

The User Experience of Wearable Skin Stretch Haptic

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Skin stretch is a unique haptic stimulus because it is such a familiar, all-encompassing sensation in daily life. For example, the massage of one's arm or the deformation of the skin during movement. Despite this familiarity, skin stretch is difficult to reproduce artificially on the body in ways that are functionally effective, while also maintaining a positive user experience. In pursuing the development of a skin strain device, a designer must actively engage with users and their opinion. This focused qualitative approach is missing in the skin stretch literature, leaving a great deal of intriguing design information left unstated in the literature. This gap hinders the ability to optimize skin stretch for human use. To address these challenges, a garment-based skin stretch system was developed, tested, and refined. A mixed methods approach was used to allow for testing of the system while also gathering comprehensive experiential feedback from the participants. Traditional apparel manufacturing methods are used to create a forearm device capable of providing skin stretch on the forearm. A reconfigurable hook and eye actuation system using shape memory alloy actuators provides the stretch stimulus, and a silicone back layer to anchor the device to the skin.

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Figure 1. Initial Testing Prototype

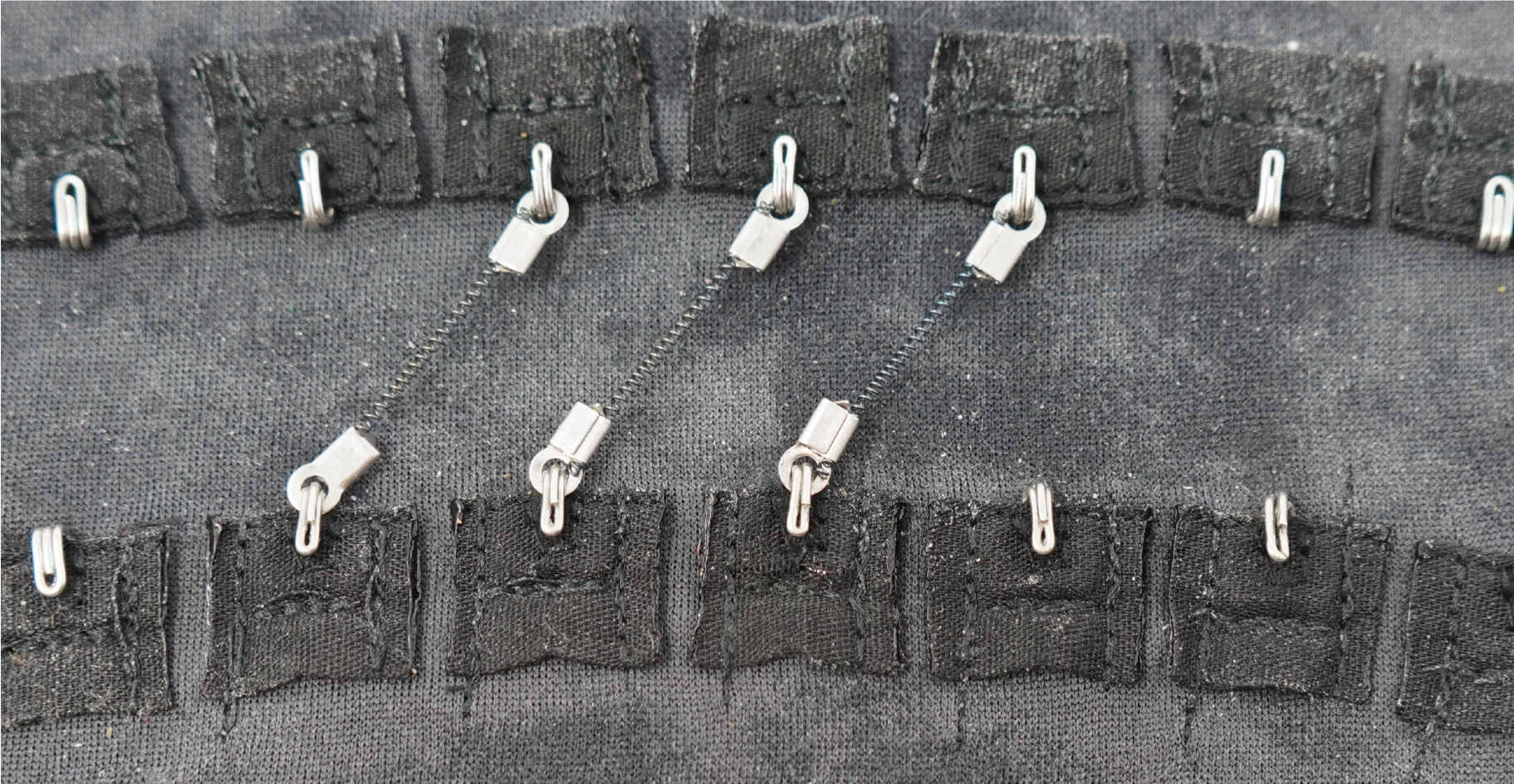
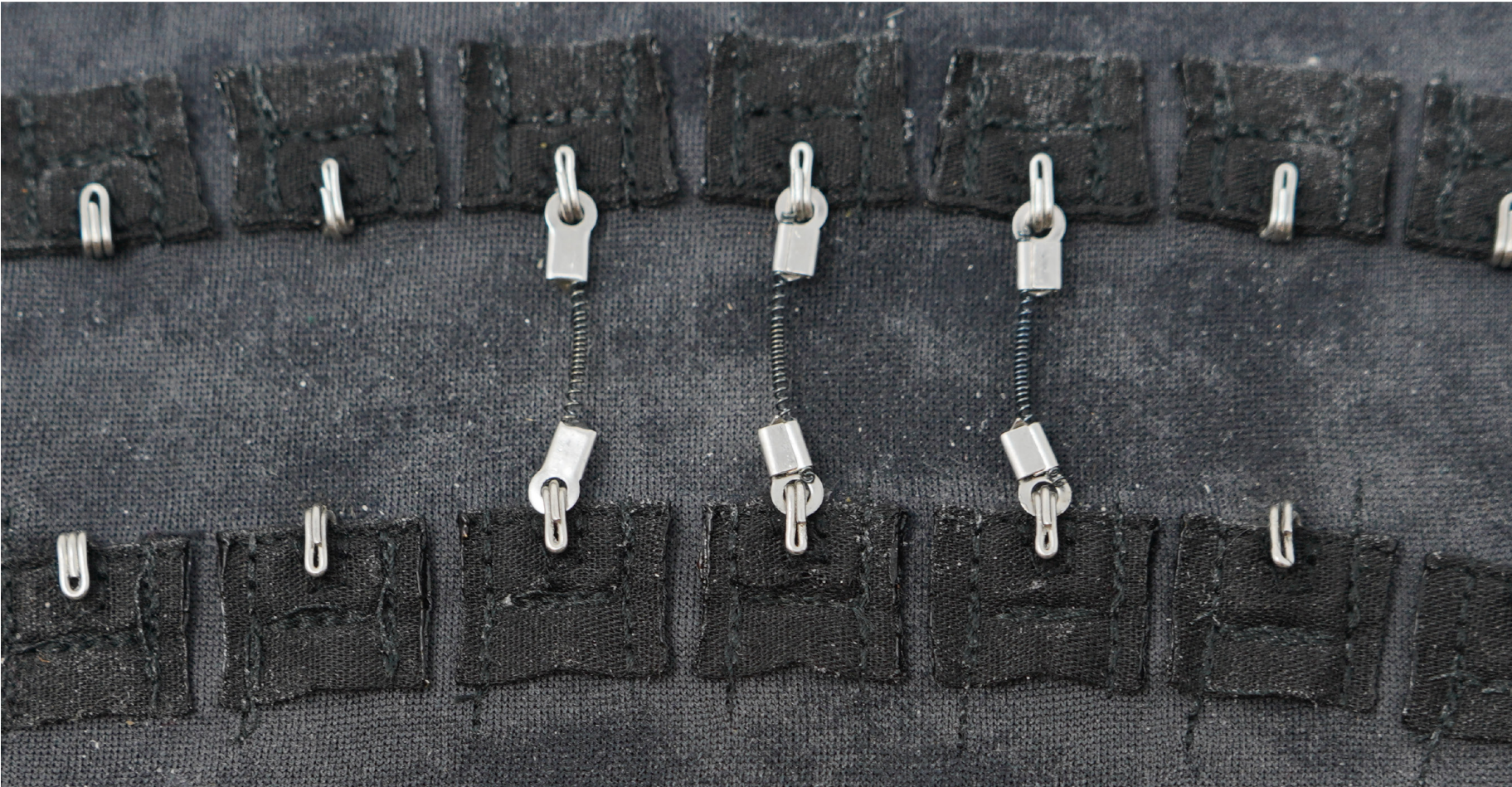


Figure 2. Close Up Photo of Actuation System

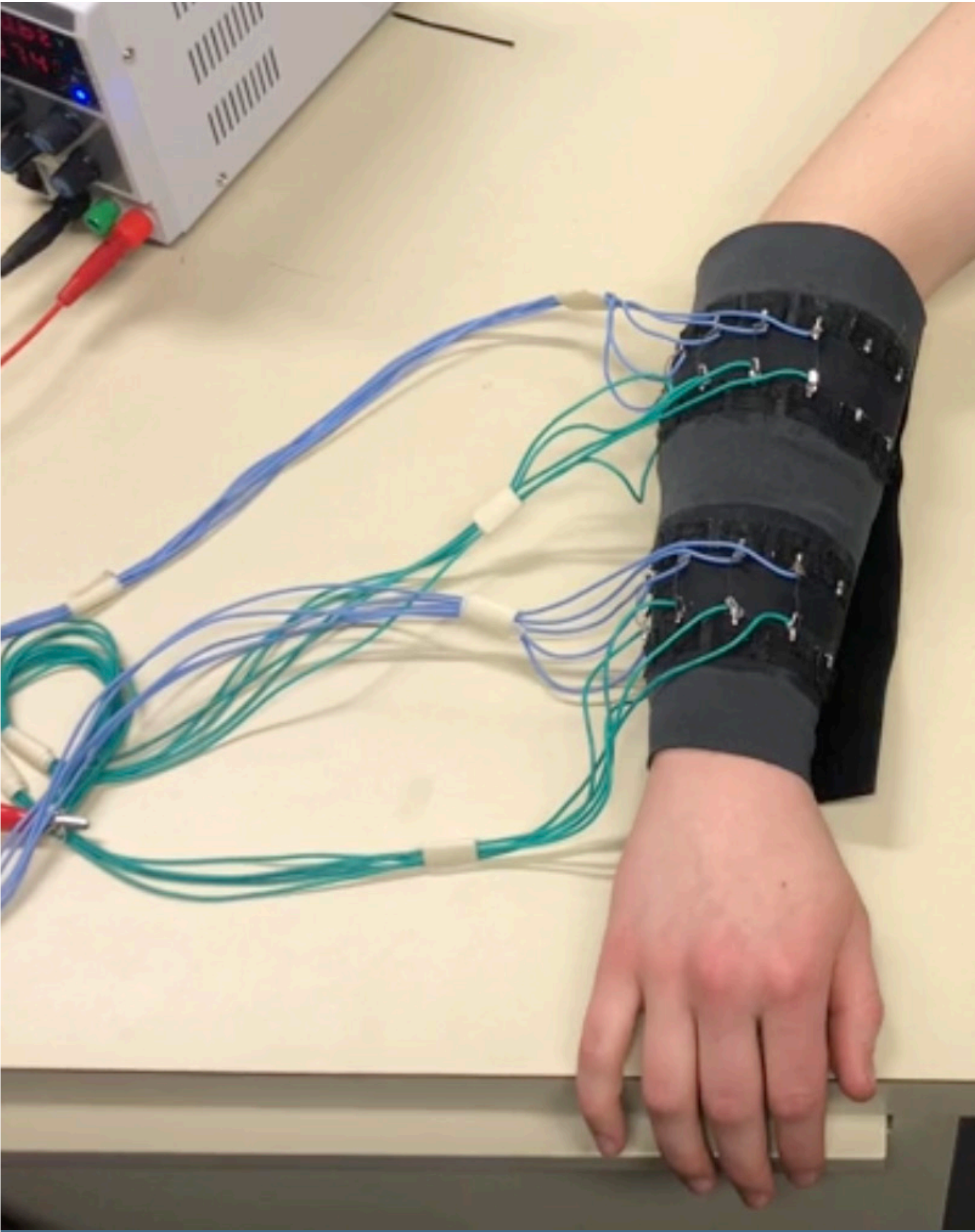


Figure 3. Prototype Worn During Testing

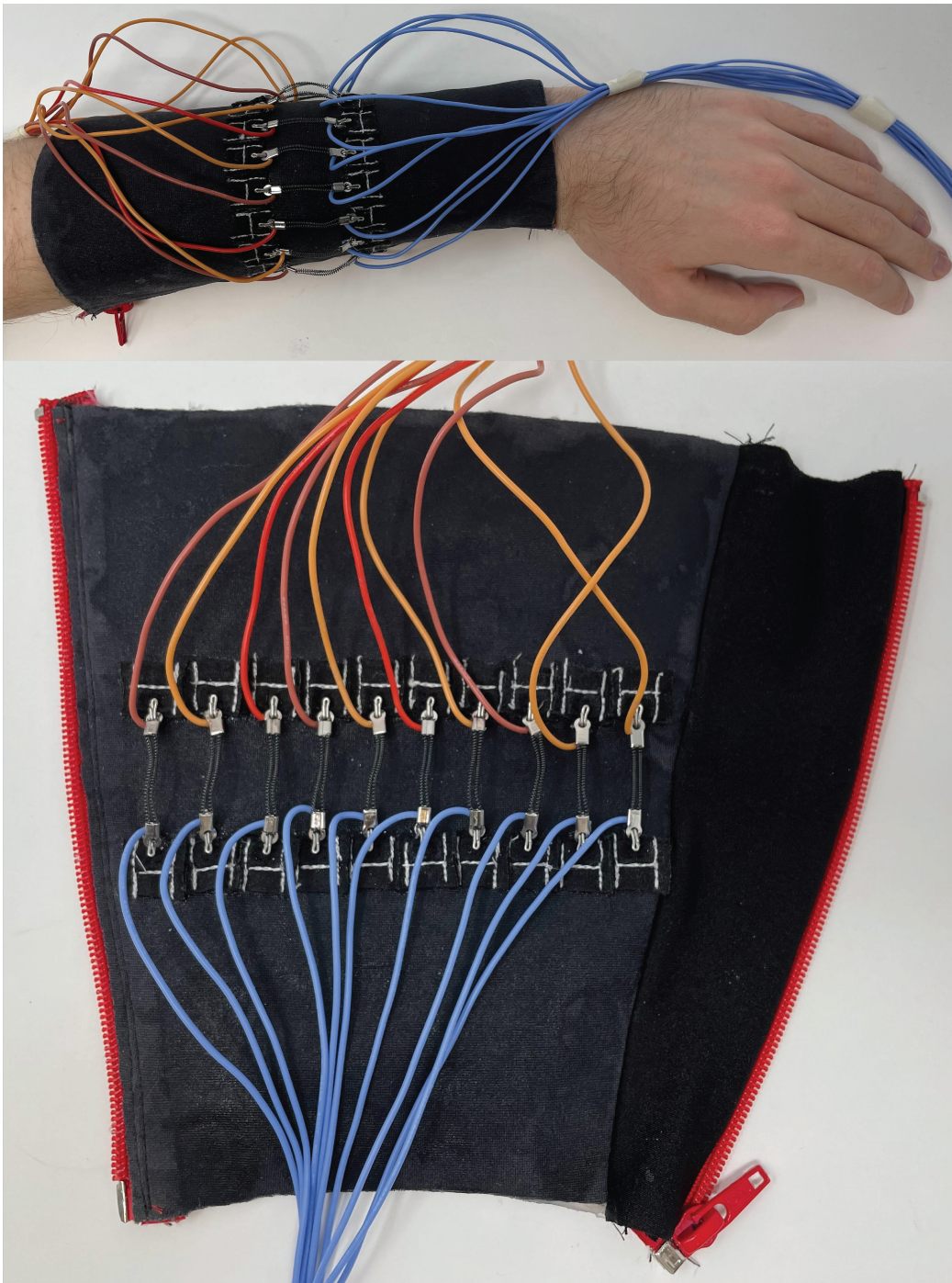
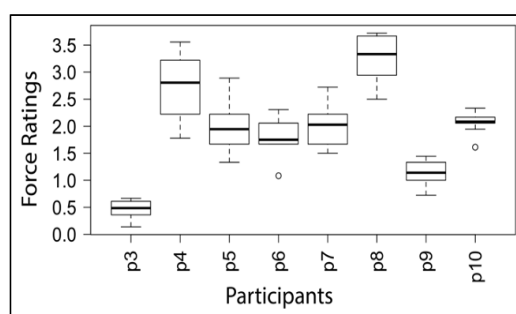


Figure 4. Refined Testing Prototype



Primary Descriptors	Secondary Descriptors	Unique Descriptors
Localized Squeeze/Pinch - 6	Tickle - 3	Cat Licking Arm - 1
Poke Followed by a Tug - 5	Twisting Pinch - 1	Ants Crawling on Arm - 1
Pulling/Pushing of Skin - 5	Reverse Pinch (Expansion) - 1	Arm Falling Asleep - 1
Finger Press/Poke - 4		

Descriptors
Moving Touch (push, drag, roll) - 4
Squeeze/Pinch - 3
Pat/Depression - 2
Rubbing Circles - 1

Figure 5. Testing Data Results