ChromoLCD

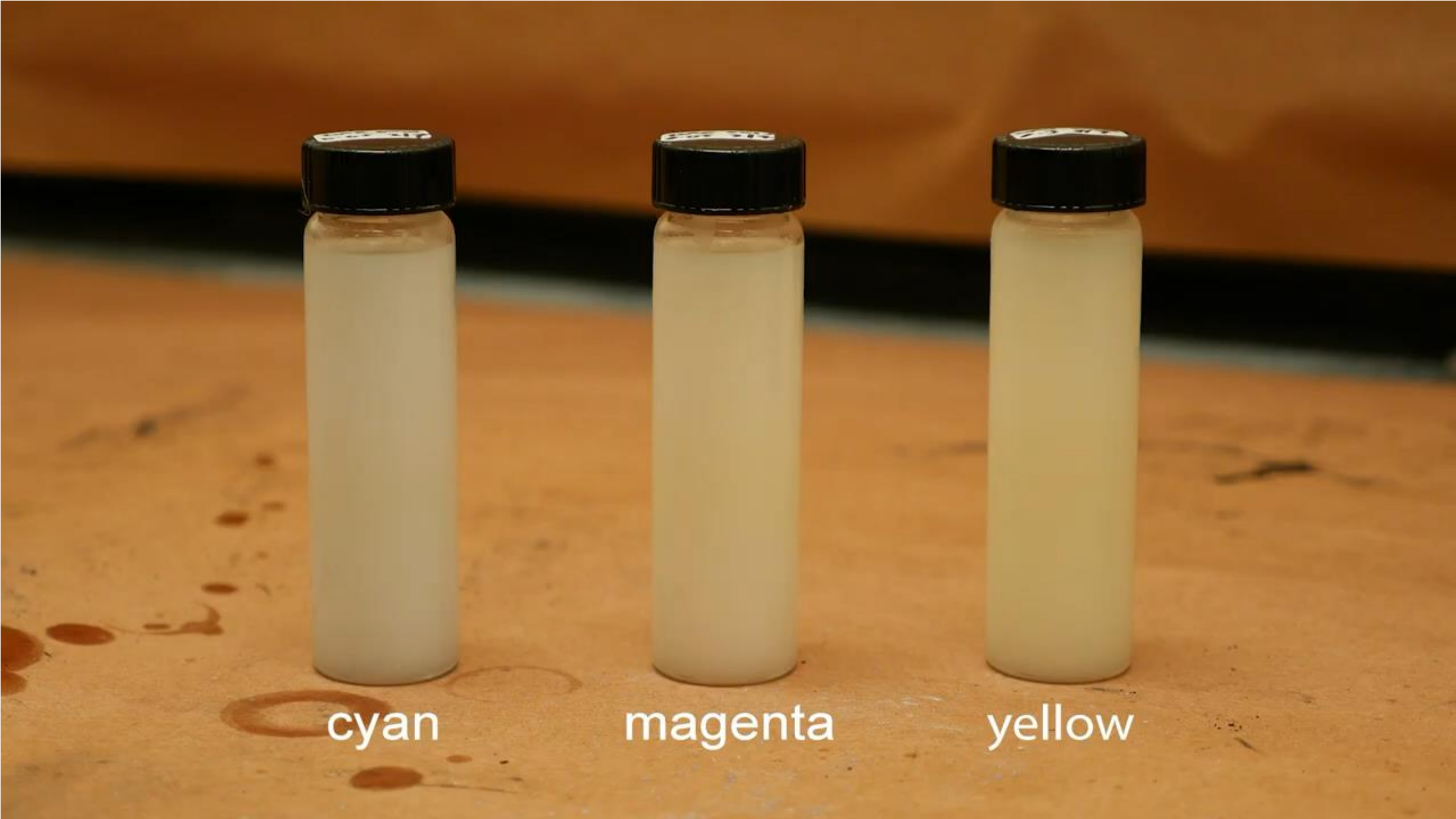
LCD-based Compact Reprogrammer for On-the-fly High-Resolution Images on Photochromic Surfaces

Yunyi Zhu*, Andy Li*, Katherine Yan, Emily Guan,
Alexandru Luchianov, Eden Hen, Stefanie Mueller

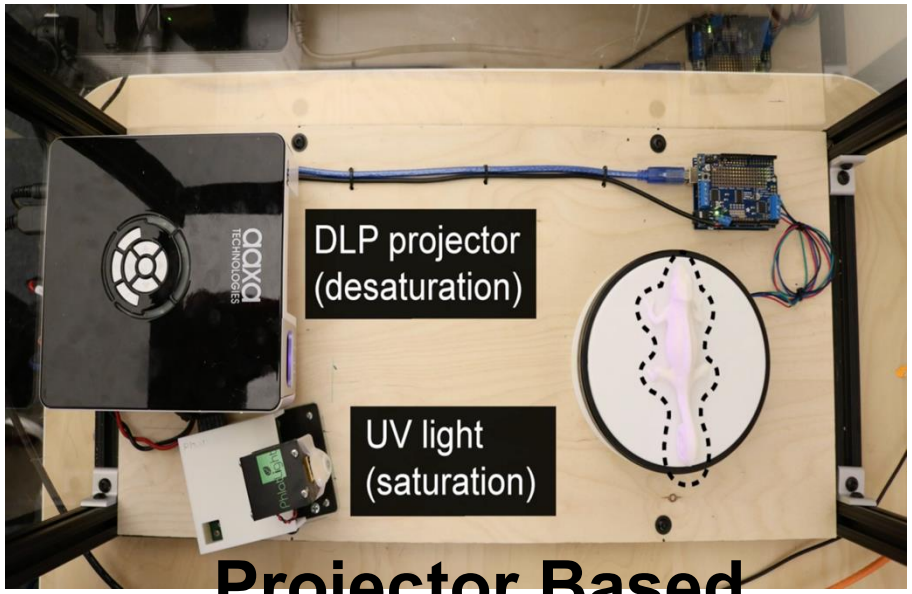
*ACM TEI 2026 [*equal contribution]*

TEI 2026

MIT CSAIL

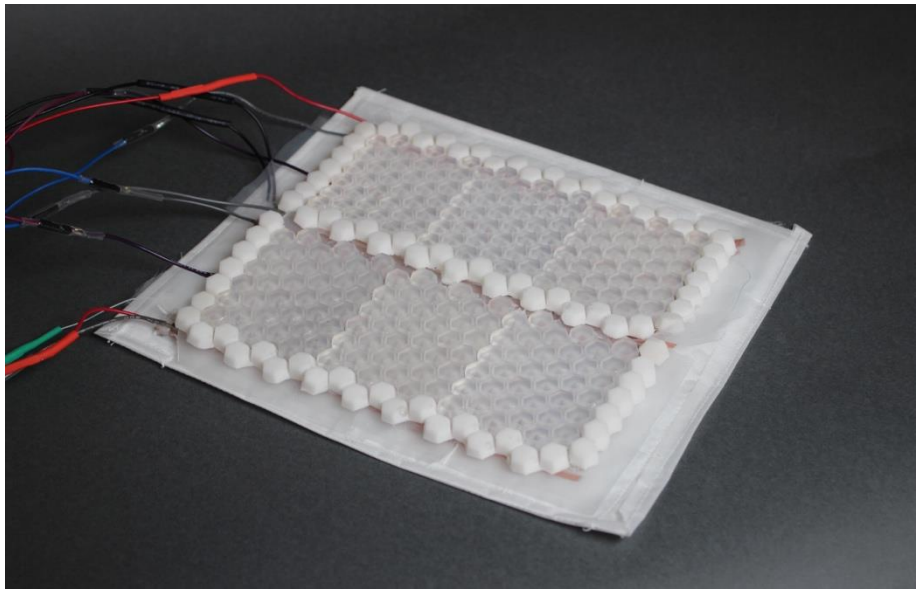

cyan
magenta
yellow

Previous Reprogrammers



Projector Based

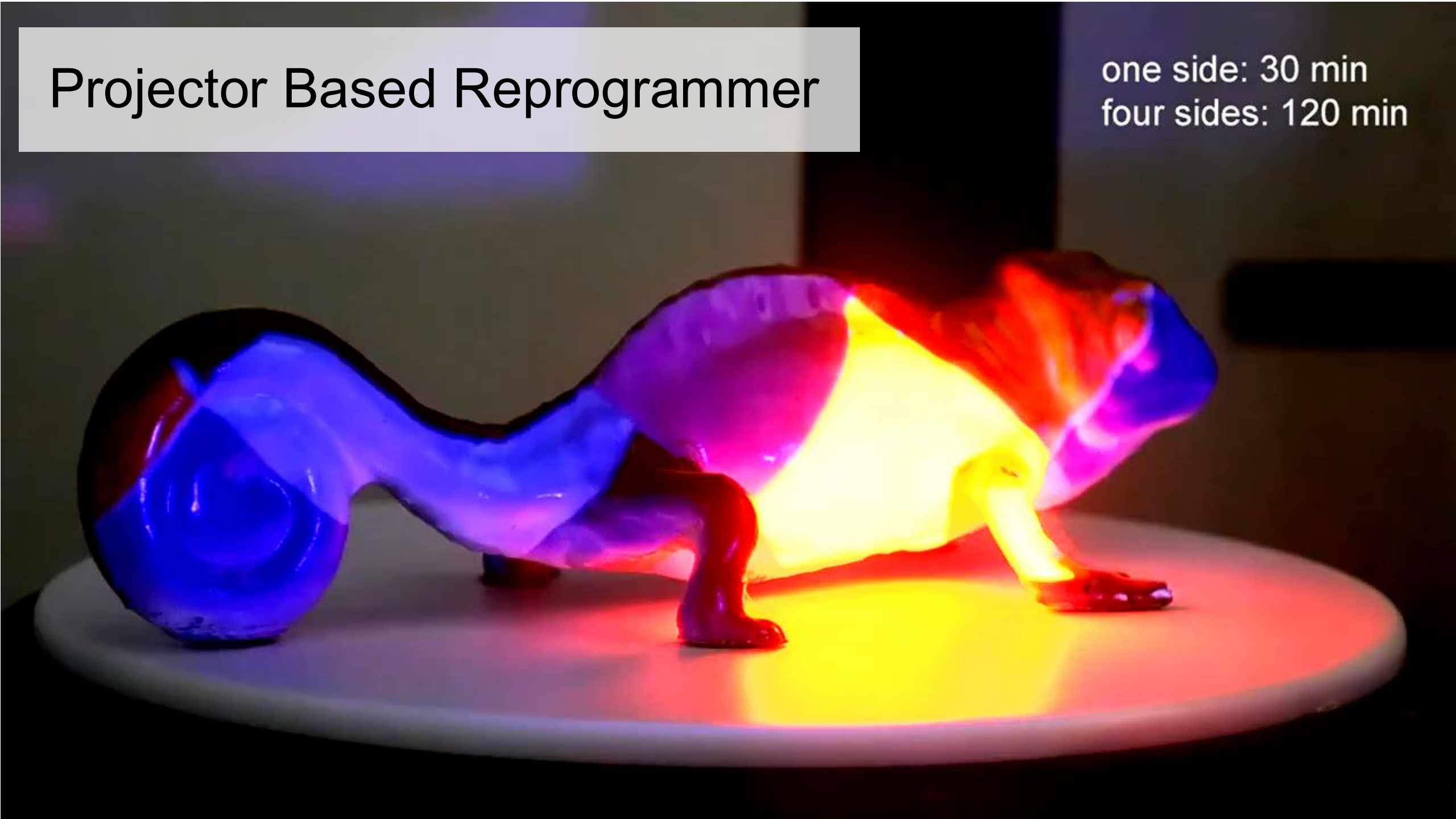
PhotoChromeleon (UIST 2019)

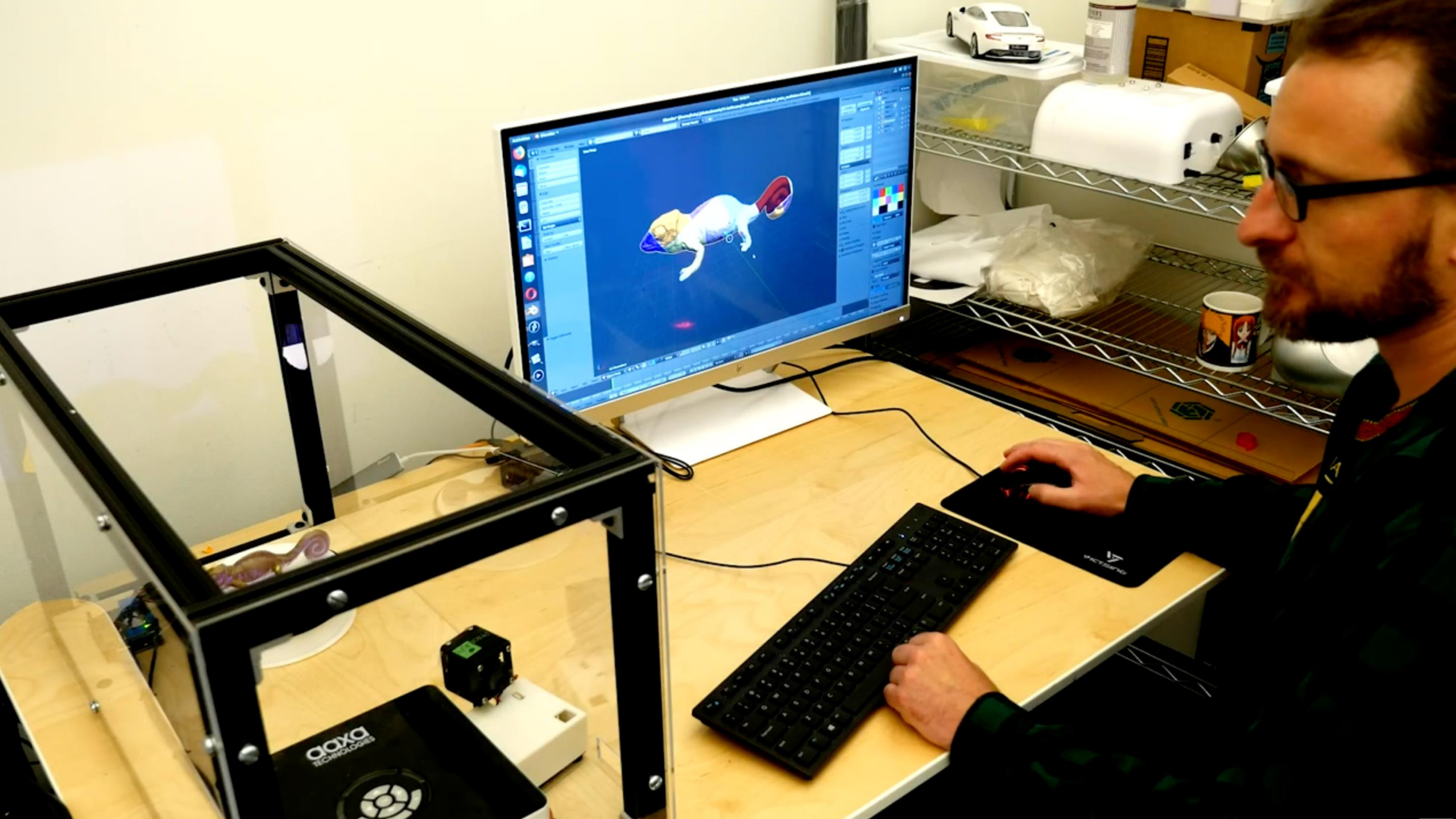


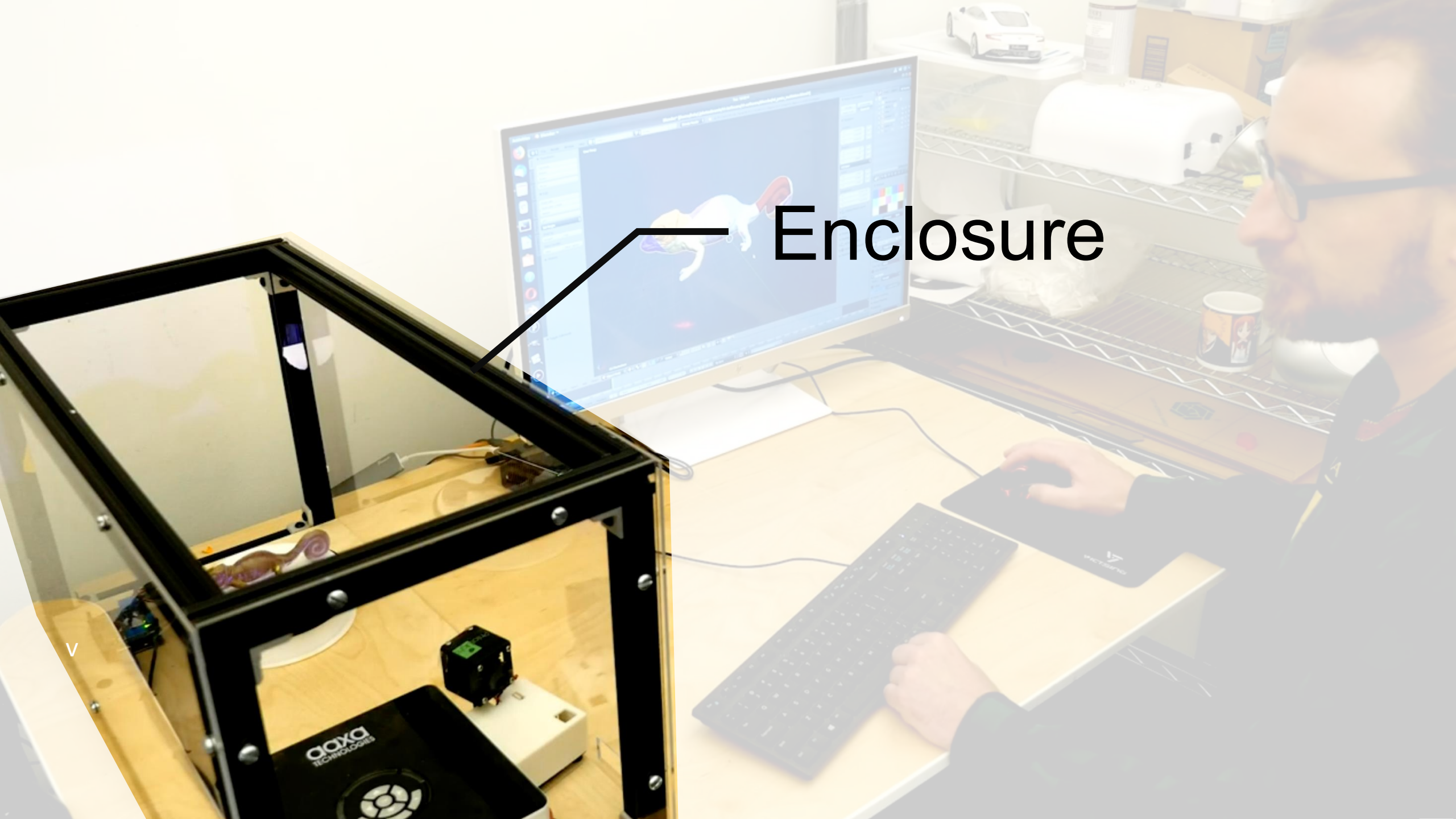
LED Based

PortaChrome (UIST 2024)

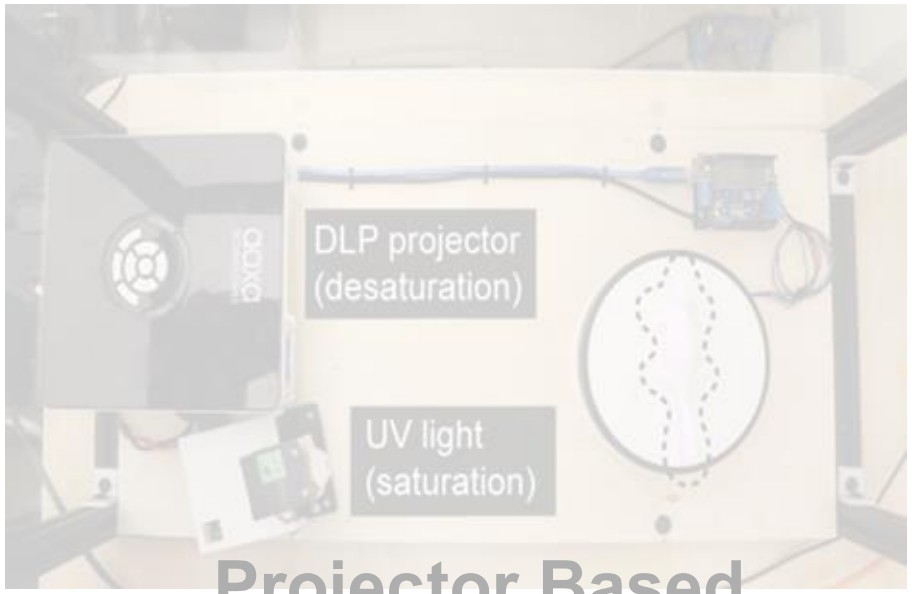
Projector Based Reprogrammer




aaxa
TECHNOLOGIES

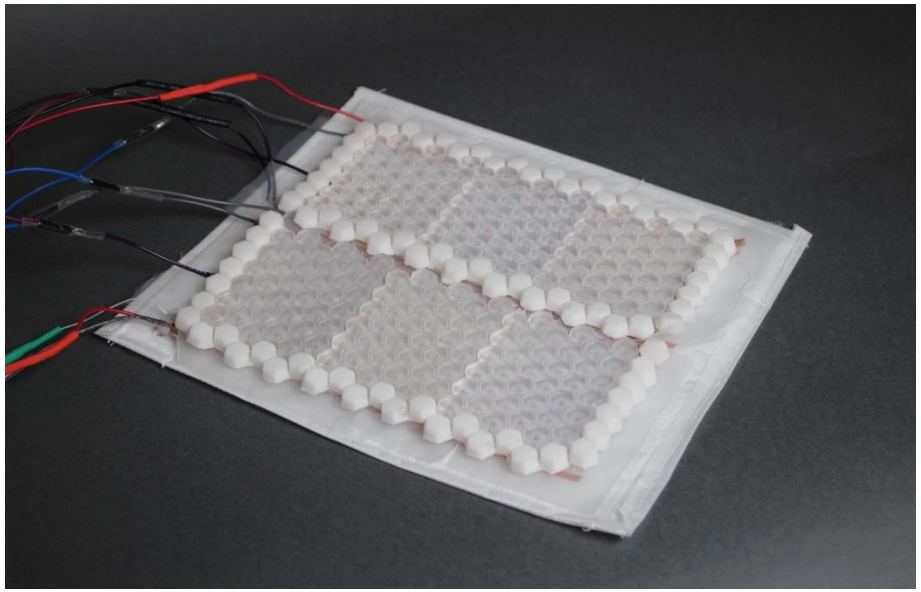

Enclosure
aaxa
TECHNOLOGIES

Previous Reprogrammers



Projector Based

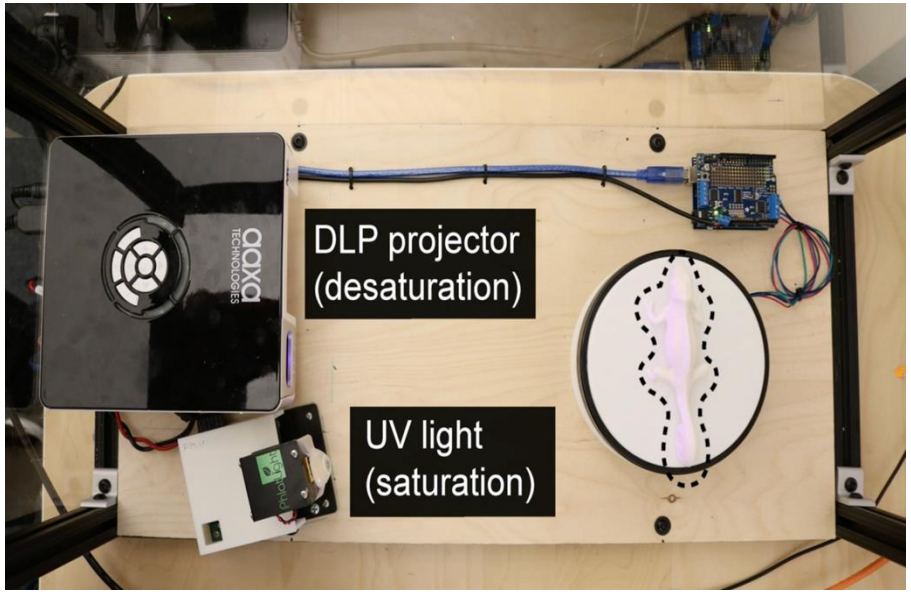
PhotoChromeleon (UIST 2019)

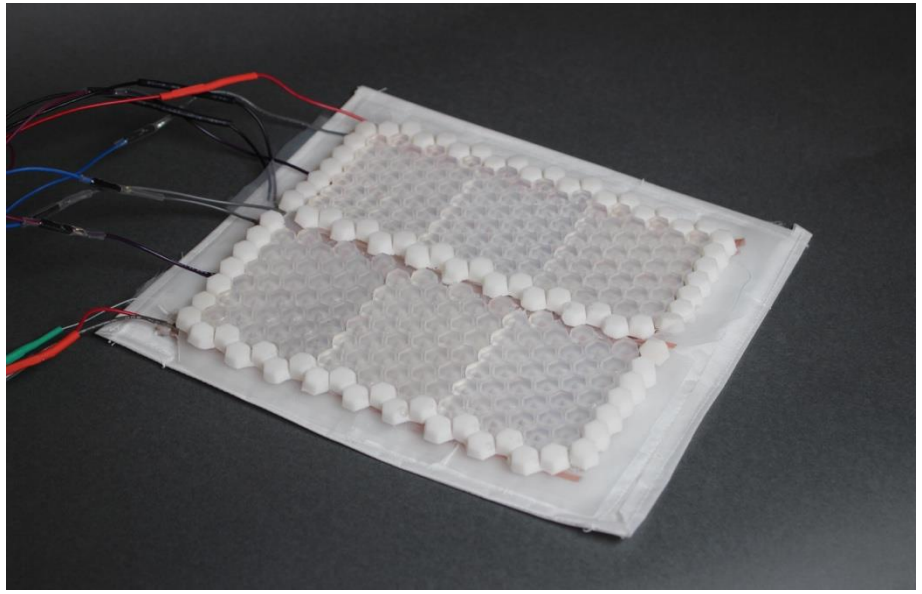


LED Based

PortaChrome (UIST 2024)

Integrated
Light Source





Projector Based

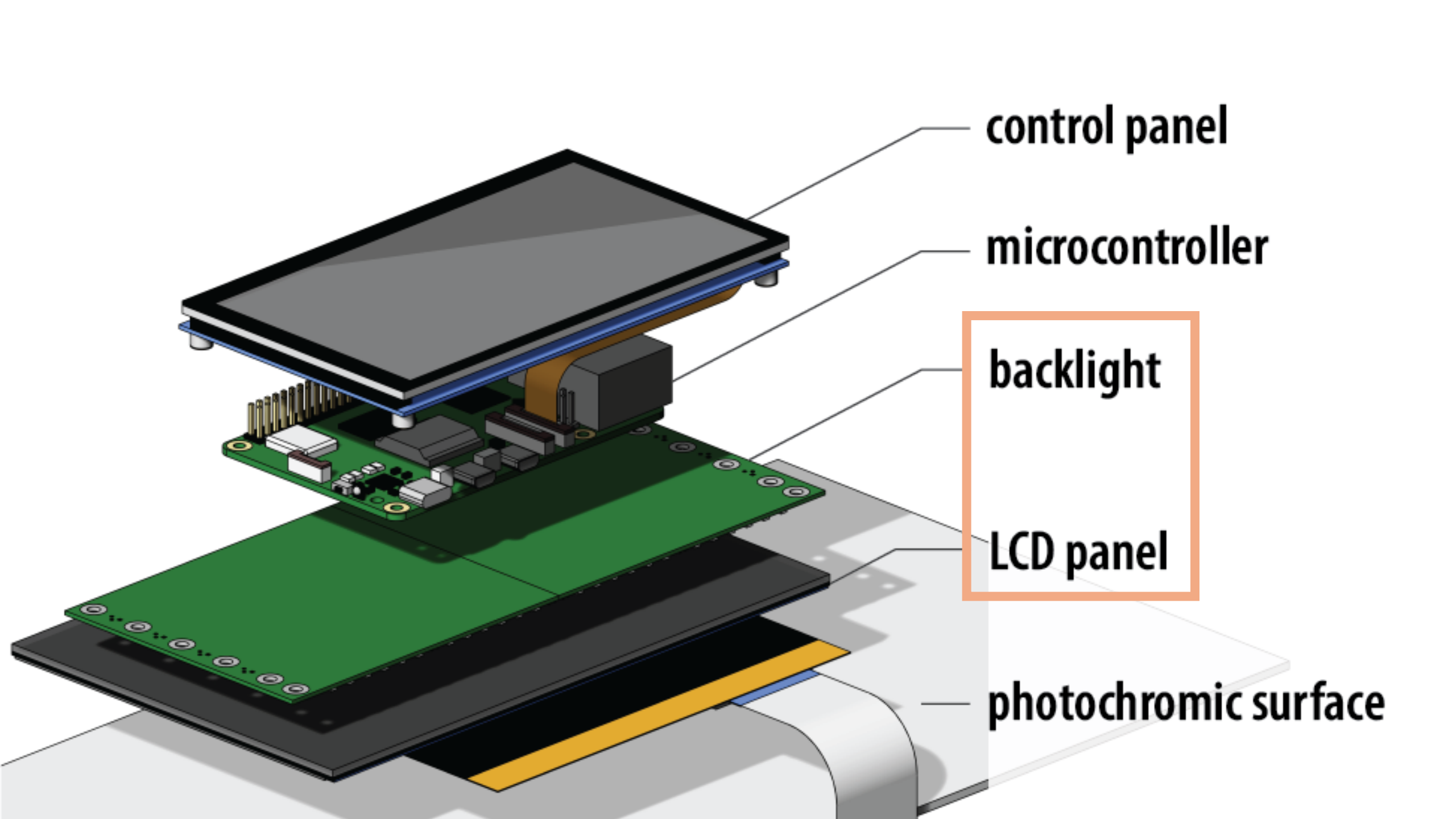
LED Based

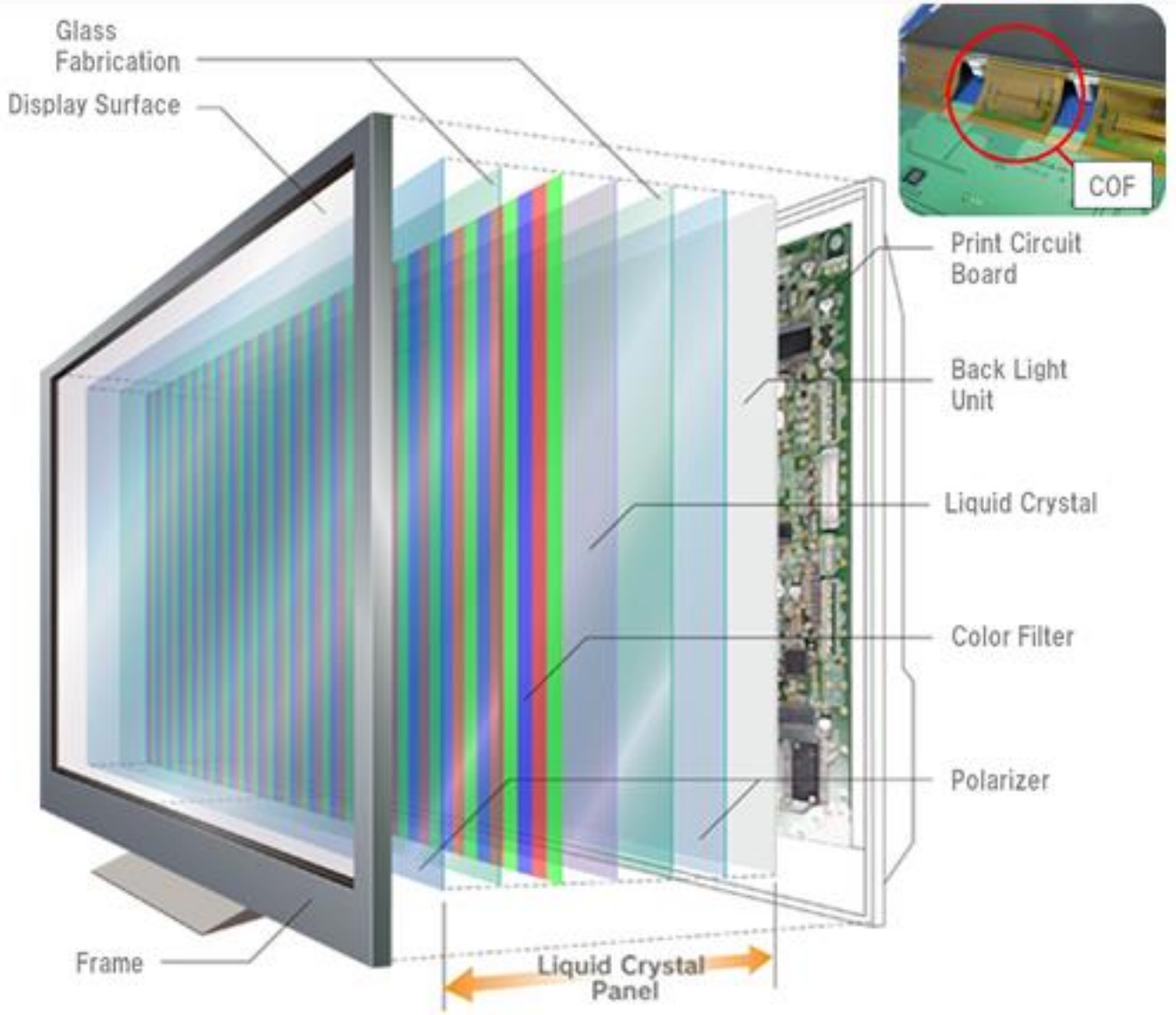
High Resoluti
Low Portabili

High Resolution
High Portability

ow Resolution
igh Portability

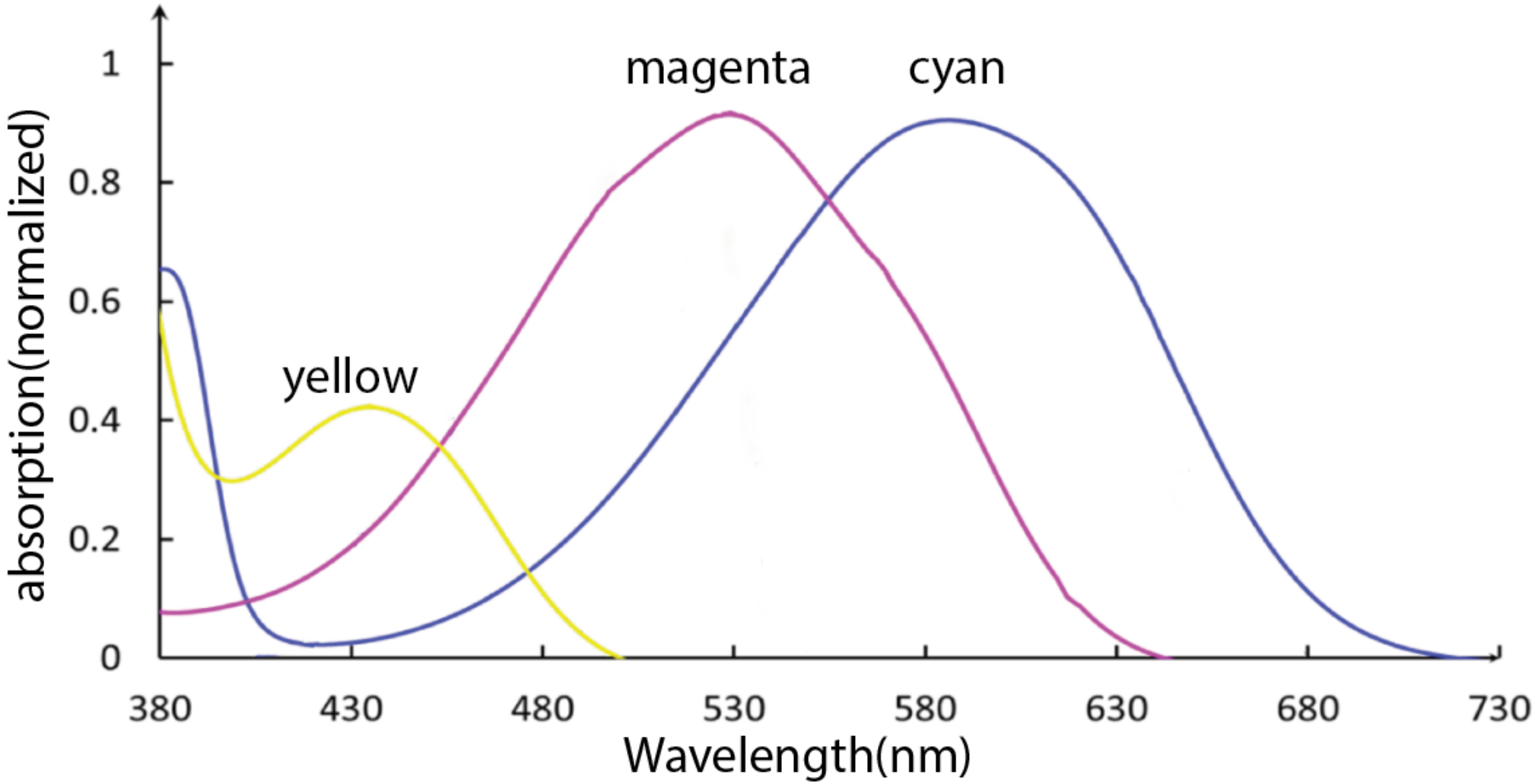

ChromoLCD Device


control panel
microcontroller
backlight
LCD panel
photochromic surface

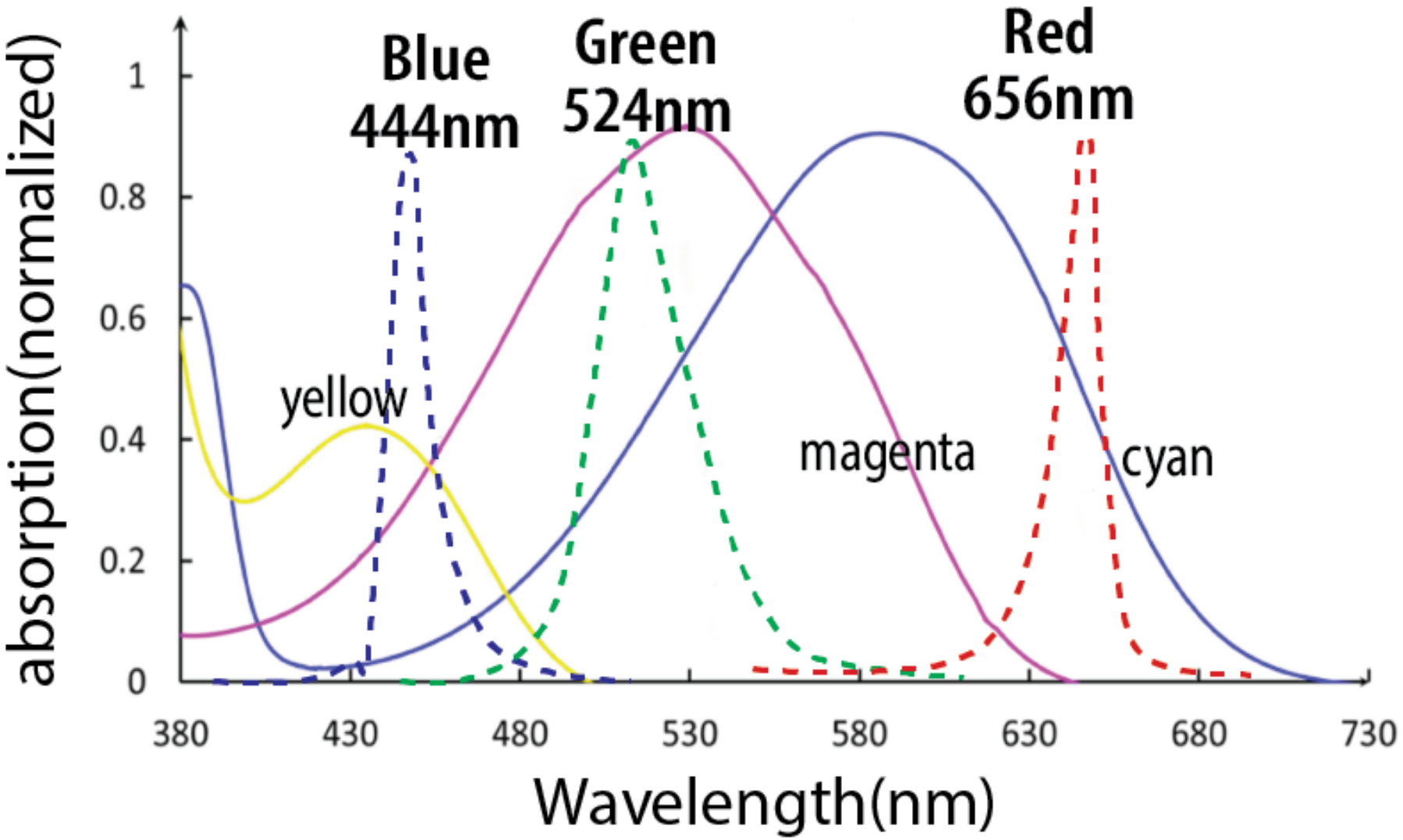

Glass
Fabrication
Display Surface
COF
Print Circuit
Board
Back Light
Unit
Liquid Crystal
Color Filter
Polarizer
Frame
Liquid Crystal
Panel

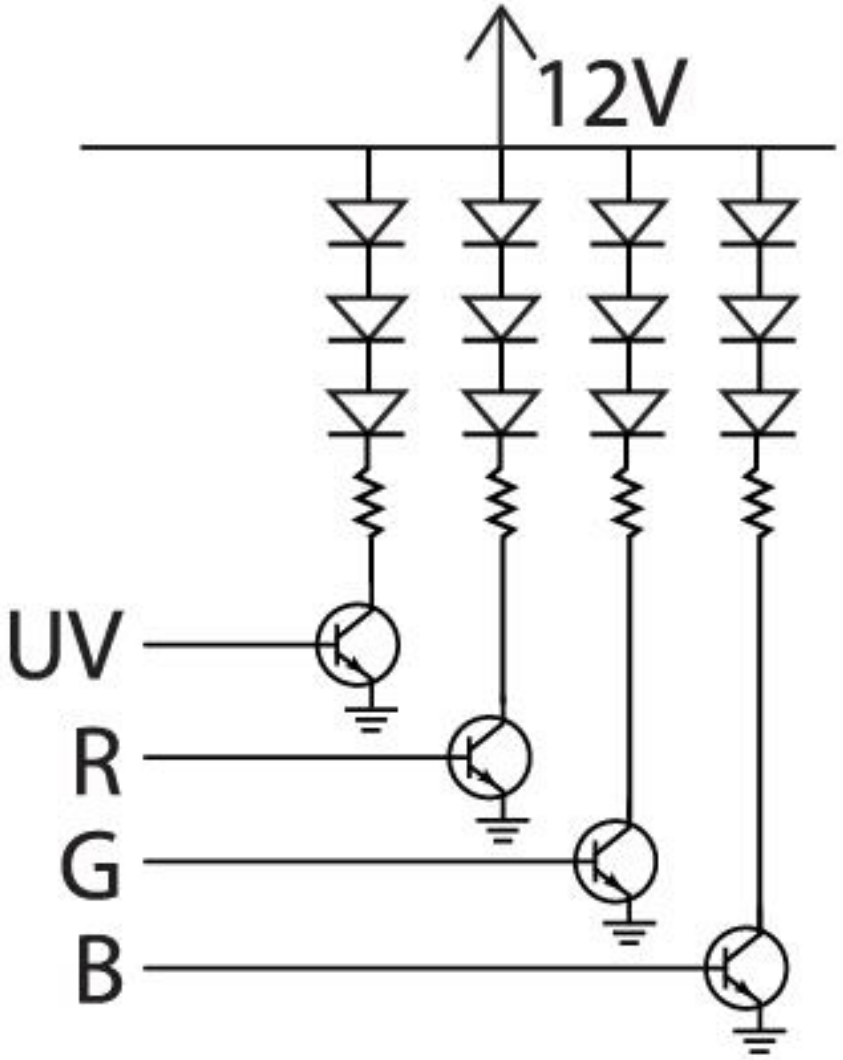
LCD in TV

Photochromic Absorption

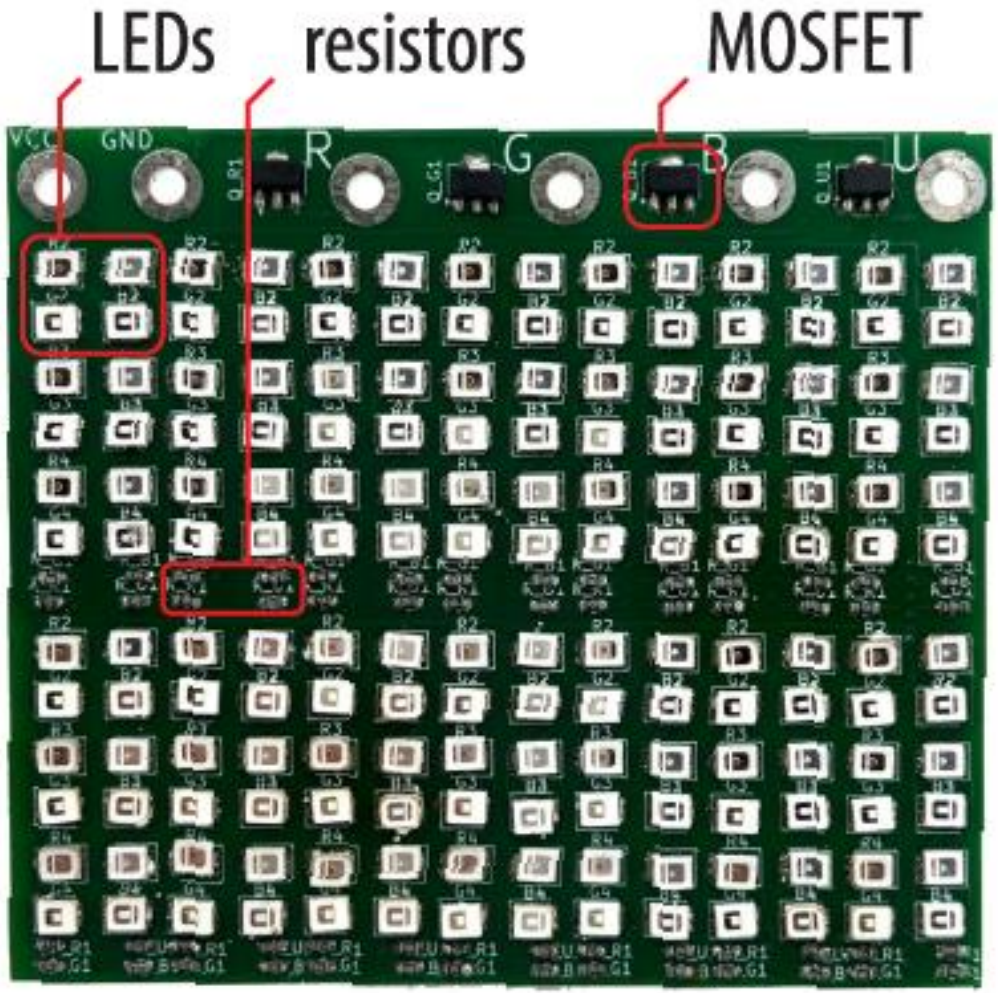


LED Selection

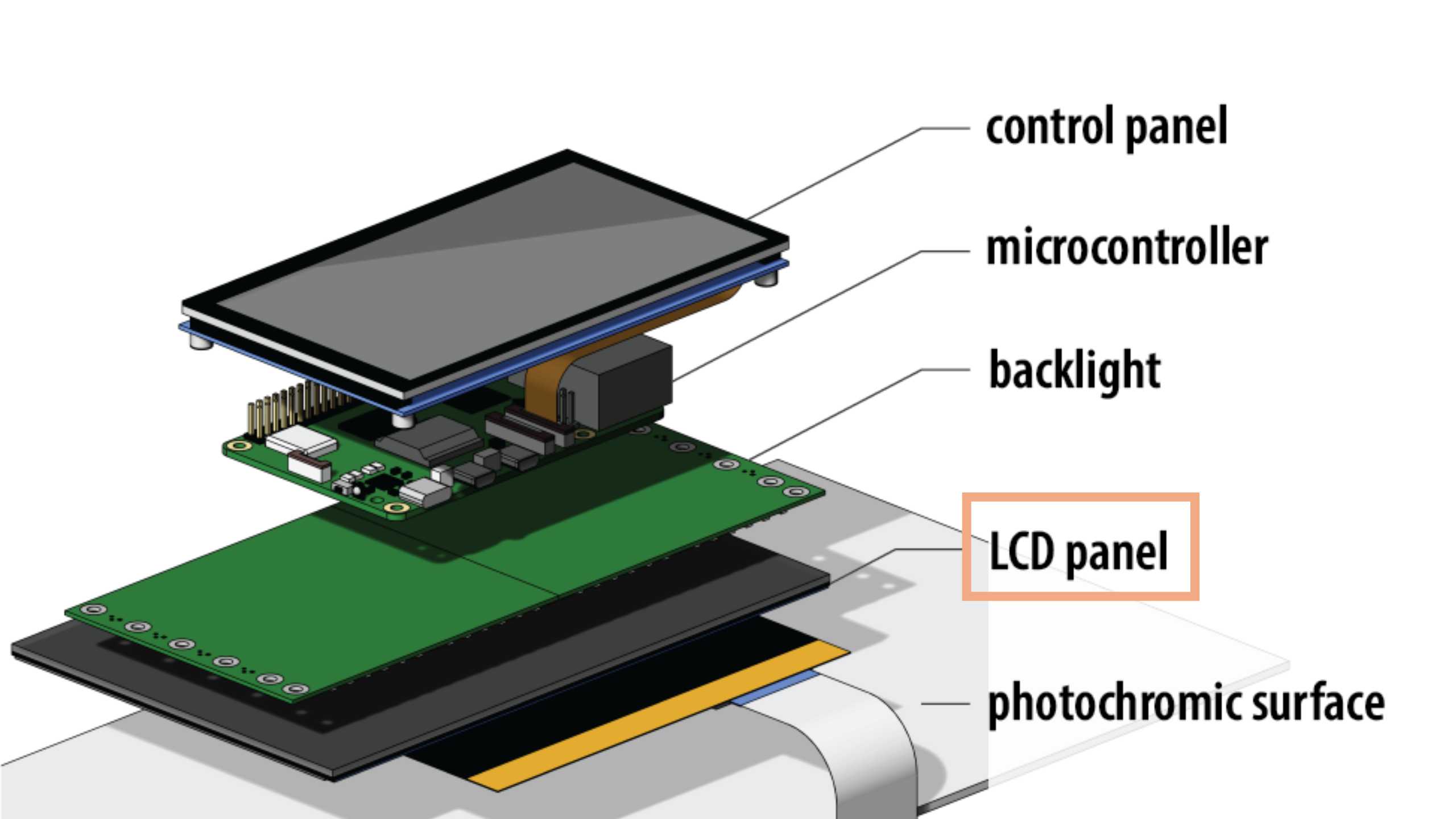


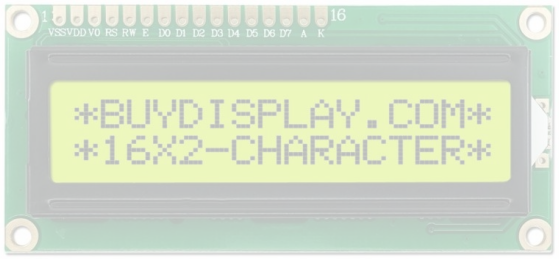


Circuit Design



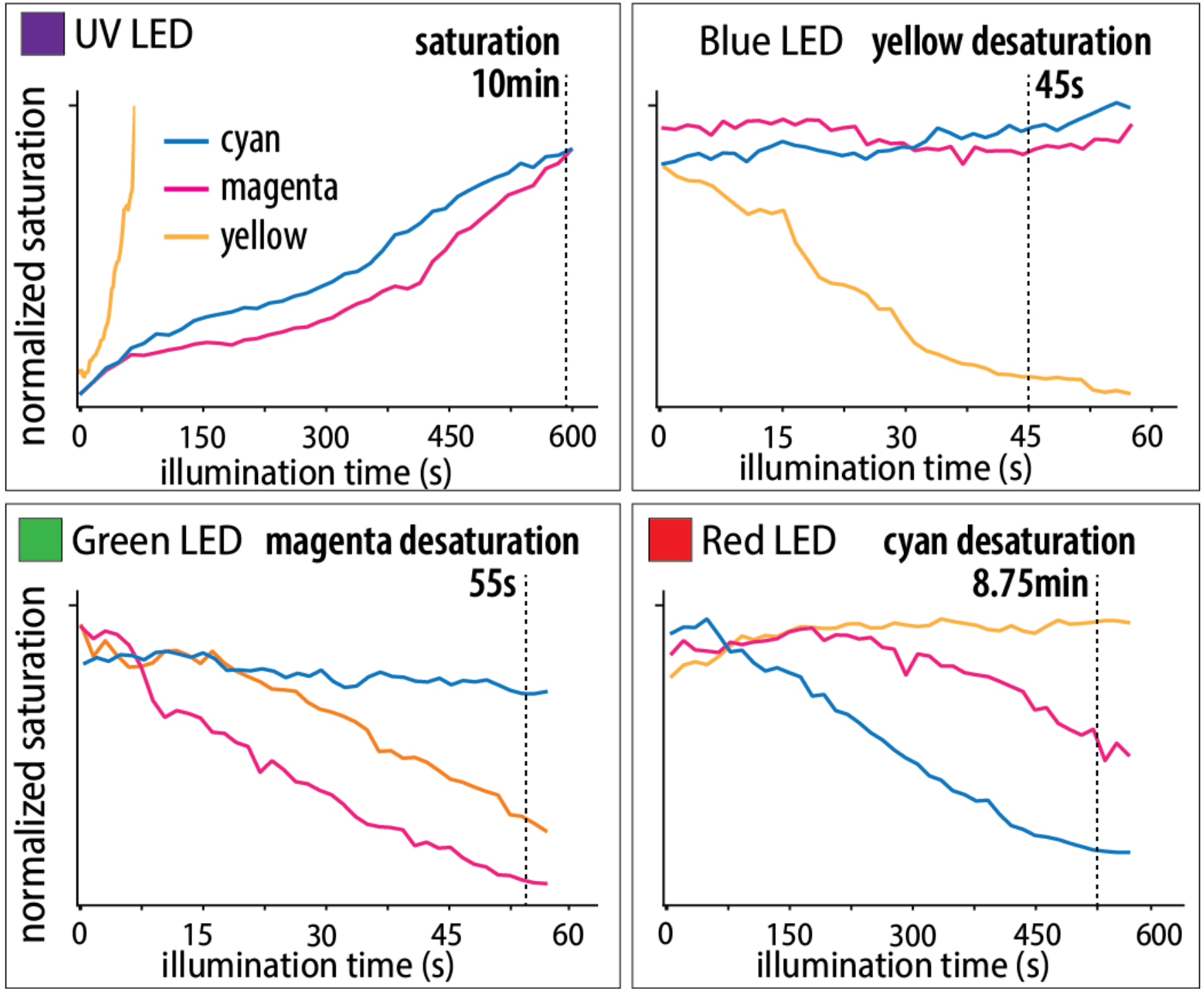
Backlight PCB

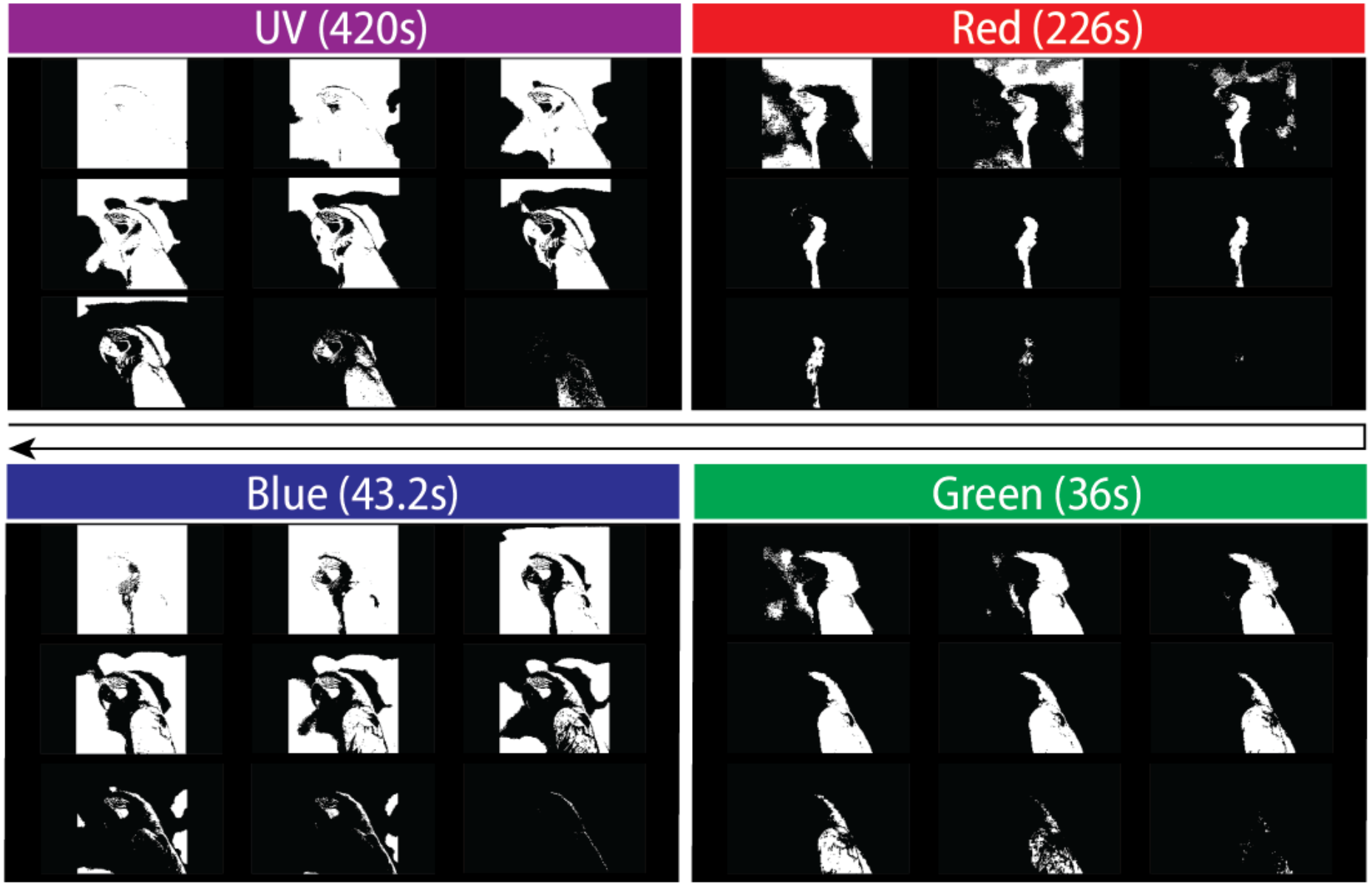

control panel
microcontroller
backlight
LCD panel
photochromic surface



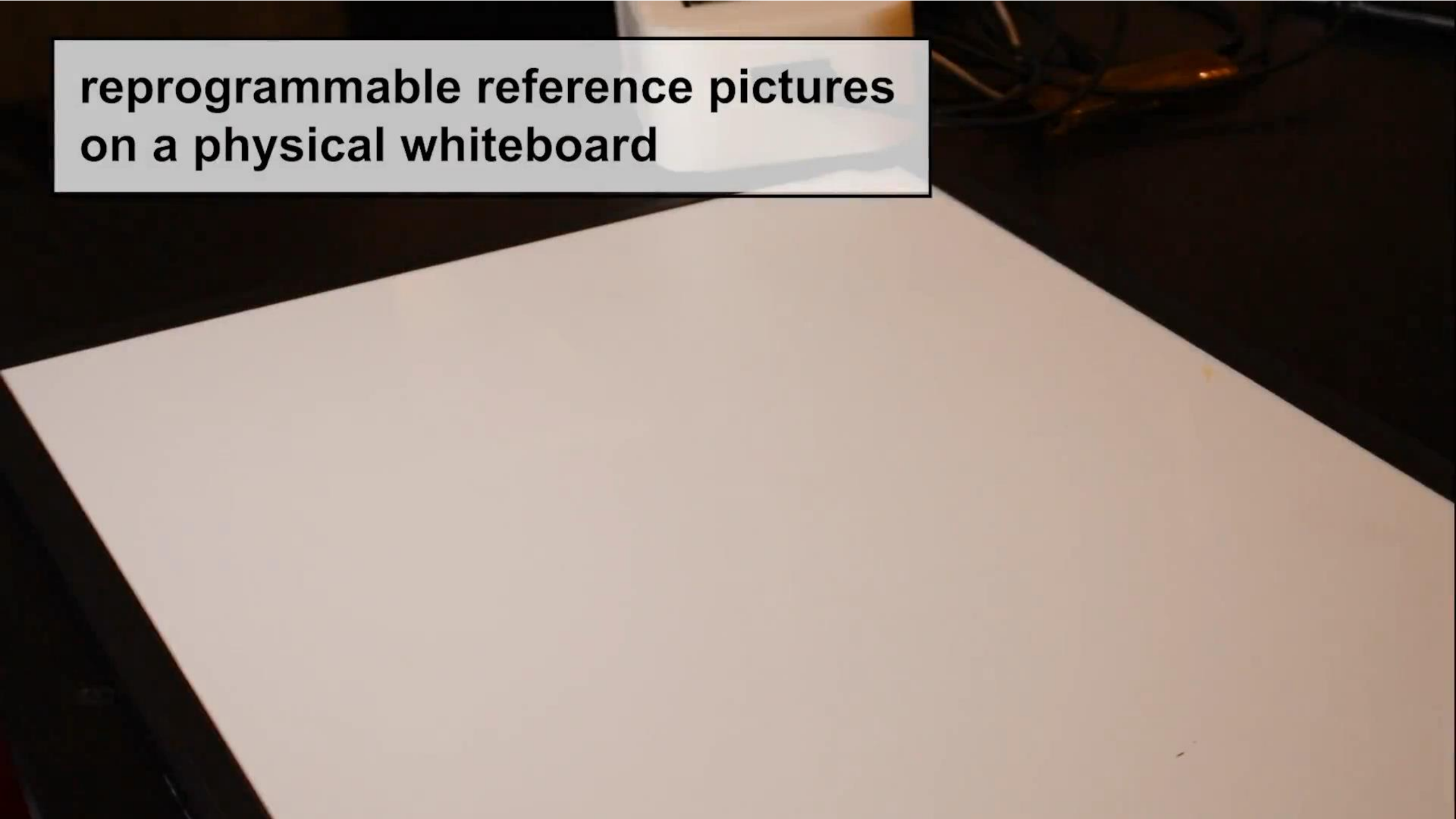
UV Filter Inside


ELEGOO
Saturn 3
12K


UV LED
saturation
10min
normalized saturation
cyan
magenta
yellow
0
150
300
450
600
illumination time (s)
Blue LED
yellow desaturation
45s
0
15
30
45
60
illumination time (s)
Green LED
magenta desaturation
55s
normalized saturation
0
15
30
45
60
illumination time (s)
Red LED
cyan desaturation
8.75min
0
150
300
450
600
illumination time (s)



reprogramming process

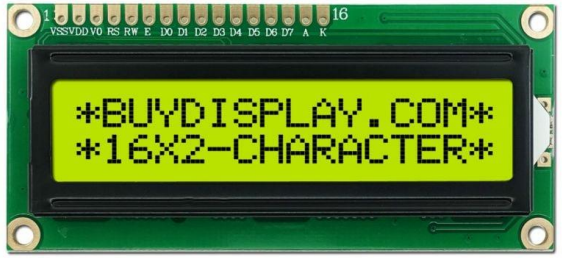

reprogrammable reference pictures
on a physical whiteboard


reprogrammable AR tags on a kitchen counter

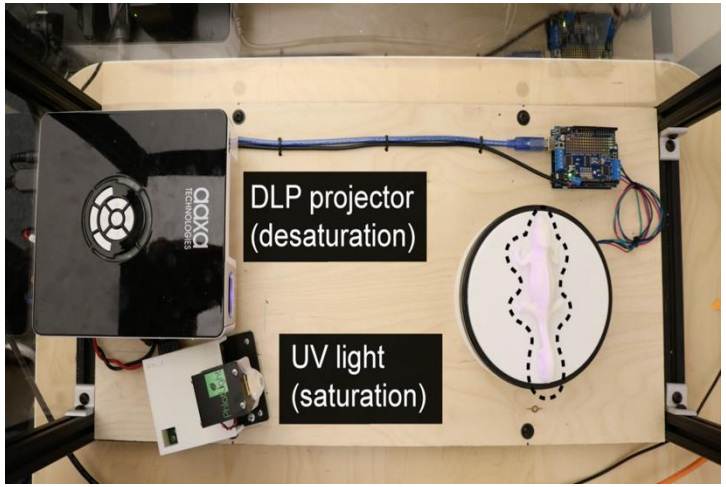

on-the-fly reprogramming of personal accessory design
bag coated with photochromic dye

Future Work:

TV LCD



LCD Module



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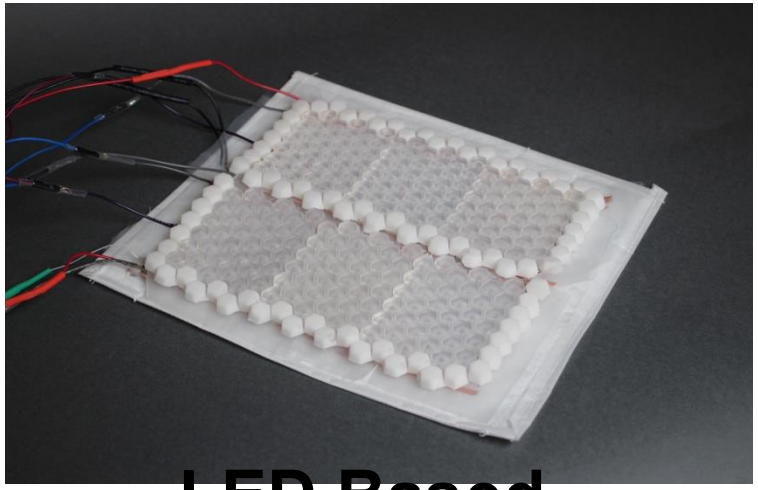

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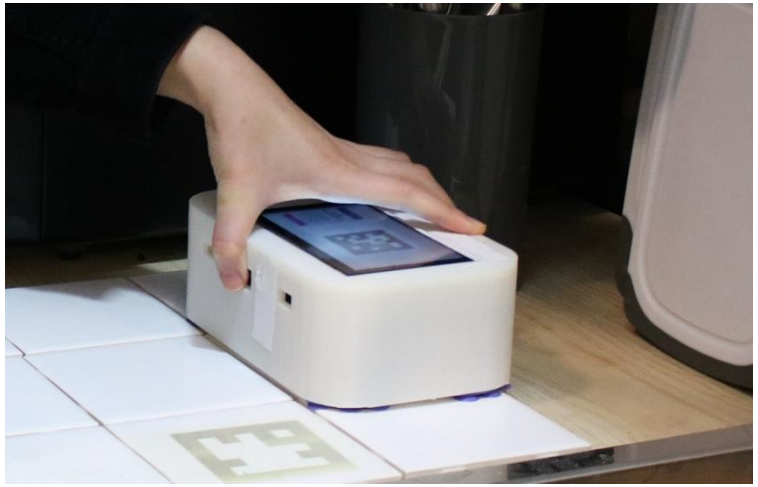
PortaChrome (UIST 2024)



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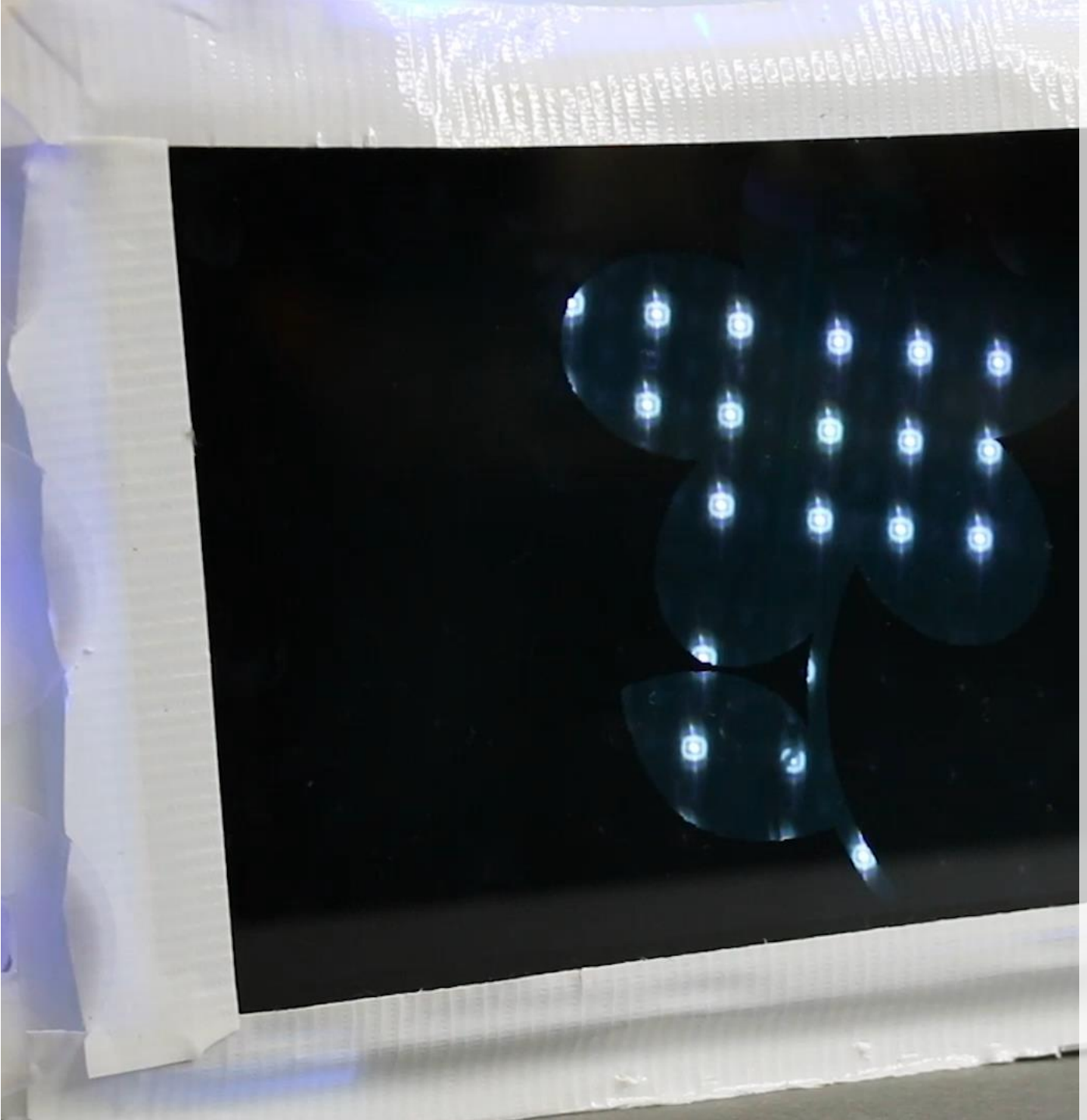
ChromoLCD (TEI 2024)



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