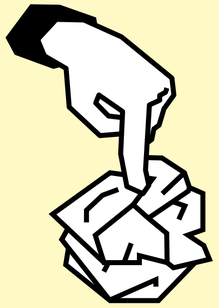


Interaction Engineering

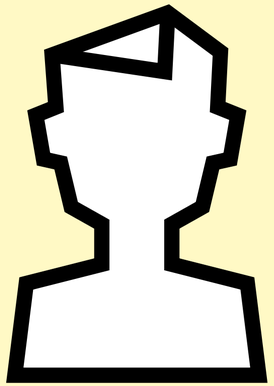
Paper Prototyping for Physical Interfaces

THEA ECKERT + NASSIM LAARMANN

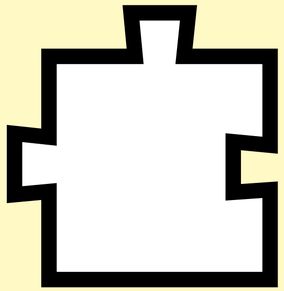
WiSe 2023/2024

Source: Mockplus – A Comprehensive Guide to Paper Prototyping

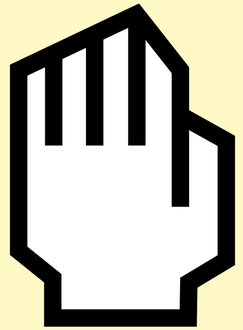
Project motivation



Product +
Interface Designer



User testing method
“Paper Prototyping”
for Physical
products



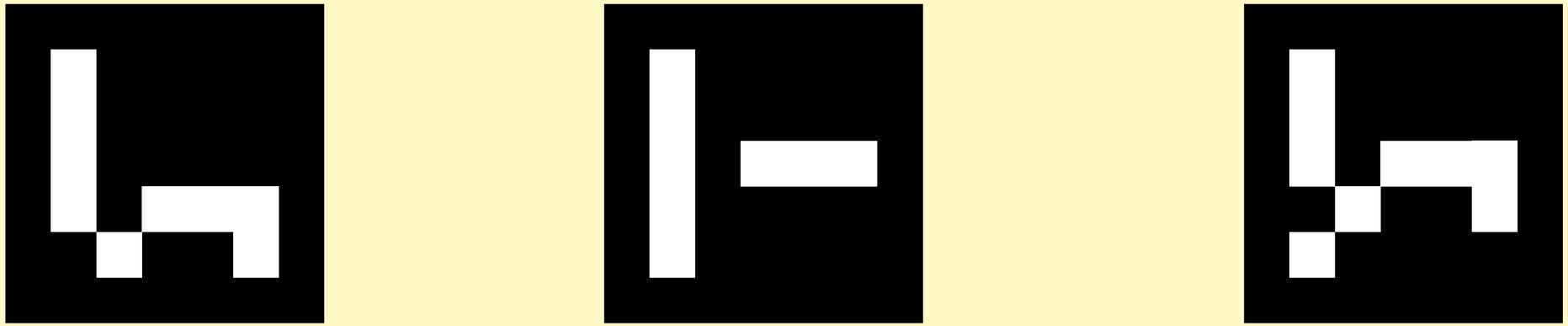
Fast iterations
and
implementations

Related work

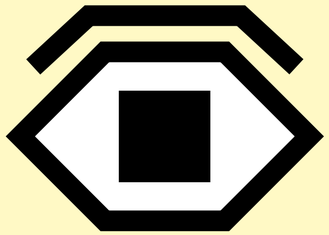
↘*Tangible Interfaces with Printed Paper Markers (2020). Zheng, Gyory, Do. ACM.*

- Paper explores possible interfaces and applications using paper with printed ArUco markers
- We use the insights on printed ArUco Markers and extend the paper with new interaction components and experiment with different media than only paper

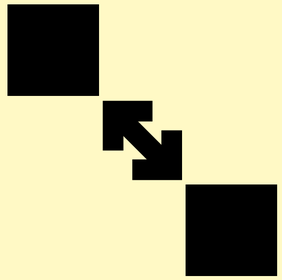
Interaction techniques



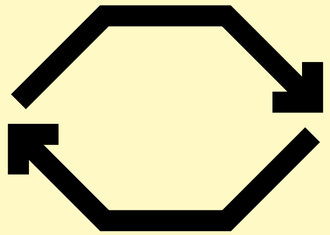
Interaction techniques



Marker visibility

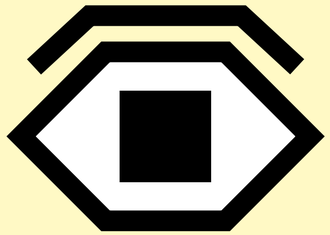


Marker position



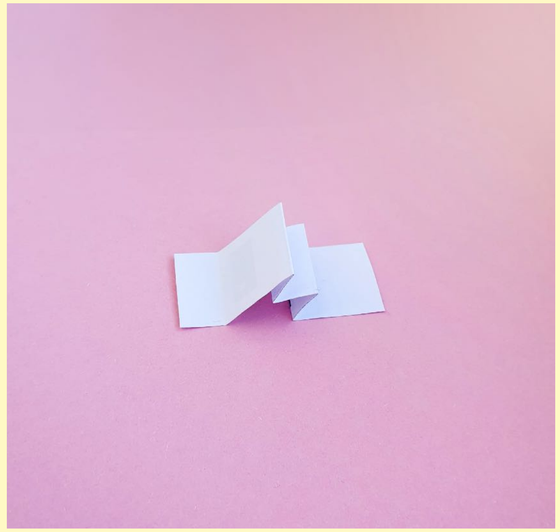
Marker rotation

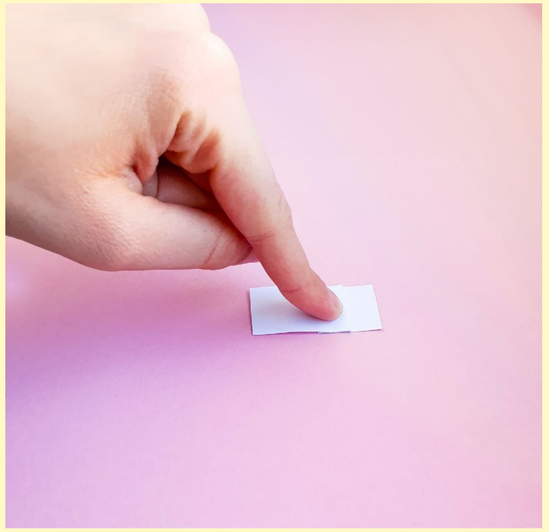
Interaction techniques

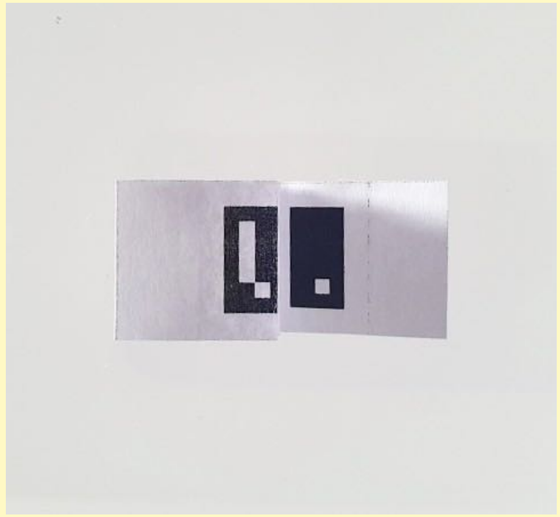


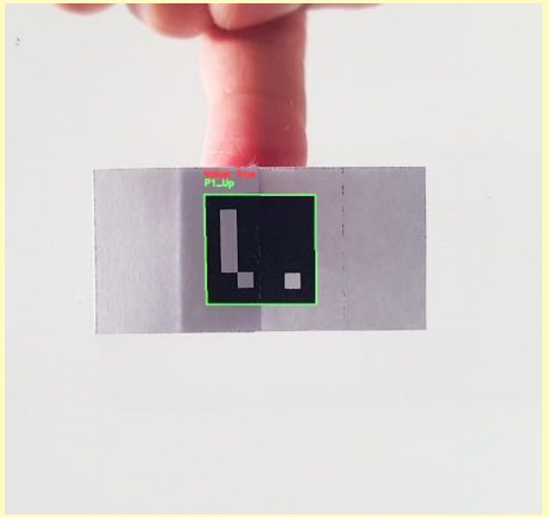
Marker visibility

CV

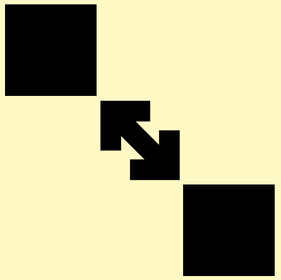




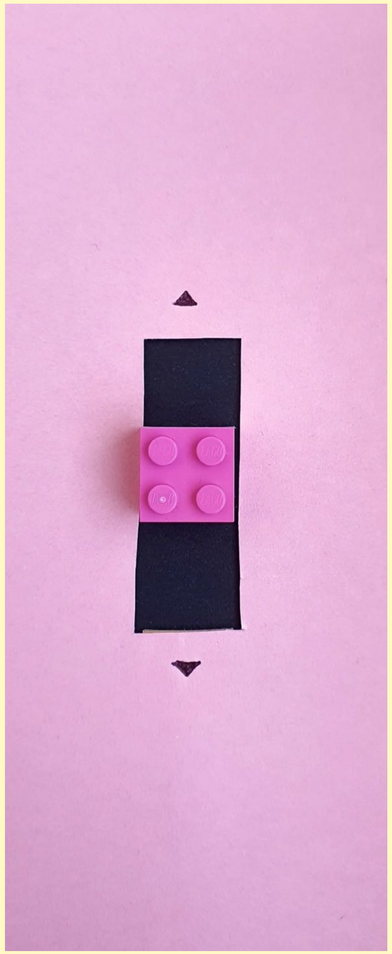


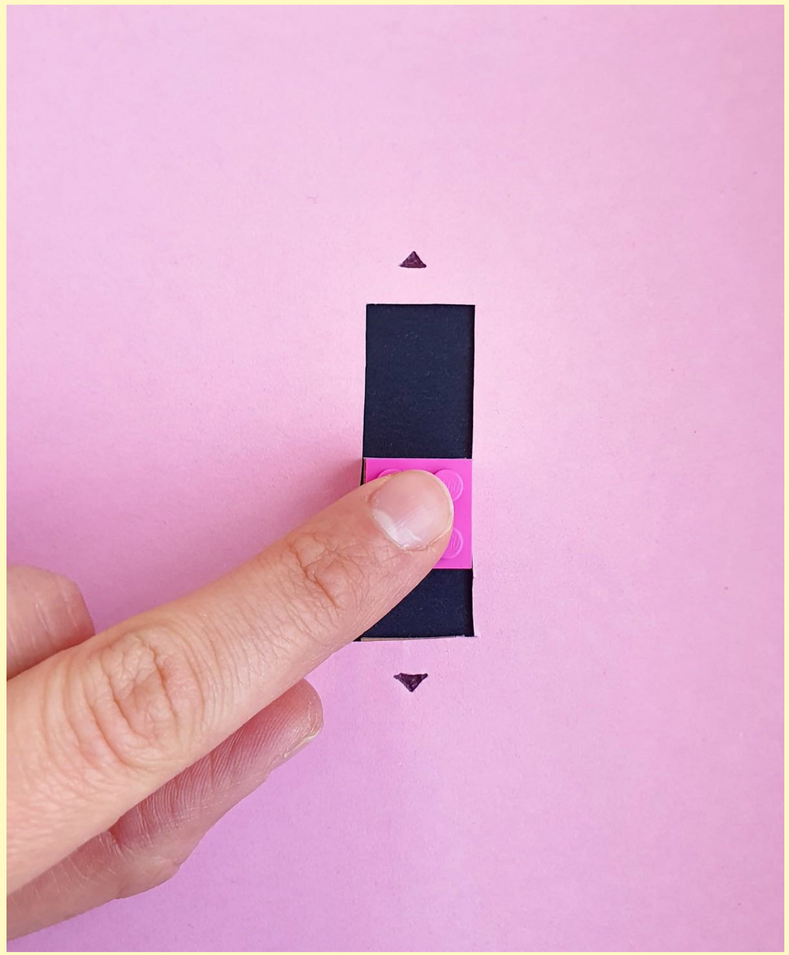


Interaction techniques

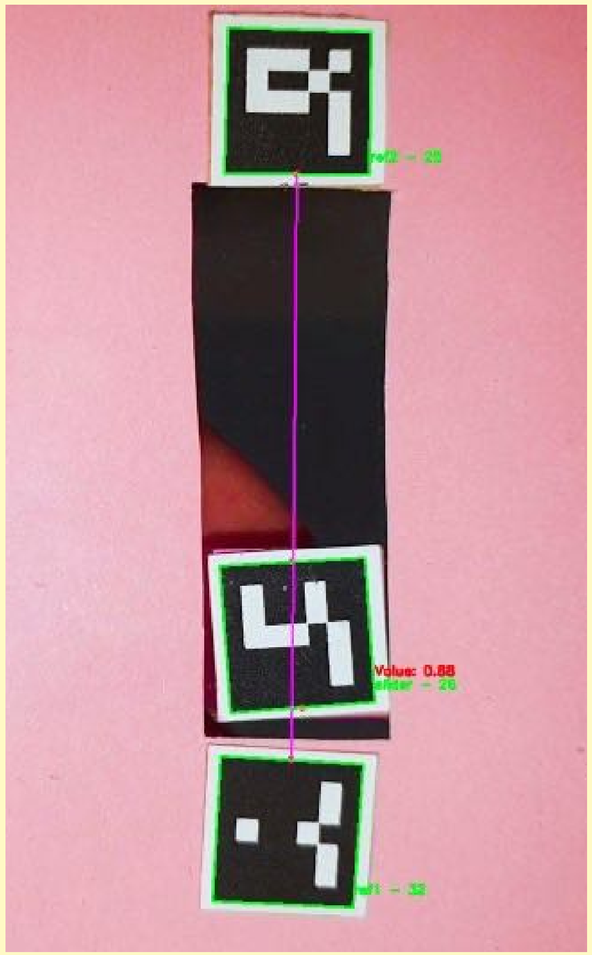


Marker position

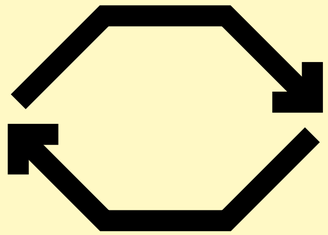




CV

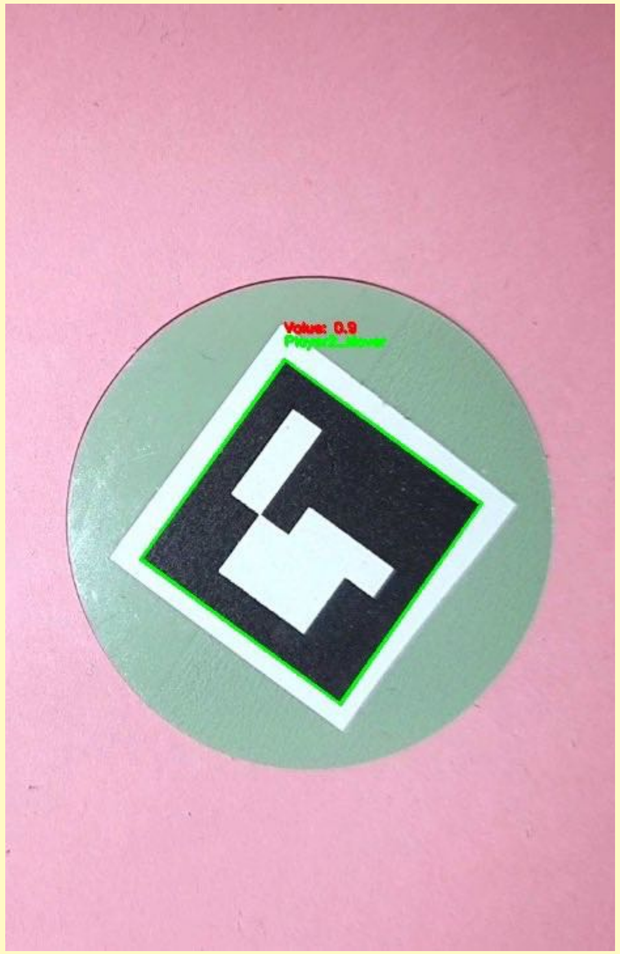


Interaction techniques

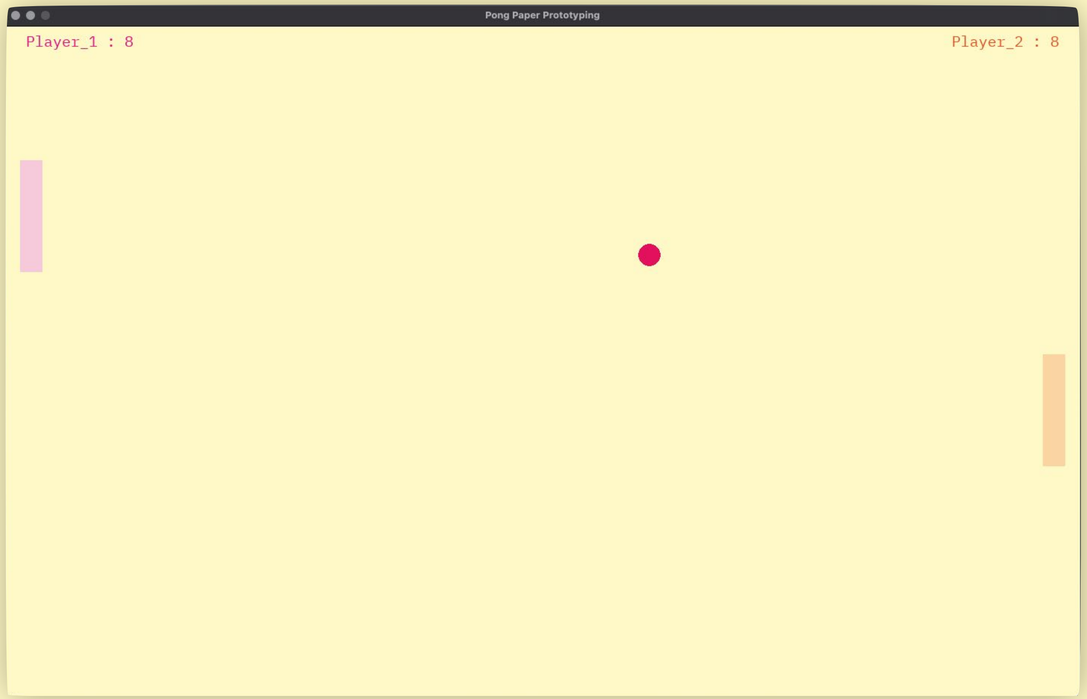


Marker rotation

CV



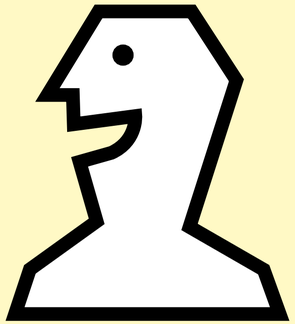
Application proposal



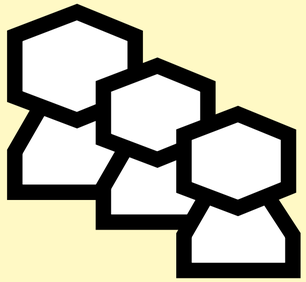
Pong-Game

Different interfaces as game controller

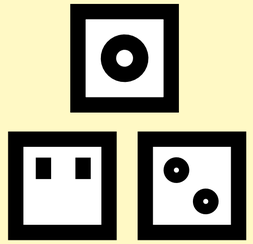
Evaluation



9 Participants



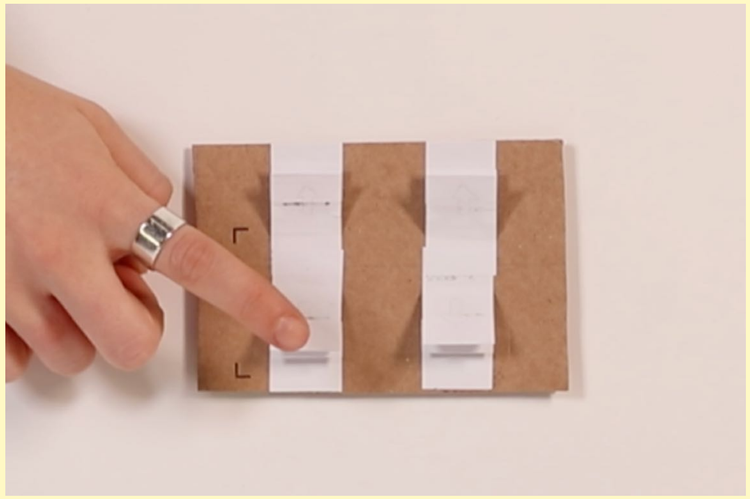
Within-Subject Study

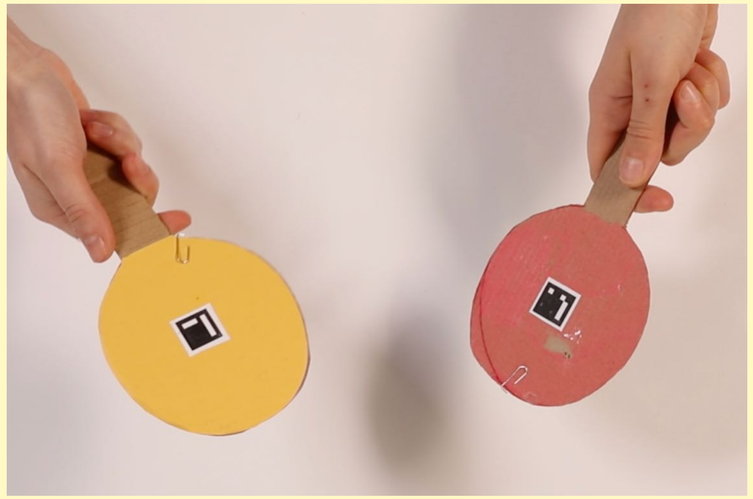


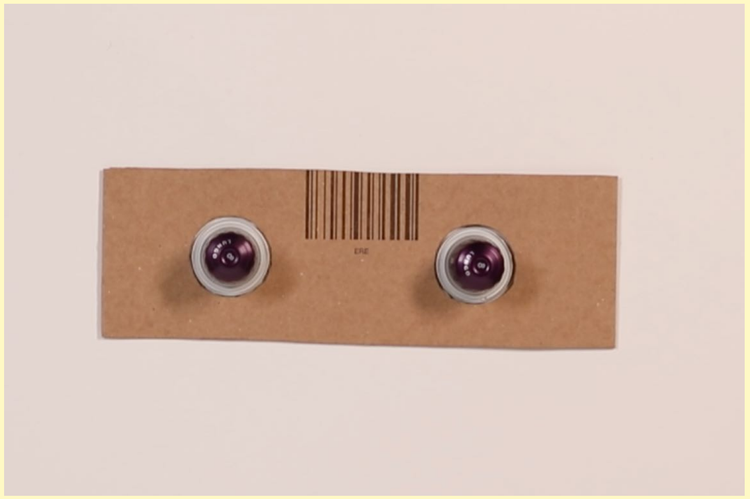
5 Interfaces

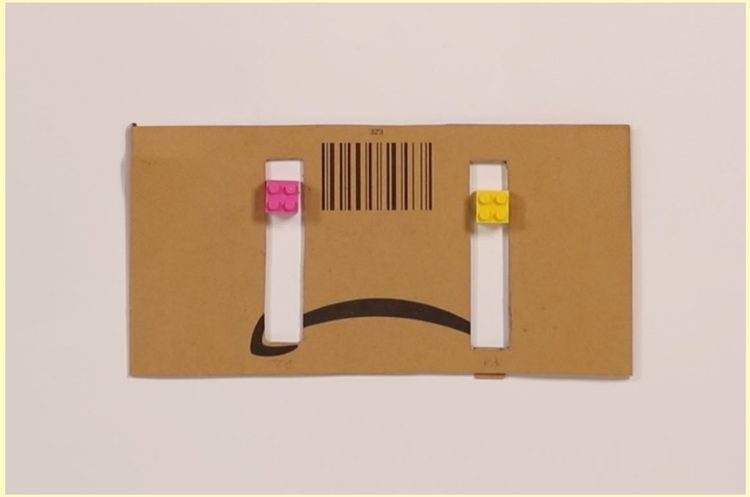
USE - Questionnaire, Rating, Open Questions

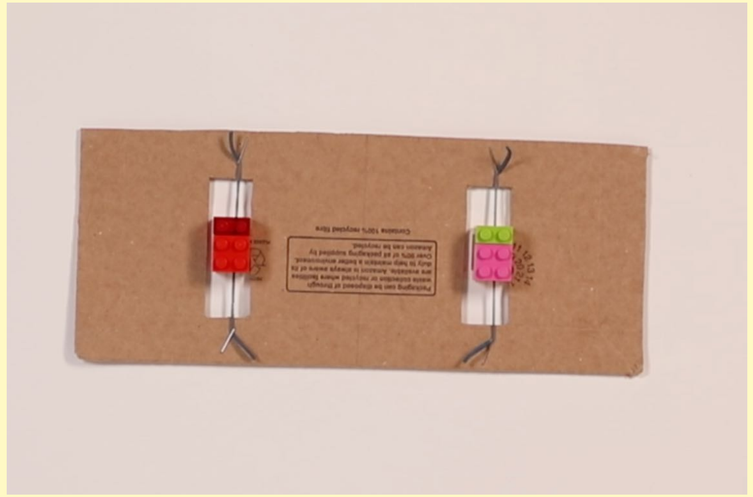
Interfaces



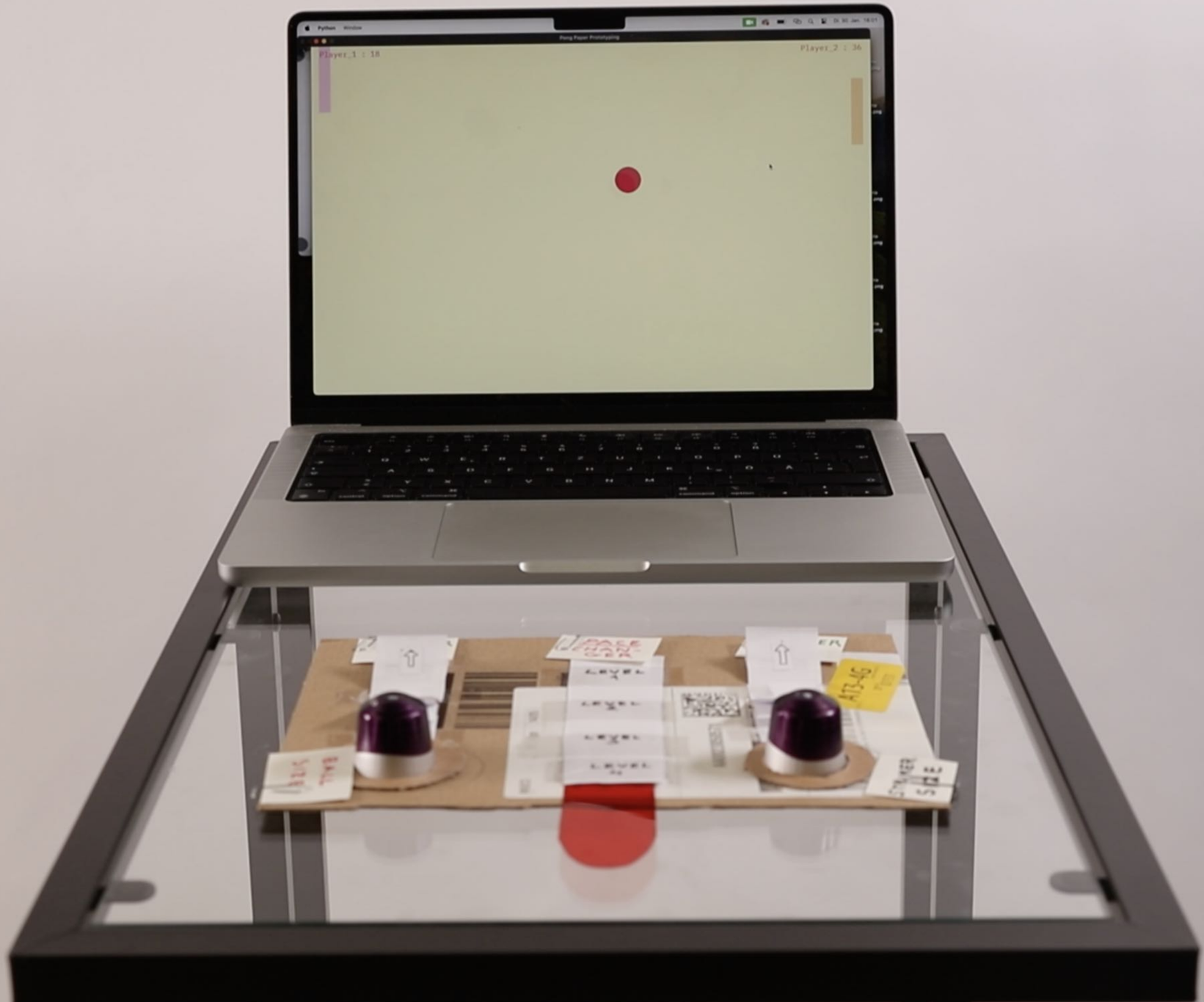








Pong

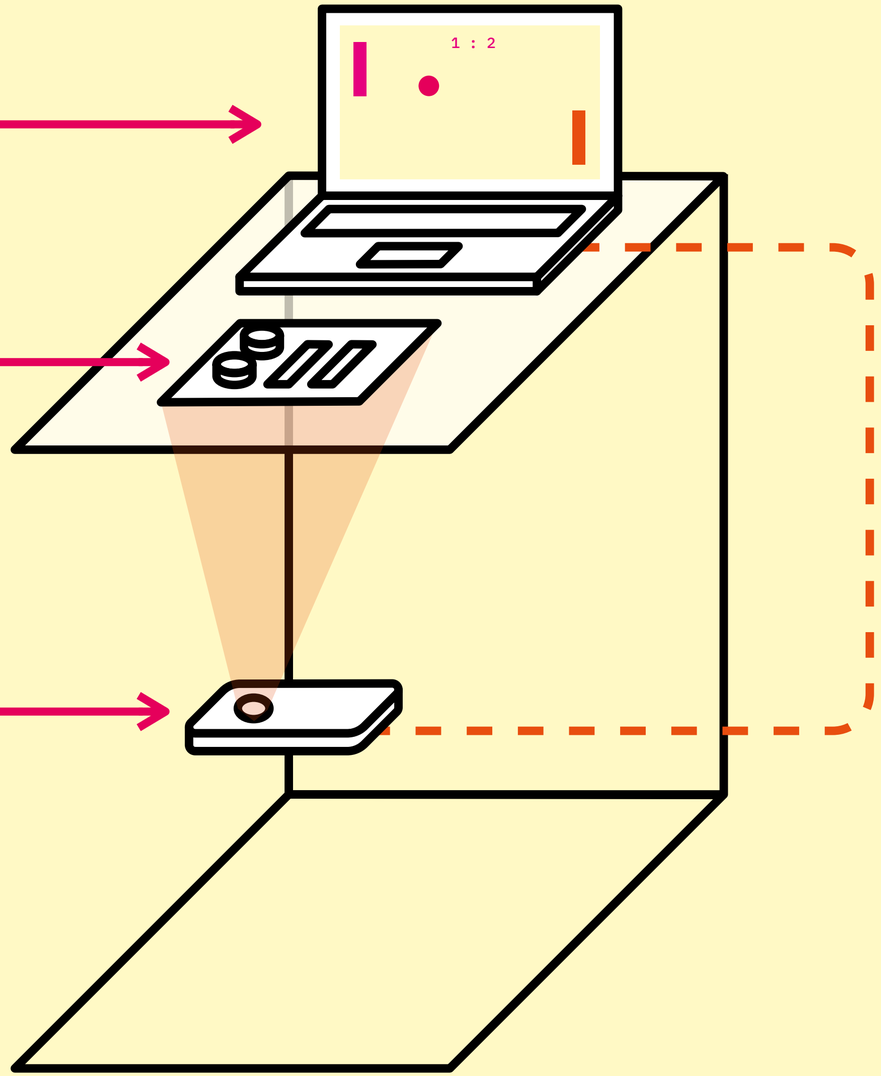


Technical setup

Laptop

Interface

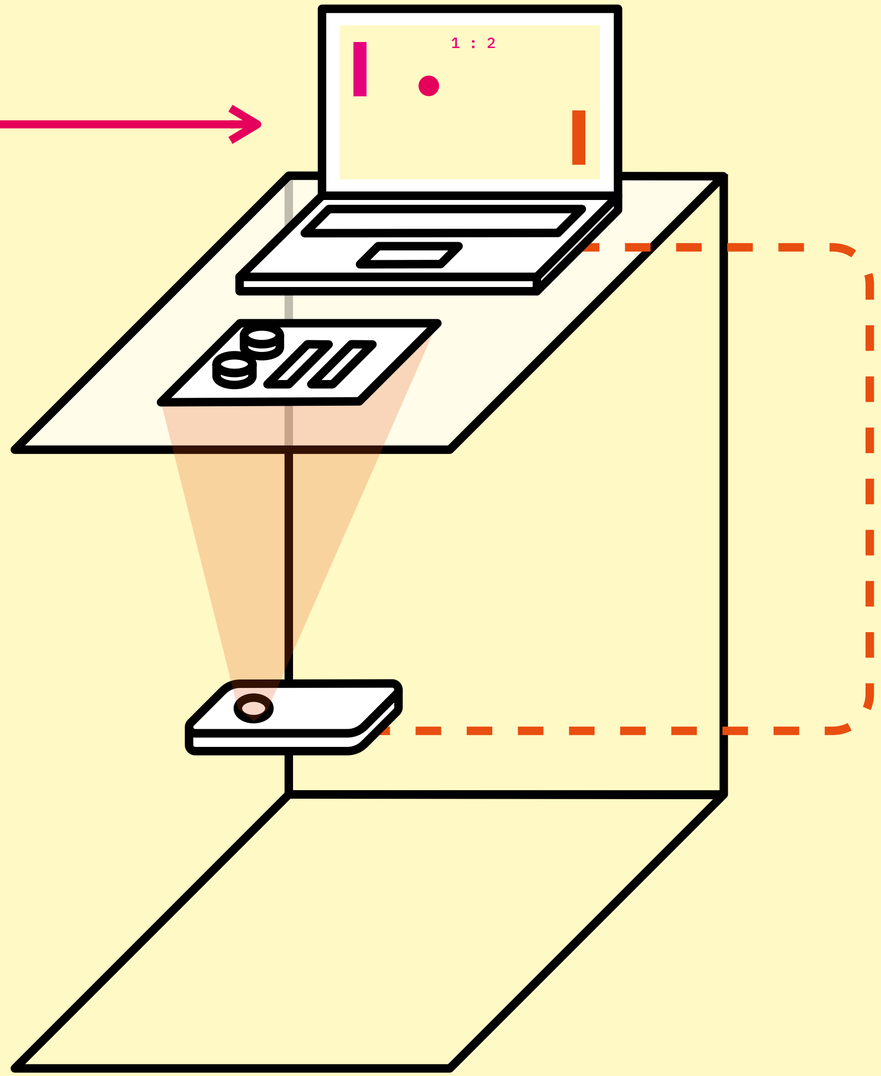
Webcam



Technical setup

Laptop

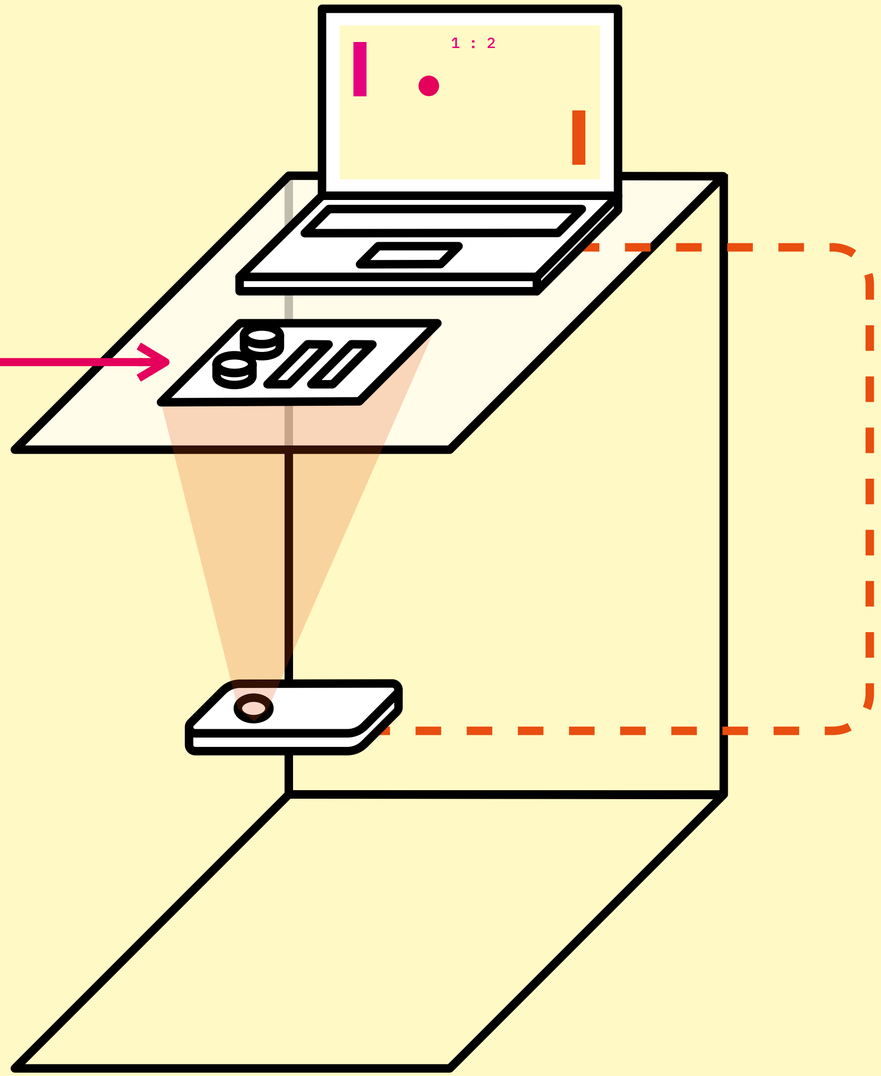
- OpenCV for marker detection
- Mapping script (Python)
- Pong Game (Python + PyGame)



Technical setup

Interface

- Haptic interface
- Crafted out of household items, like cardboard, pins, rubber, paper, etc.
- Printed and arranged ArUco markers
- Placed on a glass tabletop



Technical setup

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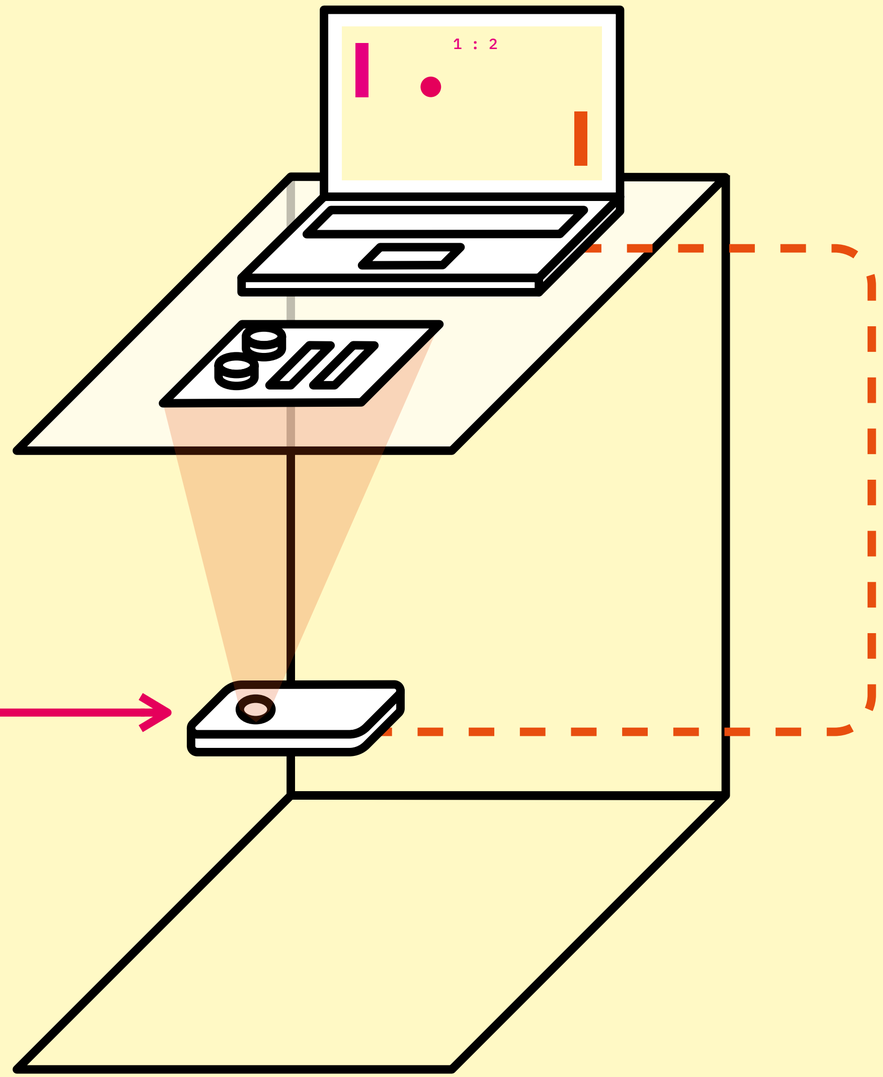
Technical setup

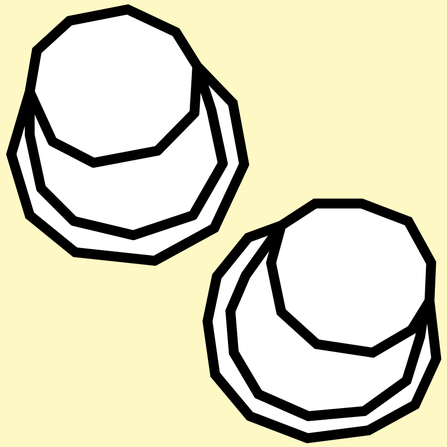


Webcam

- Here: Smartphone camera as webcam for CV input
- Iriun software

Ranking

1



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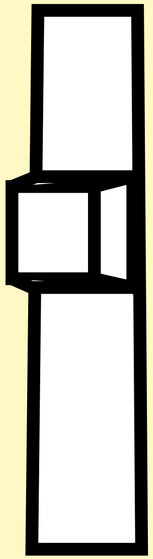

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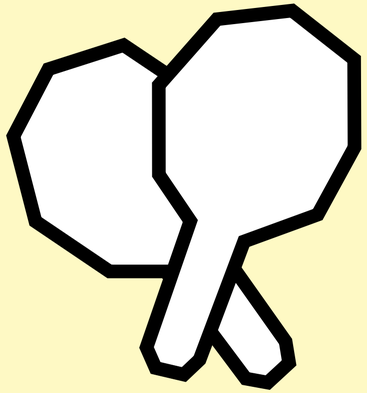

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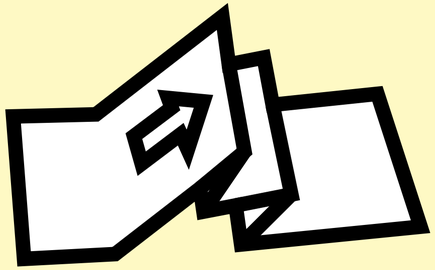

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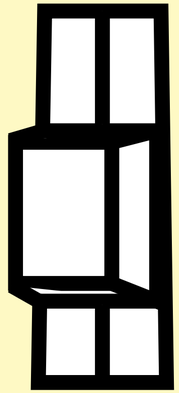

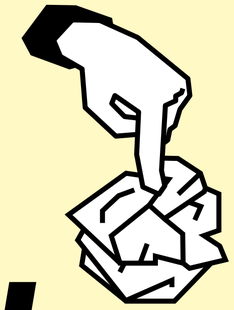

Live Demo