

MultiKnob – A Knob for Multiplexing Rotation Inputs by Multitouch-based Grasp Recognition

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Background

Physical rotary knobs are used on many devices for control and interaction: e.g. on radiators, on washing machines, for dimming light and in cars.

- ✗ Their function is usually one-dimensional
- ✗ The interaction usually refers to turning

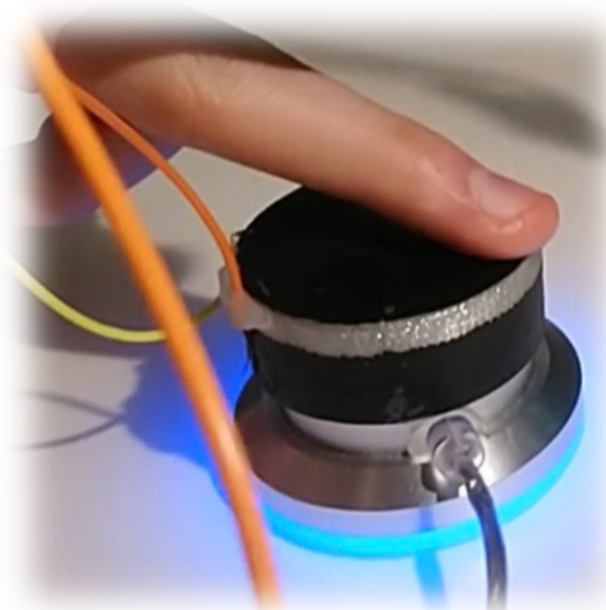
Conceptual Idea

Integration of fingers in interaction with a rotary knob to enrich the general interaction and function spectrum.

- ✓ More extensive function mapping
- ✓ Variety of functions based on finger usage

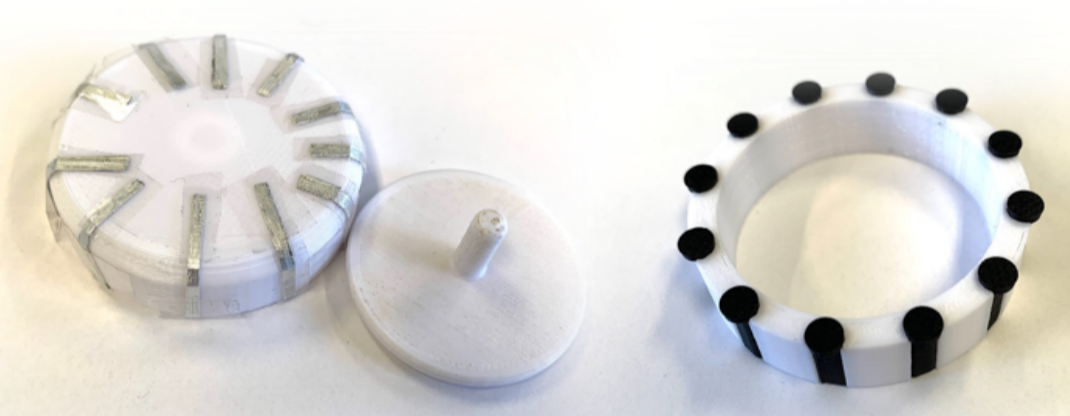
First Prototype

Extended an USB rotary knob by an experimental capacitive sensor based on copper foil and conductive ink.

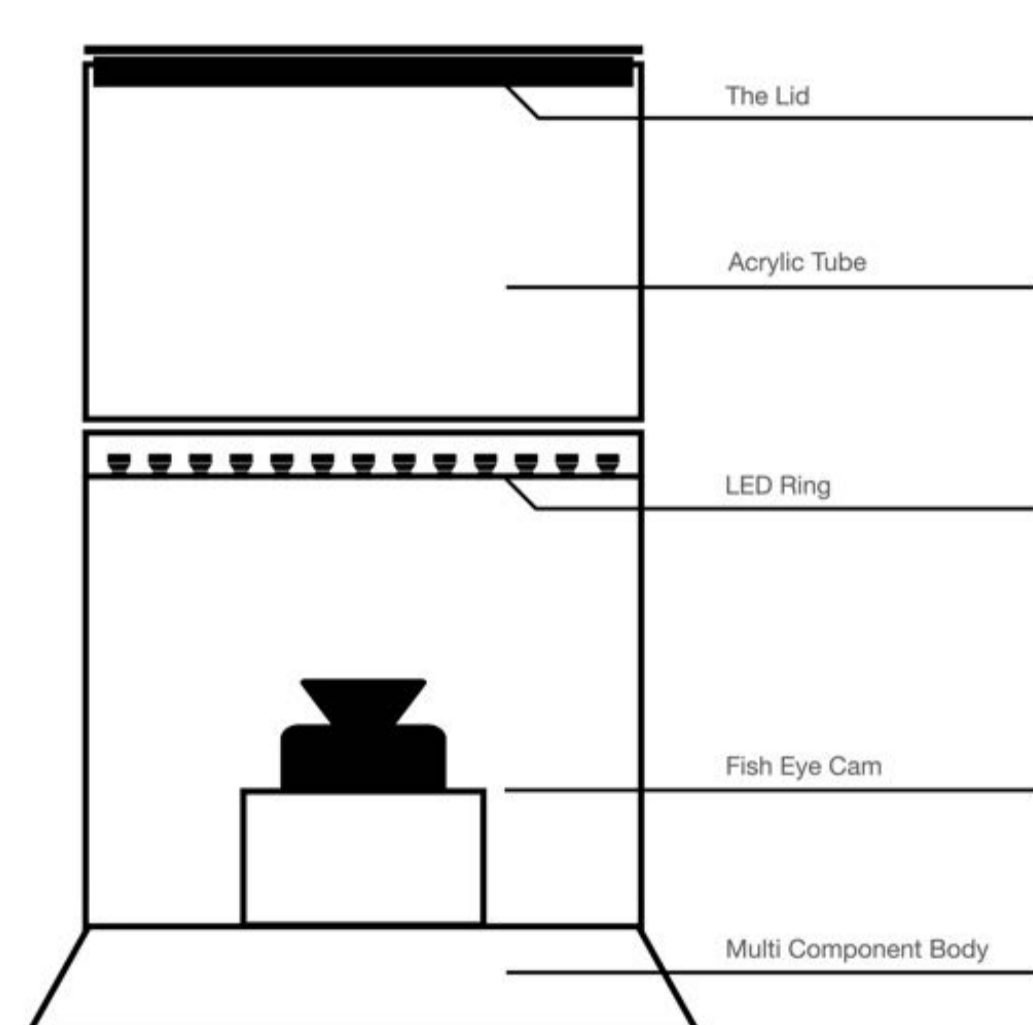


Second Prototype

Second prototype using aluminium foil and 3D printed components. Used on a tablet display.

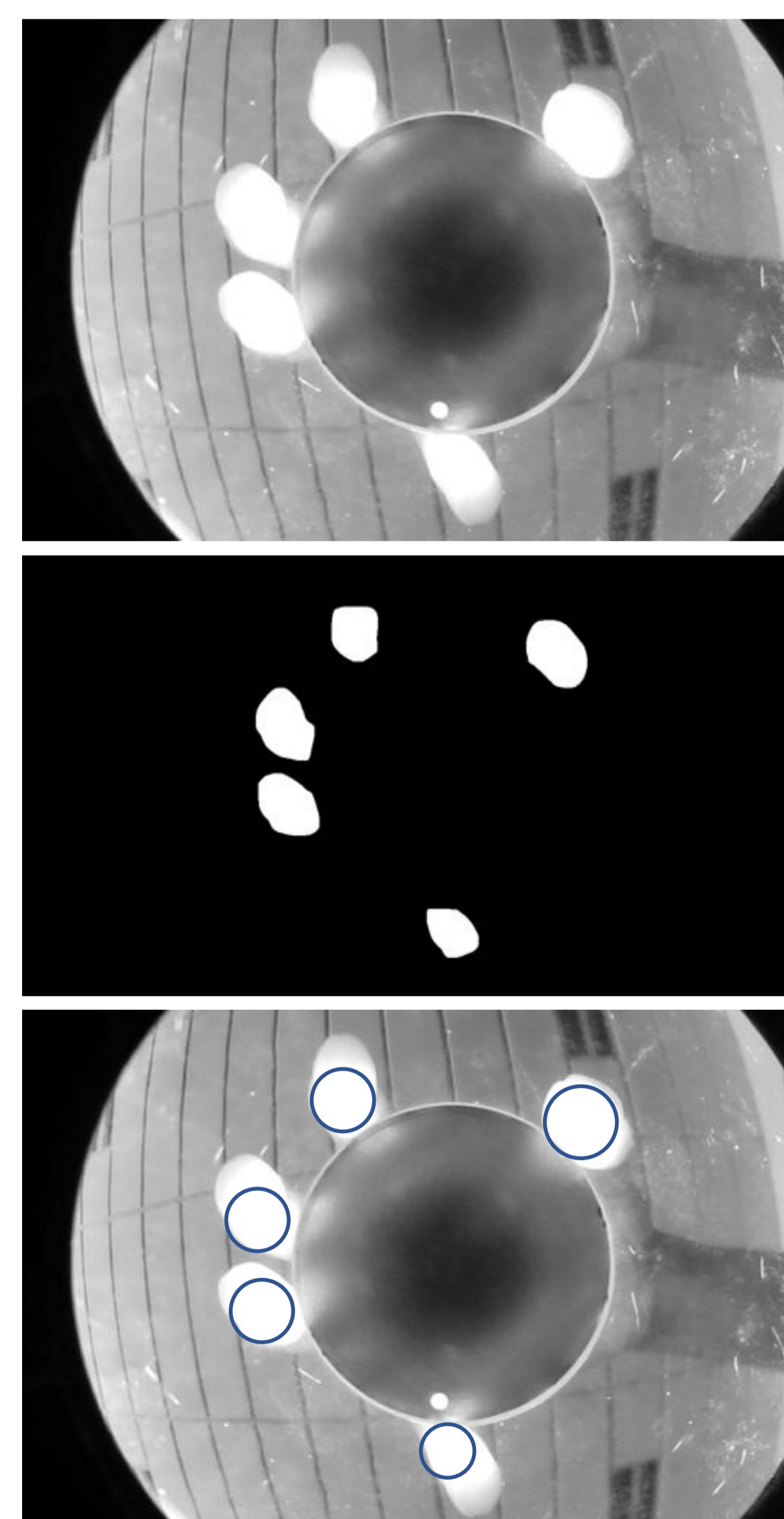


Third Prototype



The third prototype is based on the principle of Frustrated Total Internal Reflection (FTIR). The kit consists of several 3D printed components. 36 infrared LEDs shine into an acrylic tube above. Shielded from direct light irradiation, the infrared camera is located below, aligned with the acrylic tube.

Finger Recognition



The FTIR prototype was implemented using OpenCV.

1. Greyscaling of the raw camera image
2. Determine the rotation
3. Determine the touch area
4. Define pixels in area; black(0) and white(255)
5. Blob detection applied on black&white picture
6. Blobs = Fingers