Vision, Image Processing *and* Sound

The Vision, Image Processing, and Sound (VIPS) laboratory of the Computer Science Department of the University of Verona is active in both basic and applied research in the fields of Computer Vision and Pattern Recognition, Image Processing, Human-Computer Interaction, and Sound Processing and Synthesis.

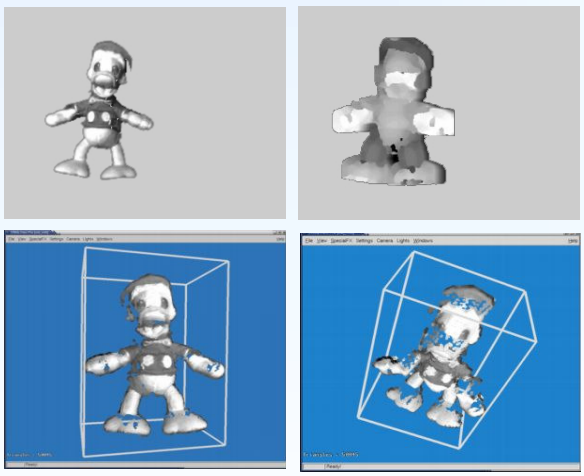
The acquired experience and know-how are applied in several projects, within the frame of consolidated collaborations between the University and other institutions, such as the European Commission, national and international research agencies, industry and public institutions.

The activities in VIPS are carried out by research groups which are mutually interacting. In order to share and compare the respective knowledge, the VIPS people get together in periodical meetings aimed at the dissemination of the acquired know-how and at the discussion of the common problems. This allows the professional growth of each member.

Research activities

The research activities carried out in the VIPS laboratory cover a wide range of subjects:

- **Image processing**: filtering, features extraction, segmentation, object recognition, scene reconstruction, security (watermarking), multi-sensory data analysis and fusion.
- **3D computer vision**: model acquisition from different sensors, structure from stereo, motion, calibration, multi-view registration and fusion, image mosaicing, 3D reconstruction, sequence analysis, tracking, metrology.
- **Pattern recognition**: shape and signal classification, face recognition and authentication, clustering, advanced analysis methods like neural networks, Markov chains (Hidden Markov Models and Markov Random Fields), Bayesian Networks and Support Vector Machines.
- **Human-Computer Interaction**: multimodal interaction based on vision, sound and gestures.
- **Sound Modeling and auditory display**: sound synthesis based on physical models, data auditory representation (data sonification).

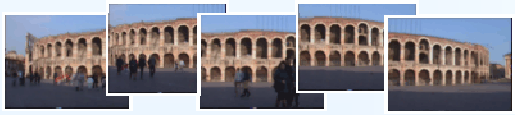


Applications

The VIPS staff know-how can be applied to several industrial fields, and can be useful in several contexts:

- Automatic inspection for the quality control of industrial products and processes: assembly control, packaging integrity check, faults survey, characters recognition and print quality, object , shape and size control.
- Robotic systems, autonomous vehicle navigation and driving assistance.

- Augmented/Virtual Reality supporting vehicle remote control into hostile environments (i.e. submarine or space).
- Human-Computer Interaction: multimodal systems, gesture, vision and sound.
- Video surveillance systems to monitor internal and external areas, hostile/suspect behaviors' recognition, distinctive situation notification (e.g. fires, accidents, etc.).
- Biometric security control: fingerprints and face recognition.
- Geographical entities extraction and classification from aerial images for Geographic Information Systems (GIS).
- Biomedical applications: 3D organs' reconstruction starting from echography, MRI, X-ray, tomography, etc.; analysis and modeling of proteins and DNA strings.



Projects

The VIPS laboratory activities include many kinds of projects such as exploratory, applied research and pre-competitive development, state of the art analysis, seminars and qualified technical consulting. The main projects under development are:

- ARROV - Augmented Reality for Remotely Operated Vehicles, funded by European Commission.
- Sob - The Sounding Object, Disappearing Computer project part of the IST Future and Emerging Technologies, funded by European Commission.
- SPADA - Spatial Data in GIS, funded by the Italian Ministry of Education and University (MIUR).
- AUREA - Augmented Reality for Teleoperation of Free Flying Robots, funded by the Italian Space Agency (ASI).
- LIMA3D— Low cost 3D imaging and modeling automatic system, funded by the Italian Ministry of Education and University (MIUR).

VIPS staff has furthermore conducted and acquired experience on a large number of concluded projects funded by European Commission, the National Research Council and some national private companies.

Contacts

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