

P-08

SMART DRY LAB: RECORDING OF SURGICAL TOOL OPERATION IN A TRAINING BOX USING AR MARKERS

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[Purpose] In order to use new medical equipment safely and effectively, it is necessary to train surgical skills. Although existing training boxes and kits provide basic psychomotor task training, they do not have means of evaluation. We propose a "Smart Dry Lab" – a patient model which provides the functionality of semi-automatic surgical skill evaluation.

[Method] Hardware of our system is equivalent to the existing training kits, except a web camera installed instead of a laparoscope. An AR marker is installed on the axis of a forceps. ARToolKit, an API for augmented reality, recognize the position and orientation of the AR marker using the camera. When a trainee operates the forceps, our software records the trajectory of the forceps, and estimates the length of trajectory after the task. To measure task completion time easily, we introduced a 'virtual stopwatch'. In the camera view, a virtual cube appears. By 'touching' the box by the forceps tip, the trainee can start/stop the measurement of trajectory.

[Results] Figure 1 shows an example of trajectory of a forceps, when a trainee performs excision task. The trajectory data was acquired in about 30 times per second. In this case, the trajectory length was 473.9 mm. The ARToolKit API could successfully recognize the marker, except when the marker was out of view of the camera.

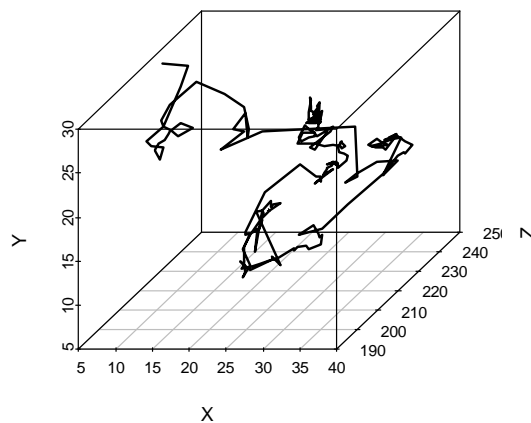


Figure 1. An example of trajectory of a forceps. Origin of coordinates is the optical center of the web camera.