

2019 International Workshop on Electromagnetics: Applications and Student Innovation Competition (iWEM 2019)

**Qingdao, China
18 – 20 September 2019**



**IEEE Catalog Number: CFP1954N-POD
ISBN: 978-1-7281-5007-9**

**Copyright © 2019 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP1954N-POD
ISBN (Print-On-Demand):	978-1-7281-5007-9
ISBN (Online):	978-1-7281-5006-2

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

TABLE OF CONTENTS

STUDY OF ELECTROMAGNETIC INTERFERENCE OF ACTIVE COMPENSATION SYSTEM IN ELECTRIC FIELD SUPPRESSION DEVICE	1
<i>Zhang Haipeng ; Zhang Xiangpeng ; Ai Xiayu</i>	
ARRAY-BASED UNDERWATER ACOUSTIC SIGNAL RECOGNITION	3
<i>Lin Chang ; Tingting Lyu</i>	
FABRICATION OF $Fe_3O_4@SiO_2@C@MnO_2$ NANOCAINS AS HIGHLY EFFECTIVE MICROWAVE ABSORBERS	5
<i>Zhouyu Tong ; Wenting Li ; Yuxin Bi ; Yuying Yang ; Rongzhen Wang ; Mingliang Ma</i>	
COMPARATIVE STUDY ON DIRECTIONAL SENSITIVITY OF PATCH-ANTENNA-BASED STRAIN SENSORS	7
<i>Lingling Wang ; Kwok L. Chung</i>	
PERFORMANCE INFLUENCE OF INCLINATION ANGLE OF RECEIVING ARRAY IN OAM-MIMO COMMUNICATION	9
<i>Taiga Katsu ; Nobuyoshi Kikuma ; Kunio Sakakibara</i>	
DECOMPOSITION OF NONSTATIONARY BRIDGE VIBRATION SIGNALS USING EMPIRICAL WAVELET TRANSFORM	12
<i>Yunxia Xia</i>	
DEVELOPMENT OF MILLIMETER-WAVE FMCW VERTICAL-LOOKING ENTOMOLOGICAL RADAR SYSTEM	14
<i>J. Yang ; Y. Shen ; L. Cai ; K. F. Tong ; K. S. Lim ; A. Reynolds ; C. Rawlings</i>	
STRUCTURAL DAMAGE IDENTIFICATION BASED ON AR MODEL AND PSO-SVM	16
<i>Wang Yumei ; Diao Yansong ; Liu Guodong ; Sui Zongzhen ; Guo Dang</i>	
PERFORMANCE EVALUATION OF DOA ESTIMATION USING COMPRESSED SENSING WITH FAST FOURIER TRANSFORM	18
<i>Kazuki Miyamoto ; Nobuyoshi Kikuma ; Kunio Sakakibara</i>	
RADIATION PATTERN AND RADAR CROSS SECTION OF A ENDFEED SLOTTED WAVEGUIDE ANTENNA ARRAY	20
<i>Shen Shou Max Chung ; Shih-Chung Tuan</i>	
A CIRCULARLY POLARIZED OMNI-DIRECTIONAL ANTENNA FOR KA BAND	22
<i>Kang An ; Xiang Gao ; Hongkun Zhang ; Aixin Chen ; Manman Li</i>	
WIRELESS RADIO ANTENNA DESIGN FOR SMART FLOAT	24
<i>Shengjuan Xu ; Tingting Lv</i>	
A FLEXIBLE WEARABLE ANTENNA OPERATING AT ISM BAND	26
<i>Bowen Yan ; Jifa Zhang ; Hui Wang ; Yan Shi ; Weihua Zong</i>	
MOOCS AND ELECTROMAGNETICS EDUCATION: SURVEY, STATE-OF-THE-ART AND IMPLEMENTATION CHALLENGES	28
<i>Laxmisha Rai ; Dapeng Chen ; Hong Li ; Haiqing Liu</i>	
RESEARCH ON THE INFLUENCE OF CPU POWER MANAGEMENT ON THE PERFORMANCE OF PARALLEL FDTD	30
<i>Yonghong Zhou ; Xin Duan ; Lin Zhou ; Zhangjie Luo</i>	
ULTRA-WIDEBAND PATCH ANTENNA FOR SUB-6 GHZ 5G COMMUNICATIONS	32
<i>Xiaocong Tang ; Yuqing Jiao ; Hongfei Li ; Weihua Zong ; Zhao Yao ; Fukai Shan ; Yang Li ; Wenjing Yue ; Song Gao</i>	
TIME-VARYING CHANNEL INTERFERENCE REDUCTION BY INTERFERENCE CHANNEL MEASUREMENT IN MU-MIMO	34
<i>Keiya Uchida ; Mitoshi Fujimoto ; Koshiro Kitao ; Tetsuro Imai</i>	
ANGLE OF ARRIVAL CHARACTERISTICS AT 20 GHZ BAND IN LOS URBAN AREA STREET CELL ENVIRONMENT	36
<i>Koyo Tategami ; Mitoshi Fujimoto ; Koshiro Kitao ; Tetsuro Imai</i>	
5-GHZ ORBITAL ANGULAR MOMENTUM ARRAY ANTENNA DESIGN	38
<i>Shuang Wang ; Qingsheng Zeng ; Yong Wu ; Yuan Shi</i>	
REPRODUCIBILITY OF EMBROIDERED ELECTROMAGNETICALLY COUPLED WEARABLE PATCH ANTENNAS	40
<i>Daiki Ichikawa ; Tadahiko Maeda</i>	
A NOVEL FLEXIBLE LOW PROFILE ANTENNA WITH ULTRA-WIDEBAND	41
<i>Ying Zhang ; Hongfei Li ; Weijin Li ; Qingsong Zhang ; Wei-Hua Zong ; Zhao Yao</i>	

MULTI-PARAMETER ESTIMATION BASED ON IMPROVED MUSIC ALGORITHM FOR POLARIZATION SENSITIVE ARRAY	43
<i>Min Zhang ; Tingting Lyu</i>	
HIGH-GAIN LOW-DIVERGENCE OAM ANTENNA	47
<i>Li Yuanlong ; Kwai-Man Luk</i>	
EFFECT OF THE HIGH-ORDER MODES ON MICROWAVE HEATING IN RECTANGULAR WAVEGUIDE	50
<i>Yusong Hu ; Tao Hong ; Zhengming Tang ; Min Jiang</i>	
AN ANTENNA DESIGN ON METAL FRAME OF SMART WATCH	53
<i>Wen-Zhong Lee ; Wen-Shan Chen</i>	
DESIGN OF HOLLOW WAVEGUIDE TO SUBSTRATE INTEGRATED WAVEGUIDE TRANSITION IN MULTI-LAYER SUBSTRATE	55
<i>Shota Mariyama ; Kunio Sakakibara ; Nobuyoshi Kikuma</i>	
DESIGN OF METASURFACE LOADED IN MULTILAYER DIELECTRIC PLATE TO REDUCE REFLECTION OVER WIDE INCIDENT ANGLE	57
<i>Shota Ino ; Takahiro Murai ; Kunio Sakakibara ; Nobuyoshi Kikuma</i>	
A 3D PRINTED DUAL CIRCULARLY POLARIZED ANTENNA FOR MILLIMETER-WAVE APPLICATIONS	59
<i>Yating Tu ; Botao Feng</i>	
A THREE-DIMENSIONAL PRINTED DIPOLE ANTENNA WITH DUAL-CIRCULAR POLARIZATION AND WIDE BEAMWIDTH	61
<i>Liangying Li ; Botao Feng</i>	
A DUAL-POLARIZED XI-SHAPED ARTISTIC ANTENNA FOR 5G MILLIMETER WAVE COMMUNICATIONS	63
<i>Junlong Chen ; Botao Feng</i>	
A DUAL-POLARIZED ANTENNA USING AN ORIGAMI STRUCTURE FOR 5G EMERGENCY COMMUNICATIONS	65
<i>Can Zhu ; Botao Feng</i>	
ELECTROMAGNETIC SHIELDING AND ABSORPTION OF CARBON NANOTUBE DOPED CEMENT COMPOSITES	67
<i>Liucong Zhou ; Jianlin Luo ; Chao Liu ; Liyao Tao</i>	
EVALUATION OF TRANSPARENT ANTENNA	69
<i>Ikki Tanaka ; Yoshihiko Kuwahara</i>	
DEVELOPMENT OF OPERATIONAL UHF-RFID TAG ANTENNA NEAR THE LOSSY LIQUID	72
<i>Atsuya Kadono ; Yuki Toriya ; Shinji Matsuoaka ; Yoshinobu Okano</i>	
DESIGN OF NON-CONTACT DETECTION OF A CHARGED CONDUCTOR AND VISUALIZATION SYSTEM	74
<i>Kazuma Nogi ; Yoshihiko Kuwahara ; Takuji Ushimoto</i>	
VEHICLE DETECTION SYSTEM BASED ON SIGNAL STRENGTH TO PREVENT ROAD TRAFFIC ACCIDENTS	77
<i>Amila Rodrigo ; Laxmisha Rai ; Chamathka Samadhi ; Pubudu Dilan Welgama</i>	
A WIDEBAND CIRCULARLY POLARIZED GRAPHENE REFLECTARRAY	79
<i>Songcen Wang ; Bin Wei ; Li Deng</i>	
DESIGN OF ELECTROMAGNETIC SIGNAL GENERATOR BASED ON FIELD PROGRAMMABLE GATE ARRAY	81
<i>Yansheng Li ; Meng Wang ; Mi Wu</i>	
A SYSTEM OF TUNABLE BANDSTOP FILTERS WITH WIDE TUNING RANGE OF 1-6-GHZ	83
<i>Yao Wang ; Jianzhong Chen ; Kai-Da Xu</i>	
AN INVERTED E-LIKE ANTENNA LOADED WITH LUMPED ELEMENTS FOR 5MHZ-343MHZ APPLICATIONS	85
<i>Yinfeng Xia ; Yingsong Li ; Jianfeng Jiang ; Wei Xue</i>	
GPU-ACCELERATED SPHERICAL NEAR-TO-FAR FIELD TRANSFORMATION SOFTWARE FOR ANTENNA NEAR-FIELD MEASUREMENTS	87
<i>Yi S. Ding ; Wenqiang Fan ; Yuxin Zhao ; Weichao Jiang</i>	
A MINIATURIZED COPLANAR WAVEGUIDE-FED ANTENNA FOR IMPLANTABLE APPLICATION AT ISM BAND	90
<i>Hongfei Li ; Ying Zhang ; Haining Ren ; Jifa Zhang ; Hui Wang ; Weihua Zong</i>	
A POLARIZATION-RECONFIGURABLE METASURFACE ANTENNA	92
<i>Zhehao Zhang ; Mei Li ; Ming-Chun Tang ; Xiaoheng Tan</i>	
A FLEXIBLE DIRECTIONAL ANTENNA FOR 5G MILLIMETER-WAVE APPLICATIONS	94
<i>Jifa Zhang ; Xianju Liu ; Yangyang Xu ; Shuqi Huang ; Weihua Zong</i>	

A TRANSMITARRAY ANTENNA EMPLOYING DOUBLE SQUARE RING SLOT UNIT CELLS WITHOUT DIELECTRIC SUBSTRATE	96
<i>Hong Zhu ; Lu Guo ; Wenjie Feng</i>	
A FLEXIBLE WIDEBAND ANTENNA USING PAPER AS SUBSTRATE	98
<i>Haining Ren ; Tongzheng Li ; Tianyu Wang ; Kuan Tong ; Hui Song ; Weihua Zong</i>	
A PURE WATER LINEAR-TO-CIRCULAR POLARIZATION CONVERTER	100
<i>Jianpeng Luo ; Zibin Chi ; Zhuowei Wang ; Zhuozhu Chen ; Zhenxin Hu ; Xin Tian ; Duo-Long Wu</i>	
ULTRA-WIDEBAND H-PLANE HORN ANTENNA FOR RADAR AND SENSING APPLICATIONS	102
<i>Zhuozhu Chen ; Zhenxin Hu ; Zhongxiang Shen ; Jun Zhang ; Gary Zhang</i>	
METHOD BASED ON DEEP LEARNING FOR CONCAVE-CONVEX FONT IDENTIFICATION	104
<i>Hui Li ; Yapeng Liu ; Yan Dong ; Chuanxu Wang</i>	
END-TO-END BANK CARD NUMBER RECOGNITION ALGORITHM BASED ON DENSENET	106
<i>Liu Yun ; Ma Ruidi ; Li Hui ; Cui Xuehong</i>	
SIMULATION OF A COMPRESSED FLAT LENS ANTENNA FILLED WITH IMPEDANCE SURFACE UNITS	108
<i>Meilin Yu ; Yonghong Zhou</i>	
BROADBAND MIMO CELLPHONE ANTENNAS FOR 5G APPLICATIONS	110
<i>Ming-Tien Wu ; Ming-Lin Chuang</i>	
A NOVEL CIRCUIT TOPOLOGY OF FORWARD-WAVE DIRECTIONAL COUPLER	112
<i>Xin Yi ; Yongrong Shi ; Xingcheng Qian ; Zhengyong Yu</i>	
A HIGH-GAIN BROADBAND OMNIDIRECTIONAL ANTENNA APPLYING SPOOF SURFACE PLASMON POLARITONS WITH HIGH BEARING STRENGTH	114
<i>Chao Xie ; Junping Geng ; Chaofan Ren ; Xuxu Cheng ; Ronghong Jin ; Xianling Liang ; Weiren Zhu</i>	
LIQUID-CRYSTAL-BASED RECONFIGURABLE HOLOGRAPHIC METAMATERIAL ANTENNA WITH STABLE PHASE CENTER	116
<i>Bang-Jun Che ; Yan-Min Cheng ; Yue-Long Lyu ; Fan-Yi Meng ; Qun Wu</i>	
COMPACT OMNIDIRECTIONAL FILTERING MONOPOLE ANTENNA USING SIGNAL INTERFERENCE TECHNIQUE	118
<i>Daotong Li ; Zhen Chen ; Ying Liu ; Ju-An Wang ; Haowei Wu</i>	
WIDEBAND OMNIDIRECTIONAL FILTERING ANTENNA BASED ON COUPLED-LINE STRUCTURE	120
<i>Junjie Fei ; Zhen Chen ; Ying Liu ; Ju-An Wang ; Daotong Li</i>	
A MINIATURE DUAL-BAND WILKINSON POWER DIVIDER USING COMPOSITE PLANAR TRANSMISSION LINES	122
<i>Yansheng Li ; Mi Wu ; Ruiqi Liu</i>	
POSITION INSENSITIVE CRACK MONITORING BY PASSIVE WIRELESS SENSOR	124
<i>Jun Zhang ; Chutian Huang ; Yao Li ; Bingsheng Zhang ; Kun Wang</i>	
PREDICTION OF 5.2 GHZ INDOOR-TO-OUTDOOR PROPAGATION THROUGH CONCRETE WALLS IN AN OFFICE BUILDING	126
<i>Keita Saito ; Manabu Omiya</i>	
DIRECTIVE RADIATION EXCITED BY SURFACE WAVE WITH AN EQUIANGULAR SPIRAL-SHAPED DIELECTRIC	128
<i>Bo Wang ; Hang Wong</i>	
A DUAL-BAND METAMATERIAL WITH DUAL POLARIZATION CHARACTERISTICS	130
<i>Shengyuan Luo ; Yinfeng Xia ; Yingsong Li</i>	
MULTIBEAM FOLDED TRANSMITARRAY ANTENNA FOR MASSIVE MIMO APPLICATIONS	132
<i>Guowei Li ; Zhenglong Wang ; Yuehe Ge</i>	
A POWER DIVIDER BASED ON THE SPOOF SURFACE PLASMON POLARITONS	134
<i>Jun Wang ; Lei Zhao ; Zhang-Cheng Hao ; Jiahao Zhu ; Wen Jiang ; Wenhua Yu</i>	
A COMPACT POLARIZATION CONVERSION METASURFACE WITH WIDE WORKING BAND	136
<i>Huanhuan Yang ; Tong Li ; Bao Ma ; Sijia Li ; Xiangyu Cao ; Jun Gao ; Dong Sun</i>	
A LOW-PROFILE MICROSTRIP PATCH ANTENNA WITH ENHANCED-BANDWIDTH BY EMPLOYING THE SLOT AND FEEDING NETWORK	138
<i>Mei-Jiao Sun ; Neng-Wu Liu ; Lei Zhu</i>	
HIGH-GAIN DUAL-POLARIZATION PATCH ARRAY ANTENNA FOR 5 GHZ WIFI APPLICATION	140
<i>Chin-Ying Liao ; Jui-Ching Cheng</i>	
DESIGN OF A COMPACT CONFORMAL CIRCULARLY POLARIZED RECTENNA	142
<i>Lei Zhang ; Wenmei Zhang ; Xinwei Chen</i>	

A COPLANAR FEED QUAD-BAND NOTCHED UWB ANTENNA	145
<i>Jia-Ming Xu ; Cheng-Zhu Du ; Gao-Yao Jin ; Kai-Jia Li ; Wei-Qing Zheng ; Zhuo-Ling Zhao</i>	
COMPACT TRIPLE-BAND LIQUID CRYSTAL POLYMER BASED FLEXIBLE ANTENNA FOR WIMAX/WLAN/5G APPLICATIONS.....	147
<i>Xiao-Di Li ; Cheng-Zhu Du</i>	
COMPARISON OF THREE WELL KNOWN METHODS FOR HUMAN BEING DETECTION BASED ON AN IMPROVED TIME WINDOW SELECTION ALGORITHM	149
<i>Farnaz Mahmoudi Shikhsarmast ; Tingting Lyu ; Hao Zhang</i>	
DUAL-POLARIZED BANDPASS THREE-DIMENSIONAL FSS BASED ON SQUARE WAVEGUIDE STRUCTURE	151
<i>Zhengyong Yu ; Xia Yang ; Wanchun Tang ; Yongrong Shi</i>	
STUDY ON NONLINEAR SYSTEM MODELING OF POLYMERASE CHAIN REACTION PROCESS.....	153
<i>Nan Zhang ; Fun-Yun Meng ; Cuili Su ; Jinhe Wang ; Yuxi Gong</i>	
FOLDED L-SHAPED CIRCULARLY POLARIZED ANTENNA FOR CUBE SAT.....	155
<i>Haruna Nagahara ; Hiroyuki Arai</i>	
FLEXIBLE, CONFORMAL, ELECTRICALLY SMALL YAGI ANTENNAS ON A SMALL CONDUCTING CYLINDER	156
<i>Yunlu Duan ; Ming-Chun Tang ; Zhentian Wu ; Mei Li</i>	
APPLICATION PROSPECT OF ELECTROMAGNETIC COMMUNICATION IN INTELLIGENT PIPE GALLERY	158
<i>Han Jinpeng ; Zhao Yanping ; Huang Xiaoyi ; Jun-Wei Liu ; Chen Jianwei</i>	
REFLECTION CHARACTERISTIC OF BENT FSS WAVE ABSORBER.....	160
<i>Yuka Shinozaki ; Hiroyuki Arai</i>	
MULTI-MODE PRINTED ANTENNA WITH ORBITAL ANGULAR MOMENTUM MODE.....	161
<i>Takuya Sato ; Ryuji Kuse ; Takeshi Fukusako</i>	
AN PROBE ANTENNA USING COAXIAL CABLE	163
<i>Hibiki Hamaguchi ; Ryuji Kuse ; Takeshi Fukusako</i>	
NEGATIVE IMPEDANCE CONVERTER WITH REDUCED REAL PART OF INPUT IMPEDANCE	165
<i>Kazushi Sato ; Ryuji Kuse ; Takeshi Fukusako</i>	
DUAL-BAND MONOPOLE-HELIX ANTENNA SYSTEM FOR MHZ-BAND IMPLANT BODY AREA NETWORKS	167
<i>Hailian Liu ; Jingjing Shi ; Siyi Wu ; Xin Wang ; Jianqing Wang</i>	
A NOVEL PATTERN RECONFIGURABLE ANTENNA FOR 2-D SCANNING ARRAY	169
<i>Xiao-Fei Li ; Yong-Ling Ban</i>	
FACILE FORMATION OF 1D FLOWER-LIKE $Fe_3O_4@SiO_2@CO_3O_4$ COMPOSITES FOR EFFECTIVE MICROWAVE ABSORPTION.....	171
<i>Wenting Li ; Zhouyu Tong ; Kaiyuan Che ; Yuying Yang ; Yuyin Bi ; Rongzhen Wang ; Mingliang Ma</i>	
A SUBSTRATE INTEGRATED WAVEGUIDE WIDE-BEAMWIDTH ANTENNA FOR 5G COMMUNICATIONS	173
<i>Xiaoyuan He ; Botaofeng</i>	
HUMAN BEING DETECTION UTILIZING WAVELET TRANSFORM: AN ADVANCED ALGORITHM OF TIME WINDOW SELECTION	175
<i>Farnaz Mahmoudi Shikhsarmast ; Tingting Lyu ; Hao Zhang</i>	
AN IMPROVED CORRELATION ELECTROMAGNETIC ANALYSIS BASED ON GENETIC ALGORITHM OPTIMIZATION	177
<i>Shaofei Sun ; Hongxin Zhang ; Weijun Cheng ; Liang Dong ; Yang Wang ; Xiaotong Cui</i>	
KA-BAND SIX-PORT NETWORK USING DOUBLE RIDGE GAP WAVEGUIDE TECHNOLOGY	179
<i>Xun Jiang ; Fangxiu Jia ; Wenjie Feng ; Yang Cao ; Jiyan Yu ; Xiaoming Wang ; Yongrong Shi</i>	
Author Index	