Before choosing on how to print, the production processes of a hand orthosis (including fingers) were thoroughly examined in this project. The smartest choice was to print the hand separately in large portions and then reassemble it because it was easier to print and prevented us from making mistakes. Because of their simplicity, the elements employed in the design of the hand orthosis were chosen, elements such as Autodesk Inventor 2021 for the hand orthosis design and Prusa 3 for the 3D printing of the hand orthosis design.

There are many methods for creating assistive orthosis but the one we would focus on in this project is to employ a soft cable and a linearly operated electric motor. These devices don't use hard kinematic constraints; instead, they use tensioned wires to impart forces to the segments of the fingers. The way these wires deliver forces to the fingers is broadly comparable in previous designs, with Kang et al glove's serving as an example, displayed in the fig 1.1 below.



FIG 1.1

In flexion, cables are routed along the palmar surface of the finger, whereas in extension, cables are routed along the dorsal surface of the finger, as shown in Fig. 1.1. Torque is generated at each joint as a result of the cable's tension and the fact that it does not travel through the joint axis.

A semi-rigid cable is used to assist with flexion and extension by pushing and pulling on the fingers. Although it's uncertain how effective this simple strategy is based on their research, a commercial rehab glove, the Gloreha (Idrogenet srl., Lu (Baronio, Harran, & Signoroni, 2016)mezzane (Brescia), employs a similar strategy. Tendon-based systems have some disadvantages over rigid systems. For example, because they use a single cable to generate an applied torque, they apply unsupported translational loads on the joints.

# References

Baronio, G., Harran, S., & Signoroni, A. (2016). A Critical Analysis of a Hand Orthosis Reverse Engineering and 3D Printing Process. *Applied Bionics and Biomechanics*.