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PROCEEDINGS

## Intelligent Robotics and Industrial Applications using Computer Vision 2017

Editors: **Henry Ngan**, Hong Kong Baptist University (Hong Kong),  
**Kurt Niel**, University of Applied Sciences Upper Austria (Austria),  
**Juha Röning**, University of Oulu (Finland)

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# Intelligent Robotics and Industrial Applications using Computer Vision 2017

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## Introduction

In our everyday work we are facing two big and very complex structures:

On the one hand we are doing **scientific research** in exploring the fundamental behavior of things.

On the other hand we cooperate strongly with **industrial needs** for reliable quality within a reasonable budget.

We all are aware of the gap between these two worlds, with even contradiction demands.

Our conference, **Intelligent Robotics and Industrial Applications using Computer Vision**, tries to serve as a bridge that has to overcome enormous tensions. A lot of contributions highlight the usage of computer vision within robotics guidance and industrial automation processes. The conference promotes the latest results of the research work in these areas. Joint sessions with other conferences are utilized to combine different fields contributing to this field.

Henry Ngan, Hong Kong Baptist University (Hong Kong)

Juha Röning, University of Oulu (Finland)

Kurt Niel, University of Applied Sciences Upper Austria (Austria)

# Intelligent Robotics and Industrial Applications using Computer Vision 2017

Wednesday, February 1, 2017

## Autonomous Robotics

Session Chair: Juha Röning, University of Oulu (Finland)

8:50 – 10:10 am

Cypress C

8:50

**Efficient visual loop closure detection in different times of day**, *Can Erhan<sup>1</sup>, Evangelos Sariyanidi<sup>2</sup>, Onur Sencan<sup>1</sup>, and Hakan Temeltas<sup>1</sup>*; <sup>1</sup>Istanbul Teknik Üniv. (Turkey) and <sup>2</sup>Queen Mary, University of London (United Kingdom) (IRIACV-258)

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9:10

**Real-time mobile robot navigation based on stereo vision and low-cost GPS**, *Soonhac Hong, Ming Li, Miao Liao, and Peter van Beek, Sharp Labs of America (United States)* (IRIACV-259)

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9:30

**The acceleration effect to the perception of velocity difference in passive elbow flexion movement**, *Fumihiro Akatsuka and Yoshihiko Nomura, Mie University (Japan)* (IRIACV-260)

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9:50

**The challenge of preparing teams for the European Robotics League: Emergency**, *J. Röning<sup>1</sup>, M. Kauppinen<sup>1</sup>, V. Pitkänen<sup>1</sup>, A. Kemppainen<sup>1</sup>, A. Tikanmäki<sup>1</sup>, M. Furci<sup>2</sup>, M. Palau Franco<sup>3</sup>, A. Winfield<sup>3</sup>, E. Stengler<sup>3</sup>, B. Brueggemann<sup>4</sup>, F. Schneider<sup>4</sup>, A. Castro<sup>5</sup>, M. Cordero Limón<sup>6</sup>, A. Viguriá<sup>6</sup>, G. Ferri<sup>7</sup>, F. Ferreira<sup>7</sup>, Xingcun Liu<sup>8</sup>, Y. Petillo<sup>8</sup>, and D. Sosa<sup>9</sup>*; <sup>1</sup>BISG (InfoTech Oulu) University of Oulu (Finland), <sup>2</sup>University of Bologna (Italy), <sup>3</sup>Bristol Robotics Lab and Science Communication Unit (United Kingdom), <sup>4</sup>Fraunhofer FKIE (Germany), <sup>5</sup>Oceanic Platform of the Canary Islands (Spain), <sup>6</sup>FADA Center for Advanced Aerospace Technologies (Spain), <sup>7</sup>NATO STO Centre for Maritime Research and Experimentation (Italy), <sup>8</sup>Herriot-Watt University (United Kingdom), and <sup>9</sup>University of Las Palmas de Gran Canaria (Spain) (IRIACV-261)

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10:00 am – 4:00 pm Industry Exhibition

10:10 – 10:50 am Coffee Break

## Machine Vision and Imaging

Session Chair: Kurt Niel, University of Applied Sciences Upper Austria (Austria)

10:50 am – 12:10 pm

Cypress C

10:50

**Application of big data analytics for recognition of microbial colonies from hyperspectral images**, *Seung-Chul Yoon, Kurt Lawrence, Bosoon Park, and Gary Gamble, US Department of Agriculture-Agricultural Research Service (United States)* (IRIACV-262)

11:10

**Weaving pattern recognition of ancient Chinese textiles by regular bands analysis**, *Connie C.W. Chan, K. S. (Sammy) Li, and Henry Ngan, Hong Kong Baptist University (Hong Kong)* (IRIACV-263)

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11:30

**Finding a needle in a haystack: Recognizing surgical instruments through vision and manipulation**, *Tian Zhou and Juan Wachs, Purdue University (United States)* (IRIACV-264)

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11:50

**Education in industrial machine vision in Upper Austria University of Applied Sciences (bachelor/master) with respect to the needs by the European industry and automation engineering**, *Kurt Niel, University of Applied Sciences Upper Austria (Austria)* (IRIACV-266)

12:10 – 2:00 pm Lunch Break

## EI 2017 Wednesday Plenary and Symposium Awards

Session Chairs: Joyce E. Farrell, Stanford University, and Nitin Sampat, Rochester Institute of Technology (United States)

2:00 – 3:00 pm

Grand Peninsula Ballroom D

**Designing VR video camera systems**, *Brian Cabral, Facebook, Inc. (United States)*

*Brian Cabral is Director of Engineering at Facebook, leading the Surround 360 VR camera team, specializing in computational photography, computer vision, and computer graphics. He has published a number of papers in the area of computer graphics and imaging including the pioneering Line Integral Convolution algorithm. Cabral discusses developing Facebook Surround 360, an open, high-quality 3D-360 video capture system. VR video capture systems are composed of multiple optical and digital components – all of which must operate as if they are one seamless optical system. The design of VR video cameras, optical choices, SNR, etc., require a new set of technologies and engineering approaches, with tight coupling to the computational system components.*

3:00 – 3:30 pm Coffee Break

## Pattern Recognition and Inspection

Session Chair: Henry Ngan, Hong Kong Baptist University (Hong Kong)

3:30 – 5:10 pm

Cypress C

3:30

**Unsupervised video segmentation and its application to region-based local contrast enhancement**, *Sungbum Park<sup>1</sup>, Woo-sung Shim<sup>1</sup>, and Yong Seok Heo<sup>2</sup>*; <sup>1</sup>Samsung Electronics and <sup>2</sup>Ajou University (Republic of Korea) (IRIACV-267)

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3:50

**High-precision 3D sensing with hybrid light field & photometric stereo approach in multi-line scan framework**, *Doris Antensteiner<sup>1</sup>, Svorad Štolc<sup>1</sup>, Kristián Valentín<sup>1</sup>, Bernhard Blaschitz<sup>1</sup>, Reinhold Huber-Mörk<sup>1</sup>, and Thomas Pock<sup>1,2</sup>*; <sup>1</sup>AIT Austrian Institute of Technology GmbH and <sup>2</sup>Graz University of Technology (Austria) (IRIACV-268)

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4:10

**Line-scan stereo using binary descriptor matching and regularization**, *Reinhold Huber-Mörk, Kristián Valentín, Bernhard Blaschitz, and Svorad Štolc, AIT Austrian Institute of Technology GmbH (Austria)* (IRIACV-269)

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4:30

**Traffic Camera Dangerous Driver Detection (TCD3™)**, Vidur Prasad,  
*University of Michigan (United States) (IRIACV-270)*

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4:50

**Outlier detection in large-scale traffic data by naïve Bayes method and Gaussian mixture model method**, Philip Lam<sup>1</sup>, Lili Wang<sup>2</sup>, Henry Ngan<sup>1</sup>, Nelson H.C. Yung<sup>3</sup>, and Anthony G. O. Yeh<sup>3</sup>; <sup>1</sup>Hong Kong Baptist University, <sup>2</sup>Hong Kong Polytechnic University, and <sup>3</sup>The University of Hong Kong (Hong Kong) (IRIACV-272)

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**Symposium Interactive Papers (Poster) Session**  
**5:30 – 7:30 pm**

Atrium