3). Digital Otoscopy Project

Problem statement, Area of investigation, Un-met clinical need, etc.

Ear infections in infants are a common ailment that can be diagnosed with an otoscope by a skilled pediatrician. Otitis media is a bacterial infection that can be treated by antibiotics however it is difficult to diagnose a bacterial infection from a viral infection (where antibiotics are ineffective). The response of the patient to treatment must be monitored over time to determine whether the treatment is effective or not. Recent advances in imaging permit one to capture an image of the tympanic membrane and evaluate it for diagnosis. Furthermore, longitudinal imaging studies of the infection permit the possibility of assessing the response to treatment. The opportunity is presented to analyze the images and quantify the degree of infection thus permitting a quantitative status of the patient and their response to treatment over time.

Project field:

A) Software
B) In vivo or experiments

Students will need expertise in image analysis. Being able to develop applications to run on iOS devices is a plus but not necessary.

Criteria for success or key milestones
The students will need to partner with a pediatric clinic or hospital and collect images of infected ears under approval of an Institutional Review Board (IRB). The partner physicians will assess the images for the identification and progression of the disease states. Based on the clinicians input, algorithms will be developed to quantify the condition of the patient. The algorithm would be then tested in the field with a new set of patients.

Other relevant materials or resources needed for the project.
Partnership with a Pediatric practice is essential for success. Images will be captured with Welch Allyn Otoscopes adapted to iPhones to capture images for analysis. Access to image processing algorithms and hardware to run them is essential.

Skills students will learn during the project if they are not already inherent.
Students will learn how to run a clinical experiment including preparation, IRB approval process, the collection of clinical data and the analysis of the data to generate image processing algorithms that may assist in clinical decision making.

Contact information: Jack Thompson (jmt248@cornell.edu)