

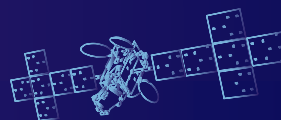
广播与电视技术



Radio & TV Broadcast Engineering

全国百种重点期刊 专业核心科技期刊

第48卷 第6期 VOL.48 NO.6



亚洲系列卫星

优质卫星资源助力用户事业蓬勃发展



中信数字媒体网络有限公司卫星通信分公司

电话: (010)84863400

传真: (010)84865262

邮箱: market@citicsat.com

网址: www.citicsat.com

广告

ISSN 1002-4522



9 771002 452210

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)

主编:何剑辉

投稿网址:tougao.lieku.cn

副主编:卢群

国内总发行:北京报刊发行局

订购处:全国各地邮局

编辑:房磊 李丹

运营总代理:北京中广信通文化传媒有限公司

市场专员:王翠霞(13651307963) 邮箱:wangcuixia@tvoao.com

发行:胡南

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:京西工商广字0029号

美编:张云峰

国内定价:20.00元/本 国外定价:20美元/本

刊号:ISSN 1002-4522
CN11-1659/TN

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



2021年 | 第48卷 | 第6期

特约刊载

10 深化创新驱动 加强引领支撑 奋力开创智慧广电发展新局面
——在CCBN2021主题报告会上主旨演讲

朱咏雷

热点·论点

超高清视频

15 基于AVS3的8K超高清压缩编码技术研究与应用

朱易,潘晓菲

22 超高清电视主观评价用测试图像研究

张乾,邓向冬,宁金辉,王惠民

25 超高清视频图像质量主观评价方法探究

汪芮

内容制播

30 基于5G与多协议的全媒体“云采访”系统的设计和实现

胡滨,龙小燕,张林,李超,全伟

35 电视台融合媒体私有云IaaS建设分析

王宇,芮浩

42 融媒体大数据运营平台设计方案研究

励琦

46 广播电视制播领域PTP同步系统冗余设计

张建东,欧臻彦

52 4K超高清播出系统建设思路的研究与实践

滕建新,何杰锋,袁锦春

56 基于网络安全融合的跨业务融媒平台设计与实现

叶佩文,宋志坚

61 县级台融媒体演播室建设实践

吴刚

有线网络

67 基于边缘云的CDN部署方案研究

姜昊,欧阳峰,汤新坤

70 基于广电网络的智慧政务电视云平台的建设和创新

钟发松

75 基于有线网络的智慧广电乡村工程平台设计

杨晨,贺乐厅,季小康,吴欣强



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、不做出任何承诺或保证、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



中国邮政
 微信订阅

2021年 | 第48卷 | 第6期

- | | | |
|----|-------------------------------|---------|
| 79 | 广电综合业务运营支撑系统与物资管理系统对接方案的研究与实践 | 王汉锋 |
| 85 | 基于广电网络的电视教育融合云平台设计及创新应用 | 张剑, 邹飞非 |
| 90 | 广电网络AI微信智能客服系统的开发 | 肖慧娟 |

无线覆盖

- | | | |
|-----|----------------------------|---------------|
| 95 | 广电5G承载网技术分析与建设方案探讨 | 汤敏健, 伍裕华, 徐江山 |
| 104 | AI和5G技术在应急广播中的应用 | 王建军 |
| 107 | 自适应加权最小二乘法在中波发射机阻抗测量与匹配的应用 | 许晓春 |
| 111 | 中波发射机常见故障汇总及分析与处理 | 周银海, 张宜 |

卫星传输

- | | | |
|-----|-----------------------|---------|
| 114 | 直播卫星集成播出平台综合网管的网络拓扑设计 | 张若纯 |
| 122 | 4K超高清卫星电视业务现状和发展介绍 | 钟声洪, 刘猛 |

安全播出与监测监管

- | | | |
|-----|------------------------------|-------------------|
| 128 | 网络视听移动应用程序安全研究 | 蔡冉, 孙黎丽, 李征昊, 王胜利 |
| 133 | 基于人脸识别技术的电视节目特定人物识别系统设计与实现 | 王婧 |
| 139 | 基于嵌入式系统的数字电视节目多声道响度测量算法研究与实现 | 杨艇 |
| 143 | 基于LoRa的机房温度采集预警系统 | 张少飞, 顾姚昊, 贾莉 |

行业聚焦

- | | |
|-----|-----------------------------------|
| 147 | 推动广播电视高质量创新性发展——广电总局“广播电视科技创新展”掠影 |
| 149 | 透过镜头看人物 《天通苑》里有温度的故事 |

广告索引 P152



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



2021年 | 第48卷 | 第6期

[15] 基于AVS3的8K超高清压缩编码技术研究与应用

2021年,中央广播电视总台8K超高清频道试验播出,并成功直播了2021年春节联欢晚会。总台采用我国自主研发的下一代更高效的AVS3编码标准进行8K超高清节目的实时编码压缩,本文即是此次探索实践后的总结,可为业界同行提供参考借鉴。

[30] 基于5G与多协议的全媒体“云采访”系统的设计和实现

在融合媒体时代,如何充分运用文字、图片、音频、视频等融媒体传播手段全面报道全国两会,不断强化网上网下互动、大屏小屏共振、会内会外呼应、前方后方配合,全面展现全国人大代表和全国政协委员履职建言情况是每个媒体机构都非常关切的课题。贵州广播电视台采用全网络技术方式,借助于5G新兴技术,利用多协议、多路径、多方式的传输方式完成视音频信号的高机动、直播化、定制化码率的传输和网络推流,利用远程制作的方式实现全国两会素材及时、安全的报道,取得了比较好的传播效果,该台的做法可资参考。

[70] 基于广电网络的智慧政务电视云平台的建设和创新

近年来,智慧广电项目实践在全国如火如荼地开展,涌现出一大批政务、教育、医疗、交通、公安等细分领域的垂直应用。本文阐述的建设案例就是智慧广电的一个典型应用场景,文中介绍的创新做法可供全国同行参考。

[95] 广电5G承载网技术分析与建设方案探讨

根据中国广电与中国移动签署的共建共享合作协议,中国广电目前可以有偿租用中国移动的承载网开展业务,从而缩短5G网络建设时间周期。但是为了广电5G网络长期可持续性发展,中国广电必须尽早着手研究自有的5G承载网规划和建设。本文全面分析了5G承载网的总体架构、主流技术、带宽需求等,并结合广电网络现状,提出了广电5G承载网的建设方案建议。

[133] 基于人脸识别技术的电视节目特定人物识别系统设计及实现

电视节目中如果出现负面政治人物、公众人物,会给社会舆论带来负面影响。通过人脸识别技术自动完成负面人物的发现与识别,能够大幅提高电视节目审核的效率和可靠性。国家广播电视总局监管中心利用基于卷积神经网络的人脸识别技术,设计实现了电视节目特定人物识别系统,经过半年的运行实践,效果良好,本文介绍了该系统的设计实现方法。



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

Publisher: Editorial Department of RTBE

Chief Editor: He Jianhui

Deputy Chief Editors: Lu Qun

Editors: Fang Lei Li Dan

Circulation Coordinator: Hu Nan

Art Editor: Zhang Yunfeng

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

Web Address: tougao.lieku.cn

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

Post Code: 100866

Postal Distributing: Code 82-464

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

Marketing: Wangcuixia(13651307963) E-mail:wangcuixia@tvoao.com

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

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

Jun 2021 No.6

Special Publication

- 10** Deepen Innovation-driven Progress and Strengthen Guidance and Support for a New Vista in Smart Broadcasting and TV Development - Keynote Speech at CCBN 2021 *By Zhu Yonglei*

UHD Video

- 15** Research and Application of 8K UHD Encode Technique Based On AVS3 *By Zhu Yi, Pan Xiaofei*
22 Research on Test Image for Subjective Evaluation of UHD TV *By Zhang Qian, Deng Xiangdong, Ning Jinhui, Wang Huiming*
25 Research on Subjective Image Quality Assessment Method for UHD Video *By Wang Rui*

Content Production & Broadcasting

- 30** Design and Implementation of Omni-media "Cloud Interview" System Based on 5G and Multi-protocol *By Hu Bin, Long Xiaoyan, Zhang Lin, Li Chao, Quan Wei*
35 Analysis of Converged Media Private Cloud IaaS Construction for TV Stations *By Wang Yu, Rui Hao*
42 Research on Design Scheme of Converged Media Big Data Operation Platform *By Li Qi*
46 Redundancy Design of PTP Synchronization System in TV Production and Broadcasting Center *By Zhang Jiandong, Ou Zhenyan*
52 Research and Practice on the Construction of 4K UHD Broadcasting System *By Teng Jianxin, He Jiefeng, Yuan Jinchun*
56 Design and Implementation of a Cross-Service Media Convergence Platform Based on Network Security Integration *By Ye Peiwen, Song Zhijian*
61 Construction Practice of County-level Converged Media Studio *By Wu Gang*

CATV

- 67** Research on CDN Deployment Scheme Based on Edge Cloud *By Jiang Hao, Ouyang Feng, Tang Xinkun*
70 Construction and Innovation of Smart Government TV Cloud Platform Based on Radio and Television Network *By Zhong Fasong*
75 Design of Smart Radio and Television Rural Engineering Platform Based on Wired Network *By Yang Chen, He Leting, Ji Xiaokang, Wu Xinqiang*
79 Research and Practice on Docking Scheme of BOSS and Material Management System *By Wang Hanfeng*
85 Design and Innovative Application of Integrated Cloud Platform for TV Education Based on Radio and TV Network *By Zhang Jian, Zou Feifei*
90 Development of AI Wechat Intelligent Customer Service System for Radio and Television Network *By Xiao Huijuan*

Wireless Coverage

- 95** Technical Analysis and Construction Scheme Discussion of Radio and Television 5G Bearer Network *By Tang Minjian, Wu Yuhua, Xu Jiangshan*
104 Application of AI and 5G Technology in Emergency Broadcasting *By Wang Jianjun*
107 Application of Adaptive Weighted Least Square Method in Impedance Measurement and Matching of AM Transmitter *By Xu Xiaochun*
111 Summary, Analysis and Treatment of Common Faults of Medium Wave Transmitter *By Zhou Yinhai, Zhang Yi*

Satellite Transmission

- 114** Network Topology Design of Integrated Network Management System for DTH Integrated Broadcast Platform *By Zhang Ruochun*
122 Introduction to Current Status and Development of 4K UHD Satellite TV Services *By Zhong Shenghong, Liu Meng*

Safety Broadcasting & Monitoring

- 128** Security Research for Online Audio-Visual APP *By Cai Ran, Sun Lili, Li Zhenghao, Wang Shengli*
133 Design and Realization of TV Program Specific Character Recognition System Based on Face Recognition Technology *By Wang Jing*
139 Research and Implementation of Multi-channel Loudness Measurement Algorithm for Digital TV Programs Based on Embedded System *By Yang Ting*
143 LoRa-based Temperature Collection and Early Warning System in Computer Room *By Zhang Shaofei, Gu Yaohao, Jia Li*



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.

Index

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

Jun 2021 No.6

[15] **Research and Application of 8K UHD Encode Technique Based On AVS3**

CMG 8K UHD Channel started to broadcast in 2021. The channel successfully broadcasted 2021 Spring Festival GALA. CMG adopts next-generation and more efficient AVS3 coding standard independently developed by my country for real-time coding and compression of 8K UHD programs. This paper is a summary of this exploration and practice, which can provide reference for industry peers.

[30] **Design and Implementation of Omni-media "Cloud Interview" System Based on 5G and Multi-protocol**

In the era of converged media, it is a topic of great concern to every media organization how to make full use of text, pictures, audio, video and other converged media communication methods to comprehensively report NPC and CPPCC sessions, and continuously strengthen online and offline interaction, large screen and small screen resonance, echoes inside and outside the conference, and cooperation between front-end and back-end to comprehensively show NPC deputies and CPPCC members' performance of their duties and suggestions. Guizhou Radio and Television Station adopts a full network technology method, with the help of 5G emerging technologies, uses multi-protocol, multi-path, and multi-mode transmission methods to complete high mobility, live broadcast, customized bit rate transmission and network streaming of video and audio signals, and uses remote production mode to realize timely and safe reporting of the materials of NPC and CPPCC sessions, which has achieved relatively good communication effect. The practice of this station can be consulted.

[70] **Construction and Innovation of Smart Government TV Cloud Platform Based on Radio and Television Network**

In recent years, the practice of smart radio and television projects has been widely carried out across the country, and a large number of vertical applications in government affairs, education, medical care, transportation, public security and other sub-fields have emerged. Construction case described in this paper is a typical application scenario of smart radio and television, and innovative practices introduced in this paper can be used for reference by peers across the country.

[95] **Technical Analysis and Construction Scheme Discussion of Radio and Television 5G Bearer Network**

According to 5G co-construction and sharing agreement, China Broadcasting Network Corporation Ltd. can rent carrier network of China Mobile for business, thus reducing construction time of 5G network. China Broadcasting Network Corporation Ltd. must start to study planning and construction of its own 5G bearer network as soon as possible for long-term sustainable development of radio and television 5G network. This paper comprehensively analyzes overall architecture, mainstream technology, bandwidth requirements, etc. of 5G bearer network, and proposes construction plan of 5G bearer network combined with status quo of broadcast and television network.

[133] **Design and Realization of TV Program Specific Character Recognition System Based on Face Recognition Technology**

If negative politicians and public figures appear in TV programs, it will have a negative impact on public opinion. It can greatly improve efficiency and reliability of TV program review through face recognition technology to automatically complete discovery and recognition of negative characters. Supervision Center of NRTA uses face recognition technology based on convolutional neural networks to design and implement a specific character recognition system for TV programs. After six months of operation and practice, the effect is good. This paper introduces design and implementation method of the system.