Biomedical Imaging: Engineering Leadership

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Imaging Activities

- Imaging Fundamentals to Applications
- Fundamentals
  - Data modeling, random processes
  - Optimization, algorithm development
  - Implementations
- Imaging Science and Engineering Program
- Applications
  - Military imaging: radar, infrared, optical, target recognition (ESSRL, CST)
  - Industrial: computer vision, biometrics (CST)
  - Medical: X-ray CT, PET (ESSRL, Radiology)
Interdisciplinary Biomedical Imaging

- Positron Emission Tomography: Michel Ter-Pogossian, Marc Raichle, Don Snyder, Jerry Cox, Mike Phelps, Mike Welch, others
Interdisciplinary Biomedical Imaging

- Positron Emission Tomography: Michel Ter-Pogossian, Marc Raichle, Don Snyder, Jerry Cox, Mike Phelps, Mike Welch, others
- Gamma Ray Cameras: Jerry Cox, Ken Larson, J. Eichling, B. Siegel
- Maximum likelihood imaging for PET: Don Snyder, Mike Miller, Tom Miller, Lew Thomas, Jerry Cox
- Computational Imaging for SPECT: D. Snyder, M. Miller, T. Miller
- Computational Deformable Anatomy: Mike Miller, Don Snyder, David Van Essen, graduate students
- Computational Microscopy: Don Snyder, Chrysanthi Preza, Jose Conchello, Jeff McNally
- X-ray Computed Tomography with Metal: Don Snyder, Jody O’Sullivan, Jim Blaine, Jeff Williamson, Bruce Whiting, Dave Politte
- Optical Diffusion Tomography: John Schotland
Biomedical Imaging: X-ray Computed Tomography

Imaging in the presence of metal

- Cervical cancer (brachytherapy)

- Cochlear implants
  Whitaker  B. Whiting, PI; M. Skinner

- Artificial joints, dental implants

- Micro-CT

- PET/CT Machines

- Impact on luggage inspection (CST)
Biomedical Imaging: 
PET/CT Machines

- PET/CT Machines
- CT images used for attenuation correction
- Streaking artifacts propagate
- New proposal to NIBIB
  J. A. O’Sullivan, PI, D. L. Snyder,
  B. Whiting, M. Mintun, R. Laforest,
  D. G. Politte, G. J. Blaine
PET/CT Artifacts:
Data from M. Mintun and R. Laforest

Dental implants in PET/CT

Artificial hip in PET/CT
Barium Artifacts:
Data from M. Mintun and R. Laforest
Interdisciplinary Biomedical Imaging

- World Leadership
  - Interdisciplinary aspect key
- SEAS—WUSM Collaborations
  - Strong historical foundations
  - Exciting future
- New Project: CT and PET → PET/CT