A thread feed control for embroidery

Graduate

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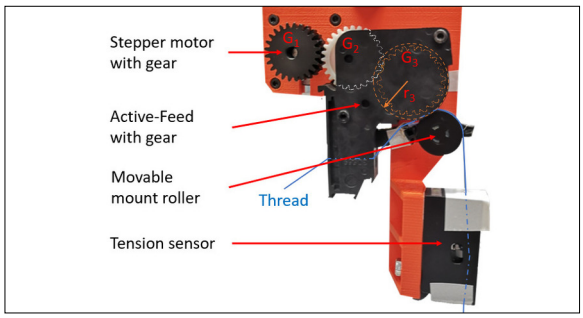
Introduction: Bernina sewing machines control the positioning of the knot by the relative tensions of the upper and bobbin threads. However, the machine generally lowers the upper thread tension relative to the bobbin thread during embroidery. This prevents the bobbin thread from being pulled onto the front of the fabric. The lowered thread tension imposes a limit to the maximally achievable embroidery speed. An alternative method of thread feeding is to actively feed the correct amount of thread into the system (called Active-Feed). This could allow the speed limit to be increased.

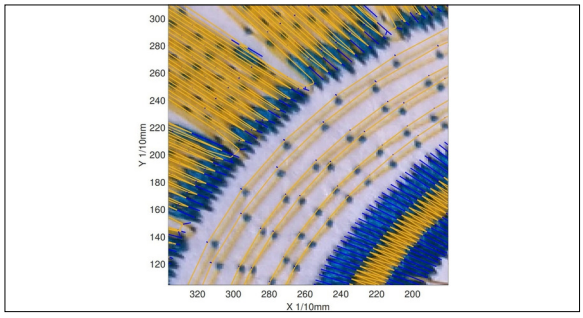
Approach / Technology: This thesis aims to provide an Active-Feed prototype as a platform for future testing and research. For this purpose, a rapid prototyping system was adapted and extended. Further, a 3D print combined the Active-Feed with the sewing machine.

Conclusion: Initial tests have demonstrated that the implemented platform can be used to perform and analyse tests. Furthermore, an algorithm was developed to calculate the required thread length for the next stitch. The embroidery patterns produced with the algorithm show that active unwinding has the potential to make the machine run faster and without errors.

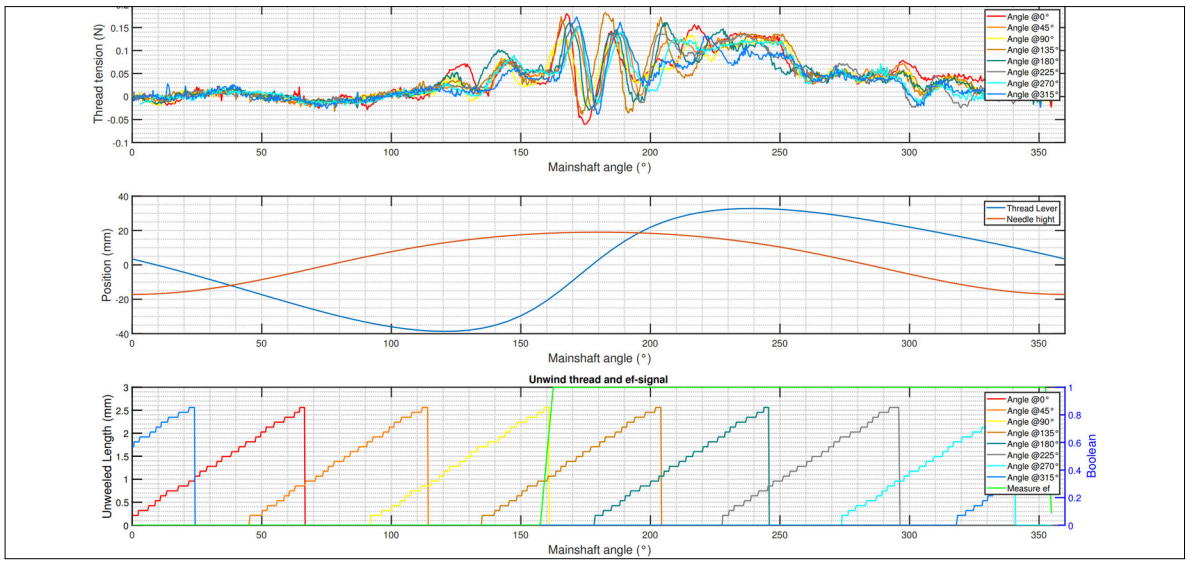
Active-Feed with the tension sensor.
Own presentment



An overlay of the prediction and produced embroidery pattern (backside).
Own presentment



Upper thread release for different release angles.
Own presentment



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