

Applied Computer Vision R&D in Biomedical Imaging, Industrial Inspection, and National Security

Group Mission and Programs

The Image Science and Machine Vision (ISMV) Group was established in 1987 to develop technologies that provide human-like decision making capabilities for computers and robots. These methods and systems perform image-based metrology, scene analysis and comprehension, and archival image indexing and management. Today we form one of 9 R&D groups in the Measurement Science and Systems Engineering Division at ORNL.

Base Technology and Experience

The group consists of fifteen researchers with Electrical Engineering, Computer Science, and Nuclear Engineering backgrounds. We conduct applied computer vision research and development that supports U.S. industry, healthcare, and security through strategic partnerships. Our research encompasses image processing methods that include: image modeling; image transforms; dimensional metrology; object and region segmentation; statistical feature analysis; pattern classification; and content-based indexing and retrieval. We apply these methods to three programmatic areas as described below.

Biomedical Imaging

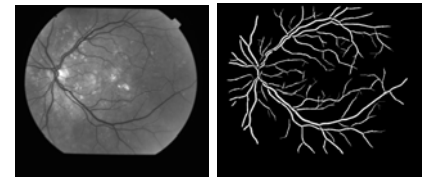
- Neuronal morphology and migration research for disease characterization.
- High-resolution tomographic medical imaging (x-ray CT and awake-animal SPECT).
- Content-based image retrieval (CBIR) and data mining for computer-aided medical diagnostics (ophthalmology, mammography).

Industrial Inspection

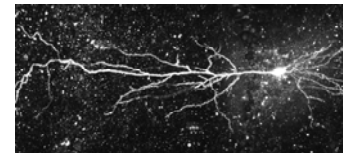
- Semiconductor metrology and inspection
- Manufacturing-based CBIR
- Energy reduction, waste mitigation, and QC

National Security

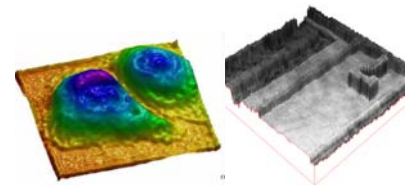
- Intelligent surveillance
- Advanced, multi-modal biometrics
- Nuclear materials verification/identification
- Geographic aerial image analysis



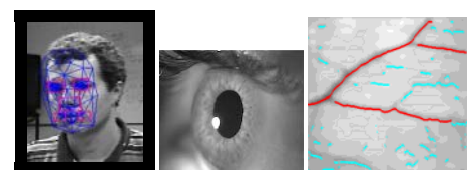
Retinal image analysis for diabetic retinopathy.



Neuronal image analysis.



Digital holography for bio-analysis and semiconductor characterization.



Intelligent surveillance and biometrics: face detection/ID, iris and vein-based ID.



The next generation of

Image Science and Machine Vision Group

Point of Contact:
Shaun S. Gleason, Ph.D.
Group leader
Oak Ridge National Lab
Oak Ridge, TN 37831-6075
Office: 865-574-8521
E-mail:
gleasonss@ornl.gov



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