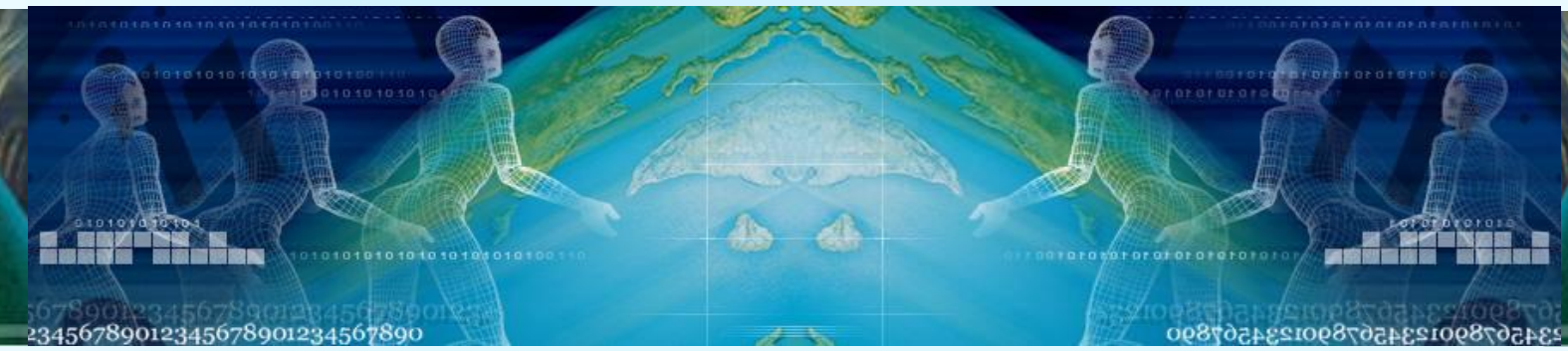
第 11 届
中国智能系统会议
CISC’2015

程序册



主办单位

中国人工智能学会智能空天系统专业委员会

承办单位

扬州大学

北京航空航天大学

2015 年 10 月 17-18 日　中国 扬州

目录

会议简介

中国智能系统会议是每年举办一次的全国性学术会议，其宗旨是为本领域的专家学者、研究生以及工程技术人员提供一个学术交流的平台，以便推动我国智能系统相关的控制理论及应用技术的发展。第 11 届中国智能系统会议（CISC'2015）将于 2015 年 10 月 17-18 日在有着“淮左名都，竹西佳处”之称的扬州举办。

本届会议由中国人工智能学会智能空天系统专业委员会主办，扬州大学承办，北京大学、北京科技大学、南开大学、北京邮电大学、中国科学院系统科学研究所、青岛大学复杂性科学研究所、IEEE 系统控制北京分会、上海市人工智能学会以及中国人工智能学会自然计算及数字智能城市专业委员会等多家单位协办。

经程序委员会的认真评审，最终有 114 篇论文被录用并收入会议论文集。会议论文集由 Springer 出版社“Lecture Notes in Electrical Engineering”分上下两卷结集出版。

本次会议将就智能系统相关的理论与应用研究进行广泛的学术交流，届时还邀请我国空天智能控制领域的著名专家、学者做大会报告，会议录用论文作者将围绕专题进行交流研讨。

我们热忱欢迎各位同仁莅临本届年会！

组织机构

主办单位

中国人工智能学会智能空天系统专业委员会

承办单位

扬州大学

北京航空航天大学

协办单位

北京大学

南开大学

北京邮电大学

北京科技大学

中国科学院系统科学研究所

青岛大学复杂性科学研究所

IEEE 系统控制北京分会

上海市人工智能学会

中国人工智能学会自然计算及数字智能城市专业委员会

大会主席

贾英民 (北京航空航天大学)　　李　斌　(扬州大学)

程序委员会主席

张天平 (扬州大学)　　杜军平 (北京邮电大学)

付永领 (北京航空航天大学)　　刘衡竹 (国防科技大学)

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张维存 (北京科技大学)　　王福忠 (河南理工大学)

邀请委员会主席

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蔡　强 (北京工商大学)　　付子义 (河南理工大学)

评奖委员会主席

陈增强 (南开大学)　　费树岷 (东南大学)

柴　毅 (重庆大学)　　楚天广 (北京大学)

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孔令富 (燕山大学)　　薛安克 (杭州电子科技大学)

王国利 (中山大学)　　董海荣 (北京交通大学)

出版委员会主席

杨洪勇 (鲁东大学)　　李海生 (北京工商大学)

周武能 (东华大学)　　李洪波 (清华大学)

区 域 主 席

任雪梅 (北京理工大学)　　周　进 (上海大学)

孙青林 (南开大学)　　尹鸿鹏 (重庆大学)

会议秘书长

裔　扬 (扬州大学)　　孟德元 (北京航空航天大学)

刘忠信 (南开大学)　　翟军勇 (东南大学)

重要信息

- 会议时间：2015 年 10 月 17-18 日
- 会议地点：扬州二十四桥宾馆
- 会议日程：2015 年 10 月 17 日 学术报告

  2015 年 10 月 18 日 会议考察
- 会议语言：中文

注册：

- 报到时间：2015 年 10 月 16 日 8:00-22:00
- 报到地点：扬州二十四桥宾馆
- 联 系 人：曹松银（137-7353-5486）

  王 芹（180-2132-0005）

  夏晓南（138-1583-0132）

会务组联系方式：

- 联 系 人：曹松银（137-7353-5486）

  李明星（138-1174-4175）
- 电子信箱：cisc2015@126.com
- 会议网址：http://sias.buaa.edu.cn/

交通方式

1、扬州西部客运枢纽、火车站：

- 旅游专线——蜀岗西峰（15站）
- 26路或88路——市政府（转乘81路）——蜀岗西峰
- 出租车——二十四桥宾馆（20元左右）

2、扬州汽车东站：

- 4路——瘦西湖（转乘旅游专线）——二十四桥
- 66路——人民大厦（转乘5路）——蜀岗西峰
- 出租车——二十四桥宾馆（20元左右）

3、扬州泰州机场：

- 乘机场大巴——友谊广场——再打车至二十四桥宾馆（10元左右）

酒店预订：

1、 扬州二十四桥宾馆：

地址：邗江区扬子江北路486号（扬州国家税务学院西南侧）

入住时间：10月16日

房间价格：标　　间 260元/间/天（包含早餐）

标间合住 130元/间/天（包含早餐）

2、 房间预订方式：

采用回执预订方式，完成住宿预订者方能得到入住保障。请注意：不同标准的房间先订者先得，如某一标准的房间被预订完，请预订其他标准的房间，预订确认后不接受更改。

3、 扬州二十四桥宾馆附近宾馆：

参会人员自行预订

会场平面图（Floor Plan）

主会场：扬州二十四桥宾馆一楼宴会厅

各分会场位置图：

<table>
<tr><td rowspan="5">客 房</td><td rowspan="5">大
厅
（总台）</td><td>一 楼</td><td>中 餐 厅</td><td>宴 会 厅</td></tr>
<tr><td rowspan="2">二 楼</td><td>学术报告厅</td><td>第三会议室</td></tr>
<tr><td>第一会议室</td><td>第二会议室</td></tr>
<tr><td rowspan="2">三 楼</td><td colspan="2">多功能厅</td></tr>
<tr><td>讨 论 室</td><td>第四会议室</td></tr>
</table>


大明寺
宋夹城体育休闲公园
二十四桥宾馆
瘦西湖西门
个园
扬州西部客运枢纽、火车站
扬州悦博馆
扬州站
扬州会议中心
扬州国际展览中心
体育公园
湖滨公园
京彩欢乐世界
阳光公园
扬州市国防园
扬州梅苑双语学校
维扬中学
鸿丰购物广场四达店
瘦西湖生活广场
竹西公园
扬州尼斯酒店
瘦西湖风景区
扬州迎宾馆
西园饭店
扬州大学盐阜路校区
双桥商务广场
蓝天大厦
扬州市政府
文昌阁
堡尼商务大厦
扬州教案旧址
公元国际大厦
凯旋国际大厦
扬州市第一人民医院
苏北人民医院
康山文化园
武警江苏总队医院
古典花园
白塔
宋井
遗址公园
扬州大学文汇路校区
杨庙中学
扬冶路分离立交
S244
司徒庙路
润扬北路
邗江北路
运河北路
瘦西湖路
扬子江北路

图 1 二十四桥宾馆

会议时间表

10 月 16 日（星期五）		
8:00-22:00	会议注册 联　系　人：曹松银（137-7353-5486） 王　芹（180-2132-0005） 夏晓南（138-1583-0132）	扬州二十四桥宾馆
20:00-22:00	中国人工智能学会智能空天系统专业委员会会议 主　持　人：贾英民（北京航空航天大学） 付永领（北京航空航天大学） 蔡　强（北京工商大学） 李海生（北京工商大学） 张天平（扬州大学） 刘衡竹（国防科技大学） 张维存（北京科技大学）	扬州二十四桥宾馆多功能厅
10 月 17 日（星期六）		
8:30-9:00	开幕式 主　持　人：李　斌（扬州大学） 张天平（扬州大学）	扬州二十四桥宾馆宴会厅
9:00-9:20	集体照相 主　持　人：张天平（扬州大学）	
9:20-10:10	大会报告 1：航天器的自主导航技术 报　告　人：王大轶（北京控制工程研究所） 主　持　人：柴　毅（重庆大学）	
10:10-10:20	茶歇	
10:20-11:10	大会报告 2：卫星导航系统与位置服务 报　告　人：边少锋（解放军海军工程大学） 主　持　人：张　霖（北京航空航天大学）	
11:10-12:00	大会报告 3：线性自抗扰控制(LADRC)技术与应用研究 报　告　人：陈增强（南开大学） 主　持　人：楚天广（北京大学）	扬州二十四桥宾馆宴会厅
12:00-14:00	午餐	二十四桥宾馆中餐厅

14:00-14:50	大会报告 4：空间天气数值预报研究进展 报　告　人：冯学尚（中国科学院国家空间科学中心） 主　持　人：费树岷（东南大学）	二十四桥宾馆宴会厅
14:50-15:40	大会报告 5：基于生物信号反馈的主动康复控制技术 报　告　人：侯增广（中国科学院自动化研究所） 主　持　人：杜军平（北京邮电大学）	
15:50-16:10	茶歇	
16:10-17:40	分组报告 1：多智能体系统控制 论 文 编 号：A-1，A-5，A-6，A-11，B-4，C-6 主　持　人：周进，孟德元	
	分组报告 2：航空航天中的控制 论 文 编 号：B-3，D-9，F-5，F-10，H-9， J-13 主　持　人：李洪波，翟军勇	
	分组报告 3：鲁棒、自适应及智能控制 论 文 编 号：B-1，B-7，C-8，C-10，F-8，G-3 主　持　人：刘忠信，曹松银	
	分组报告 4：多目标跟踪、图像处理及先进制造 论 文 编 号： H-5，H-10，I-11， J-1，J-7，J-12 主　持　人：王福忠，尹鸿鹏	
18:00-20:30	晚宴 主　持　人：张天平（扬州大学） 颁发优秀论文奖 颁　奖　人：孙青林（南开大学） 王 朝立（上海理工大学） 任雪梅（北京理工大学） 付子义（河南理工大学） 王国利（中山大学）	二十四桥宾馆宴会厅
10 月 18 日（星期日）		
8:00-18:00	会议考察	个园 双东历史街区 扬州双博馆

大会报告

报告 1

航天器的自主导航技术

王大轶

北京控制工程研究所 (502 所)

摘要：航天器自主导航是指在不依赖地面支持的情况下，不依靠人造信标，仅利用自身携带的测量设备在轨实时确定其运行轨道的过程。自主导航能够显著降低航天器对地面测控的依赖程度，提高自主生存能力，是保障航天器安全和航天任务成功实施的核心关键技术之一。航天器自主导航已有 50 多年的发展历史，经过 20 多年的研究，国内也取得了一批成果，一些已经得到在轨应用和验证。

本报告从工程实现自主导航面临的关键问题入手，梳理了核心技术，归纳了创新点，介绍了自主导航在地球轨道航天器和深空探测任务中的应用情况，最后对目前自主导航的热点研究领域进行了总结。

报告人简介：王大轶，研究员，博士生导师，国家杰出青年基金获得者，973 项目技术首席专家。 1973 年 11 月出生，2000 年于哈尔滨工业大学获博士学位。现任 502 所副所长，空间智能控制技术国防科技重点实验室常务副主任，中国自动化学会和中国宇航学会空间控制专业委员会副主任委员，《空间控制技术与应用》学报执行主编。

王大轶教授在航天器自主导航领域进行了创新研究工作，解决了一系列关键技术问题，为嫦娥一号卫星和嫦娥三号软着陆探测器等重点型号飞行试验成功做出了贡献。获国家技术发明二等奖 1 项 (排名第一)，国防一等奖 3 项，部级二等奖 3 项；获授权发明专利 34 项；专著 2 部；发表论文 64 篇。

报告 2

卫星导航系统与位置服务

边少锋

中国解放军海军工程大学

摘要：卫星导航为代表的导航系统已在国民经济和国防各领域得到广泛的应用。本报告主要介绍美国 GPS、俄罗斯 GLONASS 和中国北斗卫星导航的组成和主要技术指标。结合地理信息系统 GIS 和惯性导航系统 INS，论述卫星导航系统在信息化建设中的基础地位，介绍卫星导航系统在各行各业不可或缺的重要作用。介绍由于卫星导航系统发展出现的位置服务技术。

报告人简介：边少锋，教授、博士生导师、洪堡学者、国家杰出青年基金获得者。1982 年获解放军测绘学院天文大地测量专业学士学位，1985 年获解放军测绘学院天文大地测量专业硕士学位，1992 年获武汉测绘科技大学大地测量学博士学位。1995 年赴德国斯图加特大学进行合作研究，现任解放军海军工程大学教授、博士生导师。边少锋教授主要从事大地测量和精密导航定位技术研究，研究方向为地球重力场确定理论和舰船卫星导航。近年来先后承担和参加了国家 863 计划，国家自然科学基金委员会和军队等多项重要科研项目。在 Journal of Geodesy 和 Manuscript Geodaetica 等 SCI 和国外刊物发表论文 200 余篇。

报告 3

线性自抗扰控制(LADRC)技术与应用研究

陈增强

南开大学

摘要：自抗扰控制(ADRC)是一种新型的先进控制方法与技术，在工业过程控制、密机械、电力系统、汽车、机器人、航空航天等领域取得了许多成功的应用。这个报告首先介绍自抗扰控制(ADRC)和线性自抗扰控制(LADRC)的核心思想，绕后主要介绍我们课题组近年来在线性自抗扰控制理论及应用方面所做的一些有特色的工作。报告主要包括以下几部分：自抗扰控制简介；线性自抗扰控制设计与分析；线性自抗扰预测控制设计与分析；线性自抗扰控制理论研究；线性自抗扰控制在工业及航空航天领域的典型应用。

报告人简介：陈增强，教授、博士生导师、教育部新世纪优秀人。2001 年至 2010 年间任南开大学自动化系系主任，现任南开大学机器人与信息自动化研究所副所长。2000 年获上海宝钢教育奖（教师一等奖），同年入选教育部青年骨干教师计划，2002 年获得教育部优秀教师奖，2005 年入选教育部新世纪优秀人才支持计划。研究兴趣为多智能体系统与控制、飞行器制导优化与控制、预测控制、自抗扰控制、复杂系统建模优化与控制、智能优化计算与智能信息处理等。陈教授先后承担国家 863 计划、国家自然基金等 20 余项课题研究，发表 SCI 和 EI 论文 200 余篇，SCI 他引 1000 多次，曾获教育部和天津市科技奖 4 次，其中研究成果"智能预测自适应控制理论与应用"获天津市自然科学二等奖。

陈增强教授现为中国人工智能学会智能空天专业委员会副主任、中国自动化学会过程控制专业委员会常务委员、中国自动化学会控制理论专业委员会委员、中国自动化学会数据驱动控制、中国工业与应用数学学会复杂网络与系统控制专业委员会委员、天津市人民政府学科评议组控制学科组成员、天津市自动化学会理事；现任及曾任《控制理论与应用》、《控制工程》、《信息与控制 》、《Nonlinear Dynamics》、《Journal of Control Science and Engineering》等刊物的编委。

报告 4

空间天气数值预报研究进展

冯学尚

中国科学院国家空间科学中心/空间天气学国家重点实验

摘要：太阳风暴经过地球时，地球空间环境会产生整体剧烈的灾害性变化。行星际空间是太阳风暴吹袭地球空间的必经传输通道，是了解日地系统空间天气整体变化过程的重要纽带. 如何减轻或避免太阳风暴所造成的损失是人类高科技时代所面临的重大前沿课题. 基于物理的以强大计算能力为基础的太阳风暴日冕行星际过程三维数值研究，不仅具有了解太阳风暴在行星际空间传播的动力学过程的科学意义，还具有预测太阳风暴吹到地球的时间、强度和可能引起的地球空间天气效应方面的现实意义。 目前基于 MHD 方程数值研究行星际太阳风暴的工作已经从初期的定性原理性理论研究过渡到定量的系统性研究具体事件和数值预报试预报阶段. 本报告将概述现有基于物理的主要三维数值预报模型的算法特点及其研究成果，评述行星际太阳风暴的数值模拟研究在今后工作中的努力方向。

报告人简介：1964 年 11 月出生，理学博士，研究员，博士生导师，国家杰出青年科学基金获得者，2003 年入选中国科学院“百人计划”，2006 年“新世纪百千万人才工程”国家级人才。先后在国内外核心刊物上发表论文 100 余篇，其中 SCI 论文 80 余篇。指导过 8 名研究生。曾于 2000-2001 年作为高级访问学者访问美国阿拉巴马大学。先后承担过国家自然科学基金项目、国家 973 项目十余项目，是国家自然科学基金 95 重大项目《日地空间灾害性扰动过程及其对人类活动的影响》的一级课题——“太阳剧烈扰动在有结构太阳风中的传播”负责人；和国家自然科学基金重点项目“日冕-行星际-地磁因果链预报模式的初步研究”负责人。

报告 5

基于生物信号反馈的主动康复控制技术

侯增广

中科院自动化所

摘要：康复机器人有巨大需求，目前的康复机器人多为单一的被动训练模式，缺乏患者的主动参与。本报告将结合课题组阶段性研究结果，讨论如何将生物信息反馈技术应用于康复机器人设计、康复机器人的主被动康复训练方法等相关问题，探讨如何将先进的机器人技术等应用于临床康复训练，提高康复训练效果。

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近年来，侯增广教授承担了国家 863 计划、国家自然科学基金、科技助残等项目，研制了微创血管介入手术机器人、中风和脊髓损伤患者用康复机器人、多通道肌电信号采集仪、多通道电刺激装置等，获得国际国内专利授权 20 余项，在国内外期刊及会议发表论文 100 余篇。获杨家墀科技奖、中国科学院优秀导师奖、朱李月华优秀教师奖、《IEEE Trans on Neural Networks》Outstanding Paper Award、北京市科学技术奖等。侯增广教授是 IEEE Computational Intelligence Society 神经网络技术委员会委员、副主席，中国自动化学会机器人专业委员会委员，中国人工智能学会理事，《自动化学报》、《IEEE Computational Intelligence Society E-letter》、《IEEE Transactions on Neural Networks》、《IEEE Computational Intelligence Magazine》、《Journal of Intelligent and Fuzzy Systems》以及《International Journal of Intelligent Systems Technologies and Applications》等杂志编委。

论文摘要

A 多智能体系统

A-1

Distributed Optimization for Continuous-Time Multi-Agent Systems with External Disturbance and Discrete-Time Communication

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In this paper, distributed optimization problem for continuous-time multi-agent systems with external disturbance and discrete-time communication is considered. A distributed algorithm is developed to achieve the exact optimal solution by completely rejecting the disturbance. An upper bound for the discrete-time communication period is obtained to ensure the exponential convergence for this optimization problem. Finally, a numerical example is given to illustrate the effectiveness of the proposed algorithm.

A-2

Containment Control of Second-Order Multi-Agent Systems with Jointly-Connected Topologies and Varying Delays

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The containment problem of second-order multi-agent systems with varying delays is investigated. Supposing system topology is dynamic changed and jointly-connected, the control algorithm of double-integrator systems with multiple leaders is proposed. The stability of the control algorithm is analyzed on Lyapunov-Krasovskii method. Finally, a simulation example is provided to prove the effectiveness of the conclusion.

A-3

Flocking of Distributed Multi-Agent Systems with Prediction Mechanism

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Flocking problem is one of the most critical problems of multi-agent systems. In this paper, a modified artificial potential function is proposed, which guarantees the stability of their inter-agent distances and ensures the smooth collision avoidance among neighboring agents. The prediction control algorithm is designed that can accelerate the convergence of speed for the second-order multi-agent systems. Mathematical analysis and simulation examples show the effectiveness of the theory.

A-4

Consensus of Multi-Agent System with Singular Dynamics and Time Delay

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In this paper, the consensus problem of high-order multi-agent systems with singular dynamics and time-varying time delay is investigated. By the restricted equivalent transformation, a differential algebraic system is introduced which is equivalent to this singular system on consensus. Based on dynamic state information and time delay, a consensus protocol is proposed. A sufficient condition of consensus is given in terms of LMI. Furthermore, the consensus state is also obtained by calculating the solution of the subsystem. Finally, an example is presented to illustrate the theoretical results.

A-5

Smooth Time-varying Formation Control of Multiple Nonholonomic Agents

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In this paper, we investigate the position/orientation formation problem of multiple nonholonomic agents. Coordinate transformations are first presented to obtain the matrix form of formation error model, then a distributed smooth time-varying control law is designed based on a Lyapunov-like function. We prove that the closed-formation-system is globally asymptotically stable by Barbalat's lemma if the communication graph is undirected, time-invariant and connected. Simulation results verify the effectiveness of the proposed control scheme.

A-6

Cross-media Big Data Tourism Perception Research Based on Multi-agent

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In this paper, we introduced the design and implementation in detail the cross-media big tourist perception system based on agent. We used the technology based on agent to implement the parallel in the process of data collection. This system mainly consists of a set of cooperation agent, including the data collection agent; the URL Agent; the data update agent and the management agent. Compared with the ordinary distributed information collection system, we designed and implemented the URL agent and data update agent, we used the algorithm to analyze the page based on agent, and then improves the efficiency of the cross-media big tourist perception.

A-7

Observer-Based Adaptive Consensus for Multi-Agent Systems with Nonlinear Dynamics

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Distributed consensus problem is investigated for Lipschitz nonlinear multi-agent systems (MASs). Under the assumption that the states of the multiple agents are unmeasured, nonlinear observer for each agent is designed. Based on these observers, a distributed protocol is proposed, in which the coupling weights between adjacent agents are time-varying and can automatically change according to the designed adaptive law. Lyapunov-Krasovskii functional is constructed to analyses the consensus problem of the MASs under the proposed distributed adaptive protocol. By using free-weighting matrix approach, sufficient conditions that can ensure consensus are given. Finally, numerical example is presented to illustrate our result.

A-8

Event-Triggered H_∞ Consensus Control for Multi-agent Systems with Disturbance

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This paper is devoted to the event-triggered consensus control for a general linear multi-agent

network system with external disturbances. First a controlled output is defined and a model transformation is conducted to transform the consensus problem into an H_∞ problem. Then a distributed event-based controller is proposed so that the system can reach the consensus results by only using the agent's own information and its neighbors'. The final conclusion is given in the form of a matrix inequality. Finally a simulation is introduced to verify the theoretical conclusions.

A-9

LQR-based Optimal Leader-Follower Consensus of Second-order Multi-Agent Systems

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This paper considers an optimal consensus problem of second-order leader-follower multi-agent systems by using inverse optimality and LMI method. For a given control input, under the condition that the communication topology among followers is undirected connected, a positive definite matrix in a linear quadratic performance index function is obtained, which makes the linear quadratic performance index function to obtain the minimum value. Meanwhile, through theory analysis, we prove that the coefficient matrix of the given control input is the optimal feedback gain matrix. The simulation results show the effectiveness of our conclusions.

A-10

Flocking of Multi-Agent Systems with Multiple Virtual Leaders Based on Connectivity Preservation Approach

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In this paper, we investigate the problem of flocking with multiple virtual leader based on connectivity preserving. The basic idea is stated as follows: according to design stable control law with a navigation feedback term the follow agents equipped with virtual leaders. The velocity of the center of the mass of agents will exponentially converge to weighted average velocity of the virtual leaders by the information navigation of virtual leaders, finally approach to the same. The certain distance between every agent is kept and eventually form flocking due to the introduction of the artificial potential function. And on this basis we assume that the initial network is connected and the control law make the network of the multi-agent system preserving connectivity.

A-11

Strong Structural Controllability and Leader Selection for Multi-Agent Systems with Unidirectional Topology

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For unidirectional communication topology of multi-agent systems, this paper studies its strong structural controllability. When the topology of agents is a pabud graph, we prove that the multi-agent systems can be strongly structurally controllable by selecting only one agent as leader. When the topology is partitioned to disjoint basic controllable graphs, the system can be strongly structurally controllable via selecting corresponding number of agents as leaders. A method to select leaders is presented to ensure the strong structural controllability of multi-agent systems. Finally, the effectiveness of the proposed method is verified with two examples.

A-12

Delay Consensus of Second-Order Nonlinear Leader-Following Multi-Agent Systems

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In this paper, the delay consensus of second-order nonlinear leaderfollowing multi-agent systems is discussed. The considered multi-agent system has an active leader and the information exchange between two different agents possesses directional. A simple input control law is proposed. Based on the matrix theory and Lyapunov stability theory, the effectiveness of this control law is proved and a sufficient condition is obtained to realize delay consensus of the second-order multi-agent system.

B 机器人控制

B-1

Research on Trajectory Tracking Strategy of Roadheader Cutting Head Using ILC

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To realize the precision of cross-section shaping, iterative learning control (ILC) is studied in the trajectory tracking strategy of roadheader cutting head in this paper. The dynamic model of roadheader cutting arm is established, and then an appropriate PD-type iterative learning controller is designed. The simulation results show that the tracking error decreases with the increasing number of iterations, and the tracking curve approaches to the desired target trajectory gradually. The control method is effective for trajectory tracking, which meets the requirement of accuracy in the actual site. Moreover, the method lays a theoretical foundation for automatic cross-section shaping research.

B-2

A Multi-objective Dual-resource Shop Scheduling Model Considering the Differences between Operational Efficiency

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Multiple resource constraints exist widely in the actual job shop under the complicate manufacturing environment, so a multi-objective dual-resource shop scheduling model considering the differences between operational efficiency is established, which contains two resource constraints: the machines and workers. An improved SPEA2 is proposed for the model which achieves three goals: the shortest completion time, the lowest cost and the minimum total tardiness. Since the evolutionary operation in the traditional algorithm for single-resource model has not been able to meet requirements of the model in this paper, the chromosome coding, chromosome decoding, initialization of the population, crossover operation and mutation operation are especially improved so that the machines and workers can be assigned to the process reasonably. Finally, the feasibility and efficiency of the model are proved by the simulation experiment.

B-3

Distributed Finite-time Coordination Control for 6DOF Spacecraft Formation Using Nonsingular Terminal Sliding Mode

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This paper is devoted to the finite-time coordination control problem of 6DOF spacecraft formation with directed networks in the presence of external disturbances, and a distributed control algorithm using nonsingular terminal sliding mode (NTSM) is proposed. Based on Lyapunov methods, it is proved that all the spacecrafts achieve formation flying in finite time, which means the states of all the followers simultaneously converge to the states of the virtual leader. Simulation results are provided to validate the effectiveness of the theoretical analysis.

B-4

Region-based shape control for multi-robot systems with uncertain kinematics and dynamics

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This paper is devoted to the shape control problem of multi-robot systems with uncertain kinematics and dynamics. An adaptive control method is proposed, based on which the closed-loop systems satisfy the region shape and collision avoidance requirements in task space. Using the Lyapunov-like function and the Barbalat's lemma, a theoretical analysis on the motion of the robot endeffectors is proposed. Simulation results illustrate the feasibility and effectiveness of our controller.

B-5

Movement Curve and Hydrodynamic Analysis of the Four-joint Biomimetic Robotic Fish

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Focusing on the four-joint robotic fish, based on the fish body wave motion curve equation, deduced a mathematical model of four joint rotation of robotic fish. By setting two different parameters of amplitude coefficient and polarization coefficient, using simulation software MATLAB for different motion curves. For dynamics modeling of four-joint robotic fish provide theoretical basis. Hydrodynamic analysis is done too, the simulation software FLUNT is using for the underwater robotic fish prototype's theoretical analysis. The simulation results have validated its effectiveness, reliability, and scalability and embodied out in the proposed prototype mechanical structure model.

B-6

Decoupling Control of Manipulators based on Active Disturbance Rejection

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This paper discusses the decoupling control problem of manipulators and proposes a novel control method. This method does not need an accurate model of the robots and only needs input and

output information of the robot. The system will be first transformed into a certain integral form by an extensive state observer (ESO) which is used to accurately estimate the systems various states and disturbances inside and outside. Then the decoupling control is investigated by using feed forward compensation. In the end, PD control with gravity compensation and active disturbance rejection control are provided to illustrate effectiveness of the controllers in the simulation.

B-7

The Face to Face and Teleoperation by Using Remote Control of Robots

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In this paper, we propose a system capable of remotely controlling mobile robots based on the wireless. In this system, we can not only control mobile robots to monitor each corner of home when we are out, but also establish interactive videos among friends and family members when we are far-flung geographically. In addition, we can also teleoperate the robot to accomplish certain task at home in case some switches are not well cut-off when leaving. Meanwhile, we can also make use of sensor to ensure the robot security in the case of network delay.

B-8

Fractional modeling and controlling of the assistant motor in electric power steering system

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The inductances' nonlinear characteristic in the assistant motor can affect the steady-state and dynamic performance of motor, therefore it also relates with assist torque of Electric Powering Steering (EPS) system closely. This paper constructs an accurately optimized model based on the theory of fractional calculus. This reference model takes the advantage of fractional orders which can improve robustness to the nonlinear of mechanical system. Based on the reference model, the fractional order controller $PI^{\lambda}D^{\lambda}$ PI is designed. Several experiments show the proposed control strategy is effective and stable, furthermore the EPS system using the control strategy has a good anti-interference performance in the presence of nonlinear factors.

B-9

Robot Localization based on Optical-flow Sensor Array

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Recently, Optical-flow sensors commonly used as a PC input device have been explored in robot localization. One common difficulty is that ground-height variations in mobile robot moving can inevitably deteriorate the sensing performance of optical-flow sensors when used in a trivial fashion. In this paper, a novel deployment configuration is presented to build an opticalflow sensor array for robot localization, which is advantageous in the robustness to ground-height variation. In addition, the imaging capability of optical mouse sensors is exploited in developing a beacon based calibration approach for eliminating accumulative errors. The experimental results are reported to validate the proposed method

B-10

Research on grasping planning for apple picking robot's end-effector

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Aiming at the lack of all-purpose and effective planning study for apple picking robot's end-effector during the grasping process, which has caused great inconvenient in the accuracy of fruit picking process and design of end-effector. This paper studies the contact process of three-finger end-effector with apples. Taking contact of apples with fingers as point contact of friction between hard objects, and based on the fact that the contact force is decomposed into the orthogonal operating force component and internal force component, the regulation of internal force on contact stability is discussed. Stability would be attributed to the existence of the internal force of concurrent polygon and the position of the internal force concurrent node within the concurrent polygon. Regarding the circle center of concurrent polygon of the maximum inscribed circle as the intersection of three internal force action lines, we get the size of each internal force, and calculate the internal force meeting the friction cone constraints to avoid complex operation such as matrix operation. Eventually, a numerical example shows the feasibility of the method.

B-11

Switching Control for Multi-motor Driving Servo System with Uncertain Parameters

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This paper presents a novel switching control for multi-motor driving servo systems with uncertain parameters, such that it is sufficient to achieve speed synchronization among motors and load tracking. In order to solve the problem of complex coupling relationship between synchronization and tracking, a switching plane (SP) is introduced to implement switching between speed synchronization control and load tracking control. In design of synchronization control, the adaptive scheme based on speed negative feedback is proposed to achieve synchronization errors convergence in finite time. Due to the properties of robustness, the adaptive

robust algorithm is utilized to attain load tracking accurately, where dual-observer and adaptive laws are presented to estimate unknown friction state and uncertain parameters. Comparative simulation results are included to verify the reliability and effectiveness.

C 最优、自适应与预测控制

C-1

Second-order Sliding Mode Control for BUCK Converters

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This paper presents a second-order sliding mode (SOSM) control method for DC-DC Buck converters. First of all, by taking a subtraction between the output voltage and the desired voltage, the sliding mode variable with freedom of degree two can be constructed. Secondly, by using adding a power integrator method, the second-order sliding mode controller can be developed for the Buck converter. Under the proposed controller, it can be shown that the output voltage will track the desired voltage in a finite time. Finally, the theoretical considerations have been verified by simulations.

C-2

An adaptive optimization algorithm based on FOA

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To solve the problem that it is difficult to determine the initial location of the fruit fly in Fruit Fly Optimization Algorithm (FOA), an improved FOA, Adaptive Fruit Fly Optimization Algorithm (AFOA), is proposed in this paper. According to the ranges of variables to be optimized, AFOA can set the initial location of the fruit fly automatically and adjust the step value adaptively during iteration. Finally, the proposed algorithm is applied to Himmelblau's non-linear optimization problem and time series prediction using Echo State Network (ESN). The experimental results imply that AFOA is effective and also show better ability in adaptation and optimization than traditional FOA, Particle Swarm Optimization (PSO) and Genetic Algorithm (GA).

C-3

Extended State Observer based Sliding Mode Control for Mechanical Servo System with Friction Compensation

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This paper proposes a tracking control method based on the extended state observer for the nonlinear mechanical servo system with friction compensation. The friction nonlinearity is described by a continuously differentiable LuGre model and compensated by using neural network (NN). Then, an extended state observer (ESO) is employed to estimate the system states and uncertainties including friction compensation error. A sliding mode control (SMC) scheme is developed based on ESO estimation to guarantee the convergence of the tracking error. Comparative simulations are conducted to show the superior performance of the proposed method.

C-4

A Comparative Study on Optimal Transient Control of Aircraft Engines

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Sequential quadratic programming has been widely used in the optimization of transient control of aircraft engine. On the other hand, the study of nonlinear optimization theory and method has been made great advance in recent years, of which active set method is one of the effective measures. In this article, the two algorithms are used to optimize the inputs based on one turbofan engine model. Results from the simulation comparisons of the two algorithms, advantages and disadvantages are given.

C-5

Robust Adaptive Control for Robotic Systems with Guaranteed Parameter Estimation

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In this paper, we propose a novel adaptive control scheme for robotic systems by incorporating the parameter error into the adaptive law. By carrying out filter operations, the robotic system is linearly parameterized without using the measurements of acceleration. Then a new adaptive algorithm is introduced to guarantee that the parameter error and control error exponentially converge to zero. In particular, we provide an intuitive method to verify the standard PE condition for the parameter estimation. The robustness against disturbances is also studied and comparisons to several adaptive laws are provided. Simulations with a realistic robot arm are presented to validate the improved performance.

C-6

Improved robust multiple model adaptive control of the two-cart

mass-spring-damper system with uncertainties

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A new weighting algorithm called Posterior Possibility Generator (PPG) is proposed to replace PPE algorithm in robust multiple model adaptive control (RMMAC) architecture, resulting in the improved robust multiple model adaptive control (IRMMAC) architecture, and a two-cart mass-spring-damper system with uncertainties is used to illustrate the advantages of PPG against PPE.

C-7

LS-SVM Generalized Predictive Control based on PSO and its application of fermentation control

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Fermentation process is a complex time-varying, nonlinear and multivariable biochemical process. The traditional fed-batch fermentation conditions are difficult to satisfy the control request. A control algorithm based on Generalized Predictive Control (GPC) is proposed. Firstly, the algorithm utilizes least square support vector machine (LS-SVM) and GPC to construct the prediction model and forecast the output value. And then, the particle swarm optimization (PSO) algorithm is applied to realize rolling optimization and obtain the control values. Finally, the control algorithm is applied to control the substrate concentration (S) of lysine fermentation. The simulation results show that the LS-SVM Generalized Predictive Control based on PSO has an excellent adaptive ability with rapid control response speed, high precision, and good performance.

C-8

Adaptive Control with Prescribed Performance for Nonlinear Two-inertia System

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In this paper, a new adaptive neural dynamic surface control technique with an improved prescribed performance function is proposed for the nonlinear two-inertia system. An improved error transformation function is used to ensure the prescribed output tracking performance, and adaptive neural network is utilized to estimate the unknown disturbance. The dynamic surface technique simplifies the controller by introducing first-order filters to eliminate "explosion of complexity" inherent in backstepping approach. Simulation results demonstrate the control

scheme is effective.

C-9

Container throughput time series forecasting using a hybrid approach

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This paper proposed a novel two-stage hybrid container throughput forecasting model. Time series in reality exhibits both linear and nonlinear characteristics and individual models are not able to describe the two features simultaneously. Therefore, we combine linear model SARIMA (seasonal autoregressive integrated moving average) and nonlinear model ANN (artificial neural network). In order to break through the limitations of traditional hybrid models, based on the identified parameters of SARIMA in first stage, the structures of several ANN in second stage could be decided. Finally, we validate the proposed hybrid model 5 performs best with case study in Shanghai port.

C-10

Forecast of Train Delay Propagation Based on Max-plus Algebra Theory

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The forecast of delay time is of great assistance to decision making in train operation adjustment when the schedule is disturbed either by infrastructure fault or natural hazard. This paper presents a railway delay propagation model to forecast the delay time, described by discrete event dynamic system (DEDS) and formulated by max-plus algebra theory. On the basis of the train operation regulations and headway constraints, a system matrix of max-plus algebra is acquired to illustrate the mechanism of delay propagation. And then a function to predict the delay time is proposed to solve the model, with two advantages: Firstly, the specific delay time is able to be calculated; secondly, the result of the prediction is comparatively precise due to the highly match of the model to the actual operation. Finally, by analysis of the prediction, this paper offers the decision support in train adjustment, from which the dispatcher can proactively conduct countermeasures to alleviate the propagation and even stop it.

D 非线性、时滞及鲁棒控制

D-1

Robust Finite-time Stabilization of Fractional-order Extended Nonholonomic Chained Form Systems

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We discuss the robust, finite-time stabilization of fractionalorder extended nonholonomic chained form systems for the first time in this article. By applying sliding mode variable structure theory and stability theorem of finite-time control, the three-step switching control scheme is proposed to deal with the presence of system uncertainties and external disturbance, so that the closed-loop system is finite time stable at the origin equilibrium point within any given settling time. Finally, simulation results show the effectiveness of the presented controller.

D-2

Observer Design for Discrete-time Switched Lipschitz Nonlinear Singular Systems with Time Delays and Unknown Inputs

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In this paper, the state estimation problem for a class of discrete-time switched nonlinear singular systems simultaneously subject to Lipschitz constraints, state delays, unknown inputs (UIs), and arbitrary switching sequences is considered. A mode-dependent observer is constructed and, based on the idea of exact state and UI decoupling, sufficient conditions for the existence of the proposed observer are given in terms of linear matrix inequalities. By defining a decay-rate-dependent switched Lyapunov function, the convergence rate of the state estimation error is proved to be exponential.

D-3

Anti-disturbance Control for Nonlinear Systems with Mismatched Disturbances Based on Disturbance Observer

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An anti-disturbance control scheme based on disturbance observer is proposed for a class of nonlinear system with mismatched disturbances. With such control approach, the disturbances can be rejected and the semi-global uniformly ultimate bounded (SGUUB) stability of the closed-loop system can be achieved. Finally, simulations for a numerical example are given to demonstrate the feasibility and effectiveness of the proposed scheme.

D-4

Time-delay prediction method based on improved genetic algorithm optimized echo state networks

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In a networked control system, the time-delay has random and nonlinear characteristics, make the stability of system is hard to ensure. It need the controller in system can accurately predict time-delay. So the precise time-delay prediction of networked control system is an important factor in ensuring the stability of the control system. The echo state networks has good predictive ability on nonlinear time series, it is suitable for predict the time-delay. But parameters of echo state networks learning algorithm has a great influence on the prediction accuracy. An improved genetic algorithm is proposed for parameters optimization of echo state networks. The simulation results show that the prediction accuracy of the predictive method in this paper is higher than the conventional predictive model such as auto regressive and moving average (ARMA) model, least square support vector machine (LSSVM) model and Elman neural network.

D-5

Robust stability analysis for uncertain time-delay system

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In this paper, the robust stability problem of time-delay system is discussed by constructing a Lyapunov-Krasovskii function. And two different systems are given in this paper, one of them has not consider the interference and unmodeled dynamics components, the other one add this uncertainties into the system. Based on this two different systems model, several general and powerful algorithms can also be given as theorems.

D-6

Attitude Control for Rigid Satellite under Actuator Constraint

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An attitude controller is proposed via employing backstepping control technique, and being represented by modified Rodriguez parameters. A general dynamic attitude model of satellites is deduced, along with a general model of actuator dynamics which can describe presumably all actuators for space application. External disturbances and actuator constraints are explicitly addressed. The control performance is proved in the numerical simulation experiences at last.

D-7

On the Stability of Linear Active Disturbance Rejection Control: Virtual Equivalent System Approach

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Active disturbance rejection control is a unique control approach which could provide nice performance and need little knowledge of physical processes/plants. In order to analyze the stability of linear active disturbance rejection control (LADRC) by a direct and simple way, virtual equivalent system (VES) technique is adopted. By VES, global asymptotically stable with known process/plant dynamics and bounded input and bounded output stable with unknown process/plant dynamics are analyzed. The stability of LADRC for general single input single output nonlinear systems subject to dynamical and external uncertainties is analyzed from a brand-new viewpoint, which may be also helpful for stability analysis of other LADRC based system.

D-8

An Improved Laplacian Eigenmaps Algorithm for Nonlinear Dimensionality Reduction

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Manifold learning is a popular recent approach to nonlinear dimensionality reduction. While conventional manifold learning methods are based on the assumption that the data distribution is uniform. They are hard to recover the manifold structure of data in low-dimension space when the

data is distributed non-uniformly. This paper presents an improved Laplacian Eigenmaps algorithm, which improved the classical Laplacian Eigenmaps (LE) algorithm by introduce a novel neighbors selection method based on local density. This method can optimize the process of intrinsic structure discovery, and thus reducing the impact of data distribution variation. Several compared experiments between conventional manifold learning methods and improved LE are conducted on synthetic and real-world datasets. The experimental results demonstrate the effectiveness and robustness of our algorithm.

D-9

Nonlinear Control of Inertial Wheel Pendulum and Its Implementation Based on STM32

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The swing-up and balance control problems of inertial wheel pendulum are investigated in this work. We firstly introduce the dynamic model of inertial wheel pendulum and then propose a swing-up control law by using an energy function. Theoretical analysis shows that the system gradually moves into an invariant set during swing-up process. Later, we propose the balance control law with approximate linearization and introduce a self-built experimental platform based on STM32 microprocessor. The final combination of swing-up control law and balance control law leads to a hybrid control law. We verify the efficiency of the proposed control law on the apparatus.

D-10

Intermittent Synchronization of Cascaded Boolean Networks with Time Delays

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In this paper, we considered the intermittent synchronization of cascaded Boolean networks (CBNs) with time delays and get its criteria based on the results of synchronization of delay-free CBNs. We further discuss complete synchronization of CBNs with time delays from intermittent synchronization.

D-11

Robust Output Feedback Control of Civil Aircrafts with Unknown Disturbance

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In this paper, the disturbance attenuation problem is investigated for the flight control system of civil aircrafts. The unknown disturbance is generated by a linear exogenous system, and the civil aircraft dynamic model with unknown disturbance is established. The disturbance is augmented to the state vector and an augmented state observer is designed for estimating the unmeasured augment state vectors. Based on the designed augment state observer, the robust output feedback control scheme is developed for the civil aircrafts with unknown disturbance. Focusing on the B747-100/200, simulation results show that the developed controller could attenuate disturbance effectively.

D-12

Stochastic Stabilization of a Class of Nonlinear Systems with Sampled Data Control

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In this paper, the stabilization problem is investigated for a class of nonlinear stochastic systems with sampled data control. By means of the Lyapunov stability theory, a sufficient condition is derived to ensure that the considered stochastic nonlinear system with sampled data is asymptotically stable in mean square. The allowable bound of the sampling interval is obtained and the control gain matrix is solved in terms of convex optimization methods. Finally, a numerical example is presented to further demonstrate the effectiveness of the proposed approach.

E 智能及学习控制

E-1

Online Identification and Robust Adaptive Control for Discrete Hysteresis Preisach Model

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By using the concept of online goal adaptation, we develop a new online identification and a robust adaptive control for hysteresis system which is described by discrete Preisach model. The proposed identification requires triangle matrices to simply the calculation for Preisach model. In addition, a robust adaptive control is adopted without inverse Preisach model based on the weighting factor recursive least square (WFRLS) method. A Lyapunov function candidate guarantees the stability of this hysteresis system. Finally, simulations perform on a typical system which clarify the validity of the proposed approach.

E-2

Modeling and Optimization of Coal Moisture Control System Based on BFO

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Coal moisture control process is a critical process in energy saving for pollution reduction and improving production efficiency and the quality of coke. The RBF artificial neural network approach for modeling is used to achieve precise control of coal moisture control system and against their strong coupling nonlinear systems with time-delay characteristics. The bionic BFO (Bacterial Foraging Optimization) is used to the fitness to optimize the RBF Neural network parameters. In order to achieve better results the RBF Neural network performance is optimized by these bionic BFO. This method provides a theoretical basis for accurate control of coal moisture process. The reduction of energy and pollution with improving the quality of coke is established.

E-3

Open-world Planning Algorithm Based on Logic

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Existence of certain objects or fluent is often unknown before planning in many domains. Plan synthesis in such open worlds is challenging since we have to take various scenarios into account before searching plans. One way to do this is to employ sensors to observe unknown objects or fluent, assuming the sensors are capable of correctly capturing all information needed for planning. We aims at solving automated planning problem in open world, and call goal state with variables as query-goal. Instead of using sensors, we proposed a novel algorithm PQG(Planner with query-goal) to solve automated planning problem with query-goal, by encoding the planning problem into a planning logic problem, and then applying planning inference method to solve it. Finally, inference result is transformed into a planning solution. We empirically exhibit that our approach is effective in several planning domains.

E-4

Dual-command Operation Generation in Bi-directional Flow-rack Automated Storage and Retrieval Systems with Random Storage Policy

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In the bi-directional flow-rack (BFR) automated storage and retrieval systems (AS/RS), bins slope to opposite directions to make unit-loads be retrieved from half bins and be stored to the other half on the same working face. For random storage policy, a batching-greedy heuristic (BGH) has been proposed to generate dual-command (DC) operations in BFR AS/RS. In this paper, a novel DC operation generation rule specially designed for the BFR AS/RS is introduced to BGH, of which the effectiveness and efficienty are evaluated by simulation experiments.

E-5

Influenza immune model based on Agent

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All along, the immune system has been a hotspot and difficulty in the field of biological research. Traditional experimental immunology can observe the overall reaction of the immune system, but would be difficulty on the some details research, such as the recognition principle between antigen and antibody. In this paper, we use the binary string to express the gene of antigen and antibody, and use binary string matching to express the immune recognition process. Then, we would use the Agent computer model and the computer simulation method to study the microscopic properties of the immune system and some important details. The results of our study provide powerful basis to establish accurate perfect model of the immune system. Using the simulation model of immune responses to influenza virus, include the interactions between cells, some basic rules of the immune system are obtained.

E-6

On indirect model reference adaptive learning control

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This paper deals with tracking problem of single-input single-output linear time-invariant (SISO LTI) system with parametric uncertainties by using a model reference adaptive iterative learning control (MRAILC) scheme. The tracking error converges to zero point wisely after infinite iterations. A major feature of this proposed method is that system output could track the desired trajectory whether the plant system is minimum-phrase or not.

E-7

Classification of Seizure in EEG Signals Based on KPCA and SVM

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In this study, the electroencephalogram (EEG) signals-analysis experiments were made to classify seizures patients. Principal component analysis (PCA) and kernel principal component analysis (KPCA) were used for the data compression with the (EEG) signals. Classifiers based on support vector machine (SVM)-PCA and SVM-KPCA were designed. The classification performances of four kinds of kernel function were also compared using the same dataset. The results showed that using SVM-KPCA had higher recognition performance than SVM-PCA. Experimental results showed that the algorithm using SVM-KPCA with Gaussian-kernel had better recognition performance than the other three methods.

E-8

Interactive speech recognition based on Excel software

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With the rapid development of modern computer technology, the communication between man and machine is becoming more frequent. A large amount of data is needed to input when people use Microsoft Excel software in the fields of account, office, finance, hospital, etc. This paper presents a recognition method of naming speech as input for Excel table. In this system, we use the characteristics of the name as a basic speech unit by using the Mel Frequency Coefficients (MFCC) as the feature parameters. Moreover, we use the Hidden Markov model (HMM) as the basis to train the acoustic models of this environment. The HMM can ease the mismatch caused by the identification of the test environment and training environment, which can improve the recognition rate further. Finally, experiments show that this system has good recognition and input function. This study establishes the foundation for future development of the method of application system.

E-9

Steel Liquid Level tracking via Iterative Learning with Extended Error Information

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This paper aims to improve the steel liquid level control quality via iterative learning control (ILC) with extended error information. The ILC is one kind of type P iterative learning control, and besides the forgetting factor and the on-off switching action, error information was further

extended on account of introduction of the just past and the second past cycles error signals. Results demonstrated that, the control quality can still be improved even under the model uncertainties, periodic bulging disturbances, the measuring noises, as well as the input signal error, the state error and the output error can be guaranteed to be ultimately bounded. Simulation results were provided to clarify the suggested idea further.

E-10

3D Model Classification Based on Transductive Support Vector Machines

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With the development of graphical modeling methods and acquirement technology of 3D models, the numbers of 3D models increased exponentially. 3D model classification is crucial to effective management and precise retrieval. Due to the shortage of annotations, we adopted semi-supervised learning methods to solve this problem. This paper introduces Transductive Support Vector Machines (TSVMs) for 3D model classification. Our proposed method is verified efficient.

E-11

Composite continuous anti-disturbance autopilot design for missile system with mismatched disturbances

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In this paper, the problem of autopilot design for missile system with mismatched disturbances is considered via a sliding mode control method and finite time disturbance observer. Firstly, a finite time disturbance observer is designed to estimate the mismatched disturbances. Secondly, based on disturbance estimation values and traditional sliding mode surface, a novel sliding mode surface is constructed. Thirdly, a composite continuous anti-disturbance autopilot is developed, which can guarantee system output converge to reference signal. Finally, a simulation result is presented to demonstrate the effectiveness of the proposed scheme.

E-12

A Dynamic Performance Analyzing Method of Intelligent Fire Control System Based on SCPN

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To describe tank future fire control system logic level generally and exactly, a modeling method is advanced which based on Stochastic Colored Petri Net (SCPN). Firstly, the constitutive structure, information structure and working flow of future fire control system are studied. Secondly, the tank future fire control system is formalized described. The rule which transform tank fire control system to Petri Net is established. Finally, Petri Net model of tank future fire control system is established. Its dynamic performance is analyzed. It proves the modeling method can describe tank future fire control system logic level effectively.

F 智能仪表、传感器与检测技术

F-1

Method of Fault Diagnosis Based on SVDD-SVM Classifier

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Aiming at the problem of incomplete fault data samples, a fault diagnosis method based on Support vector data description and Support vector machine (SVDD-SVM) is presented. First, the data description model is build based on the normal data samples and known fault data samples, and SVM model is built based on known fault data samples. Then the test data samples are tackled by the data description model to reject or accept. The specific categories of accepted samples are diagnosed by the SVM model and the rejected samples are unknown fault types. Tests show that this method can efficiently solve the fault diagnosis problem of incomplete fault samples.

F-2

A new detecting and tracking method in driver fatigue detection

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In order to reduce the traffic accidents caused by driver fatigue, this paper extends the TLD tracking algorithm to the case of detecting and tracking driver's face and local areas which is based on the machine vision. We address problems of detecting driver's face and local areas, which contain the driver's fatigue information, via adaboost cascade classifier based on haar-like features and track the target areas by the TLD method. The main results are given in terms of the accuracy of detecting driver's face and local areas. Lay a foundation for the driver fatigue detection.

F-3

A study on feature extraction of surface defect images of cold steel

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Feature extraction is one of the important characteristics used in classifying images. But the extracted features have big numbers and high dimension easily due to various type defects, complicated features and diverse methods of feature. Big numbers and high dimension of features are adverse for feature extraction. The effect of feature extraction decides the effect of image classification directly. According to these problems, experimental investigations are carried out on computer aiming at three typical surface defect images of cold steel strip, and this paper choose the gray features, textural features and Hu invariant moment features as the basis of classification finally. Experimental results demonstrated that features in this paper can be classification basis correctly.

F-4

Fault Tolerant Tracking Control for a Team of Non-minimum Phase VTOL Aircrafts Based on Virtual Leader Structure

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This paper develops a fault tolerant approach for a team of thrust vector vertical take-off and landing (VTOL) aircrafts based on virtual leader structure. First, for each VTOL aircraft, a cascaded observer system with two extended state fault diagnosis observers (ESFDO) is designed. Then, local fault tolerant tracking controllers are developed. Finally, simulation results for a team of three VTOL aircrafts are presented to demonstrate the effectiveness of our proposed method.

F-5

Sliding Mode Fault-tolerant Control for Air-breathing Hypersonic Vehicles with External Disturbances

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This paper studies the fault-tolerant control for air-breathing hypersonic flight vehicles(AHFVs) subject to both actuator faults and external disturbances. The overall procedure includes the

feedback linearization of the model and the adaptive sliding mode control design. Specifically, a feedback linearized model of AHFVs is firstly obtained with the actuator faults and external disturbances. Then, two adaptive laws are designed to approximately estimate their unknown bounds. Based on the Lyapunov analysis method, it is proved that adaptive sliding mode control law can achieve the asymptotic tracking of all commands signals and guarantee the stability of the system. Simulations are conducted to confirm the efficacy of the proposed control method.

F-6

Sensor Fault Detection of double tank Control System Based on Principal Component Analysis

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Production process system is a dynamic process, so whether the dynamic process' sensor is faulted or not is determined through the method of various sensor data acquisition and analysis. The double water tank data processing and fault diagnosis model was established according to the basic method of principal component analysis theory and its application research in the field of fault diagnosis. The test data was input into the model, so whether there was a failure was determined by comparing thresholds, and which sensor and what kind of fault are determined. The effectiveness was proved by the simulation result.

F-7

Optical Mouse Sensor-Based Laser Spot Tracking for HCI Input

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When facing with the mid-air interactive tasks in a wide range, the laser spot motion sensing technique can be as an information input mode of human-computer interaction (HCI). This paper explores the use of optical mouse sensors for building a laser spot tracking system, which can be used as a motion-based HCI device. Our work is focused on the characterization of the laser speckle sensing by optical mouse sensors. Based on the laser speckle displacement measurement capability of optical mouse sensors, we demonstrate that the low-cost optical mouse sensor can be used to record the motion of laser spot as a precise, fast and compact sensing method. To make a prototype system for demonstration, we describe a kind of deployment method for building optical mouse sensor array and propose a weighted method to fuse the raw data of multi-optical mouse sensor array. In experimental testing, the ISO standard tests for HCI input device were used for evaluating the effciency of HCI input by optical mouse sensor-based laser spot tracking. A paradigm that using laser pointer and our laser spot tracking system to complete the dynamic hand

gesture recognition task is also given in this paper.

F-8

An Adaptive Weighted One-Class SVM For Robust Outlier Detection

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This paper focuses on outlier detection from the perspective of classification. One-class support vector machine (OCSVM) is a widely applied and effective method of outlier detection. Unfortunately experiments show that the standard one-class SVM is easy to be influenced by the outliers contained in the training dataset. To cope with this problem, a robust OCSVM is presented in the paper. In consideration that the contribution yielded by the outlying instances and the normal data is different, a robust one-class SVM which assigns an adapting weight for every object in the training dataset was proposed in this paper. Experimental analysis shows the better performances of the proposed weighted method compared to the conventional one-class SVM on robustness.

F-9

Study of Transformer Fault Diagnosis Based on DGA and Coupled HMM

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In this paper, a coupled hidden Markov model (CHMM) based on dissolved gas analysis (DGA) is proposed for transformer fault diagnosis in power systems. By using the theory of scalar quantization, the collected date of dissolved gas is preprocessed and put into two observation channels in the coupled two-chain hidden Markov model (HMM) with the form of gas content and ratio. Transformed to the form of HMM equivalently, CHMM can be easily trained and work as the condition classifier for power transformer. Finally, it follows from the experimental results and comparison with HMMs that the proposed model is successful and effective.

F-10

A Reconfigurability Evaluation Method for Satellite Control System

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The reconfigurability of satellite control systems is a fundamental index to the capability of

spacecraft stability after the faults occur in the the process of satellite operating in-orbit. This paper addresses the problem of reconfigurability evaluation for faulty control systems. Firstly, The reconfiguration indicator based on system stability is presented by regarding the faults that occur in the system as model uncertainties. And then the method for normalized coprime factorization is introduced to describe the maximal reconfigurability boundary, which causes the control system instability when the fault exceeds the allowable range of the given controller and model. Finally, the efficacy of the proposed method is tested through an numerical simulation on the Hubble telescope.

G 模糊系统与神经网络

G-1

Anti-Disturbance Control for T-S Fuzzy Models Using Fuzzy Disturbance Modeling

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In this paper, an anti-disturbance tracking control scheme is proposed for T-S fuzzy models subject to parametric uncertainties and unknown disturbances. Different with those previous results, exogenous disturbances are also described by T-S disturbance models. Under this framework, a composite observer is constructed to estimate the system state and the disturbances simultaneously. Meanwhile, by integrating the PI-type control algorithm with the estimates of the state and the disturbance, a feedback control input is designed to ensure the system stability and the convergence of the tracking error to zero as well as satisfactory disturbance estimation and attenuation performance.

G-2

Bayesian Network Structure Learning Algorithms of Optimizing Fault Sample set

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As a representative heuristic search algorithm of structure learning algorithms for Bayesian network, K2 algorithm is easily trapped in local optimum in the process of Bayesian network structure optimization. This paper proposes a K2 algorithm based on chaotic perturbation. First of all, define the order of the node based on mutual information to construct a Bayesian network structure. Then introduce distribution function skew tent map combined with chaotic search. And ergodicity is used to jump out of local optimum and achieve global optimization. Finally, taking steering shaft control structure of B777 control system as an example, the proposed algorithm presents a good effect in Bayesian network structure learning.

G-3

Research on Asphalt Gas Concentration Control System Based on Fuzzy-PID Control

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The asphalt gas concentration control system is characterized by its long-time delay, large inertia object and varying control parameter, too complicated to be applied in traditional PID control. In this paper, we use fuzzy-PID controller to control the asphalt gas concentration control system. The fuzzy-PID controller is designed based on fuzzy adaptive PID control principle; the PID parameters are adjusted according to error e and error change rate ec. Fuzzy-PID controller has more excellent performances than the traditional PID controller in the gas concentration control from the simulation results comparisons.

G-4

An Activity Recognition Algorithm Based on Multi-feature Fuzzy Cluster

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In this paper an activity recognition algorithm based on multi-feature fuzzy cluster is designed to find out more details of the activities so as to achieve an accurate classification among them. Firstly, it is proved that distribution of feature vectors vary from activity to activity. And then, a multi-feature extraction algorithm is designed to extract the feature vectors of each activity which makes up a standard activity class. Finally, an activity recognition algorithm based on similarity measurement is brought up and the misjudgment rate turns out to be acceptable, which proves that this algorithm is accurate and highly feasible.

G-5

Classifying the Epilepsy EEG Signal by Hybrid Model of CSHMM on the Basis of Clinical Features of Interictal Epileptiform Discharges

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Many methods of processing epileptic EEG signals are concentrated in the classification, and most

of them use the wavelet transform and SVM classification algorithm. Although these algorithms acquire the high accuracy, it is still unable to provide a good explanation of quantitative difference and physical meaning between epileptic EEG and normal EEG. This paper presents a new hybrid algorithm (CWTSVM-HMM) to classify epileptic EEG signal. By the results of classification of HMM, we can track back abnormal signal frequency sources, through the analysis of the sources of seizures during different frequency band, we can get a seizure of accurate quantitative analysis according to clinical feature of interictal epileptiform discharges.

G-6

Group consensus control in uncertain networked Euler-Lagrange systems based on neural network strategy

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This paper investigates the group consensus problem for a network consisting of Euler-Lagrange systems under directed topology with acyclic partition via neural network strategy. The neural network based controller achieves group consensus for uncertain networked Euler-Lagrange systems. By exploiting thoroughly the specific structure of the network topology, the stable analysis of the group consensus problem for such uncertain networked systems is also provided. Furthermore, a necessary and sufficient condition for ensuring that the systems reach group consensus is established. Finally, examples and simulations are given to show the effectiveness of the presented theoretical results.

G-7

Evaluation Strategy of mine Gas Outburst Risk Level Based on Fuzzy Neural Network

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Because the complicated non-linear relation between the coal gas outburst and its affecting factors, it is difficult to establish model with traditional mathematical method. The fuzzy system and the neural network were organically combined to establish evaluation strategy of coalmine gas outburst risk level based on fuzzy neural network. This paper made use of fuzzy mathematics to express and deal with the imprecise data and fuzzy information, and utilized self-adaptive neural networks system to solve the problems. Simulation results show that the model is reliable and precise and outburst risk level can be accurately predicted with proposed method and the mean error is small.

G-8

Neural network observer based optimal tracking control for multi-motor servomechanism with backlash

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In this paper, a new neural network observer based optimal tracking control is presented to attenuate the effect of backlash and other uncertainty for the position tracking of multi-motor servomechanism (MMS). By adopting a continuously differentiable function instead of the non-differential dead-zone mode of the backlash, the state space representation of MMS is set up by using a linear part of the differentiable function. Based on the state space representation, the optimal neural network (NN) observer is used to estimate the uncertainties and unmeasured states, which combines with the optimal state feedback to synthesis the actual control law. Finally, Lyapunov theory is utilized to certify that the tracking error, the observed error and neural network weights are all semi-globally uniformly ultimately bounded (SGUUB). Simulation results validate the effectiveness of this method.

H 电力系统及信息融合

H-1

Terminal sliding mode control of a Boost converter

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In this paper, a terminal sliding mode (TSM) control method for the boost converter is studied. First of all, the nonlinear model of boost converter is established. Then a change of coordinate is employed such that the nonlinear model will be transformed into a linear system. On this basis, a TSM composite controller including the state feedback control and the disturbance feedforward compensation is given. Under the composite controller, the reference voltage can be tracked in a finite time. The effectiveness of the paper is shown with a simulation example.

H-2

An Extend Set-Membership Filter for state estimation in Power Systems

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In order to improve the accuracy and reliability of nonlinear state estimation problems with unknown but bounded noises in power system, an extend set-membership filter for state estimation in power systems is present in this article. The method is based on three sampling sine wave relational model. It overcomes the poor robustness, divergence and weak traceability of kalman filter, avoids the complex calculation process of traditional extend set-membership filter. Compared with kalman filter, the simulation results show that extend set-membership filter algorithm can track signals faster and more accurately.

H-3

A Distributed Charging and Discharging Coordination for Large-population Plug-in Electric Vehicles

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Motivated by the economic and environmental benefits of plug-in electric vehicles (PEVs), the PEVs have been regarded as adjustable bilateral auxiliaries for the power grid. They can not only charge from the grid but also discharge back to the grid. This work studies the problems of PEV coordinations, considering the battery degradation cost. We analyze the characteristics of distributed strategy curve and propose an updated algorithm to implement the optimal distributed coordination in the case of the infeasibility of fully centralized formulation. As key contribution of this paper, we show that under certain mild conditions, the system converges to an optimal charging and discharging strategy. Simulation examples illustrate the results developed in the paper.

H-4

Overhead Transmission Line condition Evaluation based on Improved Scatter Degree Method

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As an important part of the transmission network, the running state of overhead transmission line will directly affect the reliability of the whole power system. With a single element reliability model, it is hard to exactly reflect the true condition of the complicated system with multi hierarchies and multi indicators, which means it is difficult to conduct an accurate comprehensive evaluation on overhead transmission line. This paper proposes an overhead transmission line evaluation model based on improved scatter degree method. The proposed model combines the subjective and objective combination weighting method, which can not only calculate the line

units, but also evaluate the running state of the whole overhead transmission line. Finally, this model is used to assess overhead transmission lines in a certain area and results show that the proposed method is effective and feasible.

H-5

Coordinated Control for Multi-WTGs WindDiesel Hybrid Power System Based on Disturbance Observer

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Wind diesel hybrid system is an important new energy supply mode, but the output power of wind turbine generator (WTG) is fluctuated depending on weather conditions. Especially, the wind-diesel hybrid system with multiple WTGs for remote areas and islands operation, it will inevitably lead to the fluctuated output power to produce the large frequency deviation. So it's crucial to coordinate the WTGs for providing high quality of electricity. Based on the designed disturbance observer, the coordination control strategy for the multiWTGs wind-diesel hybrid system is proposed. The load variation is allocated to the WTGs output power reference by using the observer. Here, the constructed controller is compared with the traditional method for every WTG system with only PID control. The simulation results show that of frequency deviations are reduced and output power of every WTGs are controlled effectively.

H-6

Photovoltaic system power generation forecasting based on Spiking neural network

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A forecasting model based on Spiking neural network (SNN) was proposed to tackle with the problem of the forecasting of photovoltaic system (PVS) power generation. This neural network uses temporal encoding scheme with precise times of spikes, which is closer to the real biological neural system and has powerful computing ability. Considering the main influencing factors such as season types, weather types, sunshine intensity and temperature etc., this model use the method of grey correlation analysis to select similar days. The high accuracy and robust applicability of the proposed forecasting model are verified by the simulation using actual operating data of PVS.

H-7

A Carrier Tracking Algorithm of Kalman Filter Based on Combined Maneuvering Target Model

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Since the traditional current statistical Kalman (CS-Kalman) filter doesn't perform well enough when used in high-dynamic carrier tracking, an carrier tracking algorithm of Kalman filter based on combined maneuvering target model composed of high dynamic CS-Kalman filter and steady-state self-adaptive CS-Kalman filter is presented. The proposed algorithm achieves stable and accurate carrier synchronization by adjusting the CS-Kalman filter type and parameter corresponding to the dynamic condition in real time. Simulation results show that compared with the traditional CS-Kalman algorithm, the proposed algorithm is more realistic, practical valuable and adaptable in high dynamic environment.

H-8

Analysis of Quantization Noise Spectrum in Signal Reconstruction

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Quantization is an essential but often ignored part of the realization of compressive sampling (CS), and the analysis of quantization noise arise from CS is incomplete and not sufficient until now. The quantization noise is generated from quantizing CS values by a uniform quantizer under ideal and noise conditions. And also, the auto correlation function and power spectrum have been derived. It is concluded that the quantization noise is always uncorrelated with the input signals, the quantization noise is white and the spectrum is white noise spectrum. On this basis, we analyze the reconstruction error introduced by quantization noise quantitatively and give the upper and lower bounds of reconstruction error. Simulation results validate the validity of the analysis for further.

H-9

Location and Navigation Study of Laser Base Station

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Underground navigation is one of critical underground intelligent mining technologies. On account of underground specialty and working conditions, this article presents a research on location mode based on laser ranging and laser-based active navigation mode. First, the hardware design of base station control system used in laser location navigation is introduced. Second, the design of base station motion controller and communication module are described. Third, based on the motion controller, a moving target acquisition algorithm, laser location tracking algorithm, and laser-based active navigation algorithm are presented. Finally, some experimental results conducted in base station are illustrated.

H-10

Target Localization and Tracking of Unmanned Mining Equipment Based On Multi-Sensor Information Fusion Technology

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The accurate localization is very important for mobile devices to make right decisions about autonomous path planning, avoiding obstacles and finishing other complex tasks. This paper presents a research on the localization and tracking technology of autonomous underground mining equipment. Two types of Kalman filters are considered as information fusion method: multi-sensor multimodel adaptive Kalman filtering and weighted adaptive multiple model Kalman filtering .

H-11

Interconnection Power Converter for Multi-rail DC Distribution System

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This paper presents an interconnection bi-directional dc-dc converter for multi-rail DC distribution system. The principles of the energy conversion process, small signal modeling and controller design for the new topology are discussed in detail. The system parameters are carefully calculated for an intended application of automotive 14V/42V dual-bus DC distribution system. A double-zero-double-pole PI controller is designed to control the high rail voltage as well as bidirectional power. The simulation and experimental results show that the proposed topology has the advantages of power expansibility, smaller capacitance current stress and bidirectional operation. It is proved to be applicable in high current high temperature automotive DC distribution systems.

I 模式识别与图像处理

I-1

Camera Calibration Implementation Based on Zhang Zhengyou Plane Method

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Camera calibration is a crucial step in computer vision, the main determinant of the visual measurement effect, laying the basis for three-dimensional reconstruction. In order to know calibration's precision exactly, pinhole model and relations of the four coordinates are used, camera's internal and external parameter matrices can be solved by Zhang Zhengyou plane calibration method, camera's distortion coefficients are then easily solved, further considered radial distortion and tangential distortion. The paper establishes a simple but clear error assessment system to evaluate the accuracy of the results and compares them with MATLAB toolbox. The experiment demonstrates that the method has high accuracy, establishing a foundation for seeking depth by binocular stereo vision.

I-2

Robust visual tracking via part-based template matching with low-rank regulation

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This paper presents a simple yet effective visual tracking method to attack the challenge when the target object undergoes partial or even full occlusion. First, a fixed number of image patches are sampled as the template set around current object location. In the detection stage, candidate image patches are sampled as the candidate set around the object location in the previous frame. Second, both the template set and candidate set patches are divided into sub-regions and features can be efficiently extracted via random projections. The confidence score for a specific candidate patch is computed through compressive features' low-rank regulation with the template set patches. The lowest confidence score in the current frame indicates the new object location. The encouraging experimental results show that our proposed method outperforms several state-of-the-art algorithms, especially when the target object suffers partial or even full occlusion.

I-3

Image Super-Resolution Based on MCA and Dictionary Learning

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Image super-resolution focuses on achieving the high-resolution version of single or multiple low-resolution images. In this paper, a novel super-resolution approach based on morphological component analysis (MCA) and dictionary learning is proposed in this paper. The approach can recover each hierarchical structure well for the reconstructed image. It is integrated mainly by the dictionary learning step and high-resolution image reconstruction step. In the first step, the high-resolution and low-resolution dictionary pairs are trained based on MCA and sparse representation. In the second step, the high-resolution image is reconstructed by the fusion between the high-resolution cartoon part and texture part. The cartoon is acquired by MCA from the interpolated source image. The texture is recovered by the dictionary pairs. Experiments show that the desired super-resolution results can be achieved by the approach based on MCA and dictionary learning.

I-4

Scene Classification Based on Regularized Auto-encoder and SVM

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Scene classification aims at grouping images into semantic categories. In this article, a new scene classification method is proposed. It consists of regularized auto-encoder-based feature learning step and SVM-based classification step. In the first step, the regularized auto-encoder, imposed with the maximum scatter difference (MSD) criterion and sparse constraint, is trained to extract features of the source images. In the second step, a multi-class SVM classifier is employed to classify those features. To evaluate the proposed approach, experiments based on 8-category sport events (LF data set) are conducted. Results prove that the introduced approach significantly improves the performance of the current populare scene classification methods.

I-5

Mirror image-based robust minimum squared error algorithm for face recognition

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To address the problems that the minimum squared error (MSE) algorithm is short of sufficient

robustness and there are often not enough training samples for face recognition (FR), a mirror image-based robust MSE algorithm which uses mirror face as new training samples is proposed. The solution vector of MSE classification model needs to transform both original training samples and its mirror images into its class labels. Owing to mirror image reflect the change of pose and expression of original face images, the solution of classification model has some robustness. In addition, two classifier schemes are proposed and the second classifier scheme outperforms the first classifier scheme computationally. The experimental results on FERET, Extended YaleB and ORL databases indicate that the proposed approach achieves better robustness on images whose pose and expression are changed than the traditional MSE algorithm.

I-6

Apple Nighttime Images Enhancement Algorithm for Harvesting Robot

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In order to enhance the applicability and efficiency of harvesting robot to ensure that people can timely pick ripe fruit, the robot need to have an ability of continuous recognition and harvest at night. For some disadvantages of night vi-sion images, Retinex algorithm for image enhancement based on bilateral filter is presented. Bilateral filter which has a function of edge preservation is adopted to improve the smooth, evaluate the illumination and remove unfavorable illumina-tion effects from the original image. Then the reflectance of the image from above that contains just the characteristics of the object itself can be obtained. Finally, apple nighttime image enhancement is implemented. The experimental results show that the above method can more accurately evaluate the illumination of high-contrast edge regions, to suppress noise, enhance image contrast and improve overall visual effects of the image.

I-7

Local Linear Discriminant Analysis Using ℓ_2-Graph

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A recently proposed method, called Local Fisher Linear Discriminant Analysis (LLDA), the experiment showed that compared with the traditional Fisher Linear Discriminant Analysis, it has a better result. However, it uses Euclidean distance selecting nearest neighbor samples which has some flaws in the way, such as the robustness is not good and not sparse, and so on. The paper presents an improved approach, called Local Linear Discriminant Analysis Using-Graph (L2G_LLDA). It remains reconstructed coefficient of samples to select the nearest samples, which enhances the robustness of the algorithms and makes it sparse. The extensive experimental results over several standard face databases have demonstrated the effectiveness of the proposed algorithm

I-8

A Vision-based Traffic Flow Detection Ap-proach

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Traffic flow detection plays an important role in Intelligent Transportation System (ITS). However, the conventional traffic flow detection approaches are high cost or complex installation. In this paper, a reliably vision-based traffic flow detection approach is proposed. In this approach, Gaussian mixture model (GMM) is employed to model the dynamic background of traffic scene. Then, the binary foreground contours are extracted by image subtraction. Comparing the binary vehicle contours' location and the current frame, the real and complete vehicles are obtained for detecting and monitoring. In the part of vehicle counting, to gather the vehicle flow parameter in each lane of the road and avoid the trouble of counting vehicles repeatedly, a discriminative method is presented to classify vehicles into different lanes. Experiment shows that a desired result can be achieved in the traffic flow detection system by the vision-based approach.

I-9

The Research of High-definition Video Processing System Based on SOC

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As people puts forward more requirements for high-definition video industry, capture, transcoding, storage and display of high-definition video then become progressively imperative. This paper presents a parallel video SOC system for faster and flexible 1080P video processing. The key elements of this system, including parallel RGB to YUV transcoder, two-level pipeline and high speed memory controller, are elaborated. 0.028um CMOS technology node is applied for implementing the SOC architecture. It is competitive in providing high quality images and is proved to be well supportive for DVI and HDMI signal.

I-10

Image Threshold Processing Based on Simulated Annealing and OTSU Method

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This paper analyzes Maximum between-Cluster Variance method to conduct image threshold,

coming up with an optimizing searching method of image segmentation with simulated annealing optimization algorithm. This algorithm determines the optimal threshold adaptively, and has strong adaptability and good effect of image segmentation, and it can greatly reduce the computational complexity. And it is optimized by multi-threading, which improves the parallel algorithm, and speeds up the efficiency of the algorithm.

I-11

Stereo Vision Pose Estimation for Moving Objects by the Interacting Multiple Model Method

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The stereo vision measurement system is very widely employed to obtain the 6 DOF pose information for the moving objects in space. However, the linear and angular velocities are impossible to estimate using these systems while the dynamic model is unknown and disturbances exist, and their applications is limited. To overcome this disadvantage, we propose an approach based on the IMM algorithm for moving objects. Our approach is verified in the feature points of a moving object. And the simulating results show its validity.

I-12

A Dual Camera System for Moving Objects Close-up Tracking

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A single camera cannot provide a broad perspective and provide the details of monitoring targets at the same time. This paper design a dual camera system based on a wide-angle camera used to provide a wide-angle visual field and a close-up camera used to provide the details of moving targets. The real-time video data are firstly acquired based on DirectShow. Secondly, a Gaussian mixture model and Kalman filter are used to detect and track the moving targets, respec-tively. In order to realize the collaborative relationship among the dual camera, the conversion model among coordinate systems is established. Finally, the PID algorithm is used to driver the close-up camera to make the target locate in the center of its visual field. Experimental results demonstrate the effectiveness of the proposed method.

I-13

Sketch-based 3D model shape retrieval using multi-feature fusion

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At present, the application of 3D models is becoming more widely, which makes it very important and crucial to retrieve 3D model effectively. With the method based on content to search for those 3D models, rather than textual annotations, it is very important. For this purpose, this paper presented an effective sketch-based 3D model shape retrieval approach. The algorithm compares multi-view rendering of 3D models with the 2D sketch, and the feature vector is defined as a combination of global feature and local feature. We perform experiments, the results of which show a significant increase in precision for 3D model retrieval.

I-14

Autonomous Navigation Based on Sequential Images for Planetary Landing

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A new autonomous navigation scheme for planetary landing is presented. The navigation system contains an inertial measurement unit (IMU) and a stereo camera which can measure unit directional vectors and range information from the camera to detected landmarks. The lander's motion is estimated by an algorithm known as vision-aided inertial navigation (VAIN). The algorithm uses the unit directional vectors and range measurements of features tracked in two sequential images and the lander's corresponding poses derived from the IMU and it does not require any a priori terrain information. An augmented implicit extended Kalman filter (IEKF) tightly integrates measurements from the stereo camera and the IMU to produce an accurate estimation of the lander's pose and velocity and to correct the IMU constant biases. The results of a numerical simulation show that the proposed VAIN method can vastly improve the navigation accuracy of the INS and satisfy the requirements of future planetary exploration missions.

J 其他

J-1

Performance of Microstrip Patch Antennas Embedded in Electromagnetic Band-Gap Structure

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Electromagnetic band-gap structures are widely used in antenna and microwave element designs due to their unique electromagnetic features which are shown in two aspects: forbidden band gap

and in-phase reflection. In this paper, three different antennas are designed and simulated by Ansoft HFSS to know the use of the EBG structure in microstrip antenna engineering. Radiation characteristics such as gain, radiation patterns and s-parameters of these microstrip antennas are performed. The simulated results verify that the gain has been increased noticeably, the radiation pattern has been improved and the sidelobe and backlobe levels have been reduced by using the mushroom-like EBG structures. Especially, the microstrip antenna over the EBG structures not only shows the best electromagnetic characteristics but also maintains its small dimensions.

J-2

The Influenza Virus Immune Model on the Android Platform

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In biological experiments, it has been impossible that we just use experimental apparatus to deal with the complex problems in immune cells. And the traditional mathematics and the physics model have some limitations, like lacking of microcosmic performance description of unit cells [1]. In this article,we do detail design after analyzing the requirements of the immune system. Then,combining with the related data of influenza virus, we use the Android platform application development to simulate the system. Android platform's simple style of page, the application of interactive interface and the easy management can bring us different experiences. With the help of the computer program simulation, the experimental result is consistent with the model of immune response in the immune system.

J-3

Data-driven filter design for linear networked systems with bounded noise

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Considering the case that the mathematical model of control plant is unavailable, this paper is concerned with the problem of datadriven filtering for linear networked systems with bounded noise and transmission data dropouts. One merit of the design is that the filter can be directly employed without identifying the model. To overcome the effect of data dropouts during the transmission, an output predictor is designed based only on the received output and input of the system. By utilizing the predicted output, a direct worst-case almost-optimal filter within the set membership framework is presented.

J-4

Technology Developments of Micro Fluid Dispensing

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Micro fluid dispensing technology is widely applied in electronics packaging, micro electromechanical system assembly, and biotechnology experiments, in which pl or nl amount of fluid materials (such as solder paste, adhesive, and DNA solution) are delivered controllably for the purpose of conducting, bonding, sealing, etc. This paper reviewed the latest developments as well as advantages and limits of three kinds of micro dispensing technology, which are needle nozzle type, integrated nozzle type and pin transfer type, classified according to the configuration of the nozzle unit. The measuring methods for the micro droplets are also briefly introduced in the article. Our work of dispensing less than 3 pl adhesive in an microassembly task is briefly introduced, and the trends and challenges of micro fluid dispensing are also discussed.

J-5

Fluid analysis for a PEPA model

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It is, as the state space explosion problem indicates, not uncommon that tremendous complexity and size of a system would annoyingly quiver the performance of discrete state-based modeling formalisms. The past few years, however, have inspiringly witnessed a brand new PEPA-based strategy offering a feasible solution against such disturbing puzzle. Via PEPA, a family of ordinary differential equations (ODEs) is figured out as continuous state space approximation. This paper establishes some significant properties for the fluid approximation of a PEPA model, including the existence, uniqueness, boundedness and convergence of the derived ODEs solution.

J-6

Sensitivity Analysis and Simulation of Performance for M/G/1/K Queuing Systems

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In this paper, the performance potential and performance derivatives are analyzed for M/G/1/K queuing systems by the embedded Markov Chain. A computation algorithm is also given basing on a single sample path. To demonstrate the effectiveness of this algorithm, a special M/G/1/K queuing systems is given in the simulation section, which indicates the estimation error is very small.

J-7

Sentiment Analysis Based on Evaluation of Tourist Attractions

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Tourists satisfaction has become more and more an indicator of tourism development. Sentiment analysis on data of comments and hot discussion on travel site and Weibo can help judge real-time satisfaction trend of tourists with scenic spots according to the intensity of sentimental tendency. Considering the deficiencies in current sentiment analysis, in this paper, firstly the polarity value and strength value are used to calculate the sentimental intensity of the sentimental words. HIT-CIR Tongyici Cilin (extended) is used to expand the syn-onyms of the sentimental words in order to reduce the impact of words not in HowNet and some sentimental words with low frequency in the corpus. Then we improved the traditional semantic similarity method based on HowNet according to the characteristics of sentiment analysis, combining it with the method based on Point Mutual Information (PMI) and syntactic dependency relations. High accuracy is showen by the experimental results.

J-8

On Three-Player Potential Games

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In this paper, some new criteria for detecting whether a 3- player game is potential are proposed by solving potential equations. When a 3-player game is potential, the potential function is constructively expressed.

J-9

An improved Kalman filter for fractional order system with measurement Lévy noise

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In this paper, taking the measurement noise as the nonGaussian Lévy noise, an improved Kalman filter for discrete linear stochastic fractional order system is proposed. By eliminating the maximum of the noise, the Lévy noise can be approximated by a series of Gaussian white noises. Then, based on the principle of least square, an improved Kalman filter is developed for discrete linear stochastic fractional order system with measurement Lévy noise. Finally, simulation results are provided to illustrate the effectiveness and usefulness of the proposed filter designing algorithm, where a better filtering performance could be found.

J-10

A Novel Driving Method for Switching Control Pulse Signal

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A novel driving method implemented with high frequency electromagnetic isolation is proposed in this paper. And the hardware designing schematic diagram and the software configuration method are presented. Then the corresponding operating principle is analyzed in detail based on digital control chip and analog circuits. The proposed driving method can be applied to real-time varying pulse width of the control signal and the duty-cycle ratio of this control pulse can be regulated in the range of 0 to 100%. This novel driving method can achieve not only the advantages of high insulation and high common-mode suppression, but also the merits of low cost and fast dynamic response speed, and it is suitable for the isolation and amplification of high frequency switching control pulse signal. Finally, the experimental results show that the proposed driving method in this paper is effective.

J-11

On Regular Subspaces of Boolean Control Networks

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This paper investigates some fundamental problems on regular subspaces of Boolean control networks (BCNs). A new necessary and sufficient condition for regular subspaces is obtained. A new method to compute complementary subspaces is proposed. An example is given to illustrate the obtained theoretical results.

J-12

Research on Evolution and Simulation of Transaction Process in Cloud Manufacturing

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Cloud manufacturing is a new service-oriented networked manufacturing mode. The participants of cloud manufacturing platform conduct transactions in an open environment. This paper focuses on the cooperation of supply-sides and demand-sides in cloud manufacturing platform from the perspective of evolutionary simulation. By combining the agents and evolutionary simulation, we design and implement cloud manufacturing platform simulation model based on service agents. Meanwhile, transactions and resource utilization based on cloud manufacturing and traditional manufacturing modes have been compared through evolutionary simulation. The experimental

results demonstrate that cloud manufacturing simulation platform based on service agents could represent the main characteristics of cloud manufacturing transactions. And in this way, the advantages of cloud manufacturing cloud also be illustrated.

J-13

An Investigation of Model-based Design Framework for Aero-engine Control Systems

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Throughout the design of aero-engine control systems, modeling and simulation technologies have been widely used for supporting the conceptualization and evaluation. Due to the increasing complexity of such systems, the overall quality management and process optimization are becoming more important. This in particular brings the necessity of integrating various domain physical models that are traditionally based on different formalisms and isolated tools. In this paper, we present the initial concepts towards a model-based design framework for automated management of simulation services in the development of aero-engine control systems. We exploit EAST-ADL and some other existing state-of-the-art modeling technologies as the reference frameworks for a formal system description, with the content ranging from requirements, to design solutions and extra-functional constraints, and to verification and validation cases, etc. Given such a formal specification of system V&V (Verification and Validation) cases, dedicated co-simulation services will be developed to provide the support for automated configuration and execution of simulation tools. For quality management, the co-simulation services themselves will be specified and managed by models in SysML.

J-14

Application of fractal on the fluids

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The applications of fractal have been involved in a wide range of areas. As a fractal brunch-fractional Brownian motion (fBm) has also been used and applied in numerous physical sciences. The fBm technique overcome the traditional non-memory random walk-Brownian motion, it could be used on modelling particle tracking dispersion in ocean surface. The technique gives more accurate simu-lation on tracking particle diffusion and dispersion. Here we use a developed fBm

model (FBMINC) as a diffusion process, simulate an idealized coastal bay surface trajectories and particle cloud dispersions using fBm particle tracking techniques. Compared to the traditional Brownian motion particle tracking model, the newly developed fBm particle tracking model produces patterns more close to the reality. Due to its flexibility, the fBm particle tracking model can be widely used in pollutant dispersion on difference size of water bodies.




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