

Decision to Discard Previous Semester's Design

Although a significant amount of time and resources was invested in this project in previous semesters, our group has come to the conclusion that the most prudent course of action is to discard this prior work and move forward in a different direction. Careful consideration of the faults in the prior work was necessary in reaching this conclusion. The first consideration involved the ergonomics of the system, that is, how easily the client could begin its implementation. We noticed that, as the system now stands, the three infrared cameras must be repositioned and recalibrated, relatively randomly, after every session of use. This is not ideal, nor is it very scientific. To truly get the most out of the cameras would require careful deliberation and calculation as to where exactly to position them in order to obtain a maximum viewing area. Following determination of camera position, time and resources would be required to devise a mounting system, so as to achieve repeatability and sustained calibration. This mounting system would also require significant space somewhere within the clinic. Even with the mounting system in place, recalibration of the cameras might become necessary due to the fact that fairly small changes in camera position require a recalibration of the entire system. Furthermore, even with the cameras positioned in such a way that their viewing area is maximized, the nature of the system creates significant blind spots such as areas on an appendage facing away from the cameras. These spots not only limit the types of areas the client may measure with the system but also cause loss of data since any interruption of the signal detected by the cameras causes data collection to cease. In other words, if the LED tip of the marking stylus leaves the view of even one of the three cameras for even a short time, the data collection will halt and any subsequent motion of the stylus will not be captured. Therefore, the client must spend time positioning the patient such that no area of interest faces away from the cameras and such that all areas of interest fall within the viewing area of all cameras. A similar concern with the current system is immobilization of the patient during mapping. The patient must be immobilized throughout the mapping process because any movement of the area of interest will cause spurious readings by the cameras. Due to the spatial nature of the current system, very small movements of the area of interest can add up to significant inaccuracies in the final area calculation. Similarly, the clinician performing the mapping must do so with extreme care to avoid errors due to an unsteady hand such as the application of inconsistent pressure to the skin with the stylus, accidentally removing the stylus from contact with the skin and so on. Finally, the software components of the current system require a great deal of further refinement. For instance, the current algorithm used to calculate the area of the mapped skin frequently connects points which should remain unconnected and which are commonly far away from one another. This creates a large amount of area which does not reflect the true area of the mapped skin and this causes the calculated area to be much larger than the actual area. In addition, the software used to collect the data is distinct from that used to compile and analyze the data and in a final design a third distinct software would be required as the user interface. This gives the system a very steep learning curve and makes even simple measurements into unnecessary ordeals. To salvage the current system, we would have to consolidate the software and correct the known and unknown eccentricities of the area calculation algorithm. Such a task would not be easy for someone familiar with the software and algorithm but for those unfamiliar with either, such as our group, it would become nearly impossible.

We believe that the limitations of the current design are insurmountable and therefore we will have more success in meeting our client's needs by letting go of prior work and pursuing a novel design.