



# IAPR MVA2017

## Proceedings of MVA2017

IAPR International Conference on Machine Vision Applications  
May 8-12, 2017  
Nagoya University, Nagoya, Japan

Sponsored by  
MVA Organization  
IAPR  
Graduate School of Informatics, Nagoya University

Supported by  
Tateisi Science and Technology Foundation

***PROCEEDINGS OF  
THE FIFTEENTH IAPR INTERNATIONAL  
CONFERENCE ON  
MACHINE VISION APPLICATIONS***

***May 8-12, 2017***

***Toyoda Auditorium, Nagoya University, Nagoya***

***JAPAN***

PROCEEDINGS OF THE FIFTEENTH  
IAPR INTERNATIONAL CONFERENCE  
ON MACHINE VISION APPLICATIONS

MVA2017

Copyright © 2017 by MVA Organization.  
All rights reserved.

Copyright or reprint permissions and order of additional copies should be addressed to:

MVA Organization  
President: Prof. Hideo Saito  
Department of Information and Computer Science  
Faculty of Science and Technology  
Keio University  
3-14-1 Hiyoshi, Kohoku-ku, Yokohama, Kanagawa 223-8522, Japan  
saito@hvrl.ics.keio.ac.jp  
<http://www.mva-org.jp>

Printed in Japan.

---

# IAPR MVA2017

---

**IAPR INTERNATIONAL CONFERENCE  
ON MACHINE VISION APPLICATIONS  
MVA2017**

**May 8-12, 2017**

**Toyoda Auditorium, Nagoya University, Nagoya, JAPAN**

**Sponsored by**

*MVA Organization*

*IAPR*

*Graduate School of Informatics, Nagoya University*

**Technical Co-sponsor**

*IEEE Robotics and Automation Society*

**Supported by**

*Tateisi Science and Technology Foundation*

**In Cooperation with**

*The Information Processing Society of Japan*

*The Institute of Electrical Engineers of Japan*

*The Institute of Electronics, Information and Communication Engineers*

*The Institute of Image Information and Television Engineers*

*The Institute of Systems, Control and Information Engineers*

*The Institute of Image Electronics Engineers of Japan*

*The Japanese Society for Artificial Intelligence*

*The Japanese Society for Non-destructive Inspection*

*The Japan Society for Precision Engineering*

*The Robotics Society of Japan*

*The Society of Academic Study on Sensing via Image Information*

*The Society of Automotive Engineers of Japan*

*The Society of Instrument and Control Engineers*

*The Virtual Reality Society of Japan*

# MVA CONFERENCE COMMITTEE

## General Chairs

Hiroshi ISHIKAWA (Waseda University)  
Ryuzo OKADA (Toshiba)

## Publication Chairs

Hitoshi HABE (Kindai University)  
Takeshi MASUDA (AIST)

## Financial Chairs

Yoshihisa IJIRI (OMRON)  
Shotaro MIWA (Mitsubishi Electric)

## Publicity Chairs

Feng Lu (Beihang University)  
Kunio NOBORI (Panasonic)  
Bryan Scotney (University of Ulster)  
Ming-Hsuan Yang (University of California at Merced)  
Takahiro YOSHIOKA (Fujitsu Laboratories)

## Web Chairs

Yohei MINEKAWA (Hitachi)  
Yoshihiko MOCHIZUKI (Waseda University)

## Program Chairs

Norimichi UKITA (Toyota Technological Institute)  
Greg MORI (Simon Fraser University)

## Award Chairs

Yasuyo KITA (AIST)  
Johji TAJIMA (Nagoya City University)

## Poster Chairs

Masaki ONISHI (AIST)

## Tutorial Chairs

Takayuki SEMITSU (Mitsubishi Electric)  
Kyoko SUDO (Toho University)

## Technical Event Chair

Noriko SHIMOMURA (Nissan)

## Local Arrangement Chairs

Ichiro IDE (Nagoya University)  
Shunsuke KUDOH (The Univ. of Electro-Communications)

## Secretary

Toshiko KABASHIMA (Keio University)

## Organizing Committee Members

Masato ISHII (NEC)  
Ken SAKURADA (Nagoya University)  
Rei KAWAKAMI (The University of Tokyo)  
Ryo YONETANI (The University of Tokyo)  
Tatsuo KOZAKAYA (Toshiba)  
Osafumi NAKAYAMA (Fujitsu Laboratories)  
Michihiro KOBAYASHI (Morpho)  
Keita TAKAHASHI (Nagoya University)

Yasutomo KAWANISHI (Nagoya University)  
Norishige FUKUSHIMA (Nagoya Institute of Technology)  
Takayoshi YAMASHITA (Chubu University)  
Yoshiko KOJIMA (Toyota Central R&D Labs.)  
Takenori HARA (DNP)  
Yosuke SAKAMOTO (Honda R&D)

## Advisory Board Members

Masakazu EJIRI (R&D consultant)  
Katsushi IKEUCHI (Microsoft Research Asia)  
Masatsugu KIDODE (NAIST)  
Hiroshi SAKO  
Johji TAJIMA (Nagoya City University)  
Hiroshi MURASE (Nagoya University)  
Hideo SAITO (Keio University)  
Keiji YAMADA (NEC)

Yoichi SATO (The University of Tokyo)  
Masaki SUWA (OMRON)  
Yasuyo KITA (AIST)  
Takeshi MASUDA (AIST)  
Yasushi NAKAUCHI (Tsukuba University)  
Shigeki SUGANO (Waseda University)  
Darius BURSCHEKA (Technische Universität München)

## Area Chairs

### Recognition / Classification

Takio KURITA (Hiroshima University)  
Si LIU (Chinese Academy of Sciences)  
Greg SHAKHAROVICH (TTI-Chicago)  
Bjorn STENGER (Rakuten)  
Yang WANG (University of Manitoba)

### 3D

Rei KAWAKAMI (The University of Tokyo)

Boxin SHI (AIST)

Akihiko TORII (Tokyo Institute of Technology)  
Yinqiang ZHENG (NII)

### Feature / Descriptor

Hironobu FUJIYOSHI (Chubu University)  
Yen-Yu LIN (Academia Sinica)  
Atsuto MAKI (KTH)  
Edgar SIMO-SERRA (Waseda University)

Kyoko SUDO (Toho University )

### **ITS**

Xiang BAI (Huazhong University of Science and Technology)

Xue MEI (Toyota Research Institute)

Noriko SHIMOMURA (Nissan)

### **Detection / Tracking**

Yoshihisa IJIRI (Omron)

Dong WANG (Dalian University of Technology)

Tianzhu ZHANG (Chinese Academy of Sciences)

### **Face**

Hitoshi IMAOKA (NEC)

Yoichi SATO (The University of Tokyo)

Y.-C. Frank WANG (Academia Sinica)

### **Video Recognition**

Shunsuke KUDOH (The University of Electro-

Communications)

Michael S. RYOO (Indiana University)

Shin'ichi SATOH (NII)

Shengping ZHANG (Harbin Institute of Technology)

### **Medical Application**

Aurelio CAMPILHO (Universidade do Porto)

Yasuyo KITA (AIST)

Yoshito OTAKE (NAIST)

### **Image / Video Processing**

Larbi BOUBCHIR (University of Paris 8)

Jia-Bin HUANG (Virginia Tech)

Keita TAKAHASHI (Nagoya University)

Masayuki TANAKA (Tokyo Institute of Technology)

### **AR / VR**

Guillaume MOREAU (Ecole Centrale de Nantes)

Jean-Marie NORMAND (Ecole Centrale de Nantes)

## **Program Committee Members**

Moatz Abdelwahab  
Philippe Bolon  
Pierre Boulanger  
Chia-Yen Chen  
Cheng-Chieh Chiang  
Naoki Chiba  
Sonya Coleman  
Franck Davoine  
Joachim Denzler  
Mariella Dimiccoli  
Keisuke Doman  
Peter Eisert  
M. Ferretti  
Robert Fisher  
Kouta Fujimura  
Kazuhiro Fukui  
Norishige Fukushima  
Takuya Funatomi  
Haokun Geng  
Guy Godin  
Igor Gurov  
Hitoshi Habe  
Takenori Hara  
Hui-Yu Huang  
Ichiro Ide  
Masato Ishii  
Mattias Johannesson  
Masataka Kagesawa  
Sei-ichiro kamata

Shun'ichi Kaneko  
Hiroshi Kano  
Yasutomo Kawanishi  
Abdelaziz Khat  
Makoto Kimura  
Itaru Kitahara  
Yoshiko Kojima  
Tatsuo Kozakaya  
Shunsuke Kudoh  
Shiro Kumano  
Yoshinori Kuno  
Makoto Kurumisawa  
Shiying Li  
Dongwei Liu  
Tyng-Luh Liu  
Lizhuang Ma  
Geovanni Martinez  
Yohei Minekawa  
Shotaro Miwa  
Yoshihiko Mochizuki  
Guillaume Moreau  
Daniel Morris  
Yasuhiro Mukaigawa  
Akio Nakamura  
Yuichi Nakamura  
Heinrich Niemann  
Kunio Nobori  
Munetoshi Numada  
Ryuzo Okada

Masaki Onishi  
Kazunori Onoguchi  
Hsing-Kuo Pao  
Soon-Yong Park  
Erik Rodner  
Takeshi Saitoh  
Ken Sakurada  
Takayuki Semitsu  
Myriam Cecile Julie Servieres  
Takeshi Shakunaga  
Yusuke Sugano  
Chuan Sun  
Junli Tao  
Masachi Toda  
Du-Ming Tsai  
Akira Utsumi  
Koji Wakimoto  
Mutsumi Watanabe  
Paul Whelan  
Toshihiko Yamasaki  
Takayoshi Yamashita  
Kimitoshi Yamazaki  
Ming-Hsuan Yang  
Juneho Yi  
Ryo Yonetani  
Yoshioka, Takahiro  
Pong C Yuen  
Huijing Zhao

For more details, please visit <http://www.mva-org.jp/> or contact: **MVA Organization, c/o Prof. Hideo SAITO**



Dept. of Information and Computer Science, Keio University  
3-14-1 Hiyoshi, Kohoku-ku, Yokohama, Kanagawa 223-8522, Japan

# MVA 2017 Reviewers

Ayman Abbas  
Moatz Abdelwahab  
Ashwan Anwer Abdulmunem  
Farnaz Abtahi  
Maiko Adachi  
Muhammad Jamal Afridi  
Jong-Hoon Ahn  
Joseph Antony  
Yoshimitsu Aoki  
Hiroyuki Arai  
Yasuo Arika  
Sinha Ayushi  
Philippe BOLON  
Baochun Bai  
Xiang Bai  
Steven Basart  
Jean-Charles Bazin  
Seth Billings  
Chunjuan Bo  
Somar Boubou  
Jorge Novo Buján  
Jaime S. Cardoso  
Ayan Chakrabarti  
Kuang-Yu Chang  
JuChin Chen  
Cheng-Chieh Chiang  
Chen-Kuo Chiang  
Naoki Chiba  
Sonya Coleman  
James Cooper  
Franck Davoine  
Yuchao Dai  
Behdad Dashtbozorg  
Daisuke Deguchi  
Patrice Delmas  
Zhiwei Deng  
Joachim Denzler  
Mariella Dimiccoli  
Keisuke Doman  
Inês Dutra  
Basafa Ehsan  
Peter Eisert  
Heng Fan  
M. Ferretti  
Frank P. Ferrie  
Robert Fisher  
Yifang Fu

Kouta Fujimura  
Norio Fukuda  
Kazuhiro Fukui  
Norishige Fukushima  
Takuya Funatomi  
Adrian Galdran  
Changxin Gao  
Xiang Gao  
Guangyu Gao  
Haokun Geng  
Guy Godin  
Qing Gu  
Naoyuki Gunji  
Igor Gurov  
Hitoshi Habe  
Hossein Hajimirsadeghi  
Muhammad Haris  
Naohiro Hayashi  
Jiawei He  
Hu He  
Akinori Hidaka  
Kazuhiro Hotta  
Sha Hu  
Hexiang Hu  
Hui-Yu Huang  
Moustafa Ibrahim  
Ichiro Ide  
Satoshi Iizuka  
Masato Ishii  
Mattias Johannesson  
Vijay John  
Jihoon Joung  
Akash Abdu Jyothi  
Makoto Kurumisawa  
Masataka Kagesawa  
Sei-ichiro Kamata  
Meina Kan  
Shun'ichi Kaneko  
Hiroshi Kano  
Kaori Kataoka  
Yasutomo Kawanishi  
Abdelaziz Khat  
Makoto Kimura  
Yasuyo Kita  
Itaru Kitahara  
Stefan Klein  
Yoshiko Kojima

Gou Koutaki  
Tatsuo Kozakaya  
Shunsuke Kudoh  
Shiro Kumano  
Kuldeep Kumar  
Yoshinori Kuno  
Keng-Hao Liu  
Antony Lam  
Kuan-Hui Lee  
Jong Taek Lee  
Shiying Li  
Hongyang Li  
Wei-Yang Lin  
Wen Liu  
Si Liu  
Tyng-Luh Liu  
Dongwei Liu  
zimo Liu  
Xiaoyu Liu  
Pengyuan Lyu  
Lizhuang Ma  
Geovanni Martinez  
Yusuke Matsui  
Tetsu Matsukawa  
Nazanin Mehrasa  
Jieru Mei  
Ana Maria Mendonça  
Yohei Minekawa  
Shotaro Miwa  
Junichi Miyao  
Haruki Mizushina  
Yoshihiko Mochizuki  
Guillaume Moreau  
Luce Morin  
Daniel Morris  
Mohammadreza Mostajabi  
Yasuhiro Mukaigawa  
Srikanth Muralidharan  
Kazuhiko Murasaki  
Rathna G N  
Akio Nakamura  
Yuichi Nakamura  
Mitsuru Nakazawa  
Karoon Rashedi Nia  
Heinrich Niemann  
Hitoshi Niigaki  
Kunio Nobori  
Shohei Nobuhara  
Kuniaki Noda  
Vincent Nozick  
Munetoshi Numada

Ryuzo Okada  
Masaki Onishi  
Kazunori Onoguchi  
Hsing-Kuo Pao  
Soon-Yong Park  
Beatriz Remeseiro  
Valérie Renaudin  
Wan Renjie  
Mrigank Rochan  
Erik Rodner  
José Rouco  
Takeshi Shakunaga  
Takeshi Saitoh  
Ken Sakurada  
Atsushi Sato  
Farook Sattar  
Takayuki Semitsu  
Lama Seoud  
Myriam Cécile Julie Servières  
Wei Shen  
Baoguang Shi  
Satoshi Shimada  
Jorge Silva  
Jon Smith  
Rainer Stiefelwagen  
Yusuke Sugano  
Shigeki Sugimoto  
Chuan Sun  
Chong Sun  
Yongqing Sun  
Masashi Toda  
Kanji Tanaka  
Yukinobu Taniguchi  
Junli Tao  
Mehrdad Panahpour Tehrani  
Du-Ming Tsai  
Chikao Tsuchiya  
Ali Uneri  
Akira Utsumi  
Igor Vasiljevic  
Koji Wakimoto  
Renjie Wan  
Shuhui Wang  
Wei Wang  
Lijun Wang  
Mutsumi Watanabe  
Chen Wei-Yu  
Paul Whelan  
Tristan Whitmarsh  
Kin Hong Wong  
Gui-Song Xia



Liming Yang  
Hiromasa Yoshimoto  
Koichiro Yamaguchi  
Toshihiko Yamasaki  
Takayoshi Yamashita  
Yuji Yamauchi  
Kimitoshi Yamazaki  
Wang Yan  
Ming-Hsuan Yang  
Xin Yang  
Juneho Yi  
Futoshi Yokota  
Haruka Yonemoto  
Ryo Yonetani  
Shaodi You  
Pong C Yuen  
Guillaume Zahnd  
Mengyao Zhai  
Qieshi Zhang  
Huijing Zhao  
Guang-Tong Zhou  
Bohan Zhuang