

A 3D and Infrared infrastructure for multi-modal image acquisition in the pediatric intensive care unit

The measurement of tidal volume is a crucial marker for many patients suffering with ARDS or other respiratory infections. Patients that are invasively mechanically ventilated can have tidal volume accurately estimated by the ventilator, but for patients ventilated non-invasively using a mask or high flow nasal canula, the tidal volume estimations are usually incorrect due to high amount of leakage. For non-ventilated patients there is currently no widely accepted method of tidal volume estimation. The goal of this project was to develop a setup that will capture 3D images of the patients in the PICU and segment the chest and thorax to estimate the tidal volume. A camera setup comprising of a Kinect Azure RGBD camera along with a FLIR Lepton infrared sensor was used in the PICU setting to take images of the patients recruited in the study. The 3D videos were used to segment the chest and thorax of the patient and volume graphs were drawn using the frames. The thermal images are used to evaluate the thermal profile of the patient and assess their internal blood flow. In addition, they will be used to segment the 3D videos automatically by detecting the location of the thorax in the IR image and correlating with the 3D videos. The RGB videos were used to observe the thorax and the chest and check for signs of retraction. The videos and images recorded were used in several studies conducted at the hospital.