In this paper a robotic system for sewing a stent graft is demonstrated. And we successfully shows that how the sewing skills (needle trajectory) can be learnt using learning from demonstration technique and later adapted to needle posture changes by the assistance of visual guidance(needle posture redetection). The effectiveness of our method is tested by using two experiments: fabric piercing and needle regripping, which are the two critical parts for completing one sewing stitch.

There are also some points that we do need to improve. Firstly, we are moving from single robot sewing to multiple robots collaborative sewing, making tasks with complex sewing trajectory easily achieved and also optimize each robot’s joint utilization. Secondly, our system works as an open-loop manner for the needle adaption part. Tracking the needle in real-time and implementing visual servoing algorithm is desired to increase the sewing accuracy. Thirdly, the sewing presented is conducted in traditional way with needle drivers, in the future, customized sewing device will be designed by us to replace the needle holder to drive the needle performing fine movement. Last but more importantly, applications of the presented system and method are not limited only for stent graft sewing; it is also a promising technique for automating robotic suturing.

%As soon as the needle tip comes from the fabric, the needle is released and it stay in the fabric. The robots then goes to grasp the needle tip and takes it out from the fabric. Due to the deformation of the fabric, the needle cannot be kept in a good posture for regrasping. In the experiment, we take another needle driver to hold the needle in place after releasing. In the future, we will use another robot to perform the regrasping task, and therefore the needle posture could be maintained during regrasping.