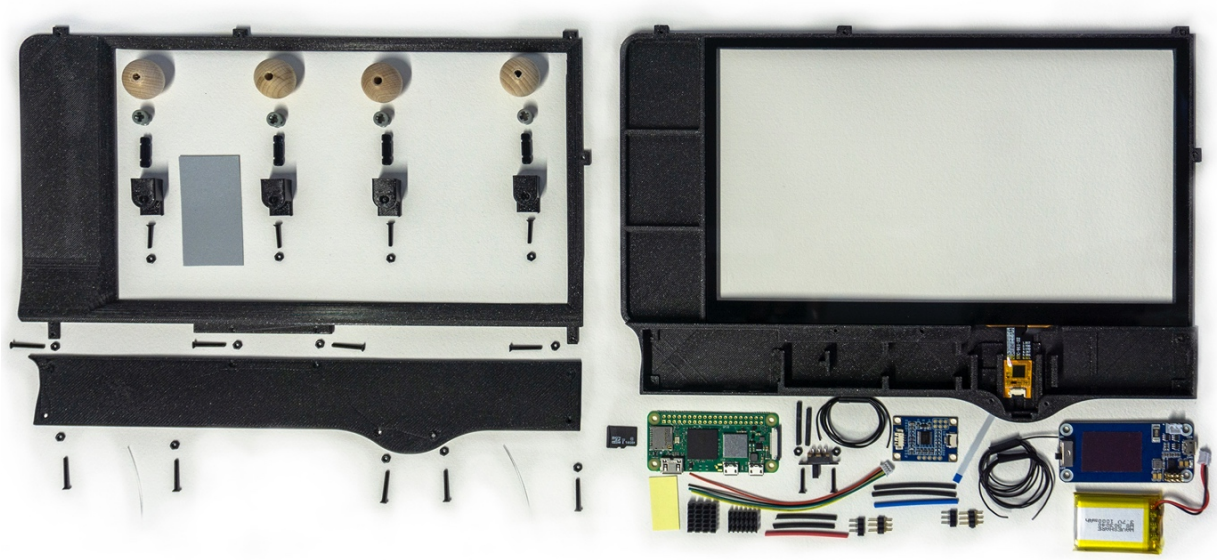
Step-by-Step Building Instructions

Transparent Touch Tablet

INTERACTIVE MEDIA LAB DRESDEN

This document contains additional information on how the transparent touch-enabled hardware prototype of our research work CleAR Sight is constructed. For this purpose, all components and a series of detailed photos with all essential fabrication steps are provided that allow to replicate the hardware device. All related software components can be found on our project website. For more details, please refer to our publication:

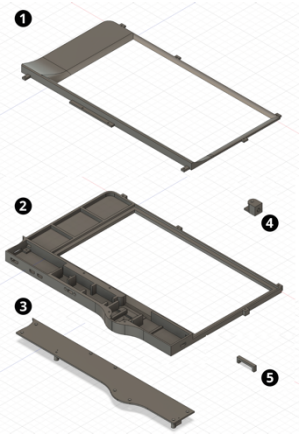
CleAR Sight: Exploring the Potential of Interacting with Transparent Tablets in Augmented Reality
Katja Krug, Wolfgang Büschel, Konstantin Klamka, Raimund Dachselt
In 2022 IEEE International Symposium on Mixed and Augmented Reality (ISMAR). ISMAR '22.
Project Website: imld.de/clear-sight/



List of Required Parts

RaspberryPi Zero 2 W Raspberry Pi Foundation (SKU: 19906)	**UPS HAT For Raspberry Pi Zero**, Stable 5V Power Output, Waveshare Electronics (SKU: 19739)	**10.1'' USB Capacitive Touch Panel Screen** Controller for Raspberry Pi, EastRising Technology Company (SKU: ER-TPC101-3-USB)
1x micro SD card (16GB)	1x Thin wire LiFY (0.8mm)	1x Screen Protector Foil
2x heat sink with adhesive	2x Swiss connectors (3 pins)	1x JST 1.25 connector cable (4 pin)
9x M2 screws (long, l=16mm)	1x Shrinking tubes (small)	1x Base housing cover (3D-printed)
6x M2 screws (short, l=12mm)		1x Base housing cover electronics (3D-printed)
15x M2 nuts	2x Fibre, d=0.75mm	1x Base housing (3D-printed)
4x Lego Technic, Axle 2L (3704)	1x Sheet of reflective material	1x Flex cable clip (3D-printed)
4x Lego Technic, Bush (3713)		4x Base housing marker clip (3D-printed)

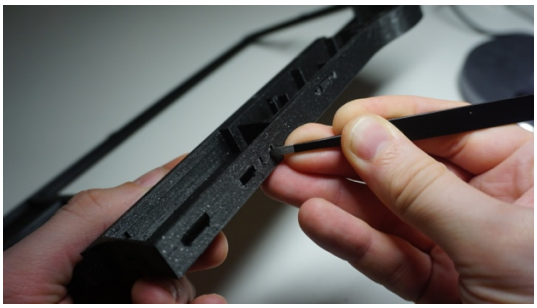
3D-print all required parts (Case)



3D Models (STL-Files)
1. base_housing_cover_variant_A.stl
2. base_housing_variant_A.stl
3. base_housing_cover_eletronics.stl
4. base_housing_marker_clip.stl
5. flex_cable_clip.stl

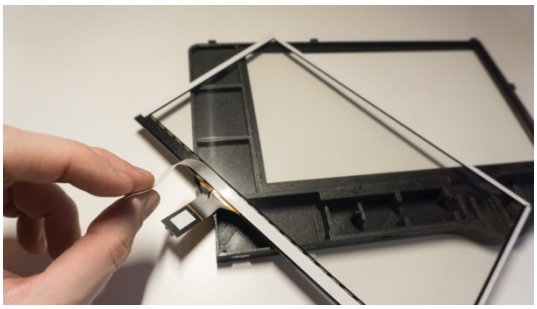
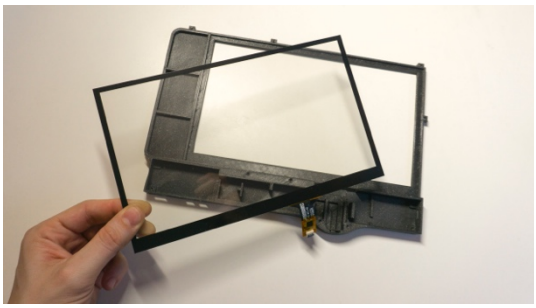
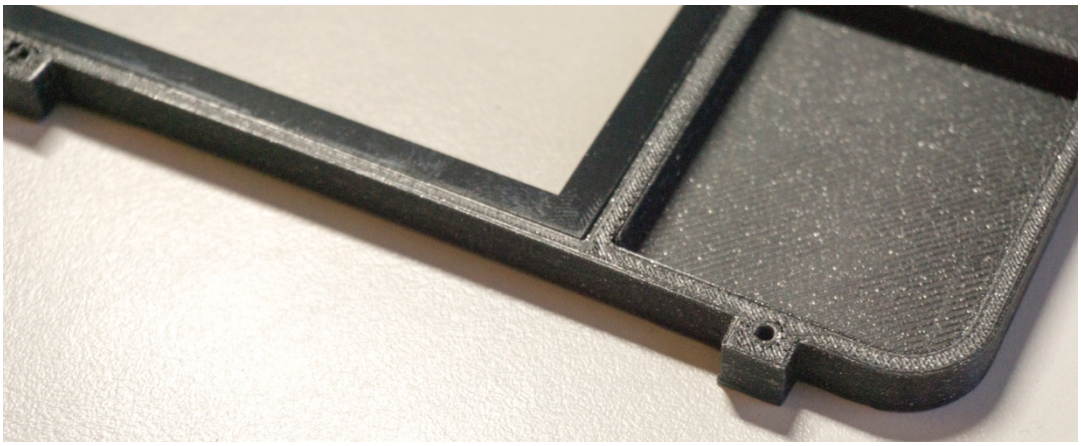
All parts can be made with normal plastic filament (e.g., PLA or ABS) on a standard FDM 3D printer with a build plate that can print at least objects with a size of 29 cm x 21 cm. Please use support material if needed.

Remove support material & sand 3D-printed parts (Case)

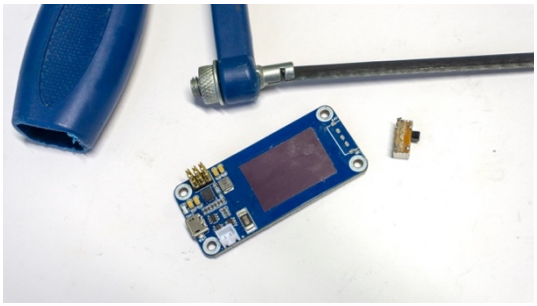
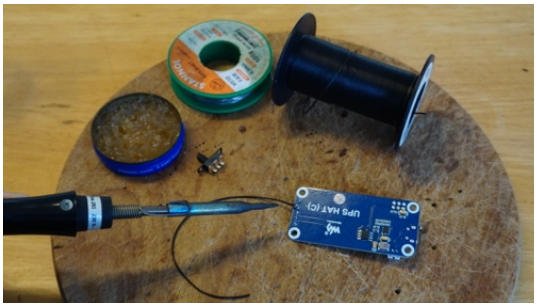


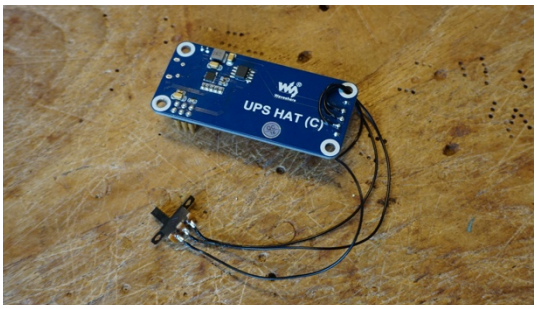

Hammering case nuts (Case)


Place touch panel in case (Capacitive Touch Panel)

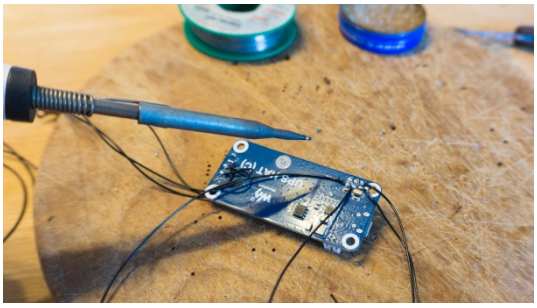
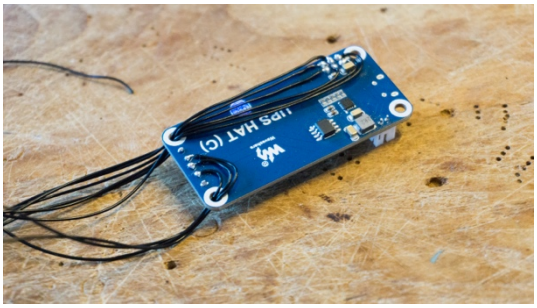




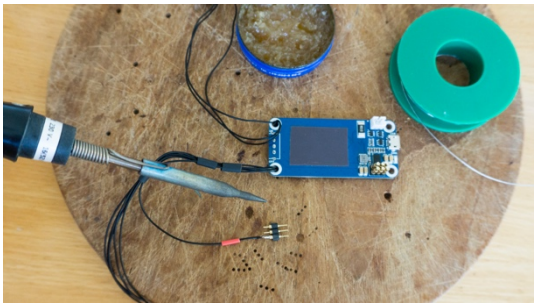
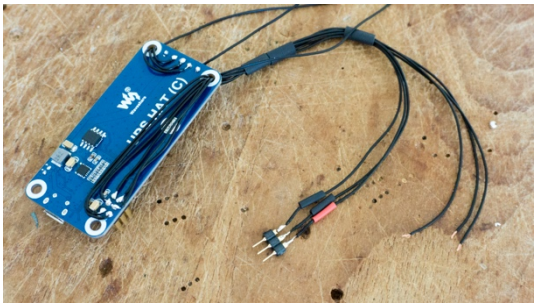
Relocating the power switch (Battery Shield)

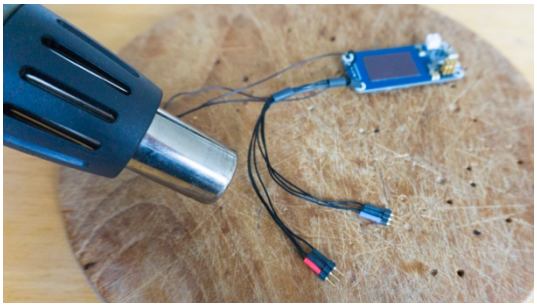
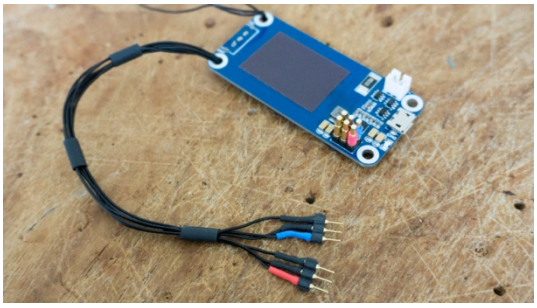





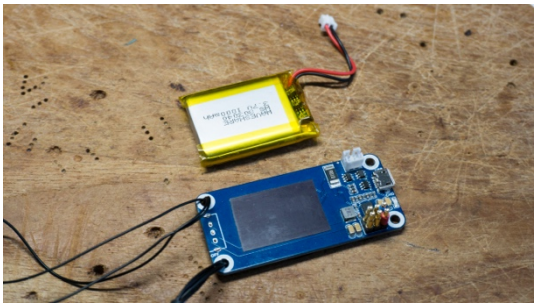
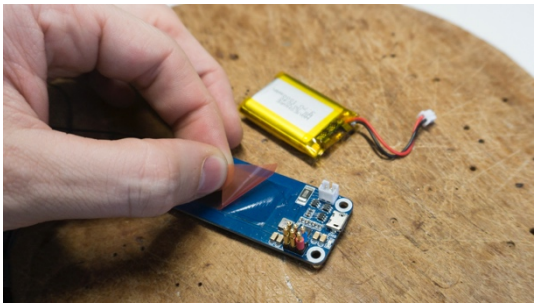
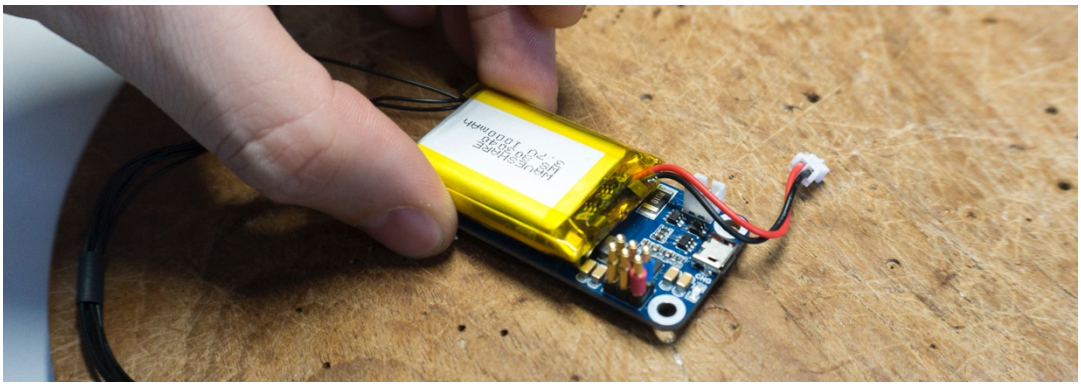
Break out power and I²C connections (Battery Shield)

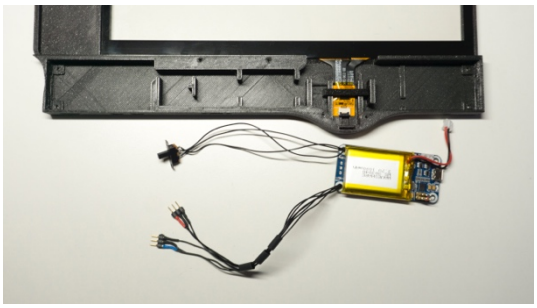



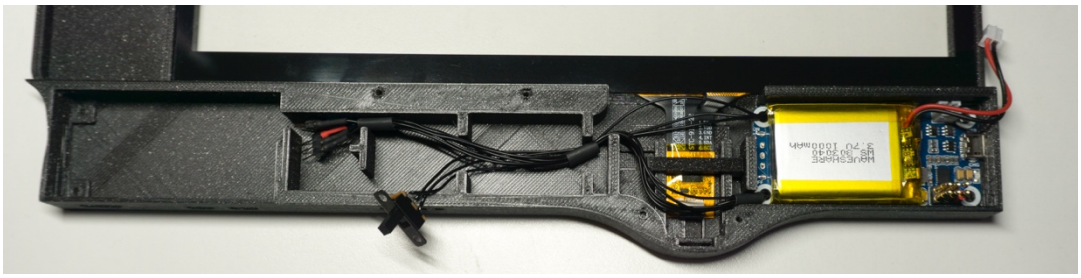



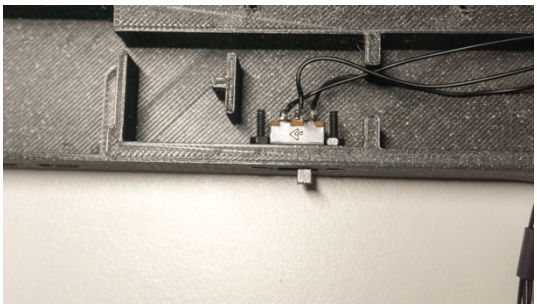
Add battery (Battery Shield)

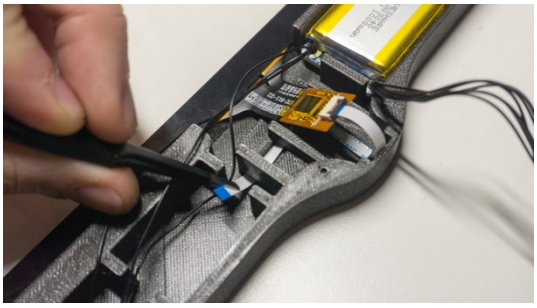
Insert battery shield in case (Battery Shield & Case)

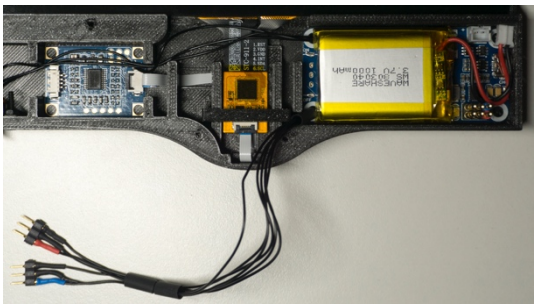






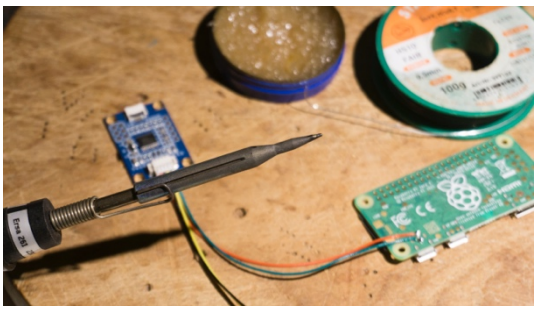
Connect Touchscreen to HID USB board (Capacitive Touchscreen)

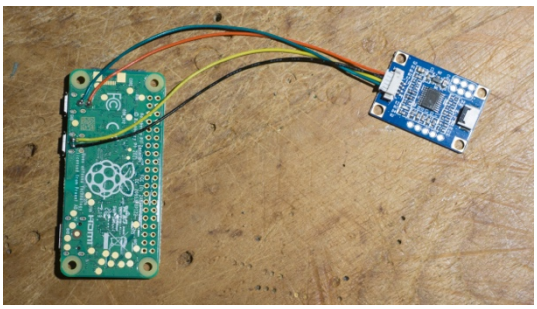


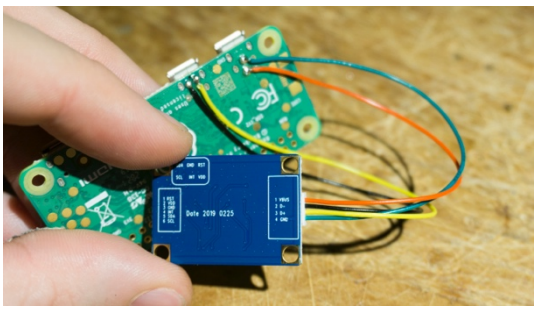


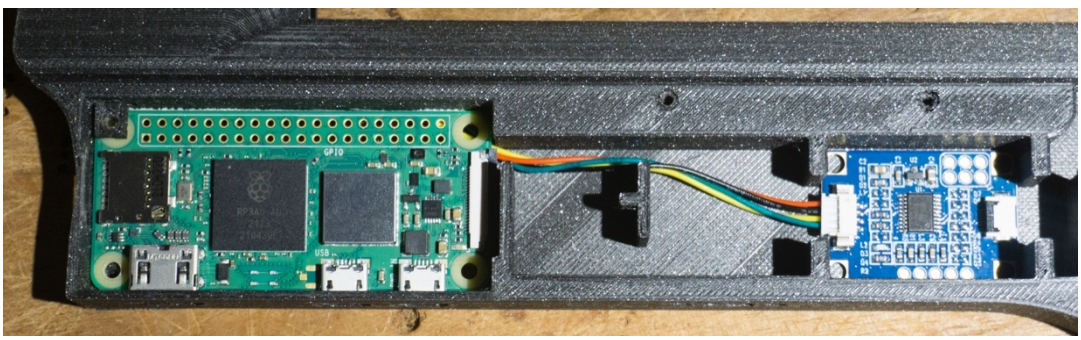
Connect the flex PCB cable
Carefully lift up the connector board and guide the flex cable along the prepared clips. Please do not bend or fold the cable too strong to avoid any signal breakage. The blue sides of the cable should face upwards. Please use ESD safe tweezers and be careful when opening and closing the board flex connectors.

Solder Micro-JST 1.25mm 4 Pin USB connector (RaspberryPi)



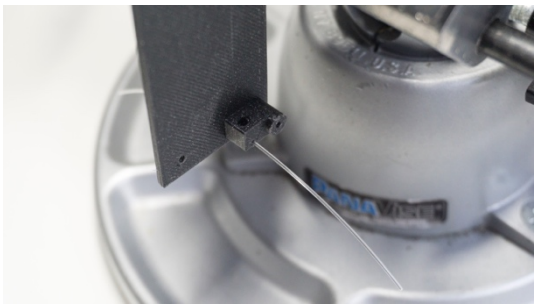


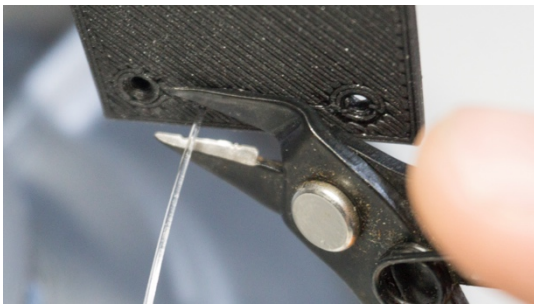




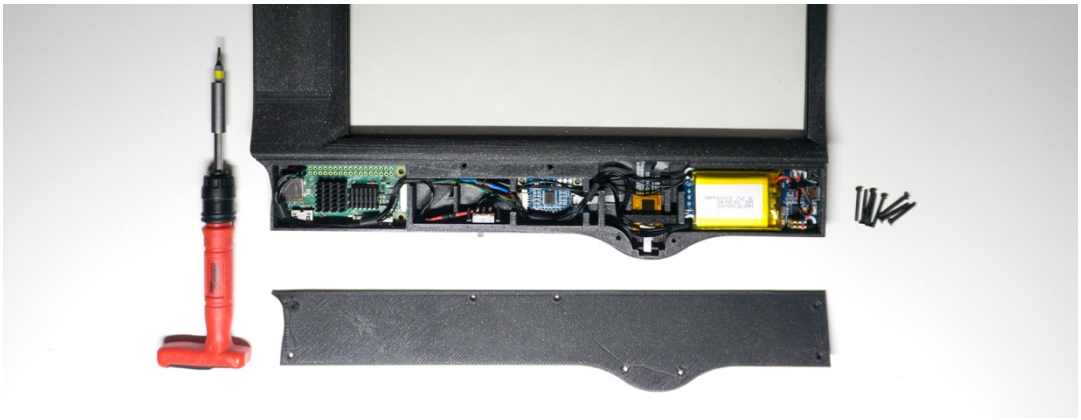
Create LED spots with fiber (Case)

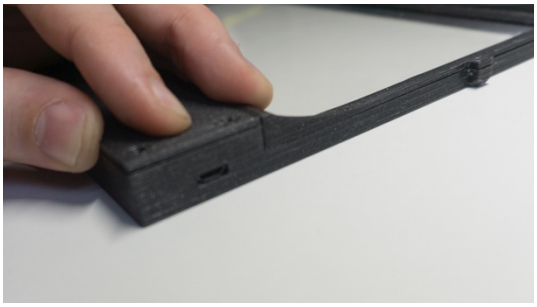


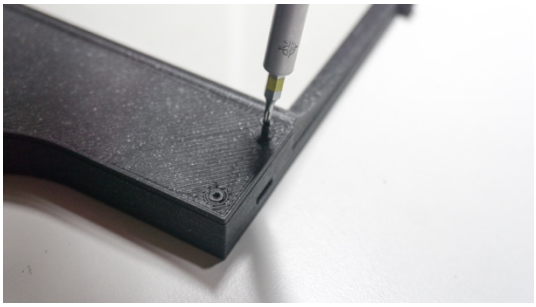


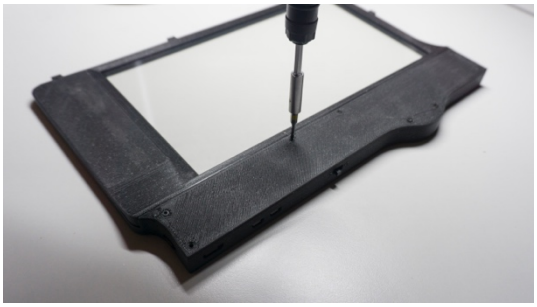



Close prototype (Case)

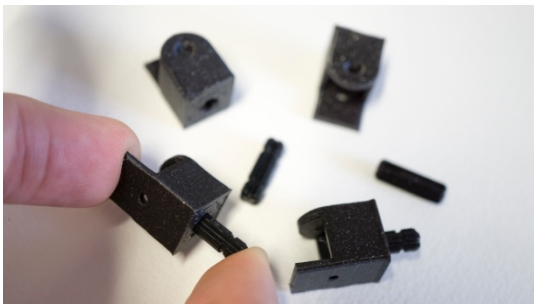


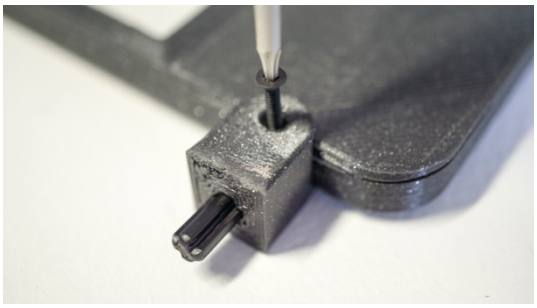


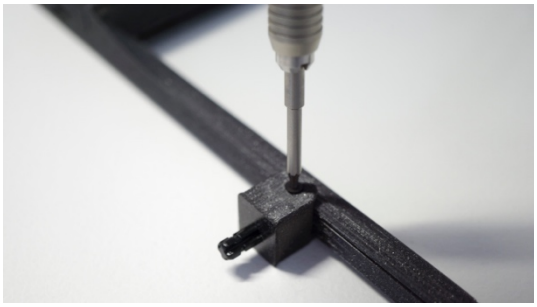


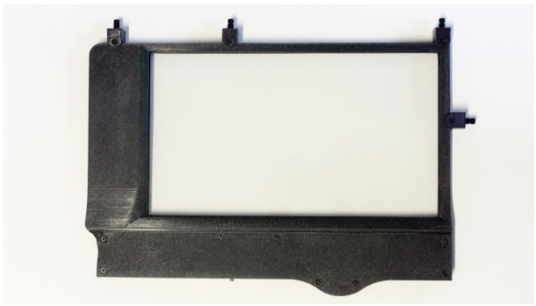


Attach marker mountings to the case (Case)

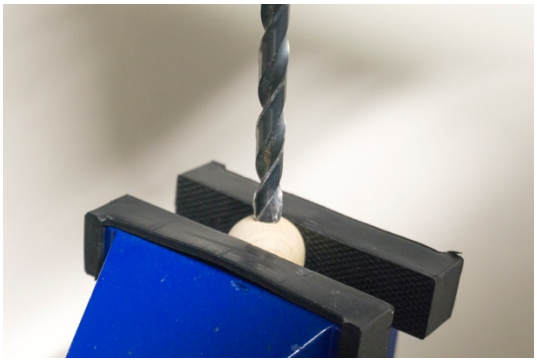


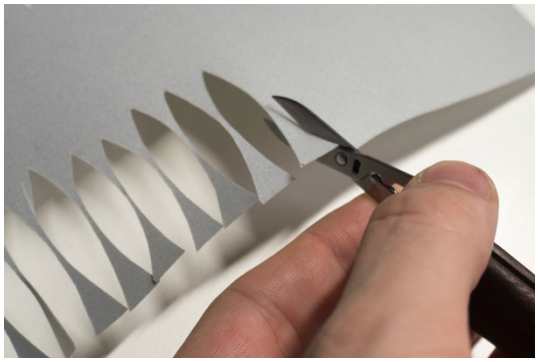


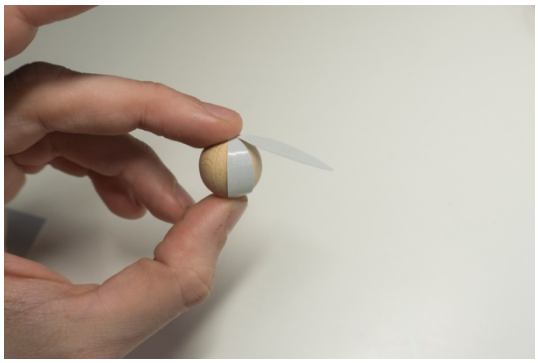




Fabricate Tracking Marker (Case)





Add screen protection