Data Analysis

The response of the barometric sensor and infrared proximity (IR) sensor to applied force is distinctively different. The barometric sensor shows a linear behavior to applied force whereas the IR sensor shows a non-linear behavior. Their behavior is consistently repeatable over a fix region of the finger over multiple days but are varying in an unpredictable manner over different regions of the finger. These variations are more dramatic for the IR sensor compared to the barometer sensor. Figure ?? shows the response of both the sensors with zero probing angle and maximum force of 30N and 50N.

To calibrate the finger sensor, or in other words to have a mapping from barometer and IR readings to actual force in newton we performed a number of tests as described in the previous section. As the combined nature of the signal from the sensor is highly nonlinear, to estimate a single function with a fixed number of parameters that will map the raw barometer and IR readings to actual force in newton is nontrivial. Hence we rely on Gaussian processes as a way to sample of out this function from a distribution of multi-variant functions from a space of infinite parameters.

It is critical to understand the location of the applied force on the finger since this mapping is different for different locations of the finger.