

广播与电视技术

2022 4
第二届全国期刊奖百种重点期刊

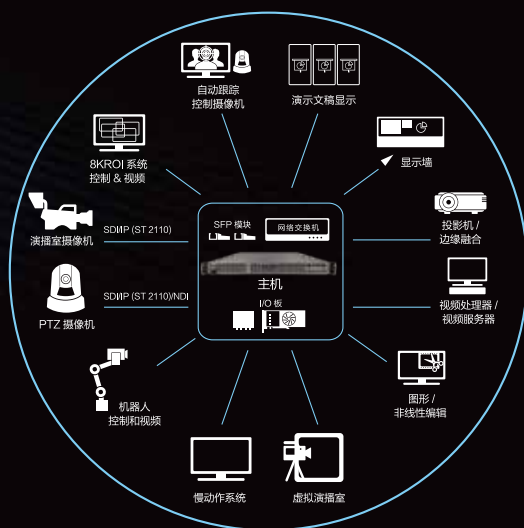
Radio & TV Broadcast Engineering

全国百种重点期刊 专业核心科技期刊

第49卷 第4期 VOL.49 NO.4

Panasonic

KAIROS
Incredible Productivity



以IT/IP为中心的 实时视频处理平台



不受限制的输入、输出，M/E级数，KEY数量

- ◆ IT/IP现场切换台
- ◆ 多种分辨率和格式
- ◆ 多种输入和输出可供使用
- ◆ 用户友好型界面
- ◆ 灵活性和可扩展性
- ◆ 实现多种视频展示的分层结构



"松下专业"官方微信



"松下专业影像"官方微博

松下电器(中国)有限公司 系统互联营销公司
Panasonic Connect China

<http://prosystem.panasonic.cn> 咨询热线: 400-881-1315

北京公司 电话: (010) 65626688 上海公司 电话: (020) 38667155 广州公司 电话: (020) 87130888 成都公司 电话: (028) 62828358

ISSN 1002-4522



9 771002 452227

国家广播电视总局 主管
国家广播电视总局广播电视规划院 主办



国家广播电视总局 主管
国家广播电视总局广播电视规划院 主办

主管: 国家广播电视总局

主办: 国家广播电视总局广播电视规划院

邮发代号: 82-464

编辑出版: 《广播与电视技术》编辑部

通讯地址: 北京2116信箱(100866)

电话: 010-86093619(作者服务) 010-86092040(读者服务)

投稿网址: tougao.lieku.cn

国内总发行: 北京报刊发行局

订购处: 全国各地邮局

运营总代理: 北京中广信通文化传媒有限公司

市场专员: 李聪(18518221868) 邮箱: licong@tvoao.com

国外总发行: 中国出版对外贸易总公司(北京728信箱100011)

广告经营许可证: 京西市监广登字20170187号

国内定价: 20.00元/本 国外定价: 20美元/本

刊号: ISSN 1002-4522

CN11-1659/TN

主编: 何剑辉

副主编: 卢群

编辑: 房磊 李丹

发行: 胡南

美编: 张云峰

目次

全国百种重点期刊 专业核心科技期刊
投稿平台 tougao.lieku.cn



中国邮政
微信订阅

2022年 | 第49卷 | 第4期

热点·论点

智能监测

- 13 基于数字音频指纹技术的广播音频自动化比对系统设计与应用 郑又中
- 17 基于声纹识别的频谱监测系统开发设计 孙爱叶
- 21 基于图像识别的广播电视异态辅助监测系统 付巍, 段献奎, 王书华, 付亚楠

内容制播

- 26 异构媒体云智能协同技术方案设计 白伟
- 31 省级电视台全媒体制播业务系统设计与实践 魏舒桓
- 36 县级融媒体省级技术平台并发性能测试研究 郑涛, 崔俊生, 覃毅力
- 43 基于多协议与多路径实时视频连线系统的设计和实现 龙小燕, 胡滨, 全伟
- 47 全场景录制机房预约管理平台的建设实践 赵勇
- 51 大型体育赛事电视转播专网系统设计与实现 徐枫, 王长丰, 刘志愚

传输覆盖

有线网络

- 56 广电网络资源信息可视化应用能力提升方法的探索与实践 郭皓
- 61 广电业务承载终端的演进策略及探索实践 石鑫鹏, 邹飞非, 马振洲



主管: 国家广播电视总局
主办: 国家广播电视总局广播电视规划院

《广播与电视技术》是由国家广播电视总局主管,国家广播电视总局广播电视规划院主办,《广播与电视技术》编辑部编辑出版的国家级技术期刊,是发布广播电视科技政策,反映事业建设成就,介绍高新技术,交流工作经验,传播各种信息的重要媒体。本刊主要面向各级广播电视行业主管部门、各级广播电台、电视台、网络公司、发射台、微波站、卫星站、节目制作单位及电教系统,同时对企业、工矿、学校、部队等具有公共广播电视设施的管理人员、技术人员也有参考价值。

为繁荣学术交流,本刊已加入《中国学术期刊网络出版总库》、“万方数据”和“维普中文科技期刊数据库”,有权选取部分论文在本刊关联平台(如广电猎酷网 www.lieku.cn、“广电猎酷”微信公众号等)发布,作者著作权使用费已随论文稿酬一次性给付。本刊充分尊重作者的原创成果并合理保护作者享有的权利,如作者不同意本刊之外其他形式的发布,请在来稿中声明,本刊将作适当处理。本刊及主办单位对本刊已发布作品的内容和观点不持有任何立场、不做任何承诺或保证、不承担任何责任。

目次

全国百种重点期刊 专业核心科技期刊
 投稿平台 tougao.lieku.cn



2022年 | 第49卷 | 第4期

65 基于FTTH业务的终端管理系统平台建设 阳必文, 陶琦

71 数字电视卫星信号CWDM传输的研究与实现 张春雷

无线覆盖

74 云南省省级电视节目无线数字化覆盖建设方案探索与实施 许华宁

79 中波与调频电视高山发射台共址技术研究 孟凡涛

83 地面数字电视单频网系统分级建设研究 杨方正, 葛东, 浮沉, 孙鹏程, 侯蒙学

90 中波发射台站防雷技术选型实践 熊晨辉

95 中波天调网络的避雷原理及有效防雷措施分析 闫本芳

安全播出与监测监管

98 调频广播计算机远程协助监控系统改造 王燃

103 广播电视发射台站大数据智慧安播系统设计 梁建彬

107 数据可视化技术在广电运维领域应用的思考和实践 丁乐

113 基于卷积自编码器的广播电视画面多等级亮度增强和色彩保真算法研究 王雅楠, 门爱东

行业聚焦

118 稳定安全 协同高效 山东省新闻中心超高清系统打造行业标杆项目

广告索引 P122



主管: 国家广播电视总局
主办: 国家广播电视总局广播电视规划院

邮发代号: 82-464

全国百种重点期刊 专业核心科技期刊

导读

tougao.lieku.cn

中国邮政
微信订阅



2022年 | 第49卷 | 第4期

〔13〕 基于数字音频指纹技术的广播音频自动化比对系统设计与应用

本文利用先进的数字音频指纹和人工智能等技术,设计了一套广播音频自动化比对系统,可对广播调频节目的错播、插播、停播、劣播等安全播出事故进行实时监测,以智能监测手段提升了安全播出事件的判断能力,保障了广播节目的安全播出,可供同行借鉴。

〔36〕 县级融媒体省级技术平台并发性能测试研究

当前,全国各省市的县级融媒体中心省级技术平台和县级融媒体中心技术系统的建设正全面铺开。省级平台作为支撑全省各县的统一技术平台,应能支撑各县融媒体中心用户的并发访问需求,同时,融媒APP客户端也应能支撑群众并发访问的需求。针对这些现实需求,本文介绍了国内某个省级技术平台的并发性能测试方法并对测试结果进行了分析,可资参考。

〔56〕 广电网络资源信息可视化应用能力提升方法的探索与实践

针对目前广电网络资源信息可视化功能仍以基础的查询和空间分析呈现为主的情况,本文通过多维度分析研究,认为需要结合广电网络资源信息管理现状与可视化应用提升的需求来进行可视化应用设计,从而实现广电资源系统运行“一张图”展现,最大程度的保障资源管理的运转高效和决策优化,文中关于广电网络资源信息可视化应用能力提升方法的探索与实践有助于拓展业界同仁的思路。

〔74〕 云南省省级电视节目无线数字化覆盖建设方案探索与实施

在中央节目无线数字化覆盖工程的基础上,多省开展省级电视节目无线数字化覆盖工程建设,为群众提供更为丰富的广播电视服务。本文以云南省省级电视节目无线数字化覆盖建设方案为例,介绍了方案设计和实施过程中需要考虑的问题,对其他省级无线覆盖工程具有参考意义。

〔113〕 基于卷积自编码器的广播电视画面多等级亮度增强和色彩保真算法研究

在广播电视智慧监测中,多采用人工智能技术对节目画面进行识别,如遇到低亮度、低信噪比和颜色失真等问题,低质量的画面难以实现精准识别。利用低照度图像增强技术提高此类视频或图像的亮度,可以提升画面质量,为智能监测提供更加完整有效的信息。本文提出了基于卷积自编码器的图像增强网络,可有效提升画面质量,为智能监测提升更有力的技术支持。



Competent Authority:
National Radio and Television Administration
Sponsor: Academy of Broadcasting Planning, NRTA

Publisher: Editorial Department of RTBE

Tel: (86-10) 86093619 (Author service) (86-10) 86092040 (Reader service)

Web Address: tougao.lieku.cn

Chief Editor: He Jianhui

Address: P.O.Box 2116, Beijing, P.R.China

Deputy Chief Editors: Lu Qun

Post Code: 100866

Postal Distributing: Code 82-464

Editors: Fang Lei Li Dan

General agent of operation: Beijing China Broadcasting Media Co., Ltd.

Marketing: Licong(18518221868) E-mail:licong@tvaoa.com

Circulation Coordinator: Hu Nan

Journal Number: ISSN 1002-4522 / CN11-1659/TN

Art Editor: Zhang Yunfeng

Prices: RMB 20 for one copy (in China)

USD 20 for one copy (outside China)

Contents

One of Hundred National Key Periodicals
A Core Professional Sci-Tech Periodical
tougao.lieku.cn

Apr 2022 No.4

Intelligent Monitoring

- 13 Design and Application of Broadcast Audio Automatic Comparison System Based on Digital Audio Fingerprint Technology *By Zheng Youzhong*
- 17 Development and Design of Spectrum Monitoring System Based on Voiceprint Recognition *By Sun Aiye*
- 21 An Auxiliary Monitoring System of Radio and Television Abnormality Based on Image Recognition *By Fu Wei, Duan Xiankui, Wang Shuhua, Fu Yanan*

Content Production & Broadcasting

- 26 Design of Heterogeneous Media Cloud Intelligent Collaboration Technical Scheme *By Bai Wei*
- 31 Design and Practice of Omni-Media Production and Broadcasting Business System of Province-level TV Stations *By Wei Shuhuan*
- 36 Research on Concurrency Performance Test of Province-level Technology Platform for County-level Converged Media *By Jia Tao, Cui Jun Sheng, Qin Yili*
- 43 Design and Implementation of Real-time Video Connection System Based on Multi-protocol and Multi-path *By Long Xiaoyan, Hu Bin, Quan Wei*
- 47 Construction Practice of Full-scene Reservation Management Platform for Recording Room *By Zhao Yong*
- 51 Design and Implementation of Special Network System for TV Broadcasting of Large-scale Sports Events *By Xu Feng, Wang Changfeng, Liu Zhiyu*

CATV

- 56 Exploration and Practice of Approaches to Enhancing the Capacity of Radio and TV Network Resource Information Visualization Application *By Guo Hao*
- 61 Evolution Strategy and Exploration Practice of Radio and Television Service Carrying Terminal *By Shi Xinpeng, Zou Feifei, Ma Zhenzhou*
- 65 Construction of Terminal Management System Platform Based on FTTH Service *By Yang biwen, Tao Qi*
- 71 Research and Implementation of Digital TV Satellite Signal Transmission Using CWDM *By Zhang Chunlei*

Wireless Coverage

- 74 Exploration and Implementation of Construction Plan for Wireless Digital Coverage of Province-level TV Programs in Yunnan Province *By Xu Huaning*
- 79 Research on Co-location Technology of Medium Wave and FM TV High Mountain Transmitting Station *By Meng Fantao*
- 83 Research on Hierarchical Construction of DTMB SFN System *By Yang Fangzheng, Ge Dong, Fu Chen, Sun Pengcheng, Hou Mengxue*
- 90 Practice of Technology Selection of Lightning Protection for Medium Wave Transmitting Station *By Xiong Chenhui*
- 95 Analysis of Lightning Protection Principle and Effective Lightning Protection Measures of Medium-wave Antenna Tuning Network *By Yan Benfang*

Safe Broadcasting & Monitoring and Supervision

- 98 Transformation of Computer Remote Assistance Monitoring System for FM Radio *By Wang Ran*
- 103 Design of Big Data Smart Broadcasting System for Radio and TV Transmitting Station *By Liang Jianbin*
- 107 Thoughts and Practice on Application of Data Visualization Technology in Radio and Television Operation and Maintenance *By Ding Le*
- 113 Research on Multi-level Brightness Enhancement and Color Fidelity Algorithm for Television Broadcasting Based on Convolutional Autoencoder *By Wang Yanan, Men Aidong*



Competent Authority:
National Radio and Television Administration
Sponsor: Academy of Broadcasting Planning, NRTA

Radio & TV Broadcast Engineering (RTBE) is a state-class technical journal, approved by the General Administration of Press and Publication, PR of China, authorized by the National Radio and Television Administration (NRTA), PR of China, sponsored by Academy of Broadcasting Planning (ABP), NRTA, and published by Editorial Department of RTBE. RTBE is an important medium, that publishes scientific and technological policies in broadcasting, reports achievements in building broadcasting cause, introduces high and new technologies, exchanges work experience and spreads various information. RTBE is mainly geared to the needs of departments responsible for the work of radio & TV industry at all levels, radio & TV stations at all levels, network companies, transmitting stations, microwave stations, satellite stations, program production units and electrified education systems, as well as is of reference value to managerial and technical personnel for public radio & TV facilities in industrial and mining enterprises, educational institutions, troops and so on.

One of Hundred National Key Periodicals
A Core Professional Sci-Tech Periodical
tougao.lieku.cn

Index

Apr 2022 No.4

[13] Design and Application of Broadcast Audio Automatic Comparison System Based on Digital Audio Fingerprint Technology

Using advanced digital audio fingerprint and artificial intelligence technology, this paper designs a set of broadcast audio automatic comparison system, which can monitor safety broadcasting accidents such as mis-broadcasting, interruption, suspension and poor broadcasting of radio FM programs in real time, improve judgment ability of safety broadcasting events by intelligent monitoring means, and ensure safe broadcasting of radio programs. It can be used for reference by peers.

[36] Research on Concurrency Performance Test of Province-level Technology Platform for County-level Converged Media

At present, the construction of province-level technology platform and county-level converged media center technology system for county-level converged media centers in various provinces and cities across the country is in full swing. As a unified technology platform supporting all the counties in the province, province-level platform should be able to support concurrent access needs of users of Converged Media Center in each county. At the same time, Converged Media APP client should also be able to support concurrent access needs of the masses. In view of these practical needs, this paper introduces concurrent performance test method of a province-level technology platform in our country and analyzes test results. It can be used for reference.

[56] Exploration and Practice of Approaches to Enhancing the Capacity of Radio and TV Network Resource Information Visualization Application

In view of current situation that visualization function of radio and television network resource information is still mainly based on basic query and spatial analysis, through multi-dimensional analysis and research, this paper believes that it is necessary to combine current situation of radio and television network resource information management and the needs of visualization application improvement to carry out visualization application design, so as to realize "one picture" display of radio and television resource system operation, and ensure operation efficiency and decision optimization of resource management to the greatest extent. The exploration and practice of improving application capacity of radio and television network resource information visualization in this paper will help to expand the ideas of colleagues in the industry.

[74] Exploration and Implementation of Construction Plan for Wireless Digital Coverage of Province-level TV Programs in Yunnan Province

On the basis of central program wireless digital coverage project, many provinces have carried out the construction of province-level TV program wireless digital coverage project to provide the masses with more abundant radio and television services. This paper takes province-level TV program wireless digital coverage construction plan in Yunnan Province as an example, and introduces the problems that need to be considered in design and implementation of the plan, which has reference significance for other province-level wireless coverage projects.

[113] Research on Multi-level Brightness Enhancement and Color Fidelity Algorithm for Television Broadcasting Based on Convolutional Autoencoder

In intelligent monitoring of radio and television, artificial intelligence technology is often used to identify program pictures. If problems such as low brightness, low signal-to-noise ratio and color distortion are encountered, it is difficult to accurately identify low-quality pictures. Using low-light image enhancement technology to improve the brightness of such videos or images can improve picture quality and provide more complete and effective information for intelligent monitoring. This paper proposes an image enhancement network based on convolutional autoencoders, which can effectively improve picture quality and provide more powerful technical support for intelligent monitoring.