

## The Hovering Mouse --- DSC ---

### Benefits for Medicine/ Surgery

There was one scenario outlined from a famous doctor, who makes knee operations:

They do (with helpers) surgery on knees, where some internal injuries and disrupted tissues and cartilages are to be improved. (I remember, what was spoken 2-3 years ago:)

The setup of the operation uses a picture-gaining method, while the knee is fixed inside the detector volume and anesthetized locally. Ideally the knee does not move, and is fixed, to prevent any position shift. Minimal invasive tools are already inserted.

On a display several details can be seen: a picture of contours of the knee, tissues, vessels, bones, and some already inserted minimal invasive tools through small holes, who will be used a bit later for removing old tissue material. Altogether the picture on a (3d) display allows to localize the whole space structure of knee, biologic structures and tools. Maybe the operation does some carve-out of rests of tissues, who have no more the stabilizing function as before.

Now, software presets have to be done. As I got it, this is necessary, because the end points and coordinates of the carving tools have to be determined. This is the skills of the doctor, who must with cursors define, the volume and its borders, where the probe has to cut, while the biological details are visible. On old software the x,y,z triples of each point are done with an ordinary mouse, and the 3<sup>rd</sup> coordinate is switched over by tools. This implies clicks, to select and open windows, select and click tools, close windows, and vice versa several times. After anything is prepared, the cut work of knives, laser, or task, whatever it is, can be done. During the whole time the knee must not move or drift even the slightest minimum. If this happens, the end coordinates, which are guided through the detectors, shift relatively to the knee, and the accuracy of the cutting deteriorates. No healthy material should be violated.

The new tool, DSC, the hovering mouse, should lead towards a significant simplification of general navigation, reducing the number of steps and clicks substantially. With a new medical software, including the hovering mouse the primary software prepositioning work can be done in a fraction of time. A thoroughly new development of true 3d intuitive display and handling software has to be done at this point.

This reduces the time needed, and the time delay between start of fixing an array of several end coordinates and other presets, and begin of work reduces.

A general rule is, that the knee position relatively to its beginning position drifts statistically as a function of time due to minimum movements, muscle activity, or whatever. Therefore the accuracy and the quality of the operation increases with shorter needed overall time interval. (this is called time critical operation conditions)

We conclude: a benefit of the general simplification of 3d navigation in medicine can be shown.