

ActPad

Used Materials

Desk Pad

- top layer: flexible PVC 900mm x 600mm x 3mm
- bottom layer: flexible PVC 900mm x 600mm x 2mm
- electrodes: 40 x copper tape squares (25mm x 25mm, conductive glue)
- electrode wiring:
 - 40 x short isolated cables (2mm diameter, 20mm long, with multiple fibers)
 - 40 x copper tape strips (5mm wide, conductive glue)
 - 40 x isolated cables (2mm diameter)
- central circuit (e.g. milled or etched, see Circuits → CentralCircuit_40PinBreakout) with a soldered 40 pin connector (2 rows, male)
- double sided tape

Controlling Unit

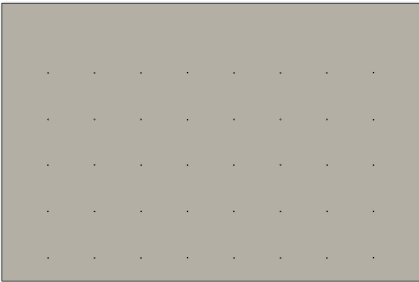
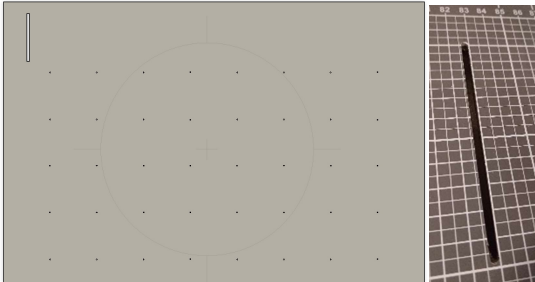



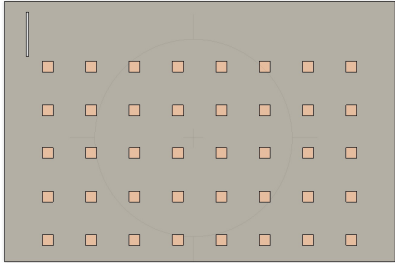
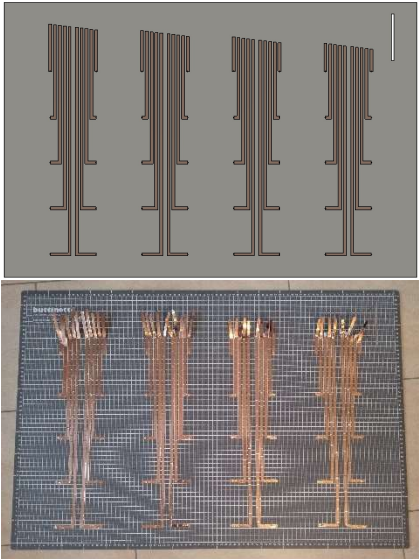
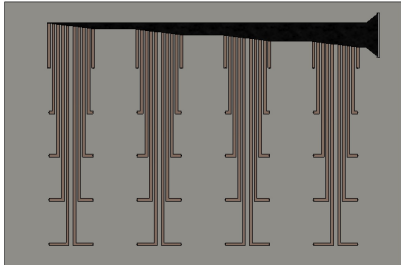
- raspberry pi
- 4 x mpr121 capacitive sensing shields
- 2 shields (e.g. milled or etched, see Circuits → MPR121_Shield1 and MPR121_Shield2) with soldered
 - 2 x 6 stackable headers
 - 4 x 6 female headers (half height)
 - 4 x 10 female headers (half height)
 - 40 pin header stackable (2 rows)
 - 40 pin header (2 rows, male)
- 8 x separators for the shields (height depends on stackable headers)
- 3D printed case (see 3D Models → ActPad_ControllingUnit_Case_Base.stl and ActPad_ControllingUnit_Case_Cover.stl)
- 40 pin bus (2 rows connector, female-female)
- 4 screws for raspberry pi

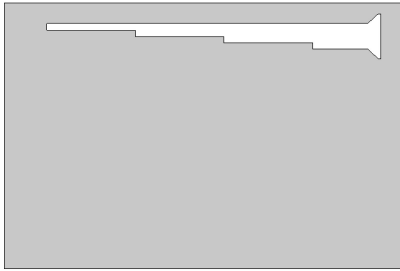
Connectors (for each)

- reusable double-sided nano tape (30mm x 30mm x 2mm)
- 3D printed flexible case (see 3D Models → ActPad_Connectors_Case.stl, use flexible material)
- 2 x copper tape squares (20mm x 20mm, conductive glue)
- isolated wire with multiple fibers (length as desired)

Build Instructions

Desk Pad

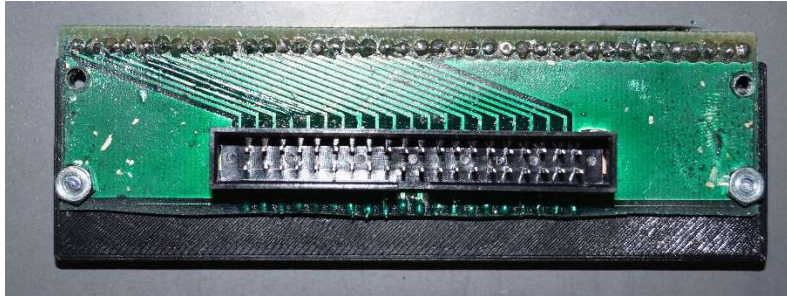
 <p>1. drill 40 holes into the top layer PVC (equally distributed with 100mm separation)</p>	 <p>2. cut or mill a slit into the upper left corner of the top layer PVC (~100-105mm long)</p>
 <p>3. slide one electrode wiring cable into each drilled hole of the top layer PVC and</p>	 <p>4. cut off the protruding insulation (~ 10mm)</p>
 <p>5. bend the cable fibers outwards creating "stars"</p>	 <p>6. stick the 40 copper squares on the top surface on top of each "star" to create the electrodes</p>
 <p>7. turn the pad around and create vertical connections to each electrode using the copper tape strips.</p>	 <p>8. solder one cable to the end of each of these 40 copper tape strips; lead the cables to the right and through the slot in the top layer pvc pad.</p>



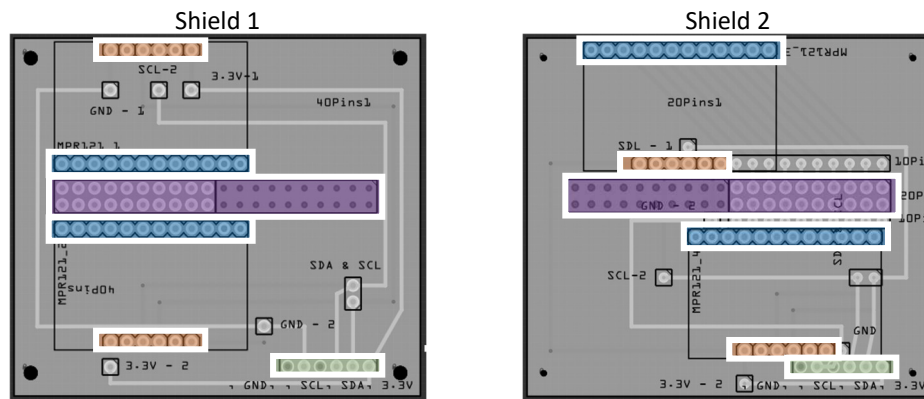
9. cut the shape of the wires out of the bottom layer PVC

10. stick both layers together using the double sided tape; now turn the whole pad around again.

11. To finish the desk pad, you need to solder all 40 wires to the central circuit; Optionally: to fix the board, we used a 3D printed box that was glued to the pad and fixated the PCB with screws.

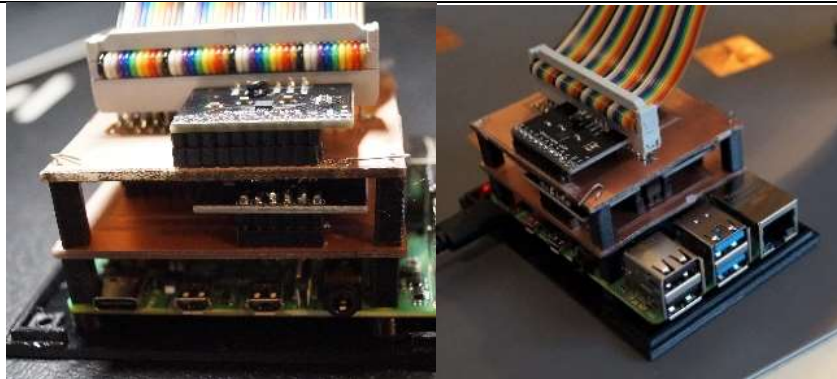


Controlling Unit

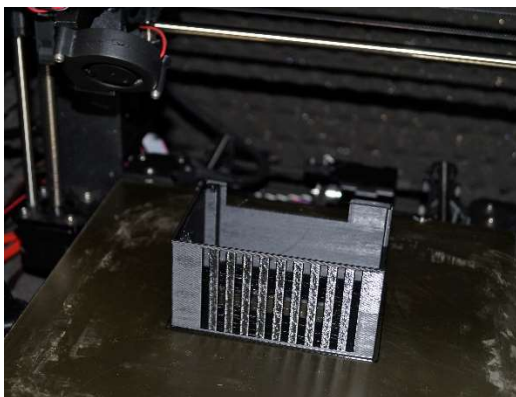


- 2 x 6 stackable headers
- 4 x 6 female headers (half height)
- 4 x 10 female headers (half height)
- 2 x 40 pin header stackable (2 rows)

1. we used a CNC milling machine to fabricate both shields and subsequently soldered all headers



2. stack the mpr121s on the shields; stack both shields on top of the raspberry pi using the separators



3. 3D print the casing

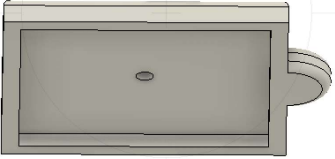
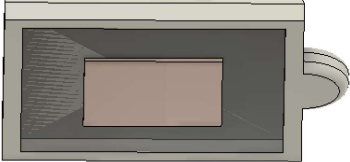
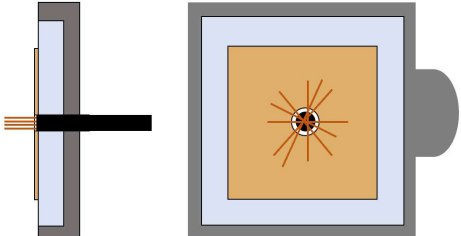



4. fix the circuits inside the case using screws; cover the electronics with the case cover.



5. you can connect the controlling unit to the desk pads central circuit using the 40 pin bus.

Connectors (for each)

 <p>1. 3D print the casing for the connectors</p>	 <p>2. stick a square of reusable double sided tape (30x30mm) in the casing; stick a copper tape square on top of the reusable tape (centered)</p>
 <p>3. pierce a ripping needle or something similar through the tape to create a hole; thread a cable through the hole and remove the protruding insulation (~ 10mm); bend the cable fibers outwards creating</p>	<p>4. stick a second copper square on top of the fibers, making sure to create a conductive connection with them; remove ~ 10mm of the insulation on the other end of the wire; the connector is now ready to use</p>
 <p>5. to use a connector, stick it on top of an electrode and connect the other end of the wire using copper tape</p>	