强　屠晓伟　王明顺　卫开夏　吴仲城　习志奇
徐　胜　薛　冬　杨　华　杨　毅　杨万扣　岳　东　张柄瑶　周文举
朱　强　朱学莉　左开中

组织委员会(Organizing Committee)：

主席(Chairmens)：

潘　颖，上海工程技术大学
茅　健，上海工程技术大学

委员(Members)：

杭鲁滨　王明红　蔡颖玲　沙　玲　何　涛
杨慧斌　曹雅致　张立强　杜向阳　吴建民

秘书长(General Secretaries)：

徐　斌　魏利胜　杨傲雷

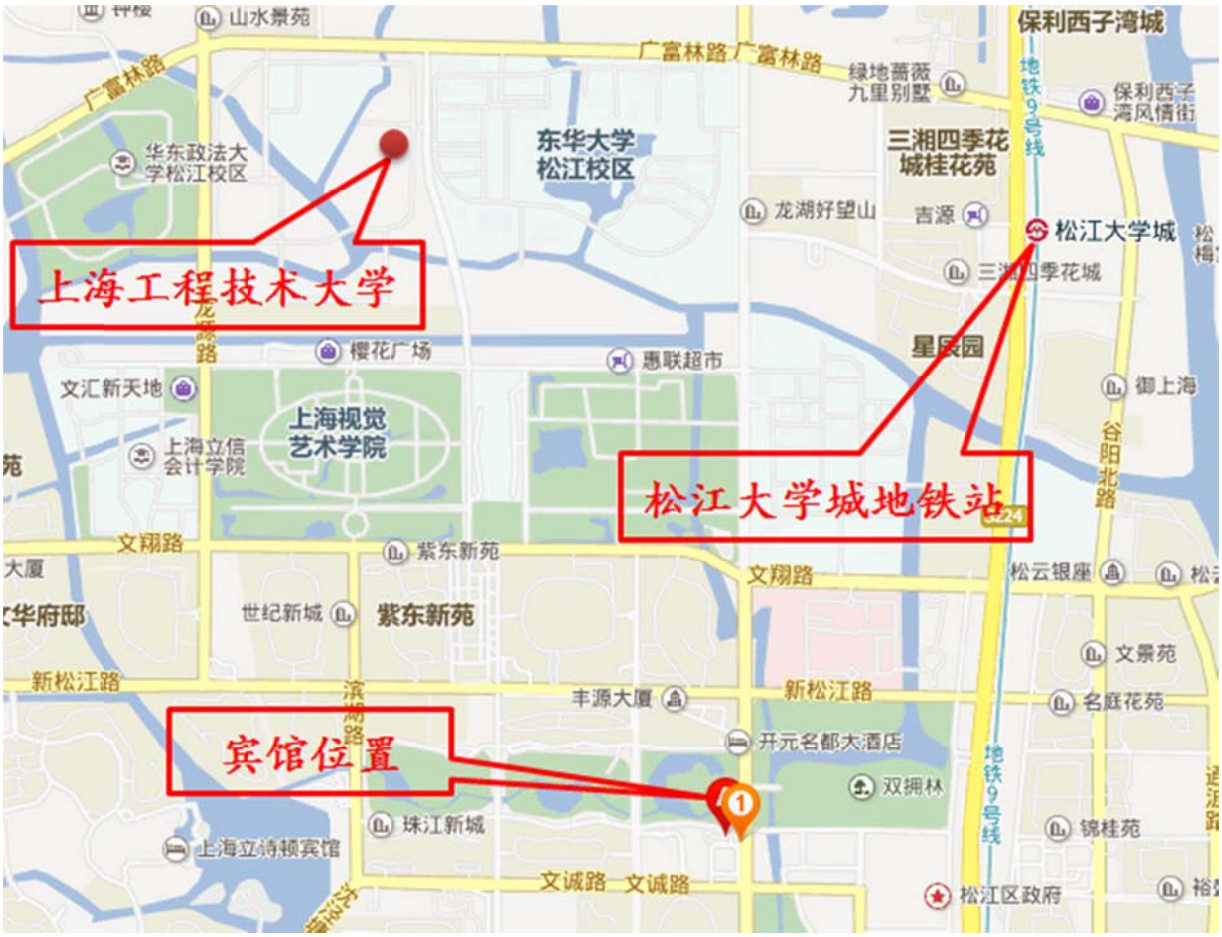
秘书(Secretaries)：

张美华　张中杰　张海峰　周　敏　朱玲玲
徐　鹏　王晓真　彭　飞　薛志文　张　勇

宾馆位置和交通（Hotel Location and Transportation)

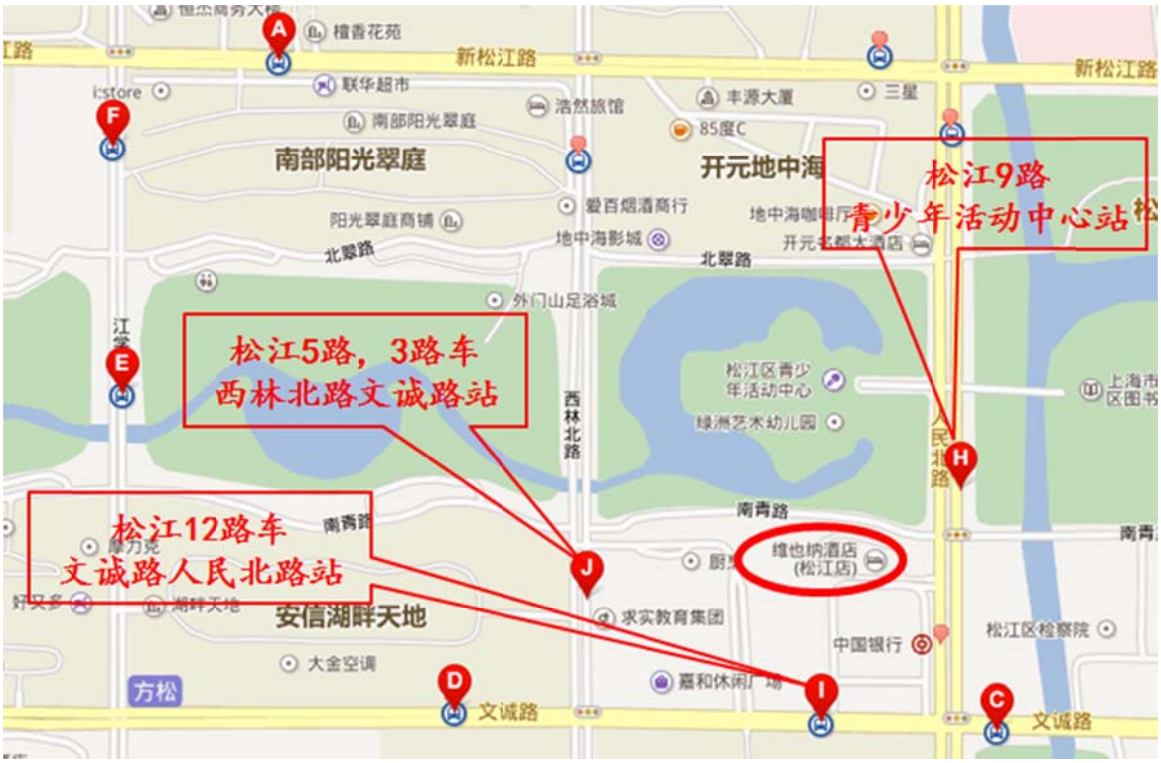
维 也 纳 酒 店 位 置：上海市松江区人民北路 1515 号

上海工程技术大学位置：上海市松江区龙腾路 333 号

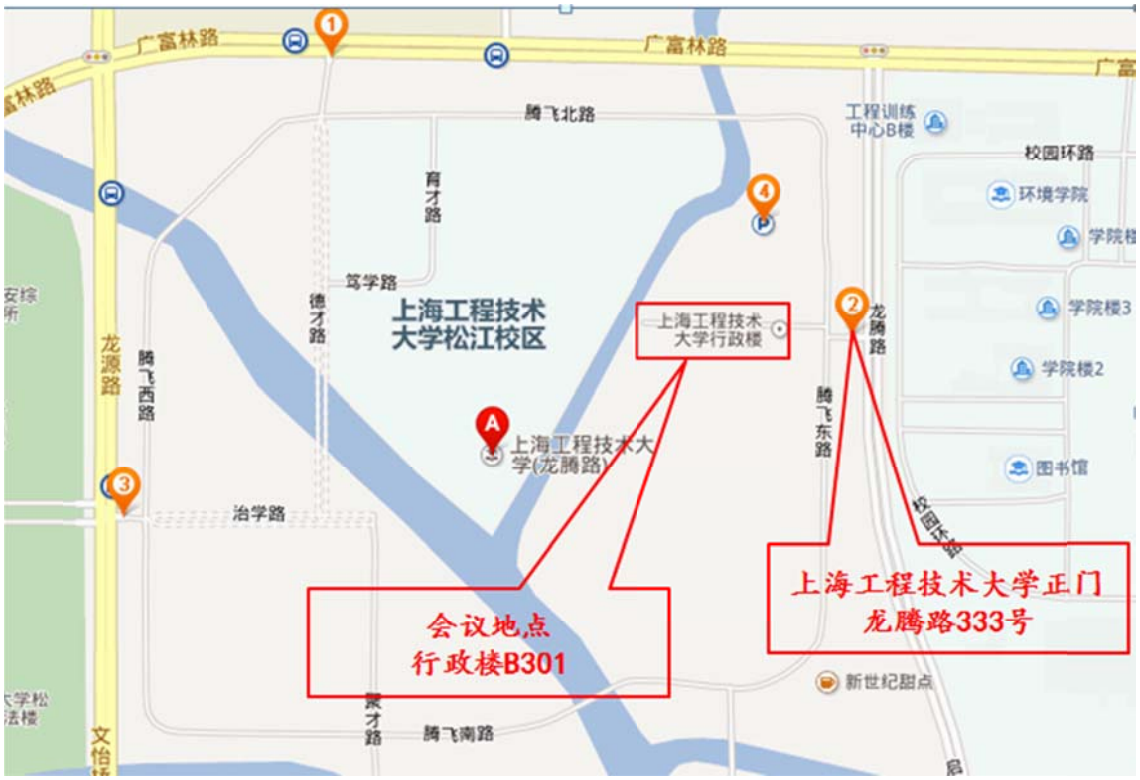


交通指南(Information for Transportation)

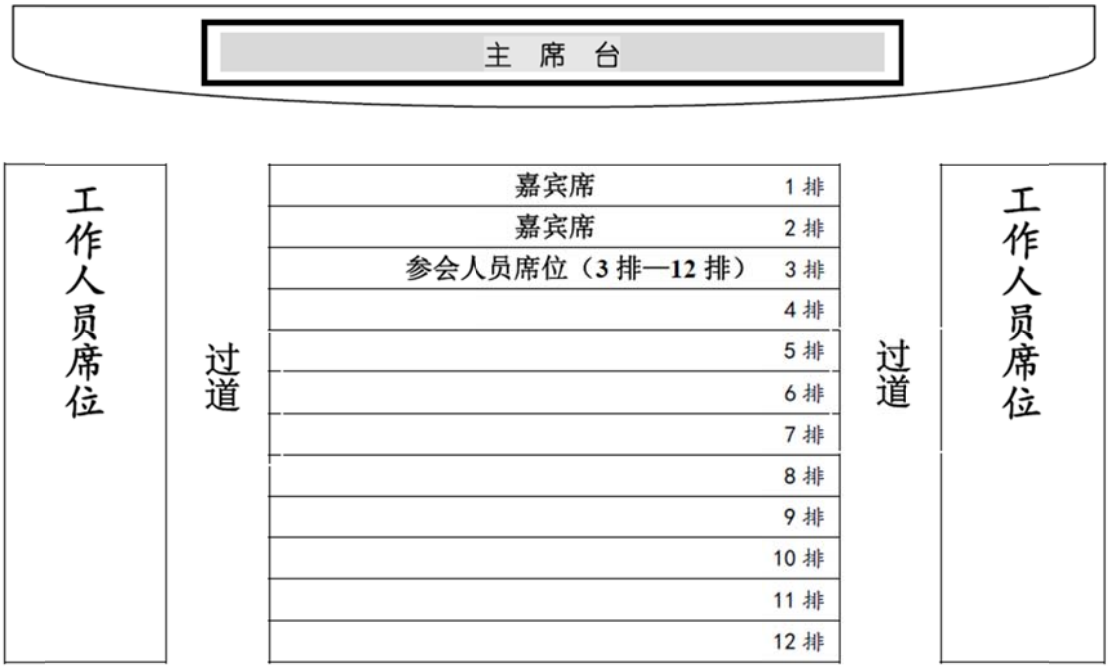
- 地铁路线：
  - 自上海火车站可乘地铁 1 号线至徐家汇站换乘地铁 9 号线至松江大学城地铁站。
  - 自上海南站可乘地铁 3 号线至宜山路站换乘地铁 9 号线至松江大学城地铁站。
  - 自上海虹桥火车站可乘地铁 2 号线至中山公园站换乘地铁 3 号线至宜山路站换乘地铁 9 号线至松江大学城地铁站。
- 松江大学城地铁站----维也纳酒店(上海松江店)（4.3 公里）：
  - 可乘坐出租车约 4.3 公里（12 分钟）。
  - 在大学城地铁站乘坐松江 9 路公交车至青少年活动中心站（约 5 站路程）。
  - 在大学城地铁站乘坐松江 5 路公交车至西林北路文诚路站（约 9 站路程）。
- 松江大学城地铁站----上海工程技术大学（约 3.1 公里）：
  - 下地铁后在大学城地铁站乘坐松江 13 路公交车至上海工程技术大学站（约 6 站路程）。
- 上海工程技术大学----维也纳酒店(上海松江店)
  - 学校正门乘出租车约 4.1 公里（10 分钟）。
  - 学校正门往南步行至龙腾路站，乘坐松江 33 路至青少年活动中心站下车。
  - 学校正门往南步行至松江大学城站（松江大学城体育中心附近），乘坐松江 3 路，在西林北路文诚路站下车。
  - 学校正门往南步行至松江大学城站（松江大学城体育中心附近），乘坐松江 12 路，在文诚路人民北路(易初莲花)站下车。
  - 学校正门乘坐松江 13 路至松江大学城地铁站，再换乘公交 5 路或 9 路（同“松江大学城地铁站----维也纳酒店”路线）。



会议地点图示(Conference Venue)



会议会场图示(Conference Room)



2014全国嵌入式仪表及系统技术会议会场在上海工程技术大学行政楼B301，请各位参会人员进入行政楼大厅后，根据路线指示标识以及会议现场工作人员的引导乘坐电梯至三楼B301会场。

重要信息(Important Information)

会议安排(Conference Arrangements)：

会议时间：2014 年 10 月 17-19 日
会议地点：上海工程技术大学
会议日程：
2014 年 10 月 17 日下午：参会代表报到（地点：上海市松江区人民北路 1515 号维也纳酒店大堂）
2014 年 10 月 17 日晚上：中国仪器仪表学会嵌入式仪表及系统技术分会第二次会员代表大会（地点：维也纳酒店会议室）
2014 年 10 月 18 日上午：开幕式及大会报告（地点：上海工程技术大学行政楼 B301）
2014 年 10 月 18 日下午：大会报告
2014 年 10 月 18 日晚上：晚宴
2014 年 10 月 19 日全天：技术参观（自愿）

会议报到(Registration)：

（1）时间：2014 年 10 月 17 日 14:00-20:00
地点：维也纳酒店大堂（地址：上海市松江区人民北路 1515 号）
（2）时间：2014 年 10 月 18 日 08:00-09:00
地点：上海工程技术大学大会报告会场（行政楼 B301）

会议联系(Contacting the Organizing Committee)：

联系人：潘颖 / 杨傲雷 / 魏利胜
电话：13681609498 / 18817426696 / 15212281833
地址：中国上海市松江区龙腾路 333 号上海工程技术大学
邮编：201620
邮箱：embed2014@163.com

会议网站(Website)：

http://www.eist.org.cn/index.html

会议程序总览 (Program at a Glance)

大会日程安排(Timetable of Technical Program)

日期	时间	负责人/主持人	内容	地点
10 月 17 日	14:00-20:00	潘颖 杨傲雷 魏利胜	报到接待	维也纳酒店大堂
	17:30-19:00 晚餐（地点：维也纳酒店餐厅）			
	19:00-21:00	马世伟	中国仪器仪表学会嵌入式仪表及系统技术分会第二次会员代表大会 （参会人员：理事及代表）	维也纳酒店会议室
10 月 18 日 上午	08:00-09:00	徐斌 杨傲雷	注册报到	上海工程技术大学 行政楼 B301
	09:00-09:25	程武山	开幕式	上海工程技术大学 行政楼 B301
	09:25-09:40	潘颖	参会人员拍集体照	上海工程技术大学 行政楼正门
	09:40-11:00	费敏锐	大会报告	上海工程技术大学 行政楼 B301
	11:00-11:10	上 午 茶 歇		
	11:10-12:10	费敏锐	大会报告	上海工程技术大学 行政楼 B301
12:10-13:40 午 餐 （上海工程技术大学校内餐厅）				
10 月 18 日 下午	13:40-15:00	潘颖	大会报告	上海工程技术大学 行政楼 B301
	15:00-15:10	下 午 茶 歇		
	15:10-16:30	潘颖	大会报告	上海工程技术大学 行政楼 B301
	16:30-18:30	集体参观		
10 月 18 日 晚上	18:00-20:30	程武山	晚宴	维也纳酒店餐厅
10 月 19 日	全天	潘颖	技术参观（自愿）	

开幕式及大会报告(Opening Ceremony and Plenary Lecture)

<table>
<tr><td colspan="3">开幕式 2014 年 10 月 18 日 09:00-09:40
主持人：程武山 教授</td></tr>
<tr><td>时 间</td><td colspan="2">会议议程</td></tr>
<tr><td rowspan="4">09:00-09:25</td><td colspan="2">嵌入式仪表及系统技术分会理事长费敏锐教授致开幕辞</td></tr>
<tr><td colspan="2">中国仪器仪表学会名誉理事长庄松林院士致贺辞</td></tr>
<tr><td colspan="2">上海工程技术大学程维明副校长致欢迎辞</td></tr>
<tr><td colspan="2">中国仪器仪表学会名誉理事长庄松林院士为嵌入式仪表及系统技术分会新一届理事长、副理事长、常务理事颁发聘书</td></tr>
<tr><td>09:25-09:40</td><td colspan="2">参会人员拍集体照</td></tr>
<tr><td colspan="3">大会报告 2014 年 10 月 18 日 09:40-12:10
主持人： 费敏锐 教授</td></tr>
<tr><td>时 间</td><td colspan="2">大会报告</td></tr>
<tr><td>09:40-10:20</td><td>王耀南教授（湖南大学，院长）</td><td>上海工程技术大学行政楼 B301</td></tr>
<tr><td>10:20-11:00</td><td>岳东教授（南京邮电大学，长江学者）</td><td>上海工程技术大学行政楼 B301</td></tr>
<tr><td>11:00-11:10</td><td colspan="2">上午茶歇</td></tr>
<tr><td>11:10-11:40</td><td>屠晓伟教授（中国商飞，国家千人）</td><td>上海工程技术大学行政楼 B301</td></tr>
<tr><td>11:40-12:10</td><td>崔建平高工（仪器仪表学报，出版人）</td><td>上海工程技术大学行政楼 B301</td></tr>
<tr><td colspan="3">12:10-13:40 午餐 地点：上海工程技术大学校内餐厅</td></tr>
<tr><td colspan="3">大会报告 2014 年 10 月 18 日 13:40-16:30
主持人：潘 颖 副教授</td></tr>
<tr><td>13:40-14:20</td><td>常晓明教授（太原理工大学，处长）</td><td>上海工程技术大学行政楼 B301</td></tr>
<tr><td>14:20-15:00</td><td>丁志刚研究员（上海嵌入式系统应用工程技术研究中心，常务副主任）</td><td>上海工程技术大学行政楼 B301</td></tr>
<tr><td>15:00-15:10</td><td colspan="2">下午茶歇</td></tr>
<tr><td>15:10-15:50</td><td>滕华强教授级高工
（上海仪器仪表研究所，所长）</td><td>上海工程技术大学行政楼 B301</td></tr>
<tr><td>15:50-16:30</td><td>程武山教授（上海工程技术大学，院长）</td><td>上海工程技术大学行政楼 B301</td></tr>
<tr><td colspan="3">16:30-18:30 参会代表集体参观 地点：上海松江大学城周边</td></tr>
<tr><td colspan="3">18:30-20:30 晚宴 地点：维也纳酒店餐厅</td></tr>
</table>

大会报告(Plenary Lectures)

Plenary Lecture 1

10月18日，星期六（时间：09:40-10:20）
上海工程技术大学行政楼B301

题目：智能制造装备视觉传感检测与控制技术及应用

王耀南 教授

湖南大学电气与信息工程学院

主要内容：

智能制造装备是具有感知、决策、控制、执行功能的制造装备，作为高端装备制造业的重点发展方向，是信息化与工业化深度融合的重要体现。概述智能制造装备的关键技术难题以及发展前景与趋势。详细探讨了智能制造装备开发过程中遇到的核心技术难题，介绍了智能制造装备的视觉传感器、机器视觉检测、嵌入式网络化高精度运动控制系统等技术，具体阐述了制约目前智能制造装备研发所遇到的瓶颈问题及可行性解决方案。并陈述了智能制造装备的下一步发展趋势。

王耀南 教授、博士生导师，湖南大学电气与信息工程学院院长，教育部视觉控制技术与应用工程研究中心主任，输变电与系统控制技术工程研究中心主任。1981 年毕业东华理工学院电子计算机系留校工作，1989-1995 年分别获湖南大学工业自动化系硕士和博士学位留校工作至今。

1995-1997 年国防科学技术大学自动控制系博士后，2000-2004 年获德国洪堡杰出青年基金和 DFG 基金，留学德国 Bremen 大学自动化系和 BIBA 研究所，从事欧盟第五框架国际合作重大项目，任中方首席科学家，德国柏林工业大学和不莱梅大学、中科院自动化所客座教授。国际 IEEE 高级会员，国际自动控制联 IFAC 会员，国际《Int. J. AIE》、《Int. J. AMSE》、《信息与控制》、《动力学与控制学报》杂志编委。国务院政府特殊津贴专家，国家“百千万人才工程”入选学科带头人，全国高等学校优秀骨干教师获得者，2014 年 4 月获全国五一劳动奖章。

Plenary Lecture 2

10月18日，星期六（时间：10:20-11:00）
上海工程技术大学行政楼B301

题目：多智能体系统分布式协同控制及在电网中应用

岳东 教授

南京邮电大学

主要内容：

报告将介绍如下主要内容：

（1）介绍多智能体系统的一些相关背景；

（2）介绍我们在分布式协同控制方面的一些研究工作及进展情况；

（3）结合智能电网特点，介绍多智能体系统方法的一些应用成果。

岳东 教授，南京邮电大学先进技术研究院院长，华中科技大学教育部长江学者特聘教授，1995年于华南理工大学获博士学位。2011年获江苏省第三期“333工程”突出贡献奖，2013年入选江苏省“333工程高层次人才培养工程”第二层次培养对象，担任IEEE Senior Member及多个国际和国内核心刊物编委，获得省部科学技术二等奖3项，发明专利6项，发表80余篇SCI收录论文，其中IEEE和Automatica国际顶尖刊物论文22篇，被国际学者他引2000余次，单篇国际学者他引超250次的论文2篇，均进入ESI千分之一，H指数28。

Plenary Lecture 3

10月18日，星期六（时间：11:10-11:40）
上海工程技术大学行政楼B301

题目：微型化、模块化的飞行模拟器需求与嵌入式系统应用

屠晓伟 教授

中国商用飞机有限责任公司

主要内容：

报告首先介绍飞行模拟器的发展史、等级和国内外的需求，然后对它的功能模块的原理和技术指标加以描述，最后对模块从设备意义上、软件、组网上如何实现及集成来阐述嵌入式系统在飞行模拟器研发上的应用。

屠晓伟 国家“千人计划”特聘专家，中国商飞资深研究员，上海飞机制造有限公司航空制造技术研究所先进装配中心副主任，上海瀚创机器人技术有限公司高级顾问，中国仪器仪表学会嵌入式仪表及系统分会理事。2008年开始受聘上海大学机电工程与自动化学院兼职教授。原工作于加拿大国家研究院航天制造技术中心和康考迪亚大学。并在法国贡比涅科技大学、加拿大蒙特利尔综合理工大学、高科工程师学校、多伦多瑞尔森和南京航空航天等大学任教授和兼职教授。主要研究方向和研究成果是：自主导航机器人平台和三维重组算法、程序设计、信号处理与分析；机器视觉和图像实时监控和检测，空间定位，工业自动化装配，生产线自动化；柔性工装和传感器伺服智能机器人工业应用；机器人柔性铆接和装配。多个系统实物和专利已用于工业界。

Plenary Lecture 4

10月18日，星期六（时间：11:40-12:10）
上海工程技术大学行政楼B301

题目：科技期刊与创新人才成长

崔建平 高级工程师

仪器仪表学报

主要内容：

报告主要从科技期刊编辑部的角度介绍如何选取论文发表，包括：

1、强国梦的实现急需大量创新人才；

2、科技论文是科技创新的组成部分；

3、科技期刊的评价体系；

4、编辑部选取优秀论文的准则及标准；

5、创新人才成长——机遇与挑战。

以上五个小节都围绕一个主题，即论文是写给读者看的，科技论文是科学研究过程的一部分。因此，读者接受、认可了你的论文，也同时认可了你的研究工作，作为论文交流平台的科技期刊，其发表论文的被认可度，就代表了期刊的影响力和学术地位，而不断受到认可的论文作者也必将成长为创新型的科技人才。

崔建平 高级工程师，专业无线电技术。现任中国电子学会理事、电子测量与仪器分会副主任委员兼秘书长、中国仪器仪表学会理事、电子测量仪器分会副主任委员兼秘书长；期刊工作委员会秘书长，中国计量测试学会理事，学术工作委员会、组织工作委员会委员；《电子测量与仪器学报》总编辑，《仪器仪表学报》、《电子测量与仪器学报》、《电子测量技术》、《国外电子测量技术》执行出版人等。

Plenary Lecture 5

10月17日，星期六（时间：13:40-14:20）
上海工程技术大学行政楼B301

题目：兴趣驱动 项目引导 文化熏陶 注重过程

-----晓明研究室 10 年嵌入式系统人才的培养与管理实践

常晓明 教授

太原理工大学

主要内容：

报告主要介绍晓明研究室嵌入式系统开发及人才培养情况：

1、研究室基本情况；
2、如何通过举办研究室成果展览，激发学生的研究热情；
3、筛选出有潜力的学生，开展暑期培训；
4、注重学生的全面发展，使其逐步学会科学的研究方法；
5、利用项目引导学生研发，注重过程管理；
6、社会评价。

常晓明 教授，太原理工大学教务处正处级调研员，曾任太原理工大学教务处长。1954年生，留学日本8年，取得日本的工学硕士和博士学位，博士生导师，具有丰富的电子技术实践经验，对嵌入式系统有广泛的研究。

多年来主持了40余项科研课题，发表论文近90篇，出版学术著作2部、译著1部。曾获得省及国家自然科学基金资助。建立的“晓明研究室”(www.xiaoming-lab.com)极具管理和研发特色，深受各类学生的青睐，受训的学生就业状况喜人，业内人士高度评价。

Plenary Lecture 6

10月18日，星期六（时间：14:20-15:00）
上海工程技术大学行政楼B301

题目：嵌入式技术与智能化系统

丁志刚 研究员

上海嵌入式系统应用工程技术研究中心

主要内容：

我们正处在一个转型发展的时代，上海的智慧城市建设已经进入新一轮的三年行动计划。智慧城市建设离不开智能系统，智能智能系统需要嵌入式技术。报告将探讨嵌入式技术的当代特征和发展趋势，以及在智能系统中的作用，特别是在物联网、智慧家庭、智能制造等中的核心作用，最后介绍其在医疗卫生、食品安全、文化教育、智慧交通、公共安全和大众服务等方面的应用。

丁志刚 研究员，现任上海软件中心副总工程师，上海嵌入式系统应用工程技术研究中心常务副主任，上海产业技术研究院智能化产品创新中心主任，上海市工程系列计算机与信息技术应用、上海市自然科学研究系列计算机与信息技术高级专业技术职务任职资格评审委员会委员，政府特殊津贴获得者，中国计算机学会和上海市计算机学会嵌入式系统专业委员会委员。

作为技术或课题负责人，承担多项国家863和上海市重大项目，建立了嵌入式专业服务平台，又引入试验床概念，逐步形成为嵌入式系统协作平台，使其在车载信息服务、AVS产业等创新集群中得到验证和示范。主持多项标准制订，指导研发32位嵌入式开发实验系统，开展专业服务（测试、培训等）。提出政府塔台、企业创新、平台助推、联盟互动的理念，并在中国（上海）创业者公共实训基地信息技术实验试制平台中成功应用。

Plenary Lecture 7

10月18日，星期六（时间：15:10-15:50）
上海工程技术大学行政楼B301

题目：嵌入式系统在电测仪器中的应用探索

滕华强 教授级高工

上海仪器仪表研究所

主要内容：

嵌入式系统已经广泛地渗透到科学研究、工程设计、军事技术等众多领域。随着各种嵌入式产品的开发和推广，嵌入式技术和人们的生活将会越来越密切。报告主要介绍采用嵌入式系统、工业现场总线，构建电测仪器网络，实现对现场设备的综合测控，并通过具体事例简要展示嵌入式系统的应用。

滕华强 1988 年毕业于上海工业大学，20 多年来主要从事仪器仪表与测控系统研究，带领科研团队在智能仪器、数据处理系统、电子专用设备、智能电网等领域取得了一定的研究成果。主持完成包括国家及市级科研项目 20 余项，获得国家知识产权授权 30 多项，制定国家标准 10 项。现为中国仪器仪表学会理事、电磁测量分会副理事长、中国仪器仪表协会理事、电工仪器分会副理事长、全国电工仪器仪表标准化技术委员会第三分技术委员会主任、中国电子专用设备工业协会理事、上海市仪器仪表学会常务理事兼秘书长、电磁测量信息处理专业委员会主任、上海市公共研发服务平台电工仪器仪表及系统测控专业技术服务子平台负责人、《仪表技术》杂志主编、上海电子元器件行业协会理事。

Plenary Lecture 8

10月18日，星期六（时间：15:50-16:30）
上海工程技术大学行政楼B301

题目：智能电网用户端测试平台建设

程武山 教授

上海工程技术大学机械工程学院

主要内容：

报告概述了智能电网在国内外的发展现状，并对美国、欧盟、中国和日本智能电网的发展进程进行了比较；介绍智能电网用户端系统架构、智能电网用户系统的总体特征，以及智能电网用户端系统的五种关键技术；从多方面视角说明了智能电网用户端系统的发展动向与应用前景；通过智能电网用户端的几个案例，对智能电网的技术研究、产品开发、平台建设与示范以及标准研究等部分进行了分析。

程武山 工学博士，教授，博士生导师，国务院特殊津贴获得者，上海市领军人才。现任上海工程技术大学机械工程学院院长，新能源研究所所长。中国仪器仪表学会嵌入式系统分会副理事长、上海市发明协会副会长、中国电气工程与自动化学科委员、上海市智能系统学会理事、上海市系统仿真学会理事、中国机械工程学会高级会员、中国科学技术进步奖评委会评审专家、国家自然科学基金同行评审专家、International Journal of Distributed Control Engineering (IJDCE) Editor-in-Chief。长期从事分布式控制和智能控制领域的研究。对建立专家系统、模糊神经网络控制的基础理论有着系统全面的研究，作为项目负责人完成国家重点项目、上海市重大攻关项目、上海市科委的重大项目等10余项，其中经鉴定认为具有国际先进水平的2项。获机械工业部科技进步特等奖1项；上海市优秀发明奖选拔赛一等奖1项、金奖1项；上海市科技进步二等奖1项、三等奖2项。

论文摘要集(Book of Abstracts)

No. 001

PDE 工具箱在电机磁场问题中的应用

颜超超1，刘瑾1，杨海马2，刘利1，张宇霆1

1.上海工程技术大学电子电气工程学院，上海201620；

2.上海理工大学光电信息与计算机工程学院，上海200093；

摘要：在电磁场问题中，偏微分方程经常作为描述解决问题的模型，有限元法（FEM）是偏微分方程的一个重要的数值求解方法。编程实现从偏微分方程到有限元求解需要较好的理论基础和编程技巧，难度较高。本文首先介绍了通过 PDE 工具箱偏微分方程有限元求解的基本理论和具体过程，然后利用该方法解决电机静磁场问题和直流导电介质问题。数值结果表明这一方法操作简单，运算速度快，计算误差可控制等优点。

关键词：PDE工具箱；偏微分方程（PDE）；图形用户界面（GUI）；静磁场

PDE Toolbox Used in the magnetic Field of the Motor

YAN Chao-chao1, LIU Jin1,YANG Hai-ma2,LIU li1,ZHANG Yu-ting1

1. Institution of Electrical and Electronic Engineering, Shanghai University of Engineering and Science, Shanghai 201620, China;

2. Institution of Optical electrical and computer engineering, University of Shanghai for Science and Technology, Shanghai 200093, China;

Abstract: In electromagnetic field, Partial Differential Equations (PDE) is used to describe the questions as a model. Finite element method (FEM) is an important numerical solution method of partial differential equation. Good theory foundation and programming skill are necessary for programming to solve partial differential equation by Finite element method (FEM) method. This article introduces the basic theory and the specific process by using PDE Toolbox finite element solution of partial differential equations, and then uses this method to solve the problem of static magnetic fields and DC motor conductive medium problem. Numerical results show that there are many advantages by using this method, such as: easy to operate, the calculation error can be controlled and so on.

Keywords: PDE toolbox; Partial Differential Equations (PDE); Finite element method (FEM) method; static magnetic fields

No. 002

基于LabVIEW及DAQ的光电检测系统

尤亚锋1，刘瑾1，颜超超1，杨海马2，曾伊浓1，王佳1

1. 上海工程技术大学电子电气工程学院，上海201620；

2. 上海理工大学光电信息与计算机工程学院，上海200093；

摘要：基于NI USB-6009数据采集卡、上位机及LabVIEW为基础构建了光电检测系统。系统适用于光电传感器性能检测以及简单的实时信号监控。系统中数据采集由数据采集卡实现，其他功能，包括数据存储、触发、控制、显示、用户界面等，均在上位机中用软件(LabVIEW 2013)实现。由于采用USB数据线，采集卡与上位机之间连接方便，并且提高了可扩展性、可维护性，降低了成本。实验结果表明，对于不同的光电传感器，系统都能够进行准确的检测。.

关键词：LabVIEW；DAQ (数据采集)；光电检测

PhotoelectricDetection System Based on LabVIEW and DAQ

YOU Ya-feng1, LIU Jin*1, YAN Chao-chao1, YANG Hai-ma2, ZENG Yi-nong1, WANG Jia1

1. Institution of Electrical and Electronic Engineering, Shanghai University of Engineering and Science, Shanghai 201620, China;

2. Institution of Optical electrical and computer engineering, University of Shanghai for Science and Technology, Shanghai 200093, China

Abstract:A Photoelectric detection system based on NI USB-6009 DAQ, PC and LabVIEW 2013 was constructed. The Photoelectric sensor system is suitable for photoelectric sensors testing and simple real-time signal monitoring. All functions, including data storage, trigger, control, display, user interface, etc. were implemented by software

(LabVIEW2013) in PC except that data acquisition was implemented by DAQ card. Because of using USB cable, it's convenient to connect the DAQ card with the PC. The expandability and maintainability were improved, while the cost was reduced. The result indicates that different photoelectric sensorcan be accurately detected by the system.

Keywords: LabVIEW; DAQ (data acquisition); Photoelectric Detection

No. 003

基于霍尔传感器HW-302的非接触式电流波形检测系统

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2.太原理工大学物理与光电工程学院，太原030024；

3.太原理工大学计算机科学与技术学院，太原030024；

摘要：为了满足在非接触条件下检测电流波形的工业需求，提出一种由霍尔传感器件HW-302构建的非接触式电流波形检测系统。系统利用霍尔传感器采集电流信号，经过信号处理电路放大后，由示波器显示，实现了电流波形的检测。为验证检测的正确性，笔者通过给电感线圈施加不同的信号，检测其电流波形，并分析了系统的性能。实验表明，设计的系统以非接触方式检测电流波形，基本达到了预期的效果。

关键词：霍尔传感器；电流波形；非接触式；检测

Non-contact Type Current Waveform Detection System Based on Hall Sensor HW-302

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2.College of Physics and Optoelectronics, Taiyuan University of Technology, Taiyuan Shanxi 030024, China;

3.College of Computer Science and Technology, Taiyuan University of Technology, Taiyuan Shanxi 030024, China;

Abstract: In order to meet the industrial demand of the current waveform detection under the condition of non-contact, a non-contact type current waveform detection system based on hall sensor HW-302 was put forward. The system used the hall sensor to collect current signal, and displayed towards the oscilloscope after the amplification of the signal processing circuit.Then the current waveform detection was achieved. To verify the correctness of the detection, different signal was applied to the inductance coil to detect the current waveform, and analyze the performance of the system. It was showed that the system detected the current waveform through the non-contact way, basically achieving the expected results

Keywords: hall sensor; current waveform; non-contact; detection

No. 004

基于模糊控制的新型楼顶水箱实时水体交换控制系统

黄立新

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摘要：楼顶水箱是城市不可或缺的重要二次供水设施。楼顶水箱由于居民用水量的时间变化及进出水等一些因素，楼顶水箱的实时水位在居民用水时间变化上存在一定规律性。本文基于模糊控制不依赖于被控对象的精确模型，对参数变化不敏感，具有较强鲁棒性的特点，提出一种基于模糊控制的新型楼顶水箱实时水体交换控制系统，对新型楼顶水箱日常进出水的水位及新型楼顶水箱清洗过程各箱体水位变化进行实时控制，并对该实时控制系统能否在一定程度上达到节水节能进行探讨和研究。实验表明果表明，模糊控制系统能够一定程度上提高楼顶水箱的工作效率，并能够实现节水节能。

关键词：模糊控制；嵌入式实时操作系统；实时任务；节能节水水箱

Water Tank System in Real Time Based On Fuzzy Control

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Abstract: The roof of the tank is an indispensable

secondary urban water supply facility. There is acertain regularity in the factors of water tank roof due to some people's consumption of water. Based on fuzzy control, exact model of the controlled object is built, which is not sensitive to parameter variations, with a strong robust features. A real-time water tank roof fuzzy control can be used in water daily cleaning, with ability to achieve a certain degree of saving water and energy. Experimental results show the fuzzy control system can improve the efficiency of a certain degree of roof water tanks, and water and energy conservation can be achieved.

Keywords: fuzzy control; embedded real-time operating system; real-time tasks; energy and water saving roof tank

No. 005

一种基于BP神经网络图像分割算法的嵌入式测树系统

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摘要：针对传统测树学中不能同步量树高、胸径，以及测量仪器自身的局限性和人为因素干扰大等问题，本文设计了一种基于 BP 神经网络图像分割算法的嵌入式测树系统，能同时测得立木胸径、树高。经测试，系统运行高效，操作简单，精度完全达到林业上测量误差在 5%以内的要求，具有很好的生产应用价值，是现有测树方法的一个很好补充。

关键字：测树学；BP神经网络；图像分割；嵌入式系统

An Embedded Tree Measurement System Based on BP Neural Network Image Segmentation

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Abstract: Because traditional tree measurement can not synchronously measure the tree's height and breast-height diameter, and the measuring instruments have the limitations and other human factors, this paper designs an embedded tree measurement system based on BP neural network image segmentation, which can synchronously measure the main characteristic of tree. Testing results show that the proposed system can run efficiently and operate simply. Furthermore, the measurement precision error fully meets the requirement of less than 5%.So the proposed system has good application value, which is the supplement of the existing methods of tree measurement.

Keywords: Tree Measurement; BP Neural Network; Image Segmentation; Embedded System

No. 006

面向多协议的物联网网关架构和中间件设计

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摘要：本文旨在融合多种无线网络、实现多种无线网络和有线网络的数据转换和存储，从而构建一个面向智能家居的无网络-ARM网关-数据库-组态软件的异构网络集成控制系统构架。针对Zigbee、Bluetooth和Wifi等不同的无线设备，提出了一种ARM网关的的架构，能够集成多种不同无线通信协议，设计了一种异构节点间的信息交互方式和流程。网关进行数据转换的同时还以有线网络（以太网）的方式将数据映射到由Mysql构成的管理数据库，在数据库中分别建立状态表、目标表、指令表、数据格式表，描述了管理数据库的整个结构和运行流程。且以Labview为例，给出了控制流程，说明了上层组态软件如何通过对管理数据库的操作实现对不同节点的控制和组网。能使用户方便地通过操控数据库中间件，实现对底层各异构子网段中节点的测控，满足客户端对不同无线网络平台高效和灵活的控制要求，加强了智能家居系统的可操作性。

关键词：中间件；数据库；无线传感器网络；网关

Design of gateway and middleware for Multi-protocol Internet of Things

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Abstract: The purpose of this paper is to integrate data conversion and storage in the field between variety of wireless network and wired network, and to construct a heterogeneous network based on wireless network ARM gateway-Database-configuration software for Smart Home. For Zigbee, Bluetooth, Wifi and others wireless devices, this paper put forward a framework which can integrate a variety of different wireless communication protocol based on ARM gateway, designed the process for heterogeneous nodes to exchange data. Gateway can converse and map the data to database which consist of the Mysql database management system by Ethernet, respectively establish the target table, instruction table, data format, and describe the management of the entire structure of the database and process. In the case of Labview, this paper would show the control process and illustrate how the configuration Software through the management of database operations to achieve networking the different communication nodes. The framework would help users easily operate the hardware system, satisfy with different wireless for efficient and flexible control requirements and greatly enhances the operability of Smart Home System.

Keywords: Middleware; Database; Wireless sensor network; Gateway

No. 007

摄像头智能车调试系统的设计与开发

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摘要：智能车竞速比赛是以迅猛发展的汽车电子为背景的。该比赛涵盖了自动控制、计算机软件技术、嵌入式编程、系统调试等多个交叉学科的知识。摄像头智能小车以摄像头为传感器提取赛道引导线，并在规范的赛道内自主循线。本文提出了一种新的摄像头智能车调试解决方法，即调试时先让小车在赛道上运动一圈，将采集到的图像和车辆状态记录在SD卡中，单片机端UI配合拨码开关和按键调整参数，提高整定效率。实际证明，这套系统完整地记录下小车运行时的图像，提高了调试小车的效率。

关键词：人机界面；视频分离电路；硬件二值化电路；SDHC卡

The Design and Development of Camera Smartcar's Debugging System

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Abstract: The smartcar competition is based on the rapid development of the automotiveelectronics. The competition contains the interdisciplinary knowledge of the automatic control, computer software technology, embedded programming, system debugging and so on. With the Sony CCD camera as the main sensor, the smartcar can extract the guideline of the track and move through the line in a high speed.This paper proposes a new camera smartcar debugging solution. When debugging the smartcar, put the car in the track. The system will record the images and smartcar status information to the SD card at the same time. The user can adjust the parameters by DIP switches and buttons and improve the efficiency of adjustment via SCM debugging software. Through the practical proof, this software makes it convenient for user to study image process and improve the efficiency of debugging the smartcar.

Keywords: UI; video;separation circuit; binarization hardware circuit; SD card

No. 008

基于无线通道的离散时变网络控制系统镇定

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摘要：研究了具有 IEEE802.11b 无线网络通道特性和时变特性的离散系统镇定问题。首先分别建立了刻画 IEEE802.11b 无线网络通道时滞的逆高斯分布模型和系统时变特性的不确定参数模型。然后设计了基于模型的状态反馈控制器以补偿网络延时和时变性对系统的影响。同时分析了离散时变网络控制系统的随机稳定性，并给出了线性矩阵不等式形式的控制器求解条件。最后通过数值仿真验证了所提方法的有效性。

关键词：网络控制系统；时变系统；逆高斯分布模型；基于模型的控制

Stabilization of Discrete Time-varying Networked Control Systems over Wireless Channels

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Abstract: This paper investigates the problem of stabilization for discrete time-varying system over a physical IEEE 802.11b wireless channel. First the wireless network-induced delays are characterized by an inverse Gaussian distribution model (IGDM) and the time-varying nature is depicted by uncertain parameter model. Then the model-based state feedback controller is designed to compensate the influence of delays and time-varying nature. And the stochastic stabilisability of discrete time-varying networked control system is analyzed and the solution of controller is given in the form of linear matrix inequalities (LMIs). Finally, the effectiveness of the proposed methods is illustrated by numerical simulation examples.

Keywords: Networked control system; Time-varying system; Inverse Gaussian distribution model；Model-based control

No. 009

基于STM32的环模制粒机的自动控制系统设计

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摘要：环模制粒机是一个非线性、强耦合、大时滞、多变量的复杂控制对象，其主要被控变量是制粒机的制粒主电机电流和调质器出口的温度。制粒过程是现代饲料生产中最常见的工艺之一，为了获得质量稳定的产品和最大化的生产效率，制粒机调制温度以及主电机电流必须准确地控制在期望值附近。另外国内大多数制粒机采取人工操作方法。因此本文介绍了制粒机的温度电流控制回路，分析了其对象本身的耦合性与滞后性，设计了基于 STM32 的制粒机自动控制系统，以及良好的控制算法有效地解决上述所存在的问题，并对锅炉水箱对象（液位与温度）进行实验，取得良好的控制效果。

关键词：制粒机；STM32；自动控制；控制算法

Design of automatic control system for hoop standard granulator based on STM32

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Abstract：Hoop Standard Granulator is a complex control object of nonlinear, strong coupling, large time delay, multi variables, the main controlled variable is the main motor current and conditioner outlet temperature. Granulating is one of the most common steps in the modern feed manufacturing process. In order to keep the quality of products stable and maximize the efficiency, the feed pellet system must be controlled in a given range. In addition, most of the domestic granulators take artificial methods of operation. Therefore, This paper introduces the current temperature granulating machine control circuit, analysis of the coupling and lagging behind the object itself, designed an automatic control system for granulating machine based on STM32, and a good control algorithm can effectively solve the above problems, and the object of the boiler water tank (liquid level and temperature) experiment, achieve good control effect.

Keywords: Granulating machine; STM32; automatic control; control algorithm

No. 010

微型直流电机检测系统的设计与实现

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摘要：随着现代汽车的不断发展，汽车上大量使用了微型直流电机来驱动天窗、控制风门。车用直流电机结构特殊，在实际应用中对带负载情况下的相电流、运转角度与反馈电压的线性度等问题具有严格要求。本文通过硬件电路的设计、软件代码的编写实现了直流电机综合性能测试系统，该系统结构简单，性能稳定，能够满足企业对微型直流电机自动化检测的需求。系统运动磁粉制动器、扭矩传感器来模拟负载的加载和检测，此方法能够应用到其他需要模拟负载的系统中，具有良好的推广应用价值。

关键词：微型直流电机；自动化检测；磁粉制动器；扭矩传感器；模拟负载

Design and implementation of micro-motor detection system

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Abstract: As modern vehicles are improving continually, more and more miniature direct current motors are used in vehicles to drive skylights and control dampers. The DC motors in vehicles have special structure, and it has strict requirements for phase current, operation angle, linearity of feedback voltage with load in practical applications. This paper achieves a direct current motor integrated performance test system through hardware designed and software code written, the system is simple structure, stable performance, and it can meet automation detection requirements of factory for miniature direct current motors. System uses magnetic brakes, torque sensors to simulate the load loading and the load detection, this method can be applied to other systems which needs simulating load, and it has good value and prospect of popularizing application.

Keywords:miniature direct current motor; test automation; magnetic brake; dynamic torque sensors; simulate the load

No. 011

基于偏最小二乘法的血糖浓度预测新方法

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摘要：由于糖尿病患者需要频繁地对其血糖浓度水平进行检测，而现行的方法一般是扎破手指取血样，有很多的弊端，因而以近红外光谱(NIR)为代表的血糖无损检测技术引起了研究人员的广泛关注。偏最小二乘法(PLS)目前是光谱分析中使用最广泛的一种建模方法，但是用它在浓度范围较大的校正集上建模时，其预测精度会变低。本文采用一种简单的建立多个模型的方法，先用其中的一个模型预测光谱矩阵每行对应的浓度区间，然后用相应浓度区间上的模型对血糖浓度进行重新预测，试验结果表明，这种方法具有较好的预测效果。

关键词：偏最小二乘；近红外；多次建模；血糖无创检测；预测精度

A New Method to Improving the Prediction Accuracy of Blood Glucose Level Based on PLS Regression

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Abstract: For diabetics, frequent detection of blood glucose level is often required. At present, that means the patients' fingers have to be pricked over one thousand times a year. Thus, non-invasive measurement of blood glucose, such as NIR spectroscopy, has drawn so much attention over the past several decades. Among all the analytical methods of the NIR spectra, Partial Least Squares (PLS) is the most extensively used algorithm. However, it will result in a loss of prediction accuracy if the concentration range of calibration set is too wide. In this study, we improve the prediction accuracy of blood

glucose level by simply establishing multiple PLS models. We first use a certain model to figure out which concentration range the row of spectral matrix belongs to. Then, we use the corresponding models to re-calculate the glucose concentration. The result shows that this method can enhance the prediction accuracy to some extent.

Keywords:PLS; NIR; multiple models; non-invasive; prediction accuracy

No. 012

基于嵌入式操作系统μC/OS-Ⅱ的多路径AGV设计

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摘要：传统AGV一般只能沿单一路径行驶，当需要完成各具有指定路径的多任务时，几台AGV在同一工况下则较难有效实现响应功能。常规的AGV就不能适应现代化物流系统中的多地、多路径以及多任务的工作需求。嵌入式操作系统凭借其进程调度的高效性和实时性在诸多控制系统应用中发挥了巨大作用。本文将嵌入式实时操作系统μC/OS-Ⅱ移植到MSP430F149芯片上，较大程度地发挥嵌入式系统的特性，通过触摸屏实现良好的人机交互，较为方便地在2台或多台AGV的使用过程中实现多路径。

关键词：嵌入式；AGV；MSP430；磁导引

The Design of Multi-path AGV Based on Embedded μC/OS-Ⅱ

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Abstract: The previous AGV mostly only runs along a single path，when it needed to be completed the multi-task on specified path，it is difficult to achieve responding effectively for AGVs at the same condition. The conventional AGV can not adapt to the demand of multi-location, multi-path and multi-task in the modern logistics system. Embedded operating system with high efficiency and real-time processing has been playing a great role in the development of control system. In this design，the embedded real-time operating system called μC/OS-Ⅱ has been transplanted to MSP430F149 and its advantages of the characteristic have been showed greatly. Operators can achieve human-computer interaction easily with the touch screen and realize multi-path selection by two or more AGVs.

Keywords: embedded, AGV, MSP430, magnetic guiding

No. 013

基于蚁群优化的无线传感器网络可信路由

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摘要：针对无线传感器网络中下一跳的安全性以及数据包转发过程中QoS需求,本文提出了一种基于蚁群优化的无线传感器网络可信路由选择算法，选择以链路上所消耗的能量、链路延迟、链路带宽等关键指标来构造QoS需求目标函数,再将邻居节点信任值融入到适应度函数的计算中进行路径选择优化,保证节点数据转发的安全。仿真结果表明，提出的算法能有效延长无线传感器网络的生命周期,实现在网络中建立快速、节能、安全的路由。

关键词：无线传感器网络；可信；蚁群优化算法；路由

Ant Colony Optimization-based Trustful Routing for Wireless Sensor Networks

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Abstract: To ensure the security of the data forwarding and requirement of QoS(Quality of Services) in wireless sensor networks, we propose an ant colony optimization-based trustful

routing algorithm. The objective function includes the key factors, such as the time delay, the bandwidth and the energy consumption of the link from the source to the destination. Also, in order to optimize the path selection, to ensure that the data forwarding node safety, the trust value of neighbor nodes is introduced to the fitness function. Simulation results show that this proposed algorithm prolongs lifetime of WSNs, and obtain fast, secure and energy-efficient routing of WSNs in communication process.

Keywords:wireless sensor networks;trustful;Ant Colony Optimization; routing

No.014

一种基于区间型联系数的WSN路由选择算法

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摘要：通过区间型联系数建立决策模型是解决多属性决策问题,具有方法简单、计算量小的特点,非常契合无线传感器网络资源受限的特点。本文针对无线传感器网络中路由能量消耗不平衡,提出了一种基于基于区间型联系数的WSN路由选择方法,对节点剩余能量、可靠性、方向、邻居节点个数等多属性进行综合评价,利用相对贴近度进行排序选择转发节点,并在属性决策中利用熵权法对多评价目标因子赋权,以避免属性权重选取时的主观性,最终形成路由路径。仿真结果验证了该算法在平衡网络的能耗,延长网络生存时间等方面表现出良好的性能。

关键词：区间型联系数；无线传感器网络；路由选择；熵权法

A Routing Algorithm for Wireless Sensor Networks Based on Interval Connection Number

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Abstract: Decision model which uses the ideas from Interval Connection Number theory is an effective way to solve the problem of multi-attribute decision making. With the characteristic of simplicity and low computation, interval connection number can be very suitable for wireless sensor networks with limited resources. In this paper, we propose a routing algorithm for wireless sensor networks based on interval connection number. To resolve the problem of the energy consumption imbalance for packets routing in multi-hop wireless sensor networks, the attributes (such as the node residual energy, reliability, direction, and the number of the neighbor nodes) are chosen for comprehensive evaluation. All candidate nodes for the next-hop are sorted, and the optimal one will be selected according to the relative closeness. Also, the entropy method for determination of weight of evaluating indicators is adopted to make the evaluation results reasonable and subjective. Simulation results show a good performance of the algorithm in the aspect of energy consumption balance, and can extend the network lifetime effectively.

Keywords: Interval connection number; wireless sensor networks; routing; Entropy method

No. 015

基于贝叶斯网络的电网故障不确定性建模和推理

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摘要：电网间互联程度的日益提高，电网故障时，故障信息存在不确定性。针对此问题，提出用贝叶斯网络对电网故障不确定性进行分析。在电网故障机理分析的基础上，定义贝叶斯网络节点及其节点状态，运用Netica软件，构建了网络拓扑结构，学习节点条件概率分布。基于电网故障诊断的贝叶斯网络模型，进行了因果推理，诊断推理，支持推理，和证据敏感性分析。算例结果表明，用贝叶斯网络方法分析电网故障的不确定性是正确的、有效的，Netica也为贝叶斯网络进行电网故障诊断提供了实现途径。

关键词：贝叶斯网络；电网故障诊断；建模；概率推理；证据敏感性分析

Modeling and Inference of Power Grid Failure Uncertainty Based Bayesian Network

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Abstract: With the continuous increasing of power grid interconnection, fault information has property of uncertainty when the fault occurs. Aiming at the problem, Bayesian network is proposed to analyze the uncertainty of grid fault. Based on the mechanism analysis of power grid failure in this paper, nodes and their statuses were defined, Bayesian network topology was established in Netica software platform, and then learned conditional probability distribution of nodes. Based on Bayesian network model grid fault diagnosis, causal inference, diagnostic inference, support inference and sensitivity analysis of evidence were implement. Probability inference and sensitivity analysis of evidence prove that the Bayesian network is correct and effective to analyze the uncertainty of grid fault, Netica software provides the realizing way for Bayesian network to diagnose grid fault in technology as well.

Keywords: Bayesian network; Power grid fault diagnosis; Modeling; Probability inference; sensitivity analysis of evidence

No. 016

基于ZigBee可穿戴传感器的医疗监护系统

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摘要：为了实现医疗设备的微型化、医疗监护的无线化，设计基于ZigBee可穿戴传感器的医疗监护系统，它能够扩大病人的活动空间，减轻监护人员的工作强度，降低医疗费用。系统采用病区/监护中心两层结构，利用可穿戴传感器采集病人体温、脉搏等生理参数，数据经过处理后送至无线通信模块，最后由ZigBee无线网络传输至监护中心。经过实验获得了病人生理参数，并与传统测量结果进行了对比。结果表明，系统稳定、可靠，很好地实现了病人生理参数的采集、传输和显示，符合设计要求。

关键词：ZigBee；可穿戴传感器；医疗监护；生理参数；无线网络

Medical monitoring system based on ZigBee wearable sensors

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Abstract: The medical monitoring system based on ZigBee wearable sensors is designed to reduce the size of medical equipments and realize wireless medical monitoring, which is able to expand patient's activity area, relief work intensity of paramedics, and lower medical expense. The system has two-layer structure, including inpatient area and care center, which collects patient’s temperature, pulse, and other physiological parameters by wearable sensors. The parameters were processed, and then sent to the wireless communication module, transmitted to the care center finally by ZigBee wireless network. Patient’s physiological parameters were obtained through system experiments, and compared with the traditional measurement data. The results show that, the system is stable and reliable, which can realize the sampling, transmission and display of patient’s physiological parameters, and meets the design requirements.

Keywords: ZigBee; wearable sensors; medical monitoring; physiological parameters; wireless network

No. 017

基于区间数和多属性决策的电厂锅炉燃烧稳定性判定方法研究

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摘要：锅炉燃烧状态自动监测中亟待解决的关键问题之一是燃烧稳定性判别问题。本文基于图像处理技术，从火焰图像中提取燃烧参数。针对火焰脉动现象，提出将燃烧参数以区间数表示的思想。针对软计算方法依赖决策样本以及相关工作人员工作经验的缺陷，本文另辟蹊径，提出基于区间数和多属性决策的燃烧稳定性判定方法。本文将区间数理论和多属性决策理论应用于燃烧稳定性判定中，定义了离稳度概念；同时在权重提取问题中提出样本提取方法，克服了多属性决策只能处理小样本数据的缺陷，提出适用于燃烧稳定性判定的算法和实现步骤。实验表明，该方法能用来进行燃烧稳定性判定，且有较好的实验结果，为燃烧稳定性判定问题提供了一种新的方法。

关键词：区间数；多属性决策；燃烧稳定性；离稳度；样本提取

Research on Determination Method of Furnace Flame Combustion Stability Based on Interval Number and Multiple Attribute Decision Making

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Abstract: Determination of furnace flame combustion stability is one of the key problems in the automatic monitoring of furnace flame combustion state. Combustion parameters can be extracted from furnace flame images based on image processing technology .Due to the existence of flame pulsation phenomenon, interval number theory is employed in this paper to express combustion parameters. Because that soft computing methods rely on samples and staff's work experience, which are difficult to obtain, a new method based on interval number theory and Multiple Attribute Decision Making is proposed in this paper to determine combustion stability. The algorithm and implementation steps of the method are described in detail. In this method, a concept of Deviation Stability Degree is defined. In the procedure of extracting weight, a method for extracting samples is proposed, which can overcome the shortcoming of Multiple Attribute Decision Making only dealing with small samples. Experiments show that the method based on interval number theory and Multiple Attribute Decision Making is feasible and has good results, and provides a new idea for the problem of determining furnace flame combustion stability.

Keywords: Interval number theory, Multiple Attribute Decision Making, Combustion stability,Deviation Stability Degree, Sample extraction

No. 018

啄木鸟机器人自激振动的动态仿真

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摘要：啄木鸟机器人可以产生自激振动，本论文主要研究了啄木鸟机器人系统的非线性的复杂运动过程，这种运动需要依赖摩擦力的作用,通过对自激振动中LCP问题的求解研究了啄木鸟机器人的运动特性。啄木鸟机器人可以通过自身的自激振动，而不需要依赖任何的动力和控制完成周期性的运动。整个连续周期的动态仿真表明其是稳定的周期被动运动。

关键词：被动运动；自激振动；动态仿真

Dynamic Simulation of a Woodpecker Robot Based on Self-excited Vibration

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Abstract: This paper studies complex nonlinear dynamic behaviors of a woodpecker robot system which can only operate in the presence of friction as it relies on combined impacts and jamming.The woodpecker robot can periodically move without any drives and controls based on self-excited vibration phenomena. The whole time histories of the dynamic simulations in successive periods

indicate its cyclical, stable passive movement.

No. 019

悬臂梁压电式振动发电机仿真与实验研究

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摘要：为了提高悬臂梁压电振动发电机的环境适应能力，分析了末端附加质量块对固有频率和输出电压的影响规律，结果表明，随着质量块质量的增加，压电梁的固有频率单调下降，而末端相对位移却单调上升；在相同的激励环境中，固有频率接近和末端振幅相同的压电梁输出电压基本一致。

关键词：无线传感器网络；振动能量收集；微型振动发电机；发电能力

Simulation and experimental study on cantilever piezoelectric vibration generator

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Abstract: For increasing adaptive capacity to environment of cantilever piezoelectric vibration generator with limited volume, influence rule of added proof mass to inherent frequency and output voltage are analyzed. The results indicate, with increase weight of proof mass, inherent frequency of piezoelectric beam monotonic decrease, but end relative displacement monotonic rise; in same stimulus environment, output voltage of piezoelectric beam with similar inherent frequency and same end amplitude are basic same.

Keywords:wireless sensor network; vibration energy harvesting; micro vibration generator; generating capacity

No. 020

基于嵌入式 STM32的 Modbus RTU 协议实现

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摘要：随着工业现场总线技术的快速发展，Modbus协议以其高效性，可靠性，广泛应用于电力行业。为了提高电厂对数据采集的可靠性和实时性，本文提出了将Modbus通信协议与32位STM32F103ZE微处理器相结合的设计方案，介绍了系统的总体设计方案和 Modbus 通信协议的内容。在嵌入式实时操作系统 μC/OS-II 上实现了基于 Modbus RTU 通信协议的主站和从站的通信，并详细讨论了Modbus通信协议中 CRC 校验码的生成。实验结果表明，该方案有效地实现了 Modbus 协议，可以广泛地应用于电厂和其他工业现场。

关键词：嵌入式系统；Modbus；数据采集；STM32F103ZE；μC/OS-II

Implementation of Modbus RTU Communication Protocol Based on STM32

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Abstract: With the rapid development of industrial field bus technology, the Modbus protocol is widely used in electric power industry because of its high efficiency, reliability. In order to improve the reliability and real-time performance of data acquisition for power plant, this paper puts forward a design of Modbus communication protocol with 32-bit STM32F103ZE microprocessor. The overall design scheme of the system and the content of Modbus Communication Protocol are introduced; In the embedded real-time operating system μC/OS-II to implement the communication between master station and slave station based on the Modbus RTU communication protocol, and discuss the generation of Cyclic Redundancy Check in the Modbus Communication Protocol. The experimental results show that the scheme has realized the Modbus protocol effectively, which can be widely used in power plants and other industrial field.

Keywords:embedded system; Modbus; data acquisition; STM32F103ZE; μC/OS-II

No. 021

面向工业无线嗅探器的一种改进型 UDP 协议

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摘要：无线嗅探器逐渐在工业领域得到应用，其网络传输协议也有较高的要求。本文针对UDP协议的弱可靠性问题,提出了一种改进的工业应用型UDP协议 (IAUDP)，在UDP协议简单、速度快、效率高的特点的基础上，加入了基于数据包数目和时间相结合的丢包重传机制。实验表明IAUDP协议可以有效提高数据帧传输的可靠性和效率。

关键词：无线传感器网络；传输可靠性；丢包；确认重传机制；

Improved UDP Applied in Industrial Wireless Sniffer

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Abstract: Wireless sniffer has been widely applied to industry， and it needs a high-quality network transmission protocol to support it. User Datagram Protocol（UDP）has the problem of poor reliability in the data transmission, in order to overcome this shortcoming, this paper designs a improved protocol called IAUDP (Industry Applied UDP). Based on the main advantages of UDP, such as simplicity, high-speed, high efficiency，it proposed packet-number-based and time-based united retransmission mechanism. Some experiments show that reliability and efficiency of data frames transmission have been improved after using IAUDP.

Keywords: Wireless sensor network; transmission reliability; Packet loss; ACK and retransmission mechanism

No. 022

基于机器视觉的表面粗糙度检测系统设计

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摘要：针对传统的光切法显微镜测量，开发了一种基于机器视觉的表面粗糙度检测系统。详述了系统的硬件构成和软件设计原理，运用图像处理技术从光切显微图像中提取出表面轮廓信号计算粗糙度评定参数。该检测系统能够实现工件表面粗糙度的自动、快速、多参数测量，通过测量实验与样本标准件的数值进行对比，验证了该检测系统能达到满意的精度。

关键词：表面粗糙度；光切法显微镜；机器视觉；图像处理

Design of Surface Roughness Measuring System Based on Machine Vision

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Abstract: Aimed at traditional light-section microscope measuring, the surface roughness measurement system based on machine vision was designed. The system configuration and the software principle were introduced in detail. Using measurement system various surface roughness parameters can be measured automatically and fast. Comparing the measurement results with the value of standard parts, it was proved that the system has a satisfying measurement precision.

Keywords: Surface Roughness; Light-section Microscope; Machine Vision; Image Processing

No. 023

基于激光扫描和摄像机 SFM 的非同步点云三维重构方法

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摘要：室外场景测量数据量大、扫描数据易重叠，单靠 3D 激光扫描方法和摄像机 SFM 无法获得完整的三维重构信息，若将两种设备进行在线实时同步测量，易受到测量环境和系统制约不易实现。针对

此问题，本文提出了一种基于激光扫描和 SFM 结合的非同步点云数据融合的三维重构方法。首先提出利用手动选择控制点进行七自由度初始配准，再利用 ICP 算法对初始配准结果进行精确配准，最后利用最近点搜索算法对融合数据进行颜色匹配。实验结果显示，该方法能有效地将激光扫描与 SFM 点云数据进行融合，实现了室外大场景的三维彩色重构。

关键词：3D 激光扫描；SFM；点云配准；数据融合；三维重构

Non-synchronous point clouds fusion algorithm for 3D reconstruction based on the 3D laser scanning and SFM

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Abstract: The outdoor scene measurement data are large, easily overlap. 3D laser scanning and SFM method can not obtain all the 3D reconstruction information. Focus on above mentioned reasons, this paper proposes a non-synchronous point clouds fusion algorithm for 3D reconstruction based on 3D laser scanner and camera-based SFM. Firstly, register by manual selection control points and utilize the result as the initial registration results. Then, the high precise registration 3D point clouds by ICP algorithm. At last, the fusion point clouds are matched color information by the nearest point search method. The 3D reconstruction experiments and analysis shows that the proposed algorithm can fuse the two point clouds come from the laser scanner and SFM to complete 3D color reconstruction of the outdoor large scenes.

Keywords:3D laser scanning; SFM; point clouds registration; data fusion;3D reconstruction

No. 024

基于 EMD 的肌音信号滤波处理方法研究

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摘要：肌音信号是指肌肉收缩时发出的低频声音是指肌肉收缩时发出的低频声音是指肌肉收缩时发出的低频声音，采用传统的滤波算法对肌音信号滤波处理，由于信号的非线性平稳信号的非线性平稳的特性，会使得部分有用信号有用信号被滤除，从而影响信号的特征提取的准确性，针对肌音信号特性，本文提出一种基于经验模态分解的肌音信号滤波方法，经过实验，验模态分解算法在肌音信号滤波处理上效果较好。

关键词：肌音信号；滤波；经验模态分解；特征提取

Research of mechanomyography signal filter processing method based on the EMD

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Abstract: Mechanomyography（MMG）signal is the sound of muscle contracting with low frequency band. The traditional filtering algorithms of processing MMG signal would make some useful signal filtered when it removes noise. Thus it affects the accuracy of signal's feature extraction. According to MMG signal characteristics, a new signal filtering method is presented in this paper based on empirical mode decomposition, which has a better performance on MMG signal filtering processing through experimental analysis.

Keywords: Mechanomyography signal; Filter processing; Empirical mode decomposition; Feature extraction

No. 025

汽车嵌入式电子控制与反馈系统

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摘要：介绍了一种嵌入式的汽车电子控制系统,系统以ARM9处理器为控制核心，嵌入式Linux系统管理多个不同类型的任务，提高系统相应率，支持多媒体、电子地图导航等辅助功能。通过CAN总线将众多功能独立的模块连接在一起，实现主从多节点

CAN通讯的智能控制系统，所有子模块可独立工作，也可以和控制中心进行高速通信。网络中配置了高速和低速CAN总线形成双备份网络，提高了网络的可靠性。同时为适应汽车智能化的发展，还设计了一种快速的反馈控制方式，提高了汽车的智能化操控体验和安全性能。

关键词：汽车电子；嵌入式控制；CAN 网络；控制与反馈

Embedded Control and Feedback Systems for Vehicle

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Abstract: An embedded electronic vehicle controlling system with feedback based on ARM9 was presented. The multiple parallel tasks managed by embedded Linux system to improve the whole system corresponding time, that also supporting multimedia, electronic map for navigation and other auxiliary functions. The CAN bus link the main controlling panel to all different modules with multiple feature together to achieve the multi-node intelligent control system, that all sub-modules can work independently, while can also receiving the control signals form center-module on high-speed communications. The CAN network was configured with high- and low-speed working mode for standby to improve the network reliability to meet the highly safety requirements. Meanwhile, circuit of fast feedback control mechanism was designed to meet vehicle intelligent development trend for better driving experience and safe performance.

Keywords:vehicle electronics; embedded control; CAN network; control and feedback

No. 026

基于双经度的鱼眼图像畸变矫正算法

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摘要：针对鱼眼镜头拍摄图片桶形畸变大的问题，研究了一种基于双经度图像畸变矫正算法，以改善其视觉效果。首先，在未知镜头视角大小且鱼眼图像非圆形的情况下，利用鱼眼图像特征求得球面中心及其半径，并对半径大小做优化处理以减弱极点畸变；在此基础上采用双经度模型方法，通过正交投影策略将鱼眼图像映射到球面上，转化为球面横向经度和纵向经度坐标，从而投射为以横向、纵向双经度坐标为基础的正方形平面图像，实现图像的快速、精确变换。最后，利用两个实例验证了本文所提算法的有效性和可行性。

关键词：鱼眼图像；畸变；矫正；双经度

Double Longitude Model Based Calibration Method for Fish-Eye Image Distortion

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Abstract: According to fish-eye lenses has wide field of view while introducing great barrel distortion, a novel image distortion correction algorithm based on double Longitude of spherical model algorithm is proposed to improve the visual effect in the paper. First of all, when camera angle is unknown and fisheye image is non-circular, center and radius of spherical model can be obtained through features of image itself, and then optimization of radius can be done to weaken the pole distortion; Base on this, the double longitude algorithm is adopt to achieve fast and accurate image correction. The fish-eye image is mapped to the sphere by orthogonal projection strategy, and then transformed into spherically horizontal and vertical longitude coordinates. At last, two experimental results show that the effectiveness and feasibility of the proposed method.

Keywords: Fish-Eye Image; Distortion; Calibration; Double Longitude

No. 027

采油树水下控制器检测系统设计

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摘要：根据采油树水下控制器检测系统的工作要求，采用了“传感器+西门子PLC+工控机”的数据采集

与控制模式。利用组态王6.55 组态软件，完成了采油树检测系统的监视软件、控制软件以及数据通讯软件的开发设计。本文采用组态设计将系统的监视功能与控制功能有机结合，监视功能实现采油树的过程仿真与控制，数据库SQL 实现了油井数据的管理和分析，做到实时跟踪、快速反应，提高了采油工程设计的速度和质量以及汇报的水平。同时设计中心可以充分利用这个数据库完成设计所需的查询、统计分析以及有关表格的输出功能。

关键词：采油树水下控制器；测试系统；监控系统；组态软件；数据库

Detection system design of subsea tree controller

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Abstract: According to the Christmas tree underwater detection system control unit workrequirements, we adopted the "sensor + siemens PLC + IPC" data acquisition and control mode.We use configuration software King View 6.55, completed the Christmas tree detection systemmonitoring software designed to control the development of software and data communicationssoftware. In this paper, the design configuration of the monitoring and control capabilitiescombine systems, process monitoring functions to achieve Christmas tree simulation and control,database SQL implementation of well data management and analysis, and do real-time tracking,rapid response, improved oil recovery project speed and quality of design and reporting levels.While the design center can take advantage of the query and statistical analysis required tocomplete the design of the database and the relevant forms of output.

Keywords: Christmas tree underwater control unit; test system; monitoring system; configurationsoftware; database

No. 028

康复护理智能床的机构设计与调试处理

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摘要：随着我国医疗水平的改善和人们对于医疗设备要求的提高，为老年人、瘫痪病人和残疾人等长期卧床者,设计开发一种具有高智能化的功能高度集成的康复护理床具有一定的必要性。考虑患者的实际需求，设计了支背、曲腿和侧翻机构，采用六自由度双并联丝杠-滑块-连杆机构实现了侧翻分区护理功能。并且对调试过程中的问题进行了分析总结。对样机的实际使用效果证明：所设计的康复护理智能床机构运行平稳，参数设计合理；在侧翻状态下可对患者的背部、臀部和腿部进行擦洗、按摩等康复护理。

关键词：康复护理智能床；六自由度双并联；侧翻分区护理；调试处理

Mechanisms Design and Debugging of an IntelligentRehabilitation Nursing Bed

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Abstract: With the improvement of medical standards and the increase of the people’s requirementsfor medical devices,it is a certain necessity to design and develop an intelligent rehabilitation nursingbed with high intelligence and integrated functions for the elderly, the paralyzed and the disabled.Taking into account the actual needs of patients,we design the mechanisms of raising back,curvinglegs and side turning-over.With six dofs double parallel screw-slider-link mechanisms,we achieve theside turning-over district nursing function.And we analyze the problems of the debuggingprocess.Practical application shows that the bed runs smoothly,and the parameters of design isreasonable.With the state of side turning-over,we can scrub and massage the patient’s back, buttockand legs.

Keywords: intelligent rehabilitation nursing bed; six dofs double parallel; side turning-over district; Nursing; debugging

No. 029

深海油气田水下控制器的研究与开发

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摘要：分析了水下生产系统的工艺流程，确定水下控制器的切换参数和控制模式，针对水下生产系统设计了水下控制模块(SCM)，其中可编程控制器(PLC)作为控制核心，实现逻辑控制、运行监视和故障报警。SCM通过采集各类传感器信息监测系统的运行状态，实现整个系统稳定、安全、高效的运行。

关键词：水下控制器；控制模式；工艺流程；故障报警

Research and development of deep-sea oil and gas fields subsea control module

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Abstract: This paper analyzed the process of subsea production system,determined the controller switch parameters and control mode. Designed subsea control module (SCM) for subsea production system, and programmable logic controller (PLC) is used as a control core,to realize logic control,monitoring and fault alarm.By collecting various types of sensor SCM monitoring system operational status,and the entire system is stable,secure and efficient.

Key words: Subsea control module;Control mode;Technological process;Fault alarm

No. 030

基于ARM和AD7606的高压开关柜电参数高速采集

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摘要：针对现行高压开关柜监测系统采集速度慢、精度低等问题，提出了一种基于ARM和AD7606的电参数高速采集系统。在分析了AD7606工作原理及采样时钟完整性的基础之上，创新性的采用了TMR磁传感器代替传统的电流互感器，实现对高压开关柜电流的测量。详细地介绍了ARM主控单元和AD7606之间的硬件接口设计、混合PCB的抗干扰设计、系统的软件测试流程以及上位机的Labview测试界面。通过实验的方法验证了高速采集系统的可行性和精确性，较好地满足了高压开关柜电参数高速采集的需要。

关键词：高压开关柜；高速采集；ARM；AD7606；Labview

High Speed Data Acquisition of the High-voltage Switch Board Based on ARM and AD7606

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Abstract: According to the problem of slow speed and low accuracy for current high-voltage monitoring system, a new high speed data acquisition system based on ARM and AD7606 was proposed. At the foundation of analyzing the working principles of AD7606 and integrity of sampling clock, TMR magnetic sensor was used innovated instead of traditional current sensor. The hardware interface between ARM and AD7606, the anti-interference design of mixed PCB boards, the software testing process of the system and the testing interface of Labview in PC were introduced in details. The feasibility and accuracy of the high speed data acquisition system were verified through measurement, it meets the demand of high-voltage switch board preferable.

Key words: High-voltage switch board; high speed data acquisition; ARM; AD7606; Labview

No. 031

基于边缘检测的人脸表情识别

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摘要：在过去的二十几年里，计算机视觉和模式识别技术的研究和发展为新的人脸表情自动识别系统的研究打开了大门[1]。文章选用Canny边缘检测的面部表情识别方法，首先对图片色彩空间进行转换，然后对人脸进行识别和定位，再分别对眼睛和嘴巴的边缘特征进行提取，最后与数据库里面的已知表

情特征比对判断人脸表情。该方法提供了人类表情全自动的解决方案，并在一定程度上克服了面部表情的变化强度问题。

关键词：表情识别；色彩空间；边缘检测

Facial Expression Recognition Based on Edge Detection

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Abstract: Over the last two decades, the advances in computer vision and pattern recognition power have opened the door to new opportunity of automatic facial expression recognition system. This paper use Canny edge detection method for facial expression recognition. Image color space transformation in the first place and then to identify and locate human face .Next pick up the edge of eyes and mouth's features extraction. Last we judge the facial expressions after compared with the expressions we known in the database. This proposed approach provides full automatic solution of human expressions as well as overcoming facial expressions variation and intensity problems.

Keywords: facial expression recognition; color space; edge detection

No. 032

基于LabVIEW的电能质量监测和分析平台设计

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摘要：针对传统的电力参数监测系统中硬件体积庞大，难以适应复杂、实时的多参数测试等问题，基于LabVIEW虚拟仪器技术提出一种新的电能质量监测和分析平台设计方案，完成电能质量各项指标的监测。基于LabVIEW的软件分析平台，包括数据采集、处理、分析和存储以及结果显示等。实验结果表明该平台测试结果准确，界面友好、性能稳定。

关键词：电能质量；LabVIEW；监测与分析

A Design of Power Quality Monitoring and Analysis Platform Based on LabVIEW

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Abstract: Aiming at the problems of bulky hardware, difficult to adapt to the complex, real-time and multi parameter testing in the traditional electric power system for parameter monitoring. A new design of power quality monitoring and analysis platform is put forward based on virtual instrument technology of LabVIEW to complete the design of power quality index monitoring. This software platform is based on LabVIEW, including data acquisition, processing, analysis, storage and results to display. The experimental results show that the test result is accurate, interface is friendly and performance is stable.

Key words: Power quality; LabVIEW; Monitoring and analysis

No. 033

基于组态王的水下采油树检测系统的设计

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摘要：针对采油树在深海封闭式工作环境下造成的设备操作与管理的难题，设计一款基于组态技术，并结合PLC 的水下采油树检测系统。通过PLC 采集现场数据信号到检测系统，运用组态王软件仿真，设计监控系统人机界面，可观察到采油树管道中的化学药剂和油的流动状态，实现了实时在线检测和监控。有效的降低了设备操作与管理的复杂性。系统现场调试运行状况良好，验证了该系统的稳定性与可靠性。

关键词：水下采油树；组态王；PLC；监控系统

The Detection System Design of Subsea Christmas Tree Based onKingview Program

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Abstract: Abstract: For the problems of equipment operation and management of Christmas tree in the deep ocean with enclosed work environment,

a subsea Christmas tree detection system based on the configuration technology and PLC was designed. Through PLC to collect field data signals to the detection system and Kingview program to simulation, design human-machine interface of the monitoring system,the monitoring system can observe chemical and oil flow state in the pipeline of Christmas tree in order to realize online testing and supervisory control. It can reduce the complexity of the equipment operation and management effectively. The debugging on site of the system shows a good operation condition, verifying the stability and reliability of the system.

Keywords:subsea christmas tree; kingview; PLC; monitoring system

No. 034

热双金属片挠度值测量精度分析

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摘要：热双金属片挠度值测量是检测其热弯曲一致性及稳定性的重要指标，本文介绍了热双金属片工作原理，分析悬臂梁法热双金属片热弯曲变形过程中产生的水平位移对各点挠度值测量精度的影响。利用CCD激光位移传感器非接触测量热双金属片被测面各点挠度值，通过补偿水平位移误差提高热双金属片各点挠度值测量精度，并实验验证各点挠度测量值的准确性。

关键词：挠度；水平位移；热双金属片；CCD激光位移传感器

Analysis of the measurement accuracy of the bimetal thermal’s deflection

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Abstract: The measurement of thermal bimetal’s deflection is key indicator to detect the consistency and steady of the thermal bimetal’s thermal curve, this paper introduces the working principle of thermal bimetal, and the influence of the horizontal displacement generated during thermal bimetal’s curving on cantilever beam method impacted on the each point deflection value of thermal bimetal’s deflection was analyzed. To measure the each point deflection of the thermal bimetal without touching thermal bimetal aided by the CCD laser displacement measurement sensor. Moreover, the formula of the horizontal displacement was provided, which can compensate the thermal bimetal’s deflection’s measurement accuracy, and the accuracy of each point deflection value measurement is verified by experiments.

Keywords: deflection; horizontal displacement; thermal bimetal; CCD laser displacement measurement sensor

No. 035

基于防扭缠仪器的旋转工件光学成像检测研究

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摘要：为了揭示基于防扭缠仪器旋转工件光学成像检测装置的恒相位成像检测原理，本文从等腰直角三棱镜的成像规律出发，分析了任意位置时有向线光源在棱镜组中的传输光路和投影方位，得到了一个恒相位光学成像检测条件。结果表明，该光学成像检测装置对转动平台上的仪器仪表、工件及其他设备进行观测和实时监控具有一定的实用意义。

关键字：棱镜；光学成像；有向线光源；恒相位

Research on Optical Imaging Detection of Rotational Workpiece Based on Avoiding Twist Instrument

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Abstract: In order to revealing the principle of rotational workpiece optical imaging detection device based on avoiding twist instrument, the transmission light path and projection directions of the directed linear light source in the prism group at any position was analyzed by introduction of the

imaging law of isosceles right-angle prism in this paper. The conditions of constant phase optical imaging detection was obtained.The results show that the optical imaging detection device has some practical significance for observation and real-time monitoring instruments and other equipment which on the rotating platform.

Keywords:prism;optical imaging;directed linear light source;constant phase

No. 036

新型热双金属片一致性测量装置及其综合误差分析

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摘要：简要介绍断路器中热双金属片热变形原理，针对断路器脱扣机构中热双金属片变形一致性问题，提出一种非接触式激光测量方法及装置方案；构造了消除热双金属片安装误差的具有标定校准的激光多点测量算法；基于空间坐标系转换，分析该装置机械装置综合误差；该测量装置所得测量结果为热双金属片成型、热处理工艺提供判定依据。

关键词：热双金属片；断路器，挠度；一致性；空间坐标转换

New Measuring Device for Consistency of Thermal Bimetal and Analysis of the Comprehensive Error in a Machine Structure

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Abstract: In this paper, thermal bimetal thermal deformation principle is introduced; furthermore, a new non-contact laser measuring device is designed, which aims to solve the problem of thermal bimetal consistency in circuit breaker tripping mechanism. An algorithm of laser multi-points has been constructed to eliminate the installation error of thermal bimetal. Based on three dimension space method , the comprehensive error of a measuring device is analyzed. The measured result from the device provides reference criteria for the formation and the thermal treatment process of thermal bimetal.

Keywords: Thermal bimetal; Deflection; Consistency; Space coordinate transformation

No. 037

基于机器视觉的工件分拣系统研究

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摘要：研究了基于机器视觉技术的工业分拣系统，介绍开发过程中使用的主要图像处理算法，并用 Matlab 对算法进行仿真。利用 C#编程软件建立图像处理的算法库，实现对规则几何工件的识别和定位。分析视觉算法库中的摄像机模型，并且对相机进行标定，然后对图像序列进行基本处理，提出了阈值分割结合形心定位算法,解决了不同颜色的规则几何形状工件的识别问题。仿真结果表明，该视觉算法可以有效解决规则几何工件的分拣问题，并且能准确地计算工件中心，达到分拣的目的。

关键词：机器视觉；工业机器人；目标识别；图像处理

The Research of Workpiece Separation System based on the Machine Vision

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Abstract: This paper describe industrial separation system, which is based on robot vision technology, introduced main image processing methodology used in development, and simulated algorithm with Matlab. Setup image processing algorithm library via C# program,realized recognition and location for regular geometry workpiece. Analyzed camera model in vision algorithm library, and calibrate the camera,and process the image series, resolved the identify problem for regular geometry workpiece with different colour.

Keywords: Machine vision; Industrial robot; Targel recognition; Image processing

No. 038

基于C#的DXF文件识别研究及开放式数控雕刻机系统开发

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摘要：本文针对开放式数控雕刻机关键技术，即DXF识别技术进行研究，提出了一种自动提取图元信息的方法。通过DXF解析算法，将图元信息转化为运动控制器代码，实现雕刻机对图元的轨迹跟踪。本文进一步以C#编程语言为开发工具，结合GALIL DMC2143运动控制器，利用DXF识别技术，开发了开放式数控雕刻机系统。

关键词：DXF识别；开放式数控雕刻机；GALIL运动控制器；C#

The Research of DXF File Identification and the Development of Open CNC Engraving Machine System Based on the C#

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Abstract: This paper investigates the critical technology (DXF Identification Technology) of open CNC engraving machine. An automatic extraction of primitive information method is proposed. By DXF parsing algorithm, the primitive information is transformed to motion controller codes. The trajectory tracking to the primitive is achieved. With the DXF identification technology, the open CNC engraving machine system is developed by the tools of C# and GALIL DMC2143 motion controller.

Keywords: DXF identification; open CNC engraving machine; GALIL DMC2143 motion controller; C#

No. 039

基于ANSYS的XX型圆管相贯节点静力性能研究

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摘要：平面XX型圆管相贯节点是实际工程常见的钢管节点之一。采用ANSYS软件对平面XX型圆管相贯节点的极限承载力进行了非线性有限元分析，揭示了相贯节点塑性区的受力全过程。在此基础上，对多组不同几何特性的平面XX型节点进行了比较，分析了一些基本几何参数对节点承载力的影响，并且将有限元分析计算结果与现行设计规范计算结果进行了对比。研究结果表明，支主管外径之比β、主支管轴线夹角θ、主管径厚比γ是影响平面XX型圆管相贯节点极限承载力的主要因素；平面KK型圆管相贯节点的破坏模式大多属于节点管壁塑性破坏；平面XX型圆管相贯节点的极限承载力计算公式，可在K型节点承载力设计公式的基础上乘以一个修正参数；平面XX型圆管相贯节点在一定程度上提高了节点的极限承载力，具有一定的可行性。

关键词：平面XX型相贯节点；极限承载力；有限元分析；几何参数；ANSYS

Research on the Static Behavior of XX-Joints based on ANSYS

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Abstract: Planar XX-joints are one of common steel tube joints in practical engineering. Nonlinear finite element analysis is used in the ultimate bearing capacity on planar XX-joints by ANSYS software, and the whole stressing processes of the plastic area on the joints are demonstrated. Based on these processes, some types of XX-joints with different geometric properties are discussed, the influences of some fundamentalgeometric parameters on the ultimate strength are analyzed. And the results of the finite element analysis are compared with the results of the current design code. The results show β, θ, γ are the main factors of the bearing capacity on planar XX-joints; the failure modes mostly belong to plastic failure of the walls of the chord; the computational formula of the bearing capacity on planar XX-joints is multiplied by a correction parameter based on the design formula of the bearing capacity on K-joints; planar XX-joints improve the bearing capacity of the joints to some

content, and the type of joints has certain feasibility.

Keywords: Planar XX-joints; the ultimate bearing capacity; finite element analysis; geometric parameters; ANSYS

No. 040

便携式光伏电池特性测试仪

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摘要：太阳能作为新型可再生能源，已经得到社会广泛的重视和认可。在光伏电池不断发展的今天，越来越期望提高光伏电池的光电转换效率。而这其中最为关键的问题是光伏电池组由许多光伏电池单元组成，如果这些电池单元之间的特性或者性能不一致或不相近，就可能导致不必要的能源浪费，甚至会出现减少电池寿命的现象。本文着眼于光伏电池的特性分析和检测方法研究，并设计基于低功耗单片机的便携式特性测试仪，对光伏电池单元特性进行测量分析，为各种光伏电池的组装提供科学的数据。

关键词：光伏电池特性；光电转化率；单片机；测试仪

Portable Tester of Photovoltaic Battery

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Abstract: Solar energy, as a new renewable energy, has got widely attention and recognition from society. Today, with the increasingly development of photovoltaic(PV) battery, higher rate of the photoelectric conversion are more expected to improve. And one of the most critical problems of photovoltaic battery, which is made up of many photovoltaic cells, is that if these cells do not match the characteristics or not close, it can lead to unnecessary energy waste, even reduce battery life. In this paper, the portable tester of photovoltaic batteries based on low power SCM is designed by the analysis of the photovoltaic battery and detection method research, and it can provide scientific datas for a wide variety of photovoltaic battery assembly.

Keywords: characteristics of photovoltaic battery; the photoelectric conversion rate; SCM; tester

No. 041

高通量筛选摇床平台在线自适应动平衡系统

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摘要：本文针对在线测量和校正摇床平台负载不平衡量的需求，创新设计了高通量筛选摇床平台的在线自适应动平衡系统。文中对系统组成和结构功能，包括不平衡量的测量，窄带跟踪滤波以及动平衡校正，以及系统的自校正控制过程和方案做了详细的论述，最后给出了自主开发的系统实验装置，相关测试结果表明了本文设计的有效性。

关键词：动平衡；窄带跟踪滤波；高通量筛选；自适应控制

An Online Adaptive Dynamic Balancing System for High Throughput Screening Platform

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Abstract: An online adaptive balancing system for high throughput screening platform is described in this paper, which is mainly used for measuring and correcting imbalances of load adaptively in the platform. The system composition and structure, including measurement of unbalance,narrowband-tracking filtering, and dynamic balancing correction, as well as the working process of self-turning control, are elaborated in this paper. Finally, experimental devices of the system and relevant test results are presented.

Keywords: dynamic balancing; narrowband tracking filtering; high throughput screening; adaptive control

No. 042

基于分时加密技术的无线AMI系统研究

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摘要：为建设安全、稳定、高效、经济的智能电网下，给出了无线AMI系统的设计方案，系统考虑到不同的测量设备和数据传输需求，兼容IEEE802.11和IEEE802.15.4两种协议。同时提出基于分时加密技术的无线通信机制，并通过NS2软件的仿真证明本方案能够有效的抵御网络攻击并节省网络能量消耗。最后从软硬件上实现了无线AMI系统的设计，并进一步验证了本系统工作的可行性和有效性。

关键词：无线AMI；分时；加密；IEEE802.11；IEEE802.15.4；智能电网

Research on Wireless AMI System Based on Time-sharingEncryption Technology

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Abstract: In order to construct a secure, stable, efficient and economical smart grid, a design scheme of the wireless AMI system is given. Considering the different measuring equipment and data transmission requirements, this system is compatible with two kinds of protocols which are IEEE802.11 and IEEE802.15.4. Meanwhile, a wireless communication mechanism based on time-sharing encryption technology is proposed. Using the NS2 software, the simulation results validate the scheme can effectively against network attack and save network energy consumption. Finally, the design of wireless AMI system hardware and software is finished, and the result verifies the feasibility and effectiveness of the wireless AMI system.

Keywords: Wireless AMI; Time-sharing; Encryption; IEEE802.11; IEEE802.15.4; Smart Grid

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