

Adaptive SPECT Prototype

We have designed and constructed a small-animal adaptive SPECT imaging system as a prototype for quantifying the potential benefit of adaptive SPECT imaging over the traditional fixed geometry approach. The optical design of the system is based on filling the detector with the object for each viewing angle, maximizing the sensitivity, and optimizing the resolution in the projection images. Additional feedback rules for determining the optimal geometry of the system can be easily added to the existing control software. Preliminary data have been taken of a phantom with a small, hot, offset lesion in a flat background in both adaptive and fixed geometry modes. Comparison of the predicted system behavior with the actual system behavior has shown excellent agreement.

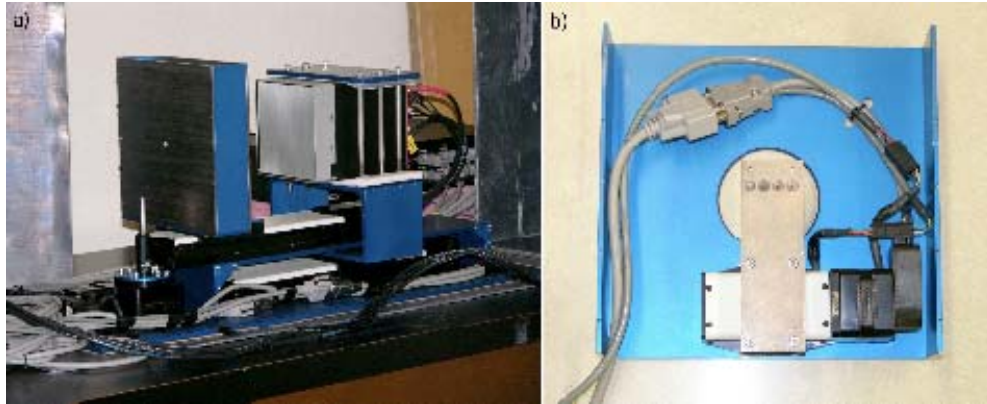
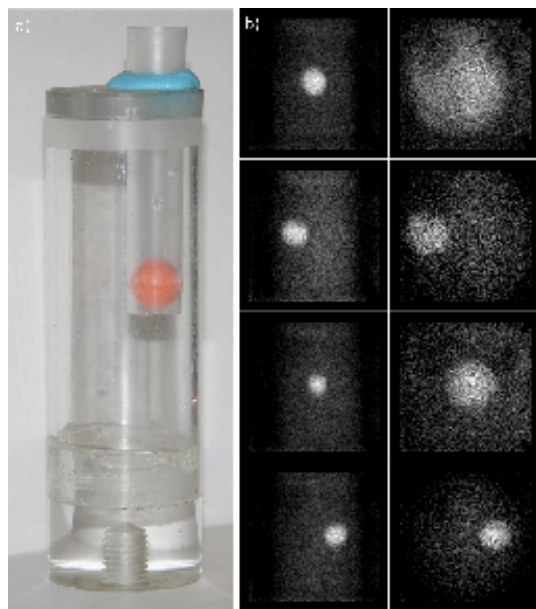


Fig 1. Images of the prototype adaptive imaging system: (a) the entire system, and (b) a closeup of the pinhole assembly.

Fig 2. (a) The phantom used to study the adaptive imaging system. (b) Projection images taken using a fixed geometry (first column) and using the adaptive geometry (second column). The signal of interest fills the field of view when the system geometry is able to adapt during data acquisition.



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