NIRFAST is a user-friendly software package enabling volumetric imaging of optical biomarkers in tissue. Developed over the past 12 years through NIH funded research, NIRFAST has been used in over 100 publications on optical tomography and tissue optics. It has a large and growing user base and support community. It is now GUI-driven and enables seamless multi-modal image reconstruction and visualization.

Main Features
- Reconstruct 2D and 3D images of Fluorescence Activity, Hemoglobin Concentration, Oxygen Saturation, Water and Lipid Content, and/or Scattering Parameters in Arbitrary Tissue Volumes.
- Work directly with standard CT/MRI/US DICOM images using ITK routines developed by Kitware Inc., for integrated multi-modal optical imaging.
- Model diffuse light fields (fluence) in tissue.
- Use CW, hyperspectral, frequency domain, and/or time domain data.
- Annual training workshops, collaborations with code authors, and community support network.
- Funded onsite visiting/consulting available.

Specifications
- Open source: Easily modifiable for your application.
- A Finite Element Method (FEM) package: For use in arbitrarily-shaped volumes (also includes BEM capabilities).
- Sophisticated multi-modal capabilities: Use the GUI and automated tools to segment internal tissue regions in DICOM images. Then, create 2D or 3D meshes from these for image reconstruction with one click.
- Includes the latest tested advances in DOT image reconstruction: Spatial priors, spectral constraints, frequency domain and time resolved algorithms.
- Multiple light propagation models: Diffusion approximation and simplified spherical harmonics.
- Parallelized code for large 3D problems.

Applications
- MRI-guided Breast Spectroscopy
- Brain Activation Imaging
- Molecular Luminescence Imaging
• Use automated segmentation tools to identify different tissue types.
• Manual editing tools allow touch-up using paintbrush, hole filling or dilation features.
• Users can write a simple script to mark source and detector locations, or these can be added manually in the GUI.

• Once segmented, one-click process will generate a 3D FEM mesh for image reconstruction and light modeling. The resulting mesh is multi-region, and preserves the surfaces of each region. Advances users can specify parameters such as desired element size, quality, and facet angle.

• To use first install both the NIRFAST and Nirview packages (www.nirfast.org).
• Create a mesh from a 3D stack of medical images by launching Nirview and opening the images.

• Meshes are used by the NIRFAST interface in computing forward light fluence data and reconstructing images from experimental measurements.

• NIRFAST includes tools for visualizing large 3D meshes and solutions, providing 3D volume renderings and 2D orthogonal slice views. The original medical data can be overlaid with the optical solution.

Full tutorials available at: http://nirfast.googlecode.com