









### 3.4. Process supervision

The automatically generated initial suture plan is presented to a supervising surgeon, which can modify the plan by moving/adding/deleting points/knots and changing the order of stitching. After the surgeon approval the assisting robot can proceed to plan and execute individual point operations, while the surgeon continuously observes a current action of the robot, next actions' plan and suture tension. Moreover, he/she is authorized to correct the robot at any moment. All actions of the assisting robot and sensory data are carefully recorded for future analysis. Using artificial machine intelligence, we can improve outcomes of surgical procedures and significantly reduce surgeon fatigue.

### 4. Conclusions

This paper presented initial stages of autonomous supervised suturing including a wound boundary detection and exit/entry points generation, that are followed by knot points allocation, being specific to particular selected technique and parameters. Our future work is to adopt the existing methods in needle path planning and integrate them into our framework to evaluate performance on KUKA iiwa robot using haptic feedback and a ZED camera stereo vision for a wound profile reconstruction.

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