Welcome to IEEE/IEIE ICCE-Asia 2016  2

Technical Program Overview  4

Organizing Committee  5

International Advisory Committee  6

Time Table  7

Floor Map  8

General Information  10

Social Program  12

Plenary Talks  13

Tutorial  19

Technical Program  21

Venue & Accommodation  49
On behalf of the First International Conference on Consumer Electronics-Asia (ICCE-Asia) sponsored by the IEEE Consumer Electronics (CE) Society and the Institute of Electronics and Information Engineers (IEIE), I would like to welcome you to the world most dynamic city, Seoul.

The goal of the First ICCE-Asia is the development and dissemination of consumer electronics technology in Asia, whose striking growth performance has long attracted the interest of the world. IEEE Consumer Electronics Society has devoted efforts to support the development of consumer electronics technology for several decades. Recently, many consumer electronics conferences have been organized by the former and current presidents of the CE Society including Stephen Dukes, Stefan Mozar, and Sharon Peng. The IEIE has played an important role in supporting the development of electronics industry and academy in Korea and Asian countries since 1946. Currently, the IEIE is one of the largest bodies that participate in the IEEE CE Society events, such as ICCE Las Vegas. Recent presidents of IEIE including Prof. Sung-Jea Ko, Youngsik Moon, Byeonkook Park, and Yongseo Koo devoted efforts to establish the first international conference on consumer electronics together with the CE Society.

There were more than 250 paper submissions from 14 countries, and only high qualified papers from them will be presented at oral and poster sessions. The recent academic and industrial trends in consumer electronics were discussed in three plenary talks presented by Prof. Daniel Cremers at Technical University of Munich, Dr. Seung-Jong Choi at LG Electronics, and Prof. Kyung Mu Lee at Seoul National University. Tutorials and special sessions will also enrich the conference.

I would like to say that ICCE-Asia 2016 is a great success
because of the dedication of both CE Society and the IEIE to joint organization. But this success would not be possible without an invaluable efforts of General Co-chairs Dr. Chang Yeong Kim at Samsung Electronics and Dr. Seung Koo Hwang at ETRI, and the technical program chair Prof. Donggyu Sim. I also express sincere appreciation to the organization committee, technical program committee, and administration staff of the CE Society and the IEIE.

I wish all participants to the ICCE-Asia 2016 to enjoy the conference and feel both heat and historic heritage of Seoul.

Thank you very much.

General Chair
Joonki Paik
Chung-Ang University, Korea

General Co-chair
Chang Yeong Kim
Vice President, Samsung Electronics, Korea
Seug Koo Hwang
Electronics and Telecommunications Research Institute (ETRI), Korea
Technical Program Overview

It is great honor and pleasure to welcome all of you to ICCE-Asia 2016, our International Conference on Consumer Electronics, on behalf of the Technical Program Committee. Also, I would like to mention that nothing meaningful could be achieved without world-wide enthusiasm about ICCE-Asia 2016.

During this year, more than 252 papers, including papers for special sessions, were submitted to 15 countries over the world. Among them, around 211 high-quality regular papers were selected and then organized into 19 regular sessions. In details, the selected papers are composed of 122 for oral presentation and 89 for poster presentation.

In addition to the regular sessions, 8 special sessions will be held at the conference venue as well. Also, there will be three plenary talks given by Prof. Daniel Cremers from Technical University of Munich, Dr. Seung-Jong Choi working on LG Electronics and Prof. Kyoung Mu Lee from Seoul National University.

Through ICCE-Asia 2016, I’m sure that it would be the best opportunity to broaden your perspectives and build real relationships for better collaboration in this field.

Thank you very much.

Technical Program Chair
Donggyu Sim
Kwangwoon University, Korea
Committee

Organizing Committee

General Chair
Joonki Paik (Chung-Ang University, Korea)

General Co-Chair
Chang Yeong Kim (Samsung Electronics, Korea)
Seung Koo Hwang (Electronics and Telecommunications Research Institute (ETRI), Korea)

Technical Program Committee Chair
Donggyu Sim (Kwangwoon University, Korea)

Technical Program Committee Co-Chair
Sunghyun Cho (Hanyang University, Korea)

Finance Chair
Eui Young Chung (Yonsei University, Korea)

Special Session Chair
Hyuk-Jae Lee (Seoul National University, Korea)

Plenary and Tutorial Chair
Jong-Moon Chung (Yonsei University, Korea)

Publicity Chair
Jong-II Park (Hanyang University, Korea)

Publication Chair
Chungyong Lee (Yonsei University, Korea)

Local Arrangement Chair
Jinwook Burm (Sogang University, Korea)

Registration Chair
Kwang-Hyun Baek (Chung-Ang University, Korea)

Industrial Relations Chair
Jong-Ok Kim (Korea University, Korea)

President of IEIE
Yong Seo Koo (Dankook University, Korea)

President of IEEE Consumer Electronics Society
Sharon Pang (IEEE, USA)
International Advisory Committee

International Advisory Chair
Sung Jea Ko (Korea University, Korea)

Members
Yong-Seo Koo (Dankook University, Korea)
Sharon Peng (IEEE, USA)
Stephen Dukes (IEEE, USA)
Stefan Mozar (IEEE, USA)
Tomohiro Hase (IEEE, USA)
## Time Table

### Wednesday, October 26, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>15:00-17:00</td>
<td>Registration (4F Lobby, Conference Room)</td>
</tr>
<tr>
<td>17:30-18:00</td>
<td>Tutorial 1 (Room 403)</td>
</tr>
<tr>
<td>18:00</td>
<td>Welcome Reception (4F Lobby)</td>
</tr>
</tbody>
</table>

### Thursday, October 27, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30-16:00</td>
<td>Registration (4F Lobby, Conference Room)</td>
</tr>
<tr>
<td>09:00-10:00</td>
<td>O-27-A-1, O-27-B-1, O-27-C-1 (SS1), O-27-D-1 (SS2), O-27-E-1 (Global 3D)</td>
</tr>
<tr>
<td>10:00-10:30</td>
<td>Opening Ceremony Conference (Room 401)</td>
</tr>
<tr>
<td>10:40-11:00</td>
<td>Plenary Talk 1 (Room 401)</td>
</tr>
<tr>
<td>11:00-11:40</td>
<td>Plenary Talk 2 (Room 401)</td>
</tr>
<tr>
<td>12:30-13:30</td>
<td>Lunch (Lu-1F)</td>
</tr>
<tr>
<td>13:30-15:00</td>
<td>Coffee Break</td>
</tr>
<tr>
<td>15:30-17:00</td>
<td>O-27-A-3, O-27-B-3, O-27-C-3, O-27-D-3 (SS1), O-27-E-3 (Global 3D)</td>
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<tr>
<td>17:30-18:10</td>
<td>Plenary talk 3 (Room 402)</td>
</tr>
<tr>
<td>18:30</td>
<td>Banquet (Grandballroom 1F, 105)</td>
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</table>

### Friday, October 28, 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>09:00-14:00</td>
<td>Registration (4F Lobby)</td>
</tr>
<tr>
<td>09:30-11:00</td>
<td>O-28-A-1, O-28-B-1, O-28-C-1 (SS1), O-28-D-1 (SS2), O-28-E-1 (Global 3D)</td>
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<tr>
<td>11:00-12:00</td>
<td>O-28-A-2, O-28-B-2, O-28-C-2, O-28-D-2 (SS3), O-28-E-2 (Global 3D)</td>
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<td>12:30-14:00</td>
<td>Lunch (Lu-1F)</td>
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<tr>
<td>14:00-15:30</td>
<td>O-28-B-3, O-28-C-3, O-28-D-3 (SS4)</td>
</tr>
</tbody>
</table>

### Room Info

**4F** - Conference Room South  
(Opening Ceremony, Plenary Talk, Poster Session, and Registration Desk)

**2F** - Conference Room North (Oral Presentation)

**1F** - Grand Ballroom (Banquet)

**1F** - Lu : (Lunch)
1F Grand Ballroom
Conference Information

Registration
The Registration desk schedule below:

Registration Desk

<table>
<thead>
<tr>
<th>Location</th>
<th>Lobby 4F, Conference Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Time</td>
<td></td>
</tr>
<tr>
<td>October 26(Wed) 15:00-17:00</td>
<td></td>
</tr>
<tr>
<td>October 27(Thu) 08:30-16:00</td>
<td></td>
</tr>
<tr>
<td>October 28(Fri) 09:00-14:00</td>
<td></td>
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</tbody>
</table>

Registration Fee

<table>
<thead>
<tr>
<th>Category</th>
<th>Overseas</th>
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<tr>
<td></td>
<td>Non-IEEE, IEIE, CES member</td>
</tr>
<tr>
<td>Regular</td>
<td>USD 700</td>
</tr>
<tr>
<td>Student</td>
<td>USD 450</td>
</tr>
<tr>
<td>Additional Proceedings</td>
<td></td>
</tr>
<tr>
<td>Additional Banquet</td>
<td></td>
</tr>
</tbody>
</table>
Presentation

Instruction for Oral Presentation

Please meet a session chair at your session at least 15 minutes before the session starts. Bring unzipped PPT presentation file on USB memory and check the file with the AV staff in order to confirm that it is working properly. This is very important to pay attention to this time frame. The visual equipment provided is a beam projector.

Your presentation time is as follows including discussion:

Tutorial : 60 minutes
Plenary : 40 minutes
Regular : 15 minutes

Instruction for Poster Presentation

The size of the poster board is 100cm (width) X 180cm (length).
You need to prepare your poster within this size and attach it on the poster board in your session room at least 15 minutes before the session starts, and then remove your poster immediately after the session finishes.

- Maximum 12 pages of A4 or 1 page of whole paper

One of author should be standing in front of poster to prepare Q&A and discussion.

Coffee Break and Lunch

Coffee Breaks

<table>
<thead>
<tr>
<th>Location</th>
<th>Location : 4F Lobby</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Time</td>
<td>- October 27 (Thu) 15:00-15:30</td>
</tr>
</tbody>
</table>

Lunches

Lunch will be provided to all participants during the conference. Please bring your lunch coupons with your name tag

<table>
<thead>
<tr>
<th>Location</th>
<th>Lu : (1F, Convention Center)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Time</td>
<td>- October 27(Thu) 12:30-13:30</td>
</tr>
<tr>
<td></td>
<td>- October 28(Fri) 12:30-14:00</td>
</tr>
</tbody>
</table>
Welcome Reception
Date: Wednesday, October 26, 2016
Time: 18:00 ~
Place: Lobby 4F, Conference Room

An invitation to the welcome reception is extended to all participants including registered students.

Opening Ceremony
Date: Thursday, October 27, 2016
Time: 10:40-11:00
Place: Room 401

All registered participants are cordially invited to join us and celebrate the official opening.

Banquet
We hope this banquet will offer you a good opportunity to promote friendship with participants. Delicious food and special performance will be offered at the banquet. A banquet ticket is included in the Regular Registration. Student Registration does not include the banquet.
Recent advances in optimization-based computer vision and its application to consumer electronics

Abstract

The reconstruction of the 3D world from images is among the central challenges in computer vision. Starting in the 2000s, researchers have pioneered algorithms which can reconstruct camera motion and sparse feature-points in real-time. In my talk, I will show that one can autonomously fly quadrotors and reconstruct their environment using on-board color or RGB-D cameras. In particular, I will introduce spatially dense methods for camera tracking and reconstruction which do not require feature point estimation, which exploit all available input data and which recover dense geometry rather than sparse point clouds. This is joint work with Jakob Engel, Jan Stuehmer, Martin R. Oswald, Frank Steinbruecker, Christian Kerl, Erik Bylow and Juergen Sturm.

Biography

Daniel Cremers is a professor for Computer Science and Mathematics at the Technical University of Munich. He received Bachelor degrees in Mathematics (1994) and Physics (1994), and a Master's degree in Theoretical Physics (1997).
from the University of Heidelberg. In 2002 he obtained a PhD in Computer Science from the University of Mannheim, Germany. Subsequently he spent two years as a postdoc at the University of California at Los Angeles and one year as a permanent researcher at Siemens Corporate Research (Princeton). From 2005 until 2009 he was associate professor at the University of Bonn, Germany. Since 2009 he holds the chair for Computer Vision and Pattern Recognition at the Technical University of Munich. Daniel is interested in computer vision and optimization with a particular focus on image-based 3D reconstruction, 3D shape analysis and convex variational methods. His publications received several awards, including the Best Paper of the Year 2003 by the Int. Pattern Recognition Society, the Olympus Award 2004 by the German Pattern Recognition Society and the 2005 UCLA Chancellor's Award for Postdoctoral Research. He is recipient of an ERC Starting Grant (2009), an ERC Proof of Concept Grant (2014) and an ERC Consolidator Grant (2015). In December 2010 the magazine Capital listed Prof. Cremers among “Germany's Top 40 Researchers Below 40”. On March 1st 2016, Prof. Cremers received the Leibniz Award 2016, the biggest award in German academia.
TV Technology Trends and SoC Solutions

Abstract

Since analog to digital transition, TV industry has been changing very rapidly to launch 3DTV, Smart TV, UHD TV, and OLED TV to the market. This trend results from TV display innovation (PDP/LCD/OLED), and demand for the smart user experiences. In this talk, the importance of TV display is emphasized with the characteristics of the human visual system. Major advantages of newly emerging OLED display technology are explained over the conventional LCD. Forecasting the future of TV, three main directions are given, that is, the immersive TV display, convenient user experiences, and personalized screen. TV SoC plays a crucial role for TV platform, and recent trends show that the market-leading system companies are developing their own SoC solutions. Explaining the basic motivation behind this, LG TV SoC R&D activities and achievements are introduced.

Biography

Dr. Seung-Jong Choi was born in Seoul, Korea, in 1964. He received the B.S. degree from Seoul National University, Seoul, Korea, in 1987, the M.S. degree from Korea Advanced Institute of Science and Technology, Taejon, Korea, in 1989, and Ph.D. degree from Rensselaer Polytechnic Institute, Troy, NY, in 1996, all in electrical engineering. His doctoral research was on video compression and video signal processing. Since 1989, he has
been at LG Electronics Inc. and is presently a Senior Vice President at the System IC Center, Seoul, Korea. His main research activities have been related with TV and Digital TV SoCs. He has been developing multiple generations of DTV SoC solutions, and successfully applied them to the LG DTV product lineups, so far. Currently, he is mainly focusing on the OLED TV SoC solution.
Dynamic Scene Deblurring Techniques

Abstract

Deblurring of images and videos of dynamic scene is one of the important and fundamental problems in image processing and computer vision. In this talk, recent trends of deblurring techniques will be addressed, and a novel parametric model-based deblurring method that can cope with general blurs inherent in dynamic scenes will be introduced. To handle locally varying blurs caused by various sources, such as camera shake, moving objects, and depth variation in dynamic scenes, a simple yet powerful bidirectional optical flow model is proposed for the approximation of the pixel-wise blur kernel. With this model, the problem is casted into an energy minimization framework, and then the latent images are recovered through the minimization of the energy function. Empirical results will demonstrate how the new approach advances the state-of-the-art performance in real and challenging scenarios.

Biography

Kyoung Mu Lee received the B.S. and M.S. Degrees in Control and Instrumentation Eng. from Seoul National University, Seoul, Korea in 1984 and 1986, respectively, and Ph. D. degree in Electrical Engineering from the University of Southern California in 1993. He is currently with the Dept. of ECE at Seoul National University as a professor. His primary research interests include scene understanding, object recognition, low-level vision, visual tracking, and visual navigation. He is currently serving as an AEIC (Associate Editor in Chief) of the IEEE TPAMI,
an Area Editor of the Computer Vision and Image Understanding (CVIU), and has served as an Associate Editor of the IEEE TPAMI, the Machine Vision Application (MVA) Journal and the IPSJ Transactions on Computer Vision and Applications (CVA), and the IEEE Signal Processing Letter. He also has served as Area Chairs of CVPR, ICCV, and ECCV many times. He was a Distinguished Lecturer of the Asia-Pacific Signal and Information Processing Association (APSIPA) for 2012-2013. He will serve as a General Co-Chair of ACM MM2018 and ICCV2019. More information can be found on his homepage http://cv.snu.ac.kr/kmlee.
Abstract

Variational methods are among the most classical and established methods to solve a multitude of problems arising in computer vision and image processing. Over the last years, they have evolved substantially, giving rise to some of the most powerful methods for optic flow estimation, image segmentation and 3D reconstruction, both in terms of accuracy and in terms of computational speed. In this tutorial I will introduce the basic concepts of variational methods. I will show how problems like image segmentation, stereo and 3D reconstruction can be formulated as variational problems. Subsequently, I will focus on recent developments of convex optimization, convex relaxation and functional lifting which allow to compute globally optimal or near-optimal solutions to respective energy minimization problems. Experimental results demonstrate that these spatially continuous approaches provide numerous advantages over spatially discrete (graph cut) formulations, in particular they are easily parallelized (lower runtime), they require less memory (higher resolution) and they do not suffer from metrification errors (better accuracy).
Biography

Daniel Cremers is a professor for Computer Science and Mathematics at the Technical University of Munich. He received Bachelor degrees in Mathematics (1994) and Physics (1994), and a Master's degree in Theoretical Physics (1997) from the University of Heidelberg. In 2002 he obtained a PhD in Computer Science from the University of Mannheim, Germany. Subsequently he spent two years as a postdoc at the University of California at Los Angeles and one year as a permanent researcher at Siemens Corporate Research (Princeton). From 2005 until 2009 he was associate professor at the University of Bonn, Germany. Since 2009 he holds the chair for Computer Vision and Pattern Recognition at the Technical University of Munich. Daniel is interested in computer vision and optimization with a particular focus on image-based 3D reconstruction, 3D shape analysis and convex variational methods. His publications received several awards, including the Best Paper of the Year 2003 by the Int. Pattern Recognition Society, the Olympus Award 2004 by the German Pattern Recognition Society and the 2005 UCLA Chancellor's Award for Postdoctoral Research. He is recipient of an ERC Starting Grant (2009), an ERC Proof of Concept Grant (2014) and an ERC Consolidator Grant (2015). In December 2010 the magazine Capital listed Prof. Cremers among “Germany's Top 40 Researchers Below 40”. On March 1st 2016, Prof. Cremers received the Leibniz Award 2016, the biggest award in German academia.
Technical Program

Special Session

**SS1 Technologies for Brain-inspired Application**

**09:00~10:30 Thursday, October 27, 2016**

**Room: 209**

Chair: Prof. Vo Le Cuong, Hanoi University of Science and Technology

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01 **Night Vision Pedestrian Detection based on Adaptive Preprocessing using Near Infrared Camera**

_Tae Young Han and Byung Cheol Song_

(Inha University, Korea)

02 **On-road object detection using Deep Neural Network**

_Huiun Kim, Youngwan Lee, Byeonghak Yim, Eunsoo Park, and Hakil Kim_

(Inha University, Korea)

03 **A Smart Sensor Calibration method using Artificial Intelligence**

_Byung-Soo Kim, Tae-Ho Hwang, and Hyun-moon Park_

(KETI, Korea)

04 **A Design of Neural Network Processor**

_Byung-Soo Kim and Hyun-Jun Shin_

(KETI, Korea)

05 **A Hybrid Artificial Neural Network processor (HANNP) designed by VLSI**

_Hyun-moon Park and Tae-Ho Hwang_

(KETI, Korea)

06 **A Parallel Genetic Algorithm Processor for Evolvable Hardware**

_Tae-Hee Lee, Hyun-moon Park, and Dong-Sun Kim_

(KETI, Korea)

07 **A Genetic Algorithm with Modified Tournament Selection and Efficient Deterministic Mutation**

_Byung-Soo Kim, Hyun-Jun Shin, Jin-San Kwon, and Tae-Ho Hwang_

(KETI, Korea)
SS2 Processor and Memory Architecture

13:30~15:00 Thursday, October 27, 2016

Room: 210
Chair: Prof. Won Woo Roh, Yonsei University

01 Optimization for object detector using deep residual network on embedded board
Youngwan Lee, Huien Kim, Eunsoo Park, Byeonghak Yim, and Hakil Kim
(Inha University, Korea)

02 Fully Dynamic Insertion and Promotion Policy
Minsik Oh, Byunghoon Lee, Kwangsu Kim, and Eui-Young Chung
(Yonsei University, Korea)

03 Improving JavaScript Performance via Efficient In-memory Bytecode Caching
Jun Heo, Seungjin Woo, Hakbeom Jang, Kyungyeon Yang, and Jae Wook Lee
(Sungkyunkwan University, Korea)

04 Measuring Error-Tolerance in SRAM Architecture on Hardware Accelerated Neural Network
Sangheon Kwon, Kyungmin Lee, Yoonsoo Kim, Kyungah Kim, Changmin Lee, and Won Woo Ro
(Yonsei University, Korea)

05 IP Deadline-Aware Bank Partition Scheme for Memory Scheduler in Mobile Platform
Jin-Ku Kim and Hyuk-Jun Lee
(Sogang University, Korea)

SS3 Mixed-Signal ICs for Smart Consumer Electronics

15:30~17:00 Thursday, October 27, 2016

Room: 210
Chair: Prof. Jung-Hoon Chun, Sungkyunkwan University

01 A 200 Atto Farad Capacitance Sensing with a Differential Signaling Method For a Mutual Capacitive Finger-Print sensors
Sanghyun Heo, Hyunggun Ma, Joohyeb Song, Kyeongmin Park, Eunho Choi, and Franklin Bien
(UNIST, Korea)
02 Energy-efficient spread second capacitor capacitive-DAC for SAR ADCs
Sung-min Lee, Ju Eon Kim, and Kwang-Hyun Baek
(Chung-Ang University, Korea)

03 A High Efficiency Active Rectifier with Zero Current Sensing for Loosely-Coupled Wireless Power Transfer Systems
Byeong-Gi Jang, Sung-Jin Oh, Young-Jun Park, and Kang Yoon Lee
(Sungkyunkwan University, Korea)

04 Design of DCM Buck Converter With Voltage-mode Control for the ZigBee SoC
Kichang Jang, Wonjoon Hwang, Donghoon Seong, Hyeondeok Jeon, and Joongho Choi
(Dept. of Electrical and Computer Engineering, University of Seoul Korea)

05 An On-Chip Jitter Tolerance Test Circuit for Mobile and Video Interfaces
Ik-Hwan Kim, Jae-Hong Jung, Sang-Hoon Kim, and Jung-Hoon Chun
(Sungkyunkwan University, Korea)

Video processing for VR and AR
09:30~11:00 Friday, October 28, 2016
Room: 209
Chair: Prof. Hyun Kim, Seoul National University

01 Augmented Reality System for Rectangular Objects
So Yeon Kim, Bum Geun Jo, Yong Seok Heo, and Hyung Il Koo
(Ajou University, Korea)

02 Hardware-efficient and high-speed Integer Motion Estimation Architecture for HEVC
Vu Nam Dinh, Hoang Anh Phuong, Vo Le Cuong, and Nguyen Vu Thang
(Hanoi University of Science and Technology., Vietnam)

03 Superpixel-based background removal for accuracy salience person re-identification
Cuong Vo Le1, Quan Nguyen Hong1, Trung Tran Quang1, and Nghia Doan Trung2
(Hanoi University of Science and Technology., Vietnam1, Seoul National University, Korea2)

04 Frequency Decomposition-based Tracking for Improving a CSK Tracker
Dong Wook Ju, Guisik Kim, Soowoong Jeong, and Sangkeun Lee
(Chung-Ang University, Korea)
<table>
<thead>
<tr>
<th>No.</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>05</td>
<td>Color-enhanced real-time high dynamic range (HDR) using color-chart calibration</td>
<td>Juhan Bae, Jungho Kim, Youngbæ Hwang, and Byeongho Choi</td>
<td>(KETI, Korea)</td>
</tr>
<tr>
<td>06</td>
<td>An Effective Data Structure for a 3D Printing Slicer API</td>
<td>Hwa Seon Shin¹,², Hye In Lee¹, and Euee Seon Jang²</td>
<td>(KETI, Korea¹, Hanyang University, Korea²)</td>
</tr>
<tr>
<td>01</td>
<td>Automated Signal Selection Maximizing Circuit Coverage for Efficient Debug</td>
<td>Soon-Kwan Kwon and Joon-Sung Yang</td>
<td>(Sungkyunkwan University, Korea)</td>
</tr>
<tr>
<td>02</td>
<td>A Novel Design Methodology for Error-Resilient Circuits in Near-Threshold Computing</td>
<td>Jaemin Lee¹, Sunmean Kim¹, Youngmin Kim², and Seokhyeong Kang¹</td>
<td>(UNIST, Korea¹, Kwangwoon University, Korea²)</td>
</tr>
<tr>
<td>03</td>
<td>Synthesis of Dual-Mode Circuits through Optimizing Transition Time Constraints</td>
<td>Sangmin Kim¹, Ik Joon Chang², and Youngsoo Shin¹</td>
<td>(KAIST¹, Korea, Kyung Hee University, Korea¹,²)</td>
</tr>
<tr>
<td>04</td>
<td>Design of Energy Efficient Ultra-Low Voltage SRAMs for Internet-of-Things Applications</td>
<td>Tony Kim¹, Dang Trang², and Ik-Joon Chang²</td>
<td>(Nanyang Technological University, Singapore¹, Kyunghee University, Korea²)</td>
</tr>
<tr>
<td>05</td>
<td>Low Power SRAM Bitcell Design for Near-Threshold Operation</td>
<td>Juhyun Park, Hanwool Jeong, Hyun Jun Kim, and Seong-Ook Jung</td>
<td>(Yonsei University, Korea)</td>
</tr>
</tbody>
</table>

**SS5 Near-Threshold Voltage Computing**

09:30–11:00 Friday, October 28, 2016

Room: 210

Chair: Ik-Joon Chang, Kyunghee University
Wearable technologies for healthcare and personal safety

11:00~12:30 Friday, October 28, 2016
Room: 210
Chair: Younggeun Choi, Dankook University

01 Tracking Object Considering Energy Balance on Wireless Sensor Networks
The Nguyen Manh, Phat Nguyen Huu, and Cuong Vo Le
(Hanoi University of Science and Technology, Vietnam)

02 A Study on Gait Pattern Identification and Classification Using a Smart Insole FootLogger
Seol-Jun Yoon¹, Seokhyun Yoon¹, Younggeun Choi², and Ae-Ran Kwon³
(Dept. of Electronics & Electrical Eng.¹, Dankook University, Korea², Daegu Haany University, Korea³)

03 Evaluation of Low-Power Techniques on Multicore Embedded Systems
Bumjong Jung, Yongjae Choi, and Jongmoo Choi
(Dankook University, Korea)

04 Indoor Navigation Based on Real-time Direction Information Generation Using Wearable Glasses
Ryota Iwanaji¹, Tomoyuki Nitta², Kazuaki Ishikawa², Masao Yanagisawa¹ and Nozomu Togawa¹
(Waseda University, Japan¹, Zenrin DataCom Co., LTD., Japan²)

05 Korean Sign Language Recognition System with IMU based Gloves and Kinect
Baeksan Moon, Dongseok Yang, and Younggeun Choi
(Dankook University, Korea)

Workshop for Video Understanding

13:30~15:00 Thursday, October 27, 2016
Room: 208A
Chair: Prof. Vo Le Cuong, Hanoi University of Science and Technology

01 Data association for Non-overlapping Multi-camera Multi-object tracking based on Similarity function
Hyunguk Choi and Moongu Jeon
(GIST, Korea)

02 Color based Human Body Part Model Matching for Person Re-identification
Sejeong Lee and Moongu Jeon
(GIST, Korea)
03 Abnormal Event Detection based on Trajectory Modeling using Histogram of Oriented Tracklets
Hae-Rim Shin, Jongmin Yu, Jeonghwan Gwak, and Moongu Jeon
(GIST, Korea)

04 Online Multiple Object Tracking with the Hierarchically Adopted GM-PHD Filter using Motion and Appearance
Young-min Song and Moongu Jeon
(Gwangju Institute of Science and Technology School of Electrical Engineering and Computer Science, Gwangju, Korea)

SS7-2 Workshop for Video Understanding
15:30~17:00 Thursday, October 27, 2016
Room: 208A
Chair: Prof. Vo Le Cuong, Hanoi University of Science and Technology

01 Occlusion Detection to Prevent False Adaptation in Tracking
ByeongJu Lee and Jin Young Choi
(Seoul National University, Korea)

02 Trajectory-Based Scene Retrieval System for Close Monitoring
Yongjin Kwon, Junho Jin, Jinyoung Moon, Kyuchang Kang, and Jongyoul Park
(ETRI, Korea)

03 A Dynamic High Dimensional Index Scheme for Contents Based Image Retrieval
Minsoo Kim, Gihoon Kim, Daeyun Kim, Jaeyeol Park, Jinsu Han, Kyoungsoo Bok, and Jaesoo Yoo
(Chungbuk National University, Korea)

SS8 ICT Components and Materials in ETRI
14:00~15:30 Friday, October 28, 2016
Room: 210
Chair: Yil Suk Yang, ETRI

01 Properties-Controllable Graphene Synthesis and Application in Flexible Devices
Jin Sik Choi, Hongkyw Choi, Young-Jun Yu, Jin Tae Kim, and Choon-Gi Choi
(ETRI, Korea)
02 Hybrid Substrate Structure for Readily Stretchable and Highly Reliable Electronic Circuits
Chan Woo Park, Bock Soon Na, Jae Bon Koo, Ji-Young Oh, Nae-Man Park, and Sang Seok Lee
(ETRI, Korea)

03 Design of a Low Temperature Co-fired Ceramics (LTCC) based Antenna with Broadband and High Gain at 60GHz bands
Dong-Young Kim, Dong-Min Kang, Min-Jeong Shin, Hyun-Wook Jung, and Jong-Won Lim
(ETRI, Korea)

04 Power Efficient Hybrid SIMO Boost Converter for Fast Transient Response and Low Cross Regulation
Jong-Pil Im, Jimin Oh, Jung-hee Suk, and Yil Suk Yang
(ETRI, Korea)

05 Metal-Insulator Transition Mechanism and Sensors Using Mott Insulator VO2
Hyun-Tak Kim
(ETRI, Korea)
Oral Session


09:00~10:30 Thursday, October 27, 2016
Room: 208A
Chair: Prof. Sunghyun Cho (Hanyang University)

01 PATH DELAY ANALYSIS OF MULTISERVER WIRELESS SENSOR NETWORKS
James Rwigema and Taeyong Kim
(University of Rwanda, Rwanda, Chung-Ang University, Korea)

02 Analysis of Complex Network Security based on Trust Management Schemes
Sunho Seo and Jong-Moon Chung
(Yonsei University, Korea)

03 A New Name Prefix Trie with Path Compression
Jungwon Lee and Hyesook Lim
(Ewha Womans University, Korea)

04 Effect of Timing Misalignment on In-band Full-duplex Communications
Jaeyoung Choi, Haesoon Lee, and Daesik Hong
(Yonsei University, Korea)

05 Secure key exchange scheme for WPA/WPA2-PSK using public key cryptography
Jaewon Noh, Jeeyeong Kim, Giwon Kwon, and Sunghyun Cho
(Hanyang University, Korea)

0-27-B-1 Signal Processing 1

09:00~10:30 Thursday, October 27, 2016
Room: 208B
Chair: Prof. Jae-Ho Han (Korea University)

01 Fast Vision-based Surface Inspection of Defects for Steel Billets
Chao-Yung Hsu, Bing-Shiou Ho, Li-Wei Kang, Ming-Fang Weng, and Chih-Yang Lin
(China Steel Corporation, Taiwan, National Yunlin University, Taiwan, National Yunlin University, Taiwan, Institute for Information Industry, Taiwan, Asia University, Taiwan)
02 Method for Detecting Situations Dangerous to the Senior in the Toilet Room
Lin Meng¹, Xiangbo Kong², and Daiki Taniguchi²
(Ritsumeikan University, Japan¹, Grand Electronics, Inc., Japan²)

03 Depth-based Fingertip Detection for Human-Projector Interaction on Tabletop Surfaces
Young-Jun Son¹, Ouk Choi¹, Hwasup Lim², and Sang Chul Ahn²
(Incheon National University, Korea¹, KIST, Korea²)

04 A Method of Locating Parking Slot using Rearview Camera for Automatic Valet Parking System.
Seunghyun Kim, Joong-Sik Kim, and Whoi-Yul Kim
(Hanyang University, Korea)

05 Multi-light White Balance Using Gaussian Mixture Model
Ji-Hoon Choi, Sang-Ho Lee, and Jong-Ok Kim
(Korea University, Korea)

01 An Exact VNE Algorithm Based on Optimization Theory
Haotong Cao, Longxiang Yang, and Jinbo Chen
(Nanjing University, China)

02 A Low Power, and Wide Tuning Range Ring Voltage Controlled Oscillator
Yiyun Sun and Mei Jiang
(Shenzhen University, China)

03 Virtual SoC Platform Based on Aldebaran Quad-Core
Jae-Jin Lee and Youngsu Kwon
(ETRI, Korea)

04 Modulation Efficiency Optimization of a Depletion-Type Silicon Optical Modulator Utilizing a Nano waveguide
Ui Seok Jeong, Kwang Woon Lee, Dong Ho Lee, Kyung Woon Lee, and Jung Ho Park
(Korea University, Korea)

05 A Hybrid Bit Transpose Scheme for Memory Access Reduction in Deep Learning Acceleration
Seung Hwan Bae¹, Ik Joon Chang², and Hyuk-Jae Lee¹
(Seoul National University, Korea¹, Kyung Hee University, Korea²)
## Home Appliances (Home Entertainments, etc)

**09:00~10:30 Thursday, October 27, 2016**  
**Room: 211**  
Chair: Prof. Incheon Paik (Univ. of Aizu)

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>NetPet: The Smarter Pet Feeder</td>
<td>Victor Nutt, Ryan Essington Parker, Corwin Pace, and Shubhalaxmi Kher</td>
<td>Arkansas State University, USA, Electrical Engineer at GE, Engineer at L-3</td>
</tr>
<tr>
<td>02</td>
<td>Energy Efficient Resource Allocation for Cloud-Based Interactive TV Applications</td>
<td>Gosala Kulupana, Dumidu S. Talagala, Hemantha Kodikara Arachchi, and Anil Fernando</td>
<td>University of Surrey, United Kingdom</td>
</tr>
<tr>
<td>03</td>
<td>Evanescent Mode Power-transfer and Communication Technology for Internet of Things Device Charging Over Metal Surfaces</td>
<td>Sai Kiran Oruganti, Olzhas Kaiyrakhmet, Sanghyun Heo, Bonyoung Lee, Wojin Park, Seoktae Seo, and Franklin Bien</td>
<td>Indian Institute of Technology Tirupati, India, UNIST, Korea</td>
</tr>
<tr>
<td>04</td>
<td>Vehicle Trajectory Clustering for Traffic Intersection Surveillance</td>
<td>Mei Yeen Choong, Lorita Angeline, Renee Ka Yin Chin, Kiam Beng Yeo, and Kenneth Tze Kin Teo</td>
<td>Universiti Malaysia Sabah, Malaysia</td>
</tr>
</tbody>
</table>

## Signal Processing 2

**13:30~15:00 Thursday, October 27, 2016**  
**Room: 208B**  
Chair: Prof. Jong-Ok Kim (Korea University)

<table>
<thead>
<tr>
<th>Session</th>
<th>Title</th>
<th>Authors</th>
<th>Affiliations</th>
</tr>
</thead>
<tbody>
<tr>
<td>01</td>
<td>New Corner Detector Using Non-cornerness Measure</td>
<td>Woon Cho, Seokmok Park, Jacob D'Avy, and Joonki Paik</td>
<td>University of Tennessee, USA, Chung-Ang University, Korea</td>
</tr>
<tr>
<td>02</td>
<td>A Novel Method of Stereo Camera Calibration for Baseball Pitching Trajectory</td>
<td>Yuntao Zhang, Joong-Sik Kim, and Whoi-Yul Kim</td>
<td>Hanyang University, Korea</td>
</tr>
<tr>
<td></td>
<td>Title</td>
<td>Authors</td>
<td>Institution(s)</td>
</tr>
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<td>---</td>
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</tr>
<tr>
<td>03</td>
<td>Design of Feedback Active Noise Control System Based on a Constrained Optimization for Headphone/Earphone Applications</td>
<td>Ji-ho Seo, Young-cheol Park, and Dae Hee Youn</td>
<td>Yonsei University, Korea</td>
</tr>
<tr>
<td>04</td>
<td>MAP-based Permutation Alignment for Underdetermined Convolutive Blind Source Separation</td>
<td>Janghoon Cho and Chang D. Yoo</td>
<td>KAIST, Korea</td>
</tr>
<tr>
<td>05</td>
<td>Securing DataTweet IoT Architecture Elements</td>
<td>Soumya Kanti Datta and Christian Bonnet</td>
<td>Institute Eurecom, France</td>
</tr>
<tr>
<td>02</td>
<td>Selective Packet Routing for Green Communications</td>
<td>Seng-Kyoun Jo¹,², Young-Min Kim¹, Hyun-Woo Lee¹, Jussi Kangasharju³, and Max Muehlhaeuser²</td>
<td>ETRI, Korea¹, Technical University of Darmstadt, Germany², University of Helsinki, Finland³</td>
</tr>
<tr>
<td>03</td>
<td>Fast Image Stitching for Continuous Casting Steel Billet Images</td>
<td>Chao-Yung Hsu¹, Jhih-Wei Huang², Li-Wei Kang², and Ming-Fang Weng³</td>
<td>China Steel Corporation, Taiwan¹, National Yunlin University², Institute for Information Industry, Taiwan³</td>
</tr>
<tr>
<td>04</td>
<td>Color Reproduction Using Intensity Compensation Function for Dual Camera Systems</td>
<td>Vivek Maik¹, Soohwan Yu¹, Seungyong Ko², and Joonki Paik³</td>
<td>The Oxford College of Engineering, India, Korea¹, Chung-Ang University, Korea²</td>
</tr>
<tr>
<td>05</td>
<td>Autonomous Detecting Scheme of the Adaptive Location of Drone-Cell in Disaster Networks</td>
<td>Jeehyeong Kim, Jaewan Noh, Giwon Kwon, and Sunghyun Cho</td>
<td>Hanyang University, Korea</td>
</tr>
</tbody>
</table>
01 Automated segmentation and classification of magnetic resonance images for brain tumor detection
Amandeep Monga\textsuperscript{1}, Shanu Sharma\textsuperscript{2}
(Noida & No, India\textsuperscript{1}, Amity University, India\textsuperscript{2})

02 An ECG monitoring system using Android smart phone
Jaehyun Park, Kihwan Seong, Hyeon-Kyu Noh, Won-Cheol Lee, Byungsun Kim, Jae-Yoon Sim, and Hong-June Park
(POSTECH, Korea)

03 Design of a Wearable Robot to Assist and Rehabilitate Upper Extremity Impairments
Kyunghwan Yoo\textsuperscript{1}, Younggeun Choi\textsuperscript{1}, Soobin Lee\textsuperscript{2}
(Dankook University, Korea\textsuperscript{1}, NEOFECT Co., Ltd.)

04 Prediction of Medical Examination Results Using Radial-Basis Function Networks
Gil-Jin Jang\textsuperscript{1}, Minho Kim\textsuperscript{2}, Young-Won Kim\textsuperscript{2} and Jaehun Choi\textsuperscript{2}
(Kyungpook National University, Korea\textsuperscript{1}, ETRI, Korea\textsuperscript{2})

05 Human Activity Recognition Using Wearable Accelerometer Sensors
Muhammad Zubair\textsuperscript{1}, Kibong Song\textsuperscript{1}, and Changwoo Yoon\textsuperscript{2}
(Korea University, ETRI\textsuperscript{1}, ETRI, Korea\textsuperscript{2})

01 A Traffic Cellular Automaton Model With Optimised Speed
Lorita Angeline, Mei Yeen Choong, Bih Lii Chua, Renee Ka Yin Chin, and Kenneth Tze Kin Teo
(Universiti Malaysia Sabah, Malaysia)

02 Computation of Cell Transmission Model for Congestion and Recovery Traffic Flow
Helen Sin Ee Chuo, Min Keng Tan, Bih Lii Chua, Renee Ka Yin Chin, and Kenneth Tze Kin Teo
(Universiti Malaysia Sabah, Malaysia)
03 Genetic Algorithm based Signal Optimizer for Oversaturated Urban Signalized Intersection
Min Keng Tan, Helen Sin Ee Chuo, Renee Ka Yin Chin, Kiam Beng Yeo, and Kenneth Tze Kin Teo
(Universiti Malaysia Sabah, Malaysia)

04 Fast and Accurate Car Detection in Drone-view
Jongmin Yoon, InHan Kim, WonTaek Chung, and Daejin Kim
(POSTECH, Korea)

05 Development of an Adaptive Visitor Detection System Using Hybrid Sensors
Hyoung-Ro Lee¹, Won-Jong Kim², and Chi-Ho Lin¹
(Semyung University, Korea¹, ETRI, Korea²)

06 Service Selection on BigData-Space based on Heterogeneous QoS Preferences
T. H. Akila S. Siriweera, and Incheon Paik
(University of Aizu, Japan)

01 A Robust Tracking-by-Detection Approach Based on Partial Update Strategy
Woon Cho¹, Min-jae Kim², Seokmok Park², and Joonki Paik²
(The University of Tennessee, USA¹, Chung-Ang University, Korea²)

02 Fall Detection Using Motion Estimation and Accumulated Image Map
Bhavya Ramakrishna¹, Jinho Park², Hasil Park², Heegwang Kim², and Joonki Paik²
(The Oxford College of Engineering, India¹, Chug-Ang University, Korea²)

03 HW/SW co-design of Face Detection & Recognition on Virtual Platform
Mi-Young Lee, Young-Seok Baek, Seong-Min Kim, Hyuk Kim, Bon-Tae Koo, and Joo-Hyun Lee
(ETRI, Korea)

04 A Study on facial appearance age estimation compared with actual age estimation
Hyunjun Kim, Sung Eun Choi, and Jaihie Kim
(Yonsei University, Korea)
05 Effect of Adaptive Thresholding on Shot Boundary Detection Performance
Soyoung Park, Jeongwoo Son, and Sun-Joong Kim
(ETRI, Korea)

06 Improving Convolutional Neural Network-based Stereo Matching Using Batch Normalization
Tien Phuoc Nguyen, Cuong Cao Pham, Tin Trung Duong,
Tai Huu-Phuong Tran, and Jae Wook Jeon
(Sungkyunkwan University, Korea)

01 Modeling and Control of a Cubic Stabilizer
Li-Hsin Chen and Chao-Chung Peng
(National Chen Kung University, Taiwan)

02 A Vehicles’ CO2 Emission Monitoring Platform Combined with Driver’s Driving Behavior
Jun Sun, Anran Zhen, Chunxiao Li, Meixiang Zhang, and Xuelong Hu
(Yangzhou University, China)

03 RoboArt - The Shadow Art Performer Robot
Nazul Perez Campillo, and Joo-Ho Lee
(Ritsumeikan University, Japan)

04 A Study on Measurement Method for Ghost Images on Display
Dong-Woon Ryu, Young-Dal Oh, and Sun-Hong Park
(KATI, Korea)

05 Real-Time Traffic Light Detection Using Color Density
Tai Huu - Phuong Tran, Cuong Cao Pham, Tien Phuoc Nguyen,
Tin Trung Duong, and Jae Wook Jeon
(Sungkyunkwan University, Korea)
O-28-B-1 Signal Processing 3

09:30~11:00 Friday, October 28, 2016

Room: 208B

Chair: Prof. Eung Kyeu Kim (Hanbat National University)

01 Fire Flame Detection Based on Color Model and Motion Estimation
Dr. Dattathreya1, Heegwang Kim2, Jinho Park2, Hasil Park2, and Joonki Paik2
(The Oxford College of Engineering, India1, Chung-Ang University, Korea2)

02 Occlusion Detection Using Iterative Motion Estimation and Error Evaluation
Raksha Umesh Bandana1, Jinbeum Jang2, Jieun Jo2, Sangwoo Park2, and Joonki Paik2
(The Oxford College of Engineering, India1, Chung-Ang University, Korea2)

03 Detour Phase Encoding for Mobile Holographic Display
Kwan-Jung Oh, MinSung Yoon, Hyon-Gon Choo, and Jinwoong Kim
(Electronics and Telecommunications Research Institute, Daejeon, Korea)

04 Non-Invertible Binary Salting Using Random Permutation and Orthogonal Keys for Cancelable Iris Biometrics
Dae-Hyun Lee1, Sang Hwa Lee1, Woonki Park2, and Nam Ik Cho1
(INMC, Seoul National University, Korea1, LG Electronics, Korea2)

O-28-E-1 Antenna and RF, Vehicular Communications

09:30~11:00 Friday, October 28, 2016

Room: 211

Chair: Prof. Chungyong Lee (Yonsei University)

01 Simulators for Vehicular Ad Hoc Network (VANET) Development
Kit Guan Lim, Chun Hoe Lee, Renee Ka Yin Chin, Kiam Beng Yeo, and Kenneth Tze Kin Teo
(Universiti Malaysia Sabah, Malaysia)

02 Performance Evaluation of IEEE 802.11 for Vehicular Communication
Chun Hoe Lee, Kit Guan Lim, Bih Lii Chua, Renee Ka Yin Chin, and Kenneth Tze Kin Teo
(Universiti Malaysia Sabah, Malaysia)

03 Outage Probability Analysis for Cooperative Vehicular Ad-hoc Networks Based on Dynamic Network Coding
Anran Zhen, Chunxiao Li, Jun Sun, Meixiang Zhang, and Xuelong Hu
(Yangzhou University, China)
04 Design and Implementation of an Embedded System to Detect Military Fratricide Crisis
Padma Prasada and Sathisha Shetty (VTU Belgaum, India)

05 ESD Robustness with Various Breakdown Voltage of BD-FCTVS Diodes
Sakhone Pharkphoumy¹, Vallivedu Janardhanam¹, Ji-Hyun Lee¹,², Sang-Sik Choi¹, Deok-Ho, Cho¹, Chel-Jong Choi¹, and Kyu-Hwan Shim¹ (Chonbuk National University, Korea¹, KBSI, Korea², R&D Division, Sigetronics, Inc., Korea³)

O-28-B-2 Software and Data Processing 2
11:00~12:30 Friday, October 28, 2016
Room: 208B
Chair: Prof. Cheolsoo Park (Kwangwoon University)

01 Efficient Mapping of 2D Convolution on DSP for Convolution Neural Network
Mihir N Mody¹, Shyam Jagannathan², Manu Mathew¹, Pramod Swami³, and Taehun Kim³ (Texas Instruments, India¹, Texas Instruments, India², Texas Instruments, India³, Texas Instruments, Korea³)

02 The Impact Analysis of Network Quality for the Smart Space
Woo-Sug Jung, Hwa-Suk Kim, JuneKey Jeon, and Sun-Joong Kim (ETRI, Korea)

03 Robust and Blind Video Watermarking Method Using Inter Prediction for H.265/HEVC
Yong-Seok Lee, Young-Ho Seo, and Dong-Wook Kim (Kwangwoon University, Korea)

04 Blind Deconvolution using Maximum A Posteriori Estimates with Dictionary Learning
Vivek Maik¹, Seonhee Park², and Joonki Paik² (The Oxford College of Engineering, India¹, Chung-Ang University, Korea²)
Signal Processing 4

11:00~12:30 Friday, October 28, 2016

Room: 209

Chair: Prof. Kwang-hyun Baek (Chungang Univ.)

01 Keypoint-Based Object Tracking Using Modified Median Flow
Dr. Dattathreya¹, Sangpil Han², Min-jae Kim², Vivek Maik¹, and Joonki Paik²
(The Oxford College of Engineering, India¹, Chung-Ang University, Korea²)

02 Near Real-Time Ego-Lane Detection in Highway and Urban Streets
Tin Trung Duong, Cuong Cao Pham, Tai Huu-Phuong Tran, Tien Phuoc Nguyen, and Jae Wook Jeon
(Sungkyunkwan University, Korea)

03 Real-time Hand Shape Classification Using Scale Invariant Curvature Feature Vector
Tae Young Jang, Seong Hyeon Kang, Hyun Woo Park, and Seong Dae Kim
(KAIST, Korea)

04 AN AUTOMATIC SELF LANE RECOGNITION USING MULTI-LANE AND LANE CHANGE DETECTION
Heechul Jung, Jonghoon Kwak, Jeongwoo Ju, and Junmo Kim
(KAIST, Korea)

Signal Processing 5

14:00~15:30 Friday, October 28, 2016

Room: 208B

Chair: Prof. Cheolsoo Park (Kwangwoon University)

01 Super Resolution Through Alternative Optimization Using Sparsity and PSF Prior
Vivek Maik¹, Byeongho Moon², and Joonki Paik²
(The Oxford College of Engineering, India¹, Chung-Ang University, Korea²)

02 Video Summarization Using Robust Multi-Task Feature Selection
Woon Cho¹, Hyuncheon Kim², and Joonki Paik²
(The University of Tennessee, USA¹, Chung-Ang University, Korea²)

03 High Performance Audio DSP Processor for DTV
Jinsae Jung, Kiseok Kwon, Keshava Prasad, Jaeun Park, Chulsoo Park, Youngrae Cho, and Sukjin Kim
(Samsung Electronics Co., Ltd., Korea)
04 Point Cloud Sampling and Detection of Overlap Region for 3D Registration  
Jin-hoon Park¹, Ghulam Hussain¹, Yun-su Choi¹, and Jun-dong Cho¹,²  
(Sungkyunkwan University, Korea¹, North University of China, China²)

05 Development of a 3D Printable Facial Model Construction System  
Soonchul Jung, Yoon-Seok Choi, and Jin-seo Kim  
(ETRI, Korea)

0-28-C-3 Multimedia System

14:00~15:30 Friday, October 28, 2016  
Room: 209  
Chair: Prof. Soochan Kim (Hankyong National University)

01 A Model Based Error Resilience Scheme for HDR Video Transmission over Error Prone Channels  
Gosala Kulupana, Junaid Mir, Anil Fernando, Dumidu S. Talagala, and Hemantha K. Arachchi  
(University of Surrey, United Kingdom)

02 Impact of Channel Errors on Single-Layer and Two-Layer HDR Video Transmission Architectures in Error Prone Networks  
Junaid Mir, Gosala Kulupana, Dumidu. S. Talagala, Hemantha K. Arachchi, and Anil Fernando  
(University of Surrey, United Kingdom)

03 High Quality Image Processing System for ADAS  
Mihir N Mody¹, Shashank Dabral², Mayank Mangla², Hetal Sanghvi², Niraj Nandan³, Kedar Chitnis³, Brijesh Jadav³, Rajasekhar Allu³, and Taehun Kim³  
(Texas Instruments, India¹, Texas Instruments, USA², Texas Instruments, Korea³)

04 A Hybrid Approach for Summarization of Cricket Videos  
Ali Javed¹, Khalid Bashir Bajwa¹, Hafiz Malik³, Aun Irtaza¹, and Muhammad Tariq Mahmood³  
(University of Engineering and Technology-Taxila, Pakistan¹, University of Michigan, USA³, University of Technology and Education, Korea³)

05 Power-efficient dynamic brightness driver architecture for modular LED display  
Jinmo Kang, Hosup Lee, Sang-Young Park, and Seong-Phil Cho  
(Samsung Electronics Co. Ltd., Korea)
01 Analysis of memory utilization of CTU level processing for HEVC codec
Xiangjian Wu, Xiang Li, Yong-Jo Ahn, and Donggyu Sim
(Kwangwoon University, Korea)

02 Always Optimal Visibility for HVS on Mobile Display
Wonhee Choe and Seo-Young Lee
(Samsung Electronics Co. Ltd, Korea)

03 Driver’s Head Pose and Gaze Direction Estimation Using Weighted Random Forest Regressor
Mira Jeong1, Sooyeong Kwak2, Byoung Chul Ko1, and Jae-Yeal Nam1
(Keimyung University, Korea1, Hanbat National University, Korea2)

04 A Novel Segmentation Method for Overlapping Granular Objects
Min-Jae Yoo, Sung-Tae Kim, Sung-Ho Lee, and Sung-Jea Ko
(Korea University, Korea)

05 Single Object Tracking System using Fast Compressive Tracking
Abdullah Tahir, Shoaib Azam, Sujani Sagabala, Moongu Jeon, and Ryu Jeha
(GIST, Korea)

06 Fire Detection Using the Brownian Correlation Descriptor
Sung Yun Kim and Tae Jeong Kim
(Seoul National University, Korea)

07 Efficient Generation of Spatiotemporal Images for Leukocyte Motion Detection in Microvessels
Eung Kyeu Kim and Byunghyun Jang
(Hanbat National University, Korea)

08 A Gradient Based Rail Detection Algorithm Using Sketchy Component
Ji-Sang Bae, Jae-Won Lee, and Jong-Ok Kim
(Korea University, Korea)
09 Foreground-Background Separation Guided by Statistical Features of Surveillance Video
Xiaofeng Shi1, Junyi Dai1, Xiaoyan Luo1, Yuan Yepez3, and Seok-Bum Ko2
(Beihang University, China1, University of Saskatchewan, Canada2)

10 Counterlight Region Detection and Contrast Enhancement using Convolutional Neural Network
Sung Min Cho, Bok Gyu Han, Woo Jin Jeong, and Young Shik Moon
(Hanyang University, Korea)

11 Skewness Mapping Function in Retinex Algorithm
Jong-Geun Oh and Min-Cheol Hong
(Soongsil University, Korea)

12 Seamless Registration of Dual Camera Images Using Optimal Mask-Based Image Fusion
Hyeonji Kim, Jiun Jo, Jinbeum Jang, Sangwoo Park, and Joonki Paik
(Chung-Ang University, Korea)

13 An Efficient Pruning and Weight Sharing method for Neural Network
Jin-Kyu Kim, Mi-Young Lee, Ju-Yeob Kim, Byung-Jo Kim, and Joo-Hyun Lee
(ETRI, Daejeon, Korea)

14 Single Image Haze Removal Using Blue Channel Characteristics
Geun-Jun Kim and Bongsoon Kang
(Dong-A University, Korea)

15 Pedestrian detection in the Radiometric Temperature based Far infrared Thermal images at Night time
Taehwan Kim1, Taehoon Kim1, Minseok Son1, Sungho Kim1, Eunryung Lee2, Masoud afrakhteh2, and Miryong Park2
(Yeungnam University, Korea1, ETRI, Korea2)

16 A Selective Upscaling Method via Super-Resolution Validity Measure
Seokeon Choi, Jonghee Kim, and Changick Kim
(KAIST, Korea)

17 A Hand and Wrist Detection Method for Unobtrusive Hand Gesture Interactions using HMD
Ju Young Oh1, Jun Lee2, Joong Ho Lee2, and Ji Hyung Park2
(University of Science and Technology1, Korea Institute of Science and Technology2)
18 Ghost removal based on local background-foreground segmentation for view synthesis in free-view point TV
Tien-Dat Nguyen and Min-Cheol Hong
(Soongsil University, Korea)

19 3D Structure Reconstruction from Aerial Imagery
Jung-Jae Yu and Chang-Joon Park
(ETRI, Korea)

20 Brightness and Color Correction for Dual Camera Image Registration
Seoyoung Park, Byeongho Moon, Seonhee Park, Seungyong Ko, Soohwan Yu, and Joonki Paik
(Chung-Ang University, Korea)

21 Combining Local Patch Based Descriptors with Discriminant Dictionary Learning for Improved Face Recognition
Kyung Tae Kim and Jae Young Choi
(Hankuk University of Foreign Studies, Korea)

22 Implementation of Computer-Generated Hologram on Mobile Device
Changseob Kim, Joongseok Song, Jungsik Park, and Jong-Il Park
(Hanyang University, Korea)

23 Study on the Effect of Frame Size and Color Histogram Bins on the Shot Boundary Detection Performance
Soyoung Park, Jeongwoo Son, and Sun-Joong Kim
(ETRI, Korea)

24 Uniform Brightness Mobile Display using Multiple Light Sensors
Seunghoon Lee, Wonhee Choe, and Hoyoung Jung
(Samsung Electronics Co., Ltd., Korea)

25 Image Understanding for Global Lifelog Media Cloud
Hyok Song¹, Young Han Lee¹, Min Soo Ko¹, In Kyu Choi², and Jisang Yoo²
(Korea Electronics Technology Institute¹, Kwangwoon University, Korea²)

26 Encoding with Discriminative Dictionary Obtained by Support Vector Machine for Pedestrian Detection
Taehun and Sungho Kim
(Yeungnam University, Korea)

27 Image Template Matching with Size and 2D Angle Adjustment
Youngmo Han
(Hanyang Cyber University, Korea)
28 Night Time Vehicle Detection using Rear-Lamp Intensity
Kyeong Min Jeong and Byung Cheol Song
(Inha University, Korea)

29 Robust Cutting-Edge Detection Based on Intensity Concentration
Wei Li¹, Cheng-Bin Jin¹, Mingjie Ma¹, Jong-Hee Kim¹, Hakil Kim¹, and Xuenan Cui¹
(Inha University, Korea¹, Center for Interactive Culture Technology, Korea², JASTECH, Korea³)

30 A Study on Interactive Broadcasting Service Based on a Player of Interest in Basketball Game
Kwang-Yong Kim and Kee-Seong Cho
(ETRI, Korea)

31 Study on an Integer Frequency Offset Estimation and Compensation for DOCSIS 3.1 Downstream
Jae Hwui Bae, Jin Hyuk Song, Sang-Jung Ra, Dong-Joon Choi, Joon-Young Jung, and Namho Hur
(ETRI, Korea)

01 Fast zero-block decision based on perceptual quality for HEVC encoder
Yong-Jo Ahn and Donggyu Sim
(Kwangwoon University, Korea)

02 VLSI Architecture for Simultaneous Capture and Playback of 4K UHD Audio and Video Data from Multiple Channels
Sung-Joon Jang¹,², Sang-Seol Lee¹, and Je Woo Kim¹
(Intelligent Image Processing Research Center, Korea Electronics Technology Institute¹, KAIST, Korea²)

03 A Smart Audio/Video Mixing Method Based on Main Speaker Decision for a Software-Based Multipoint Control Unit
Jin Ah Kang, Seung Han Choi, Miskyong Han, and Jong-Hyun Jang
(ETRI, Korea)

04 Adaptive similarity measures for matrix objects based on feature variation and sequence length for gesture recognition
Hyunsoek Choi¹, Sang-Heon Lee¹, Myoung-Kyu Sohn¹, Byunghun Hwang¹, Hyunduk Kim¹, and Hyeyoung Park²
(Daegu Gyeongbuk Institute of Science & Technology¹, Kyungpook National University, Korea²)
05 Color Matching between Display and Printed Material using Smartphone
Nari Kim, Min woo Lee, and Wonhee Choe
(Samsung Electronics Co., Ltd., Korea)

06 Smart Helmet System for the Safety of Industrial Workers and Data Fusion Algorithm for the Detection of Hazard Types
Younggeun Choi¹, Junghoon Sung¹, Donghyun Kim²
(Dankook University, Korea¹, NexSys Co., Ltd., Korea²)

07 Classification of Moving Object using Micro-Doppler Signals
Jeehyun Lee¹ and Chong Hyun Lee²
(Sogang University, Korea¹, Jeju National University, Korea²)

08 Beat Estimation of Non-Periodic Human Movements using Kinect
Myoung-Gyu Seo, Sang-Yeob Kim, Jang-Bok Ju, and Chul Lee
(Pukyong National University, Korea)

09 Digital Hologram Coding using Intra Correlation of Fresnelet Subbands
I-Seul Kang, Yoon-Hyuk Lee, Young-Ho Seo, and Dong-Wook Kim
(Kwangwoon University, Korea)

10 A Cloud based Adaptive Streaming System for High Resolution Multimedia Service
Jongbae Moon, Junghyun Cho, Minkyong Han, and Jong Hyun Jang
(ETRI, Korea)

11 Moving object detection with Kinect v2
Trinh Thi Doan Pham, Hai Thanh Nguyen, Sungmin Lee, and Chee Sun Won
(Dongguk University, Korea)

12 Proposal of Scenarios of 2nd-screen based Media Commerce Service
Sang-Yun Lee¹, Chang-Sub Kim², Min-Suk Sung³, and Sun-Joon Kim¹
(ETRI, Korea¹, DS Plusteck, Seoul, Korea, CJ HelloVision, Seoul, Korea³)

13 Low Delay Automatic Loudness Control for Broadcasting Services
Young Han Lee, Choong-Sang Cho, and Je-Woo Kim
(Intelligent Image Processing Research Center Korea Electronics Technology Institute Gyeonggi, Korea)

14 Proposal of VoD Clip Service based on Real-time Broadcasting Content Recognition
Sang-Yun Lee, Man-kyu Lee, Dong-Hwan Shin, and Sun-Joon Kim
(ETRI, Daejeon, Korea)
15 Relay Amplifying Matrix Design for Multiuser Two-Way AF Wireless Relay Network
Kanghee Lee¹, Inha Hyun², Heonjoong Kim³, Sun Jo³, and Jaewon Yoo³
(Air Force¹, ROKAF, Korea², Hoseo University, Korea³)

16 Bluetooth Low Energy Security Vulnerability and Improvement Method
Giwon Kwon, Jeheeong Kim, Jaewon Noh, and Sunghyun Cho
(Hanyang University, Korea)

17 Method of Network Slicing and Network Functions Selection in 5G
Sunhwan Lim
(ETRI, Korea)

18 Performance Evaluation of LTE-LAA Partial Subframe using SLS
Igor Kim and Seungkeun Park
(ETRI, Korea)

19 Ternary Bloom Filter Replacing Counting Bloom Filter
Hayoung Byun, Jungwon Lee, and Hyesook Lim
(Ewha Womans University, Korea)

20 High accuracy indoor localization with low cost based on wireless LAN, mobile sensors and floor layout
Andrew YongGwon Lee, Abhishek Kumar, and Pawel Wilk, Witold Chmielewiec, Wojciech Jaworski, Marcin Skorupa and Pawel Zborowski
(Samsung Electronics co. Ltd., Korea)

21 Per-tone MMSE Receiver for MIMO FBMC-QAM Systems
Taehyun Lee and Chungyong Lee
(Yonsei University, Korea)

22 Security Threat on Wearable Services: Empirical Study using a Commercial Smartband
Myeonggeon Lee, Kyungmook Lee, Jaewoo Shim, Seong-je Cho, and Jongmoo Choi
(Dankook University, Korea)

23 Enhanced LTE Handover Scheme using NFV for LTE Handover Delay Reduction
Changsung Lee, Sungjin Shin, and Jong-Moon Chung
(Yonsei University, Korea)

24 Networked Smart LED Lighting System and Its Application Using Bluetooth Beacon Communication
Sungjae Kim, Wonsil Kang, and Hyunchul Ku
(Konkuk University, Korea)
25 Test Access Mechanism for Automotive Chips through Vehicular Control Networks
Jinuk Kim, Muhammad Adil Ansari, Dooyoung Kim, Jihun Jung, Youngsung Kim, and Sungju Park
(Hanyang University, Korea)

26 A New IoT Architecture for a Sustainable IoT Adoption into the Society
Lukman Lamid Idowu, Soo-Hyun Park, and In-Kyu Kim
(Graduate School of Business IT Seoul, Korea)

27 Wireless power transmit method for IoT devices
Taewon Ahn, Hyejung Cho, Bonhyun Koo, YoungKyu Kim, Dusan Baek, and Yunsu Lee
(Samsung Electronics DMC R&D Center Seoul, Korea)

28 A Fast Virtual Machine Management Scheme of the Multiscreen Engine for Multiscreen Clusters
Yeonjoon Chung
(ETRI, Daejeon, Korea)

29 An Efficient Music Accompaniment Extraction Method Using Panning Processing and Median Filtering for Stereophonic Songs
Beomjeong Kim and Hyung-Min Park
(Sogang University, Korea)

P-28-L-2
11:00~12:30 Friday, October 28, 2016
Room: 4F Lobby
Chair: Prof. Chungyong Lee (Yonsei University)

01 Optimal TDMA Time Slot Allocation Scheme for Multi-hop Relay Networks
Jae Seang Lee1,2, Yoon-Sik Yoo1, Hyung Seok Choi3, and Jun Kyun Choi3
(KAIST, Korea1, Agency for Defense and Development, Daejeon, Korea2)

02 Building a Robot Friend Capable of Reading Emotion Using Cloud Vision, OpenCV and Raspberry Pi
Yunkyu Lee, Hee-Ju Jeong, Ara Jo, Jungsoo Kim, Shomansurov Shoshakhzod, and Hyeon-Joong Yoo
(Sangmyung University, Korea)

03 Optimum Charging Scheme for Electric Vehicle based on Game Theory
Yu-seok LIM and Seung-ho HAN
(Korea Electric Power Corporation, Korea)
04 Optimized Design and Thermal/Electrical Characterization Analysis of Automotive Power Semiconductor Switch Modules Using an Inlay PCB
Jaehyun Park, Changjong Yim, Hyewon Yim, Jongmin Park, Shihong Park Electrical, and Electronic Engineering (Dankook University, Korea)

05 A Hardware Architecture of Face Detection for Human-robot Interaction and its Implementation
Sang-Seol Lee, Sung-Joon Jang, Jungho Kim, and Byeongho Choi (KETI, Korea)

06 Gesture-based Automotive Interior Lighting Control using Thermal Sensors
ShinWon Park, Deok-Weon Song, and Chan-Su Lee (Yeungnam University, Korea)

07 High Performance System-on-Chip Implementation for Object Recognition of Mobile Robot
Sung-Joon Jang, Sung-Seol Lee, Youngbae Hwang, and Byeongho Choi (Intelligent Image Processing Research Center, Korea Electronics Technology Institute, KAIST, Korea)

08 Development of Radiation Dosage Measurement System for Vehicle Load Radiation Management
Hee-Yeol Lee, Kyewon-Uk Jang, Seung-Tak La, Joo-Hyun Lee, and Seung-Ho Lee (Hanbat National University, Korea)

09 A Custom Developed Linear Array Photoacoustic Tomography for Noninvasive Medical Imaging
Prasannakumar Palaniappan, Dong Ho Shin, Sang Hun Park, Myoung Young Lee, Bang, Young Kim, Sang Young Lee, Seung Kye Go, and Chul Gyu Song (Chonbuk National University, Korea)

10 Dynamic Boosting for Fast User Interactivity in Smart Devices using Tizen OS
Sungkyo Oh, Bongwon Seo, Cheulhee Hahm, Juhwan Song, Jaegil Lee, and Taeyoung Lee (Samsung Electronics co. Ltd, Korea)

11 Side Channel Analysis based on Non-Profiling Singular Spectrum Analysis
Young-Jin Cho, Yoo-Seung Won, Ae-Sun Park, Soo Mi Lee, and Dong-Guk Han (Kookmin University, Korea, Financial Security Institute, Korea)

12 Gesture Recognition Framework invariant to User Posture for an Interactive TV
Jongmin Yu, Jeonghwan Gwak and Moongu Jeon (GIST, Korea)
<table>
<thead>
<tr>
<th>Number</th>
<th>Title</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>13</td>
<td>Geometry Dependent Optoelectronic Properties of Infrared Photodetector</td>
<td>Munkhsaikhan Zumuukhorol¹, Zagarzusem Khurelbaatar¹,², Yeon-Ho Kil¹, Chel-Jong Choi¹, and Kyu-Hwan Shim¹,＊ (Chonbuk National University, Korea¹, MUST, Mongolia²)</td>
</tr>
<tr>
<td>14</td>
<td>Development of an Argon Welding Torch Mounted Automatic 8-Style Weaving Device and Its Control Equipment</td>
<td>Yui-Hwan Sa, Ronnie O. Serfa Juan, Sung-Yong Jung, and Hyeong-Woo Cha (Cheongju University, Korea)</td>
</tr>
<tr>
<td>15</td>
<td>Development of digital ukulele and mobile rehabilitation contents for enhanced therapeutic instrumental music performance (TIMP)</td>
<td>Jong-Hyun Jo, Jeong-Jin Yeo, and Yoonseok Yang (Chonbuk National University, Korea)</td>
</tr>
<tr>
<td>16</td>
<td>Requirement Verification of Multi-Transit Station Layout using Petri-Net</td>
<td>Junhyuk Kang and Changbeom Choi (Handong Global University, Korea)</td>
</tr>
<tr>
<td>17</td>
<td>Automatic Classifier Learning for Vehicle Detection in Highway Surveillance Videos</td>
<td>SeungJong Noh, Younkwan Lee, and Moongu Jeon (GIST, Korea)</td>
</tr>
<tr>
<td>18</td>
<td>Enhanced Rolling Cache Architecture with Prefetch</td>
<td>Daeyeon Jo¹, Seonyoung Lee, Kyounghwon Min, and Yong Ho Song² (Intelligent SoC Research Center, Korea Electronics Technology Institute, Seongnam, Korea¹, Hanyang University, Korea²)</td>
</tr>
<tr>
<td>19</td>
<td>Modeling and Simulation of Robotic Projector for SAR: A Preliminary Study</td>
<td>Joo-Haeng Lee¹,², Joo-Ho Lee³, and Min Gyo Chung⁴ (ETRI, Korea¹, UST, Korea², Ritsumeikan University, Japan³, Seoul Woman’s University, Korea⁴)</td>
</tr>
<tr>
<td>21</td>
<td>Inductor characteristics analysis in High Power Interleaved Buck Converter</td>
<td>Chul Yun, Byung-keun Yoon, Tae-ho Oh, and Woo-hyen Kwon (Kyungpook University, Korea)</td>
</tr>
</tbody>
</table>
22 Clothes Radar: A Crowdsourcing Application Collecting and Displaying User Clothes Data
Hye-Lim Cheon and Jundong Cho
(Sungkyunkwan University, Korea)

23 A Graph-Based Automated Segmentation of Retinal Layers in Optical Coherence Tomography Images
Lua Ngo and Jae-Ho Han
(Korea University, Korea)

24 Media Application Behavior Classification through Windows API Analysis
Minho Han and Sun-Joong Kim
(ETRI, Korea)

25 Valuation of Microprocessor’s and Network Simulation Technique
Biruk Y. Nidaw1,2, Ziho Shin1,2, Hag Young Kim2, and Young Woo Kim1,2
(UST, Korea1, ETRI, Korea2)

26 The Development of Driver Warning Algorithm for Safety Driving Support
Young-Dal Oh, Dong-Woon Ryu, and Sun-Hong Park
(KATI, Korea)

27 Weighted Priority-based Optimal Energy Distribution Scheme
Yoon-Sik Yoo1,2, Jae-Seang Lee2, Il-Woo Lee1, and Jun Kyun Choi2
(ETRI, Korea1, KAIST, Korea2)

28 LDO Regulator with Compensated Error Amplifier Using Active Capacitor
Min Ju Kwon, Kyeong Hyeon Park, Kyoung Il Do, Jun Geol Park, and Yong Seo Koo
(Dankook University, Korea)

29 Signboard Replacement in Video Environment
Joo-Hyeon Kim and Jong-II Park
(Hanyang University, Korea)
Korea, the Land of Morning Calm, is a truly remarkable place. There are so many things to see and do in Korea that you are sure to find an attraction that is the perfect match for your requirements. Korea's rugged mountainous terrain and hundreds of miles of coastline provide unlimited scenic beauty and opportunities for outdoor activities throughout the year. But scenic wonders are not the only attraction of Korea. Evidence of Korea's unique 5,000-year-old history and culture can be found everywhere. Every city and village has their share of traditional festivals that preserve the old ways of life, but updated to cater to the comforts of foreign visitors. The unique Korean cuisine has flavors sure to please every palate.

For more information about Korea: www.tour2korea.com

Currency Exchange

Korea's currency unit is won which comes in 1,000, 5,000, 10,000 and 50,000 won bills, and 10, 50, 100 and 500 won coins. Generally, banks are open between 09:30-16:30 Monday to Friday. Automated teller machines are in operation 24 hours a day. Most of larger stores, hotels and restaurants in Korea will accept major international credit cards. However, it is advisable to carry some cash, since many smaller establishments and stores are unlikely to accept any credit cards.

Tax & Tipping

Tipping is usually not customized in Korea, but it is appropriate for the excellent service. In major tourist hotels, 10% VAT and 10% service charge is added to the bills for rooms, meals and other services.
Electricity and Voltage

The standard voltage in Korea is 220 volts. The outlet has two round holes and is the same type used in France, Germany, Austria, Greece, Turkey, and many other countries. If you do not have a multi-voltage travel adapter, you can borrow one from your hotel's front desk. If you want to buy one in Korea, you can do so at a duty-free shop, convenience shop at Incheon International Airport, or Yongsan Electronics Shopping Town.

Time Difference

In relation to Greenwich Mean Time, Korea is +9 hours.

Tourist Complaint Center 1330

Tourist Complaint Center strives to resolve complaints from tourists in Korea as well as to improve tourism services by informing and providing consultation to relevant agencies. Complaints and inquiries can be filed via email or fax.

International Call Service 00799

International call service “00799” is a telephone operator service used to make international calls from Korea. The Service features station-to-station calls (forwarding the receiver’s number to the operator for direct connection), collect or reverse charge calls (charging the receiver for the international call) and interpretation calls (having interpretation during the international call).
Coex is a business and cultural hub located in the heart of Gangnam, Seoul’s business district. It is a popular entertainment destination in Seoul for both domestic and foreign visitors, and welcomes an average of 150,000 people a day. Asia’s largest underground mall, three five-star hotels, two premier office towers, a department store, a subway station, an airport terminal, and more are all located at Coex.

Coex is also Korea’s top business events destination. The Coex Convention and Exhibition Center itself is a four-floor meetings venue with over 450,000㎡ of total floor space. There are over 200 exhibitions and 2,000 symposiums here each year.

**Exhibition / Convention**

Coex Convention & Exhibition Center located in Samseong-dong of Gangnam-gu district, Seoul, is one of South Korea’s largest convention and exhibition centers. It was designed by Larry Oltmanns who was a Design Partner with SOM at the time. The four-story center has four exhibition halls and 48 meeting rooms. It is operated by Coex Co. Ltd., a subsidiary of Korea International Trade Association.

**COEX Mall**

COEX Mall is the largest underground shopping center in Asia. It is located in the basement of the Korea World Trade Center, and is considered to be the best shopping and entertainment complex in the area.

Along the main route, visitors will find the Lake food court, the event court, and plenty of brand name stores. There are also plenty of attractions for those visitors looking for a break from shopping. The Game Champ video arcade has 100 of the latest game devices, while the Megabox Cineplex has 16 theaters screening a wide selection of movies. Other popular attractions include the COEX Aquarium, with its water tunnel, and the Kimchi Museum, where visitors can learn everything they need to know about Korea’s favorite food, and even try some of it.

- Business Hours: 10AM – 10PM
- Telephone: +82 2 6002 5312, 3
About Seoul

Seoul has been the capital of Korea for about 600 years, since the time of the Joseon Dynasty (1392-1910). Seoul was referred to as “Han Yang” during the Joseon Dynasty, but after the liberation from Japan, in 1945, the newly founded Republic of Korea officially changed its capital city’s name to Seoul. Seoul has developed into a bustling metropolis, acting as the hub for political, economic, social, and cultural matters. The Han River runs through the heart of the city. The river divides the city in two; the northern part of the city is a focal point for culture and history, while the southern part is well known for its business district. Seoul has hosted many international events including: 1986 Asian Games, 1988 Olympic Games and 2002 Korea/Japan FIFA World Cup. The success of these events has shown people that Korea is truly an international city. In Seoul you can find ancient palaces and Royal Shrines of the Joseon Dynasty, as well as Seoul World Cup Stadium, 63 CITY building, Lotte World, Namsan, Bukhansan Mountain National Park, Daehangno, Insa-dong, Itaewon, Myeong-dong, Apgujeong, Namdaemun and Dongdaemun Markets. On the outskirts of Seoul you can find Seoul Land, Everland, Caribbean Bay, The Korean Folk Village, Suwon Hwaseong Fortress, and Namhansan Mountain Fortress.

1. Gyeongbokgung Palace

- **Address**
  161, Sajik-ro,
  Jongno-gu, Seoul
  (Sejongno)

- **Inquiries**
  • 1330 Travel Hotline:
    +82-2-1330
  (Korean, English, Japanese, Chinese)

  • For more info: +82-2-3700-3904~5 / +82-2-738-9171

- **Introduction**
  Built in 1395, Gyeongbokgung Palace is also commonly referred to as the “Northern Palace” because its location is fur-
The north when compared to the neighboring palaces of Changdeokgung (Eastern Palace) and Gyeongheegung (Western Palace). Gyeongbokgung Palace is arguably the most beautiful and remains the largest of all five palaces.

* Tickets for Gyeongbokgung Palace are also valid at the National Palace Museum and the National Folk Museum.

2. Insa-dong

- **Address**
  130-4, Insa-dong, Jongno-gu, Seoul

- **Inquiries**
  • 1330 Travel Hotline: +82-2-1330 (Korean, English, Japanese, Chinese)

  For more info: +82-2-734-0222

- **Introduction**
  Insa-dong, located in the heart of the city, is an important place where old but precious and traditional goods are on display. There is one main road in Insa-dong with alleys on each side. Within these alleys are galleries, traditional restaurants, traditional teahouses, and cafes.

3. Bookchon Hanok Village

- **Address**
  37, Gyedong-gil, Jongno-gu, Seoul

- **Inquiries**
  • 1330 Travel Hotline: +82-2-1330 (Korean, English, Japanese, Chinese)

  For more info: +82-2-2148-4160, +82-2-2148-4161

- **Introduction**
  Surrounded by Gyeongbokgung Palace, Changdeokgung Palace and Jongmyo Shrine, Bukchon Hanok Village is home to hundreds of traditional houses called ‘hanok’ that date back to the Joseon Dynasty. The name, ‘Bukchon,’ which literally trans-
lates to ‘northern village,’ came about as the neighborhoods that the village covers lie to the north of the two significant Seoul landmarks, Cheonggyecheon Stream and Jongno. Today, many of these hanoks operate as cultural centers, guesthouses, restaurants and tea houses, providing an opportunity to experience, learn and immerse in Korean traditional culture.

4. Myeong-dong

- Introduction
  <No.1 Tourist Destination>
  Myeong-dong is one of the busiest places in Seoul and is among Korea’s premier shopping destinations. Over 1 million shoppers pass through this area each and every day. Located in the heart of Seoul, Myeong-dong market has been a witness to Korea’s tumultuous modern-day history as a center of city politics, economy, and culture. To international visitors, Myeong-dong is a stunning shopping district with countless shops and restaurants. Its wild popularity has led to similar shopping districts springing up all across the country.

- Myeong-dong Tourism Information Center
  Located at the Myeong-dong Jungang-ro Intersection, this information center employs two guides who can provide assistance to visitors in English, Japanese, and Chinese. As an added convenience, there are a number of multi-lingual guides free-floating around the Myeong-dong area, ready and willing to assist tourists. Just look for people wearing red vests marked with an ‘ⓘ’ information logo.
  • Hours: 09:00-22:00 (Summer hours, Open all year-round, including holidays)
  • Tel: +82-2-774-3238
5. Hongik University (Hongdae)

- Introduction
  <The Unconventional Side of Hongik University>
  Hongdae (the abbreviation of Hongik University) has become a symbol of unique cultural identity among Korea’s youth. The area is home to an eclectic mix of cafés and clubs that have served as breeding grounds for many of Korea’s growing subcultures.

- Hongdae Tourism Information Center
  To reach the information center, walk 160m from Exit #5 of Hongik University Station (Subway Line 2), turn left, and walk for another 130m. The center provides tourism information on the area around Hongik University in English, Japanese, and Chinese.
  • Hours: 12:00-22:00 (Closed: Lunar New Year and Korean Thanksgiving Day)
  • Tel: +82-2-323-2240

6. Itaewon

- Introduction
  <The Global Community in Seoul: Global Fashions and Foods>
  Itaewon is a unique place in Seoul where one can meet people of diverse nationalities and cultures. There is a popular joke saying that international residents may not know Seoul, but they know Itaewon. Seoul even designated Itaewon as its first ‘Special Tourism District,’ to highlight it as a destination for internationals to enjoy a diversity of culture, shopping, and entertainment experiences.

- Itaewon Tourism Information Center
  Located next to the Main Business Office inside of Itaewon
Station, the center offers tourism information in English, Chinese, and Japanese.

- Hours: 09:00-22:00 (Closed: Lunar New Year and Korean Thanksgiving Day)
- Tel: +82-2-3707-9416~7

7. Seoul City Tour Bus

The Seoul City Tour Bus, covering popular areas north of the Han River, allows passengers to get on and off throughout the day for a flat rate. A downtown tour, a palace tour and a night tour are currently offered. You can also get discounts (applicable that day) for museums, art museums and performance centers. T-money is accepted. No tours on Mondays. For more information call 02 777-6090 or visit the Seoul City Tour Bus website. http://en.seoulcitybus.com/

For more information: http://asiaenglish.visitkorea.or.kr/