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Resistiver textiler Touchscreen

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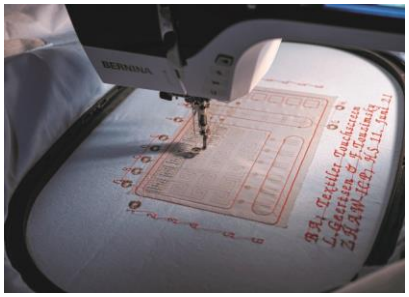
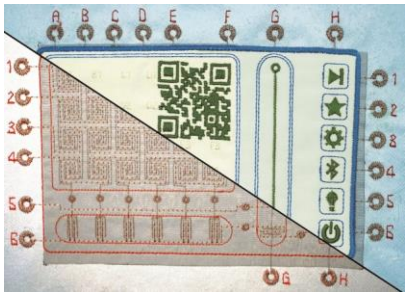
If one would ask about smart textiles a few years ago, barley anyone could tell something about them. Today this is a completely different story and smart textiles are a booming technology. Smart textiles is a generic term for materials with textile properties that have more advanced functionality compared to traditional fabrics. Modified by modern manufacturing processes and innovative materials smart textiles allow applications, which go beyond traditional garments or vintage furniture covers. Sportswear that tracks vital functions, high-tech fabric for car interiors that heat up or cool down the driver depending on outside temperatures or textile interfaces that allow communication between man and machine by registering human contact. This thesis aims to manufacture exactly such sensors in a economic way by using established materials and production processes. While spreading some light on the functional principle of said sensors, this documentation describes the manufacturing process and evaluation of a vast variety of prototypes. With the ambition to demonstrate that commercial embroidery machines have the ability to process conductive yarns in shape of numerous electrode designs into resistive fabrics, capable of detecting human touch. Purposefully designed experiments have shown, that it is not only possible to sense the exact location of contact but also the amount of applied force. Furthermore, a prototype of a textile touchscreen was engineered during this project that is not only is capable of multitouch detection, but is also able to capture movement patterns, like the commonly used swipe gesture and visualizes them on the computer. A secondary textile layer rounds up the prototype and instructs the user on how to interact with additional elements by descriptive embroidered symbols. Hence this interface shows how smart textiles can be seamlessly integrated into nearly any textile design without losing its flexibility or tactile structure. This thesis demonstrates, that many new functional features can be reproducibly integrated into fabrics, offering an entire new range of possible applications for textiles.



The embroidery machine stitches the final electrodes on top of a resistive textile mesh



Prototype in three layers: Two layers of embroidered electrodes with conductive yarn and a protective top layer for the user interface with embroidered symbols.