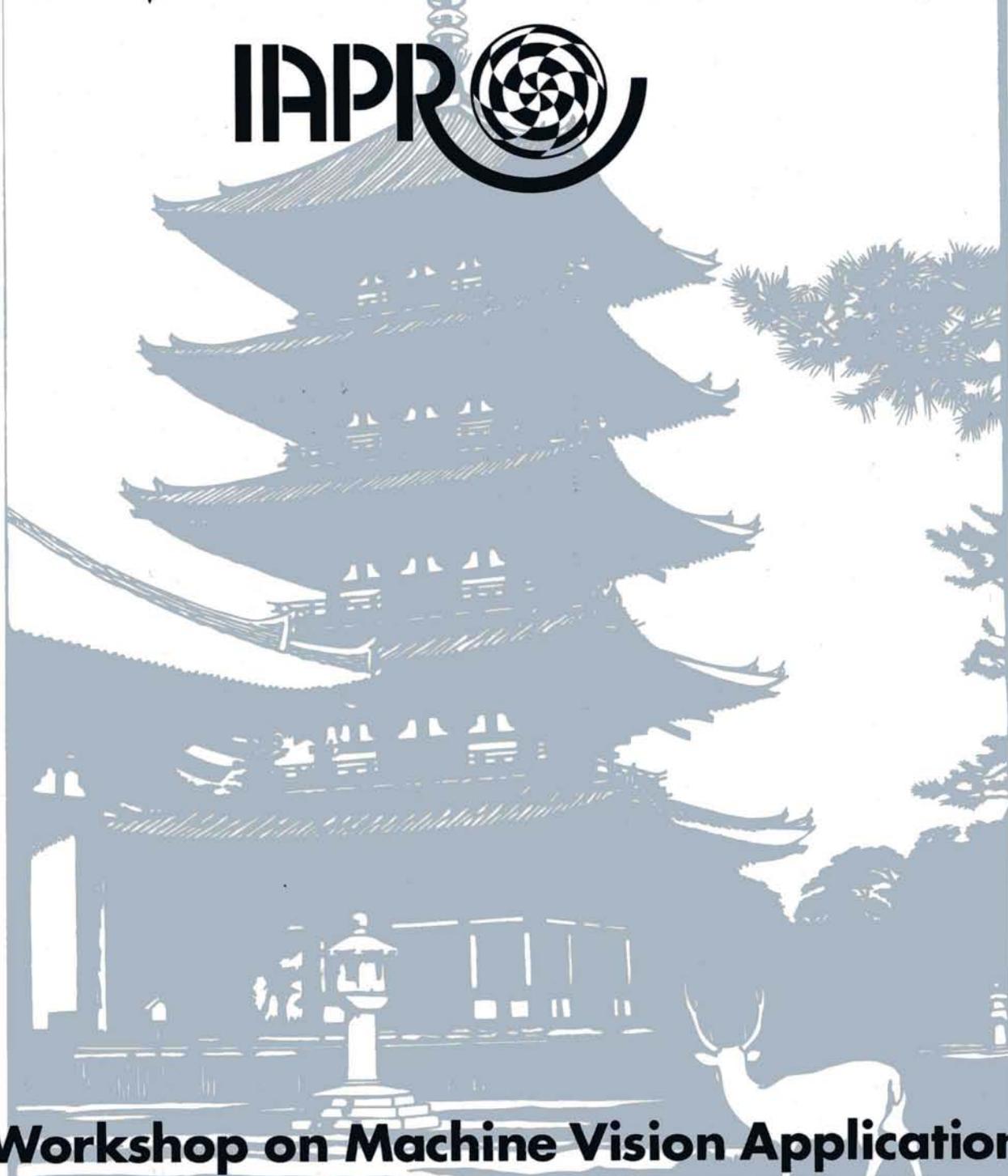


December 11-13, 2002 Nara-ken New Public Hall, Nara, JAPAN

# PROCEEDINGS OF MVA 2002



## **IAPR Workshop on Machine Vision Applications**

Sponsored by

IAPR MVA Organizing Committee  
Nara Institute of Science and Technology  
Information Processing Society of Japan, Kansai Chapter  
Nara Convention Bureau

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**Proceedings of  
IAPR Workshop on  
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**IAPR**  ***MVA2002***

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# IAPR MVA2002

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## IAPR WORKSHOP ON MACHINE VISION APPLICATIONS

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## Message from the Workshop Chairs

It is our great pleasure to welcome all of you to the IAPR 2002 Workshop on Machine Vision Applications (IAPR MVA2002). This workshop is co-sponsored by IAPR, Nara Institute of Science and Technology, Information Processing Society of Japan, Kansai Chapter, and Nara Convention Bureau. While the first workshop was held in Tokyo, 1988, this is the eighth one in Japan and the first one in Nara, outside the greater Tokyo area.

Nara is a beautiful ancient city of World Heritage and a city of cultural and historical importance in Japan, having been the capital of the country in 710-784 A.D. There are numerous temples, shrines, statues, carvings and paintings, many of which are well-preserved and designated as important cultural assets and national treasures. The workshop site, Nara-ken New Public Hall, is situated in Nara Park, where you can also find famous historical buildings such as Todai-ji Temple, Koufuku-ji Temple, and Kasuga Grand Shrine. Nara park is also famous for its thousands of tame deer that roam freely. We hope you will enjoy yourselves at these traditional sites as well as acquire newer knowledge in advanced research studies.

Recently the area of vision applications has been growing in factory automation, medical diagnosis, security, intelligent transport system, geographic information system, human computer interaction, and wearable computing. Then, we have received more than 190 extended abstracts from 24 countries in the world. Among them 40 and 116 papers have been selected for oral and poster presentations, respectively. Unfortunately, however, some excellent papers have not been accepted due to the limitation of presentation slots. In addition to the accepted papers, three distinguished researchers have been invited to give their fruitful presentations. We thank those three speakers: Prof. Bernt SCHIELE, Prof. Jun-ichiro TORIWAKI, and Prof. Tieniu TAN, for accepting our invitations. We have also selected two papers from those presented in the 1992 workshop, which is most influential to the Machine Vision research field in this decade.

Organizing a workshop is a challenging and interesting job. We would like to express our gratitude to the members of the MVA Organizing Committee who have done such a wonderful job of organizing the MVA2002 workshop so successfully. Lastly, we express our hearty gratitude to all participants, and we hope that this workshop will be an informative and memorable one to all of you.



Mikio TAKAGI  
Co-Chair, MVA2002  
Science University of Tokyo



Masatsugu KIDODE  
Co-Chair, MVA2002  
Nara Institute of Science  
and Technology



Hiroyasu KOSHIMIZU  
Program Chair, MVA2002  
Chukyo University

# Most Influential Paper over the Decade Award

This award is given to the authors of papers appearing in IAPR MVA'92 which have been recognized as having had the most significant influence on machine vision technology over the subsequent decade.

## **A Real-Time Vision System Using Integrated Memory Array Processor Prototype LSI**

Yoshihiro Fujita, Nobuyuki Yamashita and Shin'ichiro Okazaki

**Abstract:** This study reports on the performance of a Real-Time Vision System (RVS) and its use of an IMAP prototype LSI. This LSI integrates eight 8 bit processors and a 144 Kbit SRAM on a single chip. Processors operate in SIMD at 200 MIPS (25MHz). The RVS was developed using 64 IMAP prototype LSI's connected in series in a 512 processor system configuration. Memory on the IMAP prototype LSI can be easily accessed from a host workstation through a VME bus. RVS performance is shown in real-time road-image processing and in a neural network simulation, as well as in low level image processing algorithms, such as filtering, histograms, Discrete Cosine Transform, and rotation. The RVS image processing is shown to be much faster than the video rate.

## **Qualitative Visual Interpretation of 3D Hand Gestures Using Motion Parallax**

Roberto Cipolla, Yasukazu Okamoto and Yoshinori Kuno

**Abstract:** We present an efficient and geometrically intuitive algorithm to reliably interpret the image velocities of moving objects in 3D. It is well known that in a small neighborhood the image motion of points on a plane is characterized by an affine transformation. We show that the relative image motion of a nearby non-coplanar point and its projection on the plane is equivalent to *motion parallax* and that it is a reliable geometric cue to 3D shape and viewer/object motion. In particular we show how to interpret the motion parallax vector of a fourth point and the *curl*, *divergence* and *deformation* components of the affine transformation (defined by the three points of the plane) in order to recover the projection of the axis of rotation of a moving object; the change in relative position of the object; the rotation about the ray; the *tilt* of the surface and a one parameter family of solutions for the *slant* as a function of the magnitude of the rotation of the object. The latter is a manifestation of the *bas-relief* ambiguity. These measurements, although representing an incomplete solution to structure from motion, can be reliably extracted from 2 views even when perspective effects are small. We present a real-time example in which the 3D visual interpretation of hand gestures or a hand-held object is used as part of a man-machine interface. This is an alternative to the Polhemus coil instrumented Dataglove commonly used in sensing manual gestures.

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