Designing Interactive Systems 2

Lecture 11: Software Prototyping

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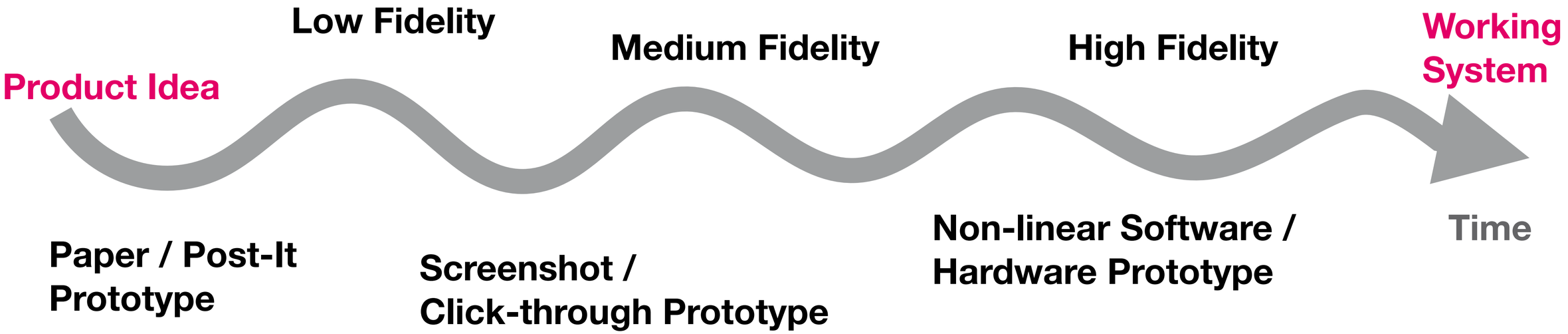
CHAPTER 38

Software Prototyping

Prototyping Stages (DIS1)



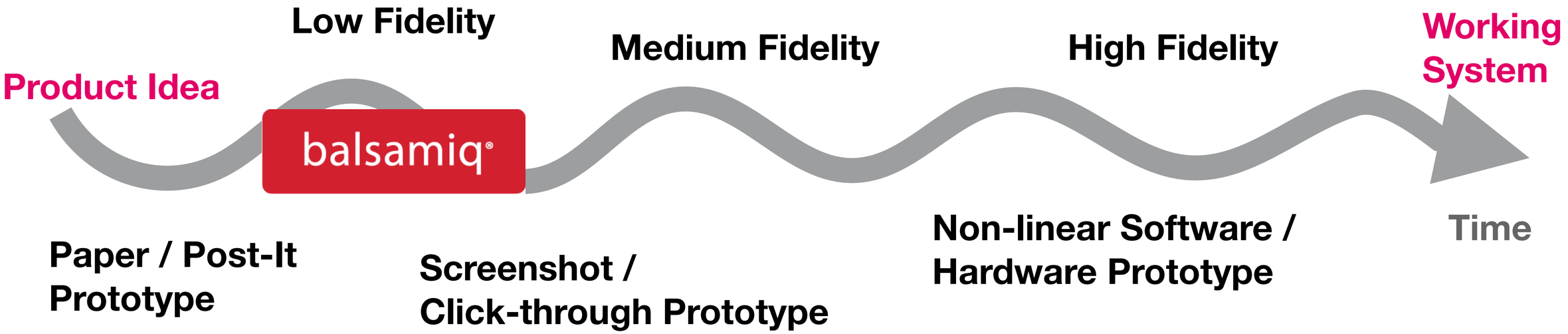
CHAPTER 39

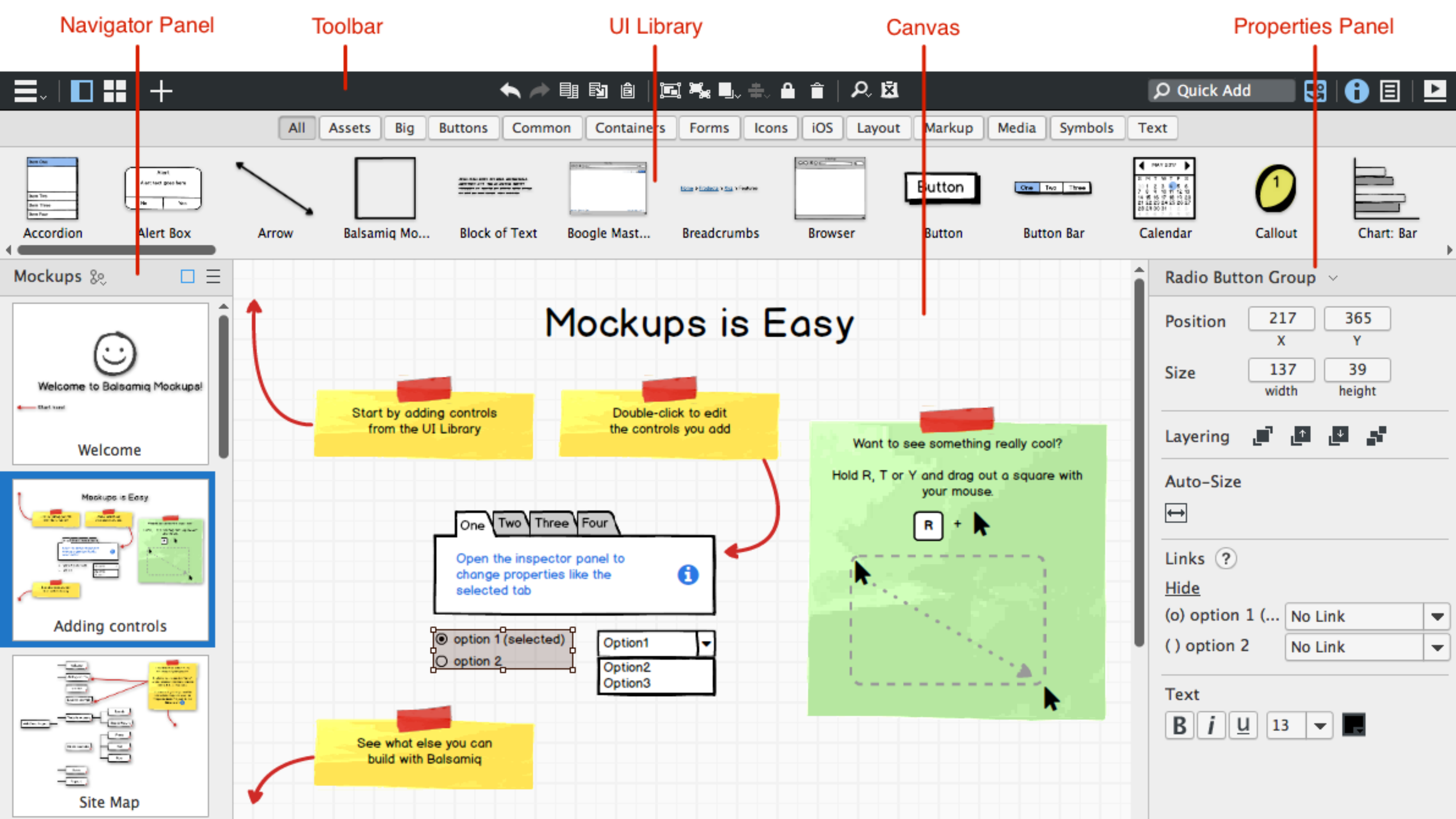
Prototyping Standard Apps

balsamiq®

- Wireframing tool
- Design mockups
- First released in 2008
- **WYSIWYG** editor

When to Use




Navigator Panel
Toolbar
UI Library
Canvas
Properties Panel
Quick Add
All
Assets
Big
Buttons
Common
Containers
Forms
Icons
iOS
Layout
Markup
Media
Symbols
Text
Accordion
Alert Box
Arrow
Balsamiq Mo...
Block of Text
Boogle Mast...
Breadcrumbs
Browser
Button
Button Bar
Calendar
Callout
Chart: Bar
Mockups
Welcome to Balsamiq Mockups!
Welcome
Mockups is Easy
Adding controls
Site Map
Mockups is Easy
Start by adding controls from the UI Library
Double-click to edit the controls you add
One
Two
Three
Four
Open the inspector panel to change properties like the selected tab
option 1 (selected)
option 2
Option1
Option2
Option3
Want to see something really cool?
Hold R, T or Y and drag out a square with your mouse.
R
+
See what else you can build with Balsamiq
Radio Button Group
Position
217
X
365
Y
Size
137
width
39
height
Layering
Auto-Size
Links
Hide
(o) option 1 (...
No Link
( ) option 2
No Link
Text
B
i
U
13

Demo: balsamiq®

Balsamiq: Features

- Focused on structure rather than colors and icons
- For rough wireframes
- Library of UI elements
- Can design widgets

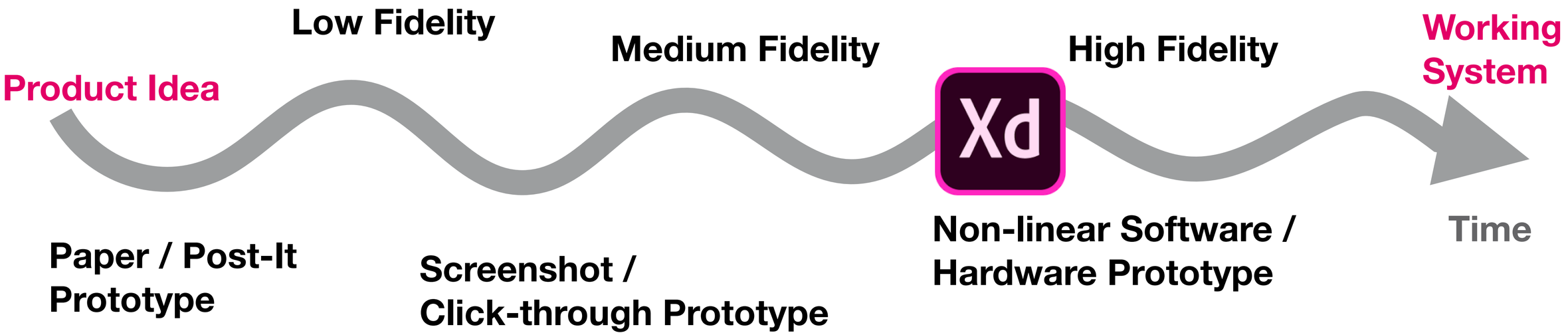
CHAPTER 40

Sketching

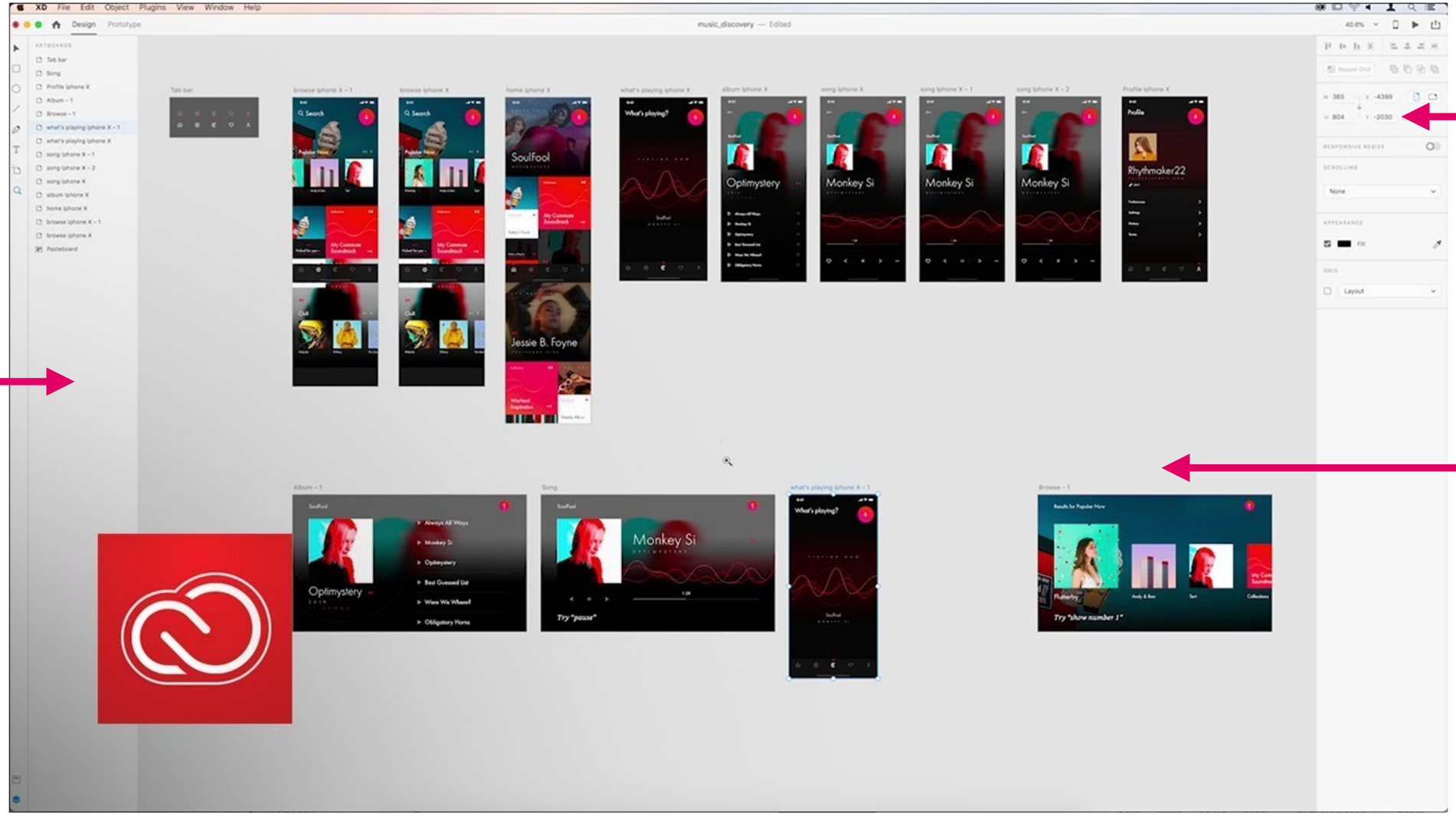
Adobe Xd

- UI sketching and prototyping tool
- Create user interfaces for mobile and web applications
- First released in 2017
- Free

When to Use

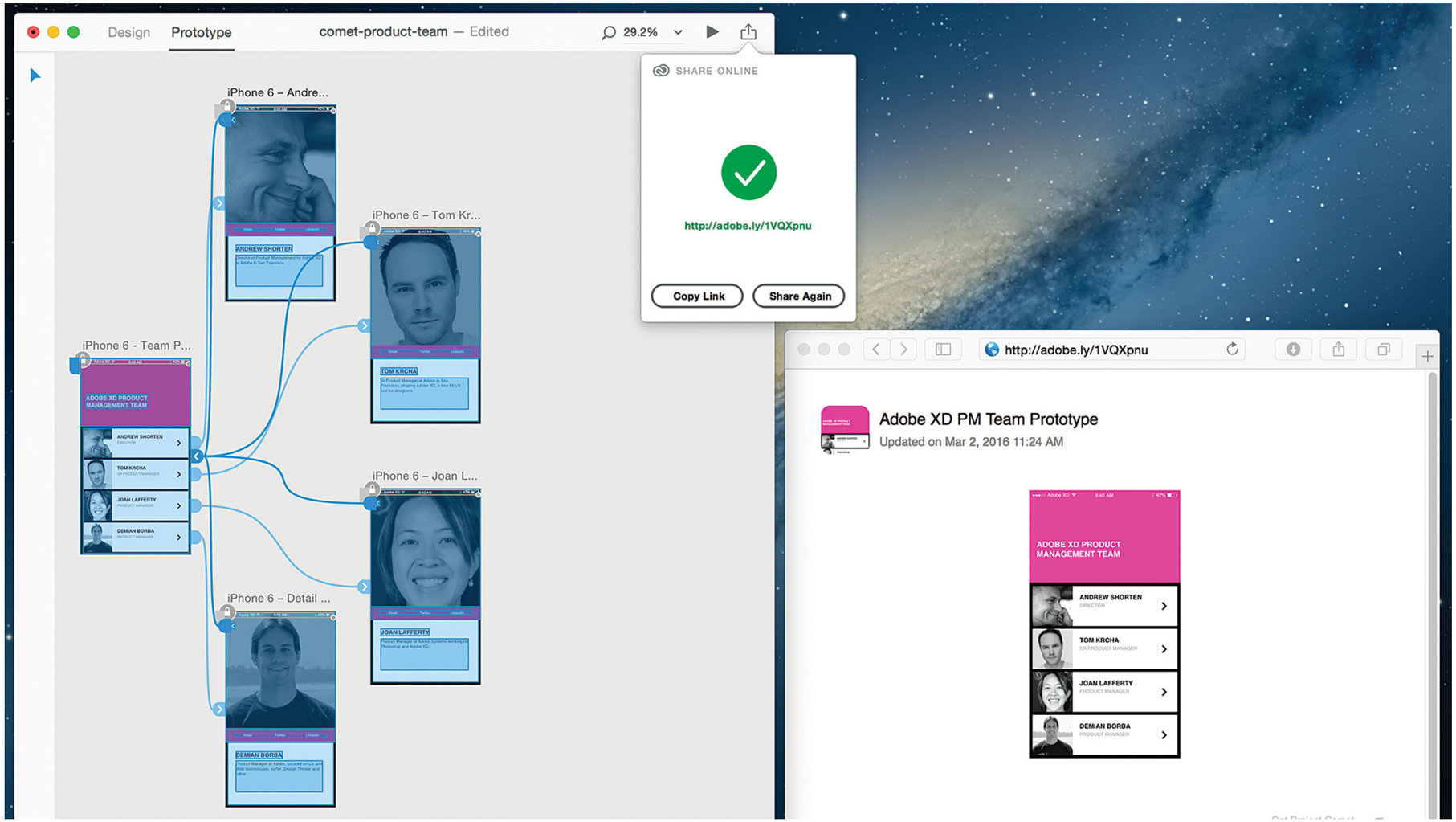


Interface

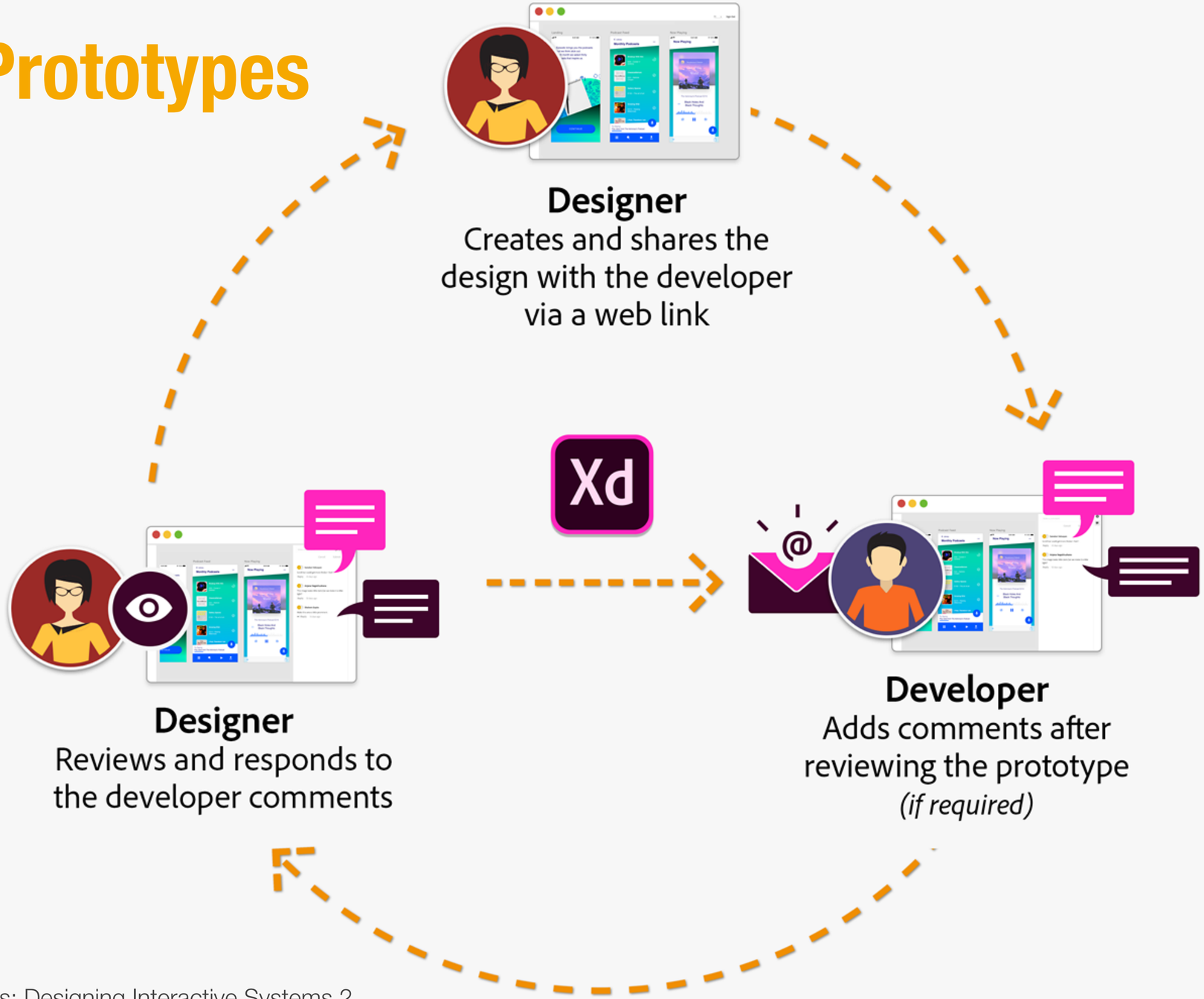


Nonlinear Software Prototypes

- In-App preview
- Mobile preview app for iOS and Android



Sharing Prototypes



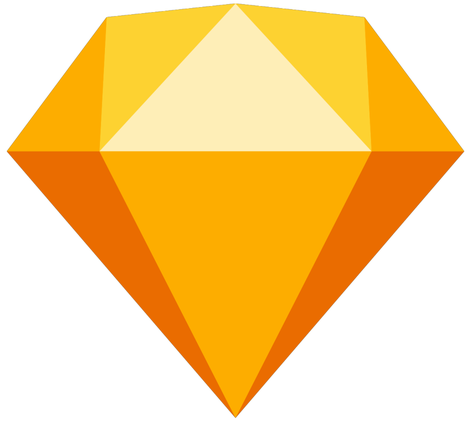
Demo: Adobe Xd

Adobe Xd: Features

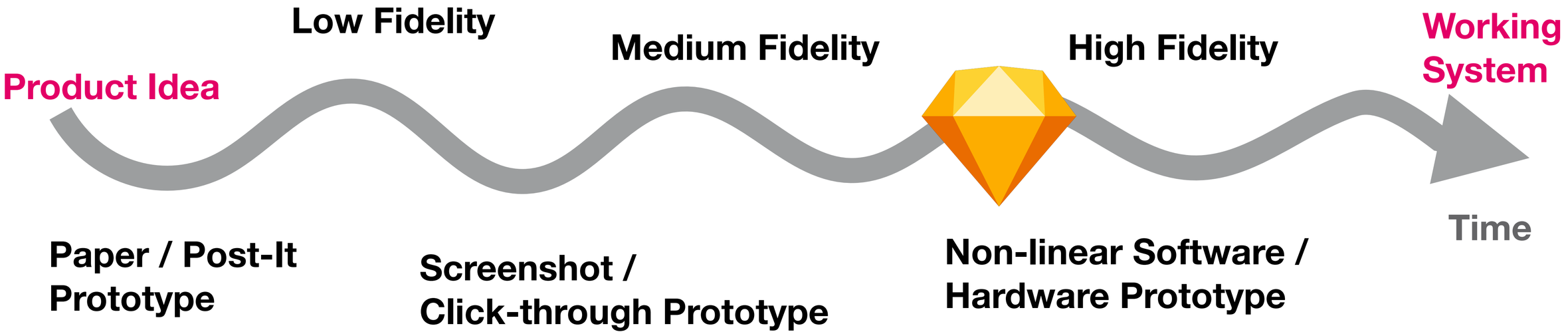
- **Scrolling** by resizing canvas
- Repeat Grid
  - Tool that lets you replicate a group of objects
- Voice Design
- Supports applications in the Adobe Creative Suite (Illustrator, Photoshop, Photoshop Sketch)
- **Developer file**

Sketch Software

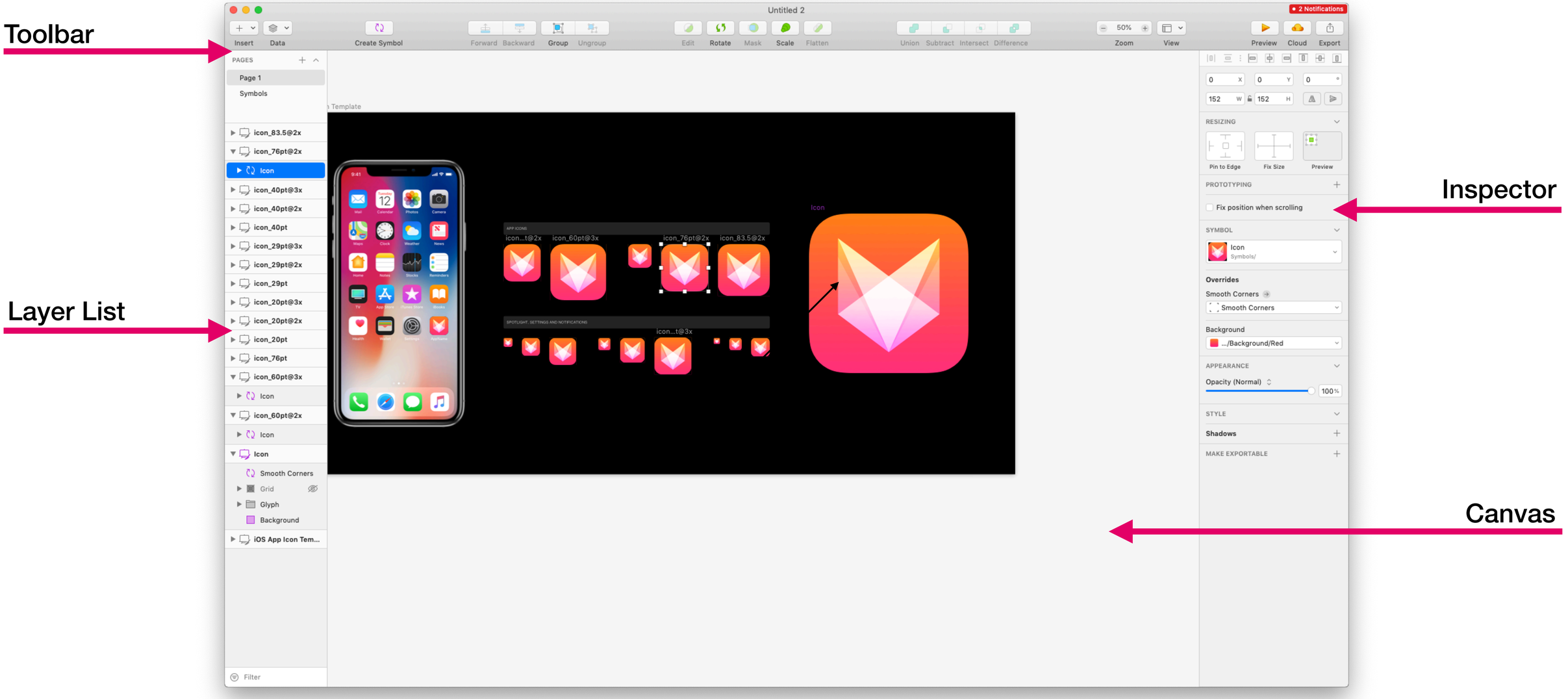
- First released in 2010
- Designing **UI** and **UX** of **mobile apps** and **websites**



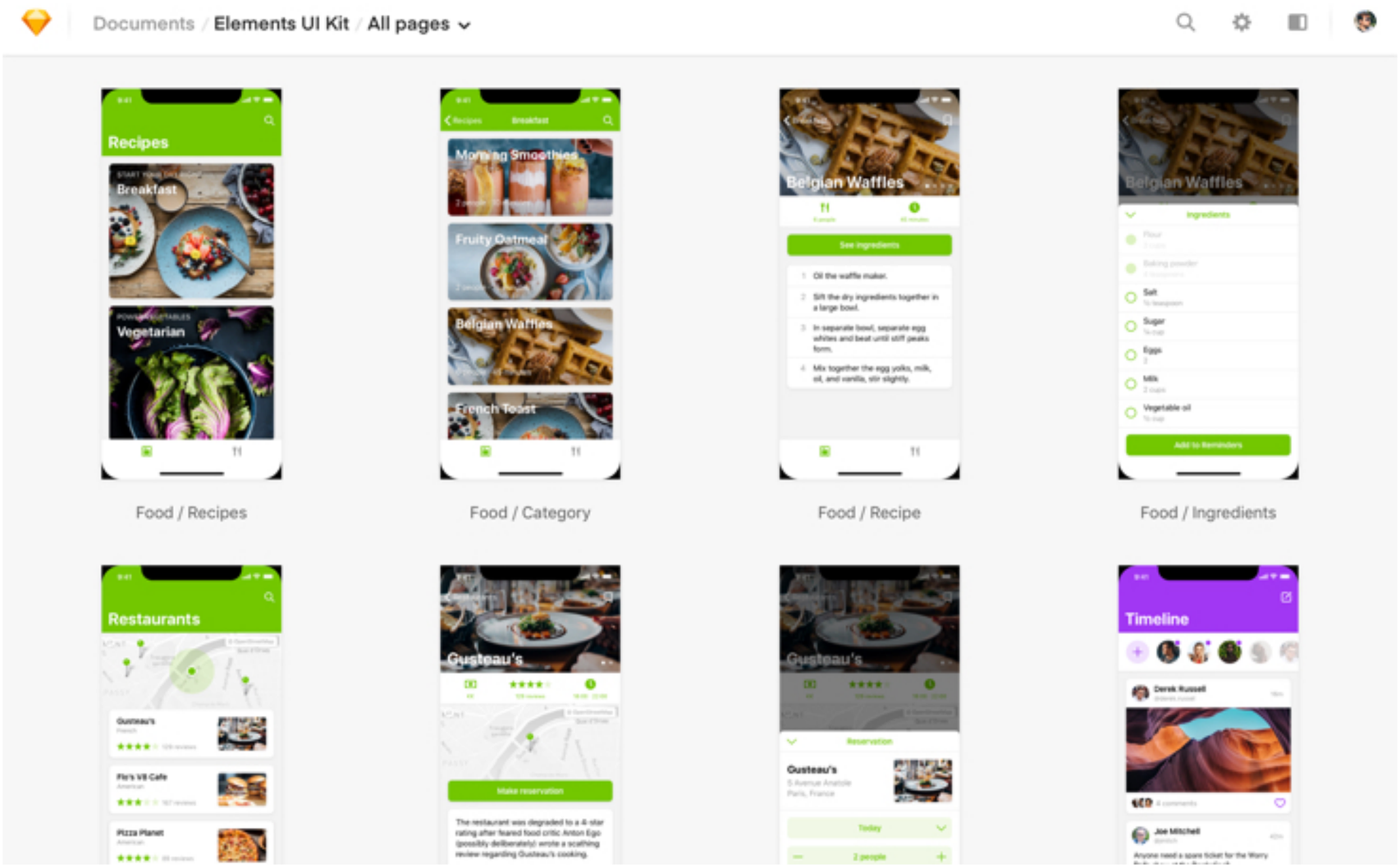
When to Use



Interface



Sketch Cloud



Demo: Sketch

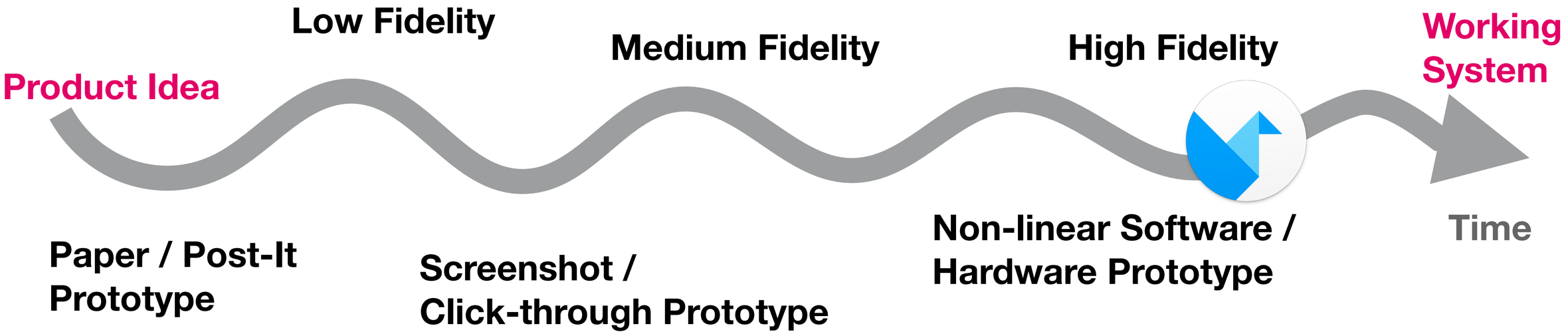
Sketch: Features

- Sketch vs. Illustrator and Photoshop
  - Combines Design and Prototyping
  - Focused on the needs of the UI and icon designer
  - Good for newbies
- **Scrolling** by resizing canvas
- **Symbols** allow reusing elements across different Artboards and Pages so you can save time and stay consistent
- **Libraries** with designed widgets, e.g., for iOS

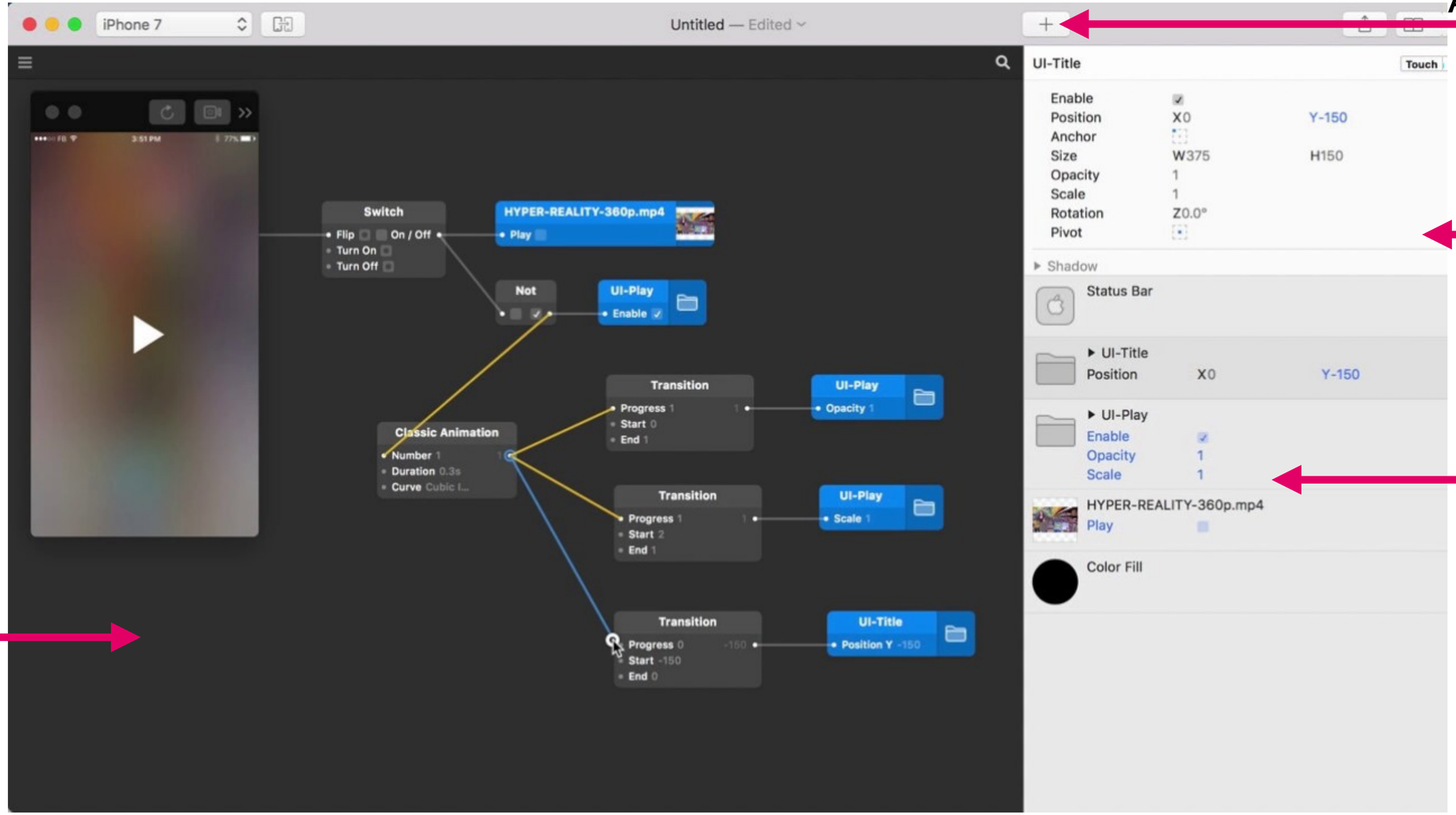
Origami Studio

- Free design tool by Facebook
- Plug-in for Quartz Composer
- Visual programming environment
- Programming in Quartz Composer by connecting patches to each other
- Good companion to Sketch

When to Use



Interface



Add Components

Properties

Layer List

Viewer

Demo: Origami

Origami: Features

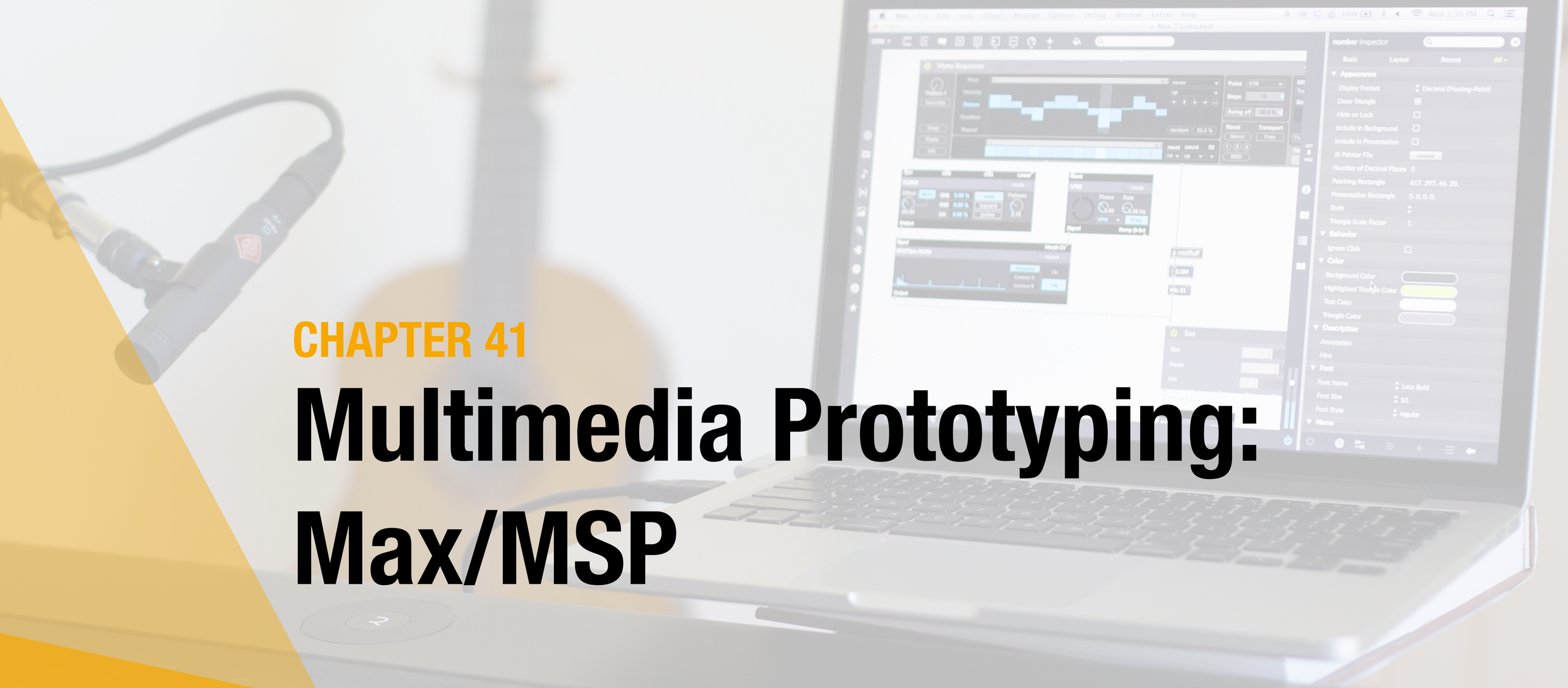
- Building small high fidelity prototypes
  - Rather complex in its functions
- Tweaking the interaction you have in mind
- Not suitable for quick wireframing
- **Scrolling** possible
- Pasting of Sketch UI files possible

Features

Feature \ Tool	Sketch	Origami	Adobe Xd	Balsamiq
Plattform specific options				
Sharing Designs	**Online Link**	**Via Mail**	**Online Link**	**Only PNG (not interactive)**
Libraries				
Scrolling				
Developer file	**objects are exported with specifications**	Export code snippets	**Sharing includes all assets, dimensions**	**PNGs without specifications**
Real Testing		**Origami Live app on Mac**	**App for iOs and Android**	
Advanced Interactions		**Microphone & Sound**	**Voice commands**	

Which Tool to Use When?

- balsamiq:
  - Standard (productivity) apps
  - Fast wireframing by using widgets for medium fidelity
- Adobe Xd & Sketch:
  - Standard UIs via libraries, and custom UIs (immersive apps, games)
  - Medium to high fidelity
- Origami:
  - Reuse Sketch files
  - Small high fidelity

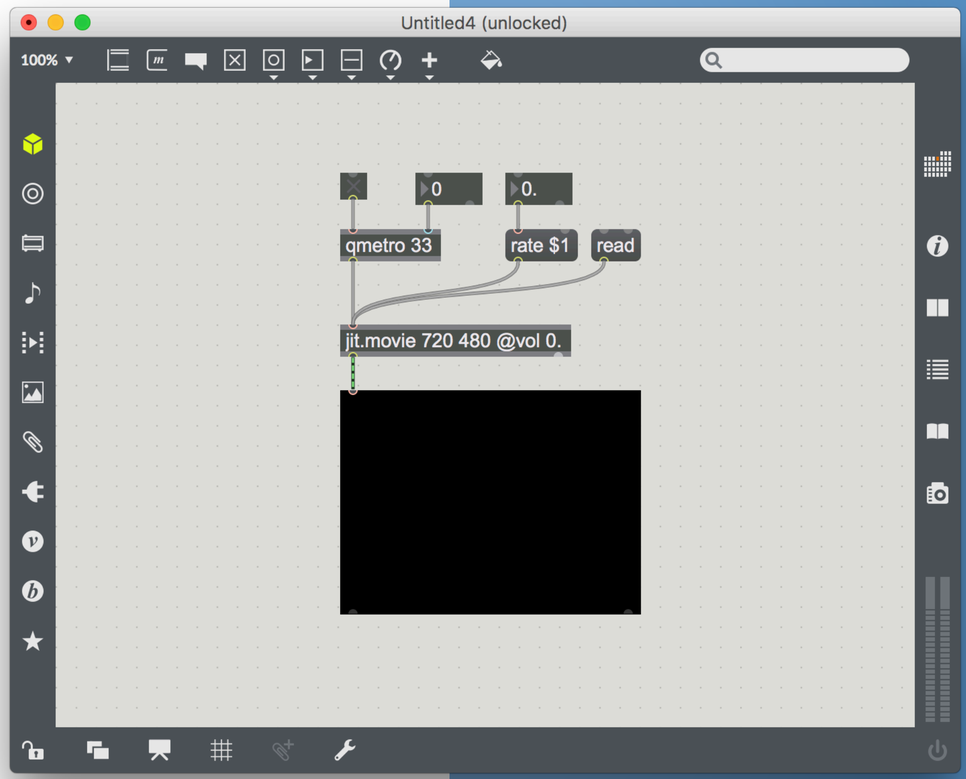


CHAPTER 41

Multimedia Prototyping: Max/MSP

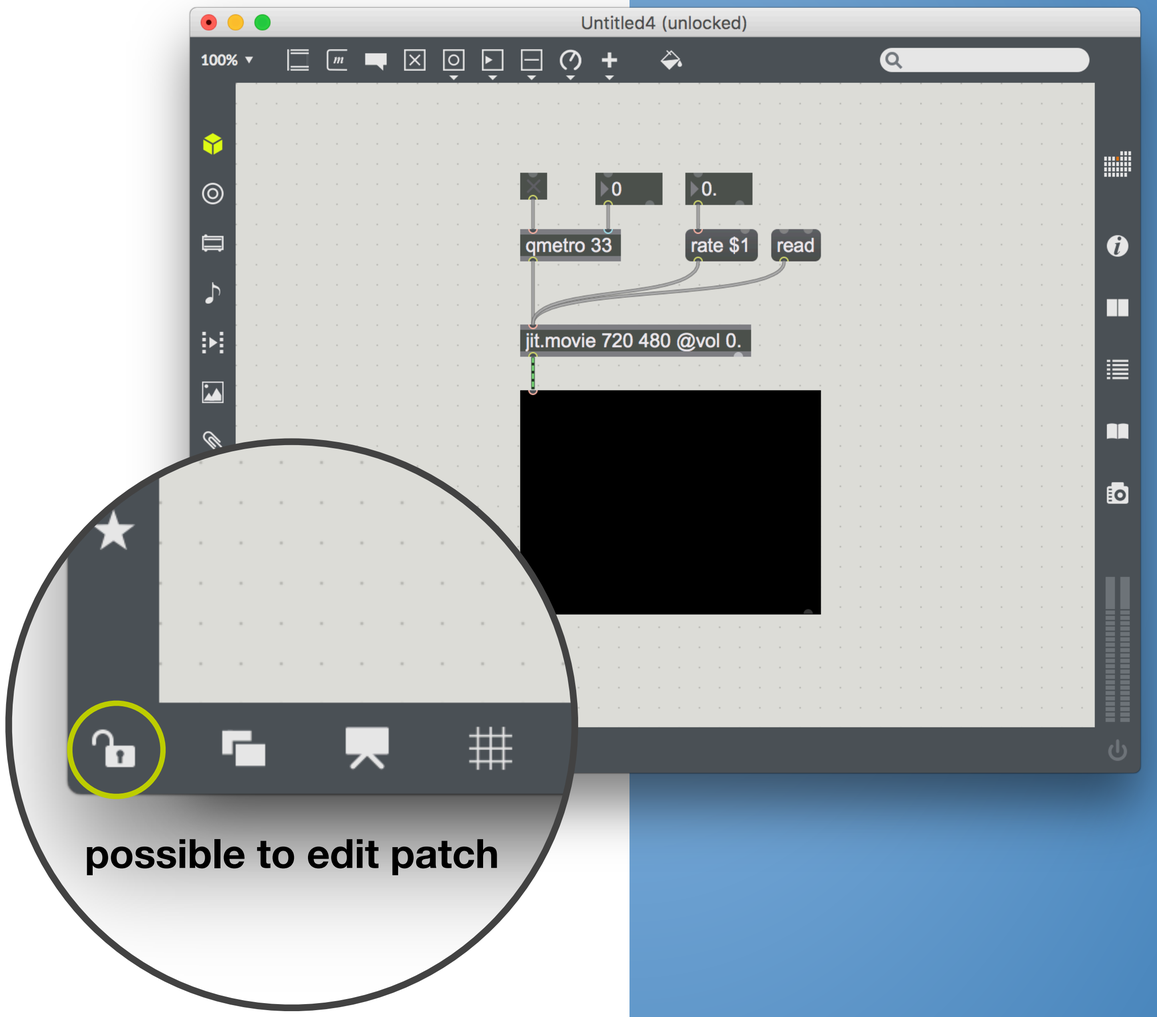
Intro to Max

- Visual **flow-based programming** inspired by patch panels in recording studios
- Tuned for working with time-based input streams
- Programs are called **patches**
- **Objects** contain functionalities and are visually represented by boxes
- **Patch cords** connect objects



HCI View on Max

- **Prototyping** UIs
  - For working with time-based media
  - Using time-based media as input/output devices
- No need for being a DSP guru
- **Liveness** allows fast development
  - Locked: use patch
  - Unlocked: edit patch



“If most MIDI apps are 🍕 pizza,
then Max is a kitchen.”

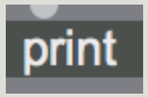
- Miller Puckette

History

- 1986: **Patcher** for Mac
  MIDI and control processing
- 1989: **MSP** allows to process digital audio
- 1989: Ircam Musical Workstation featuring Max containing
  - GUI on NeXTStep
  - „Faster Than Sound“ card
- 1995: **pd** (pure data)
  ability to share patches between multiple projects
- 2003: **Jitter** real time processing of matrix data, e.g. video, 3D
- 2010: **Vizzie** visual processing module

Objects

- **Normal objects**
  - Squares with object name in it
  - Object name can be followed by arguments
  - Inputs are at the top, outputs at the bottom
- **UI objects**
  - Sliders, dials, number fields, buttons, etc.
- **Comments**

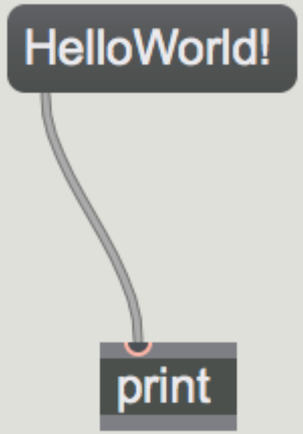


Messages

- Sent through patch cords

- Various **types**
  - number: int, float
  - list of numbers, separated by spaces
  - word (”symbol”)
  - bang
  - combinations

- **Message order**
  right to left, bottom to top



Math in Max

- Basic operations as objects like `*`, `+`, `-`, `/`
- Common functions like `sin`, `abs`, `sqrt`
- `expr` object for more complex terms
- `if` for conditions

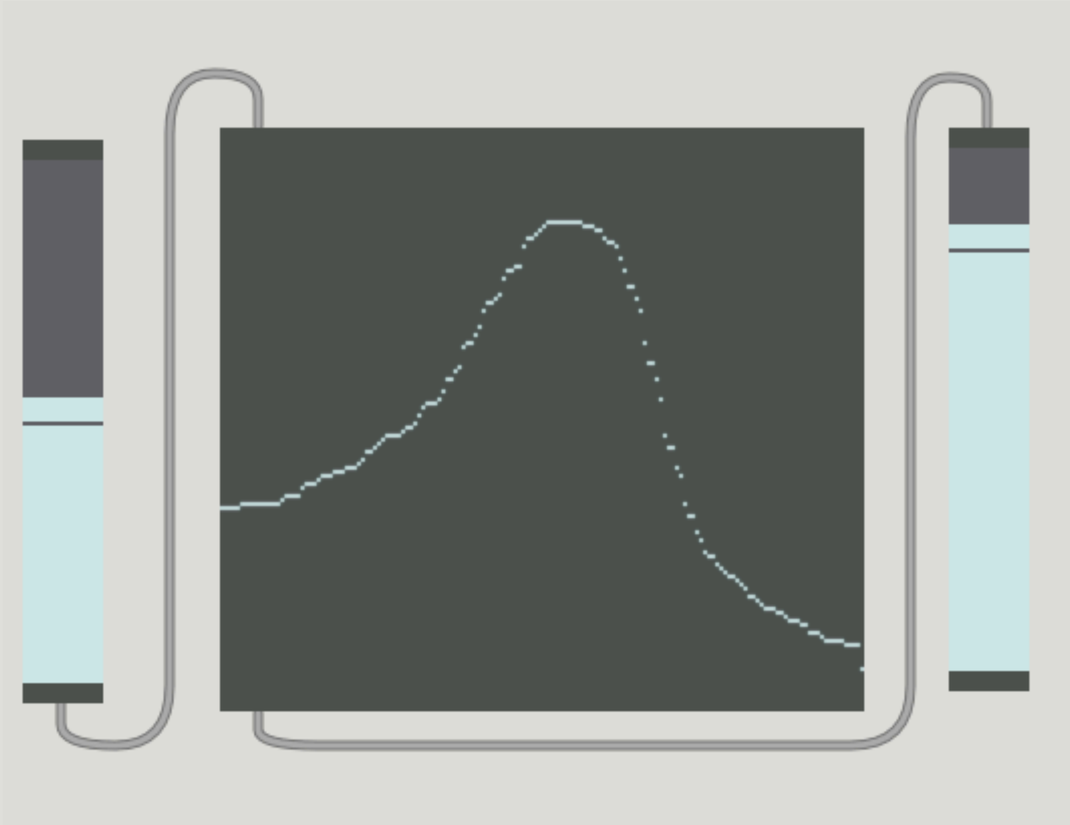
Creating Patches

DEMO 1

Using a table to map slider input to slider output

DEMO 2

Adding integers



MIDI Handling

- Objects for input and output of notes, control messages and raw data, e.g. **`ctlin`**, **`midiout`**, **`notein`**

- Objects for translation between MIDI notes and frequencies

- MIDI messages are ordinary messages:
  MAX handles MIDI as sequence of numbers

MSP

- MSP object names end with ~
- MSP signal patch cords are curly
- curly signals cannot be connected to regular objects
- DSP operations happen at sample timing precisions

MSP Features

- **`adc~`** and **`dac~`** for audio in-/output
- **`fft~`** and **`ifft~`** convert from time to frequency domain
  - phase vocoder (timestretching)
  - complex filters
- **`buffer~`** for storing sample data
- UI elements for visual analysis

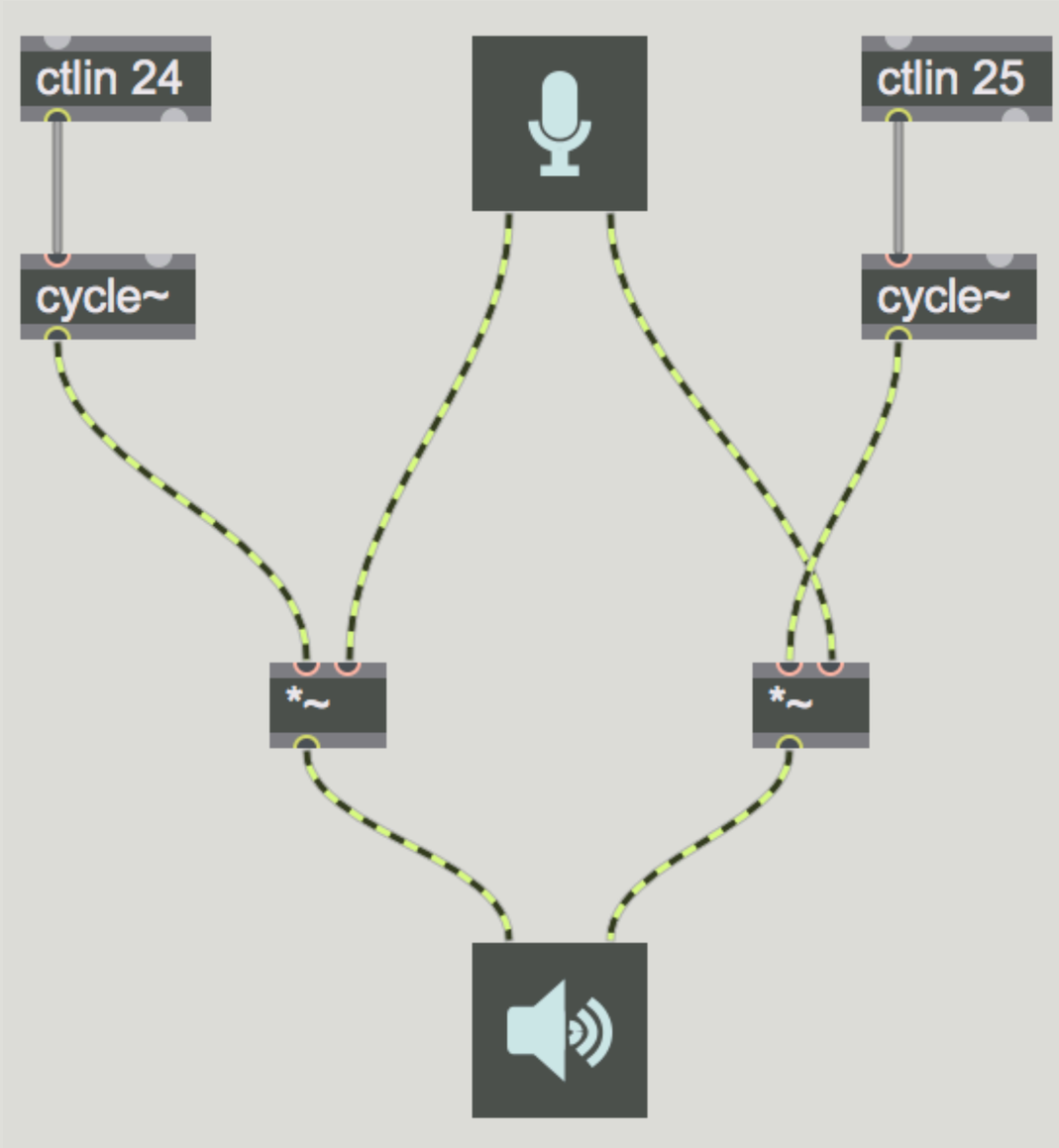
Simple MSP Patch

DEMO 3

Performing ring modulation

- **cycle object**
  generates a periodic waveform

- **ctlin object**
  outputs MIDI control signals

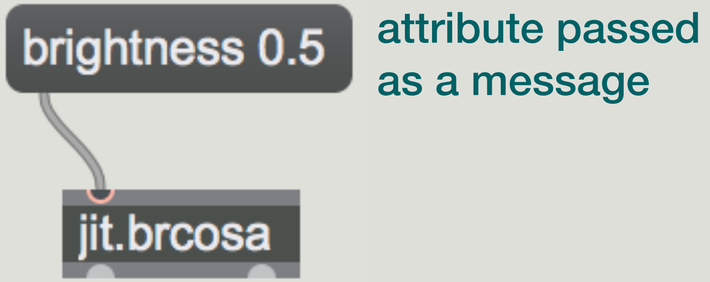


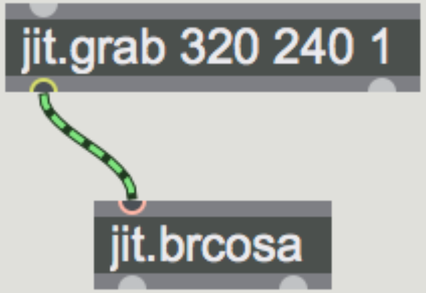
Jitter

- 130 additional objects for Max/MSP
- processing of matrix data (rows and columns)
  - video, still images, 3d geometry, text, spreadsheets, particle systems, voxels or audio
- supports Apple QuickTime
  - import, export, capturing
  - DV camera control
  - QTVR

Jitter Objects

- most names start with **`jit.`**
- attributes instead of dozens of arguments
- the green matrix patch cords cannot be connected with other Max/MSP objects

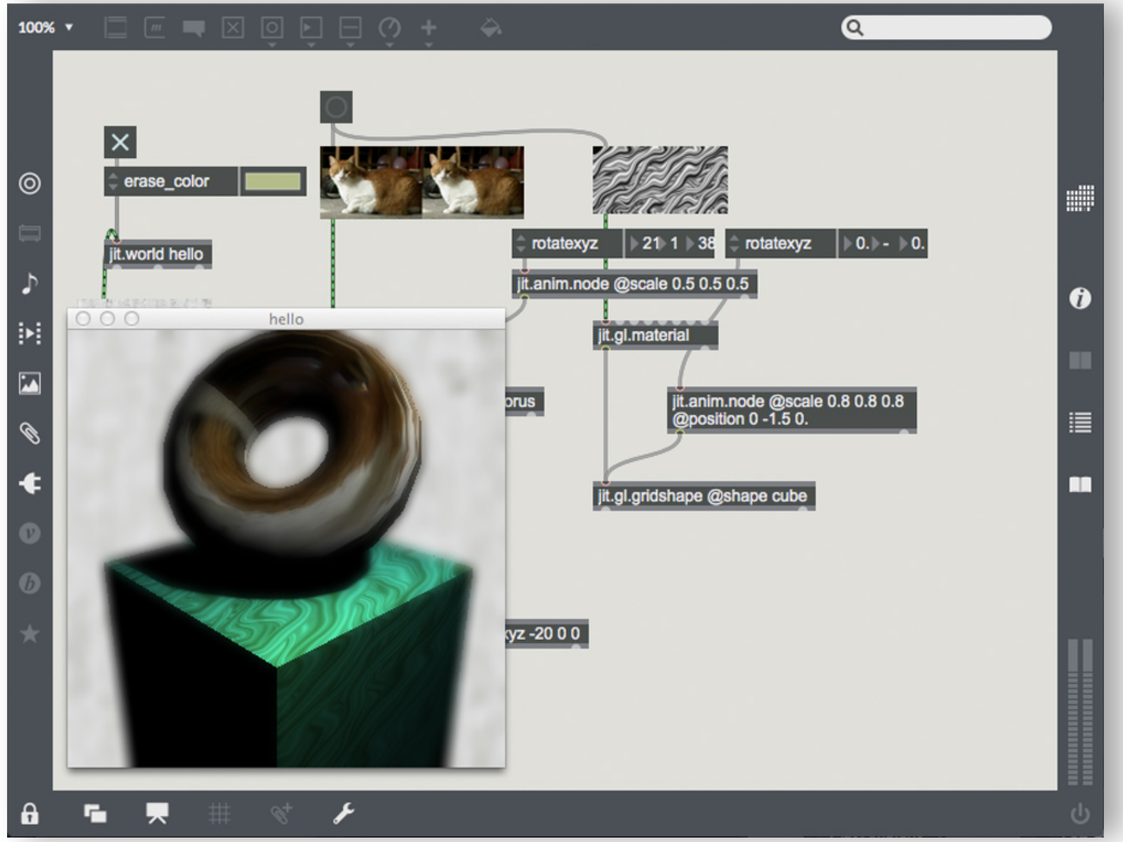




Jitter Objects

- **`jit.qt.*`** for video
- **`jit.gl.*`** for 3d/OpenGL
- **`jit.p.*`** for particle effects
- **`jit.la.*`** for linear algebra

- **`jit.peek~`** and **`jit.poke~`** for connection to MSP



Extending Max/MSP

- **Software**
  - write plugins in C that appear in Max as new objects
  - free SDK available

- **Hardware**
  - MIDI controllers and synthesizers
  - DMX Lighting
  - Arduino

Designing Interactive Systems 2

Lecture 12: Hardware Prototyping

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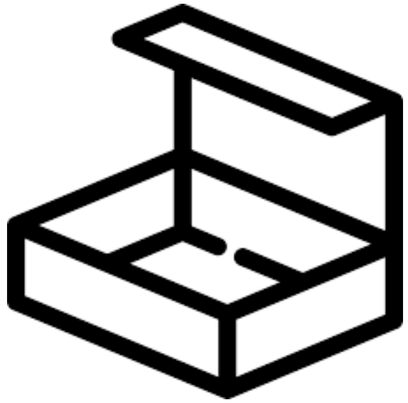
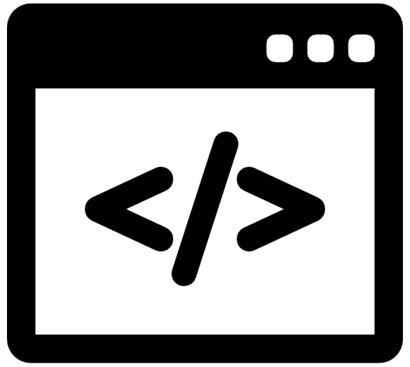
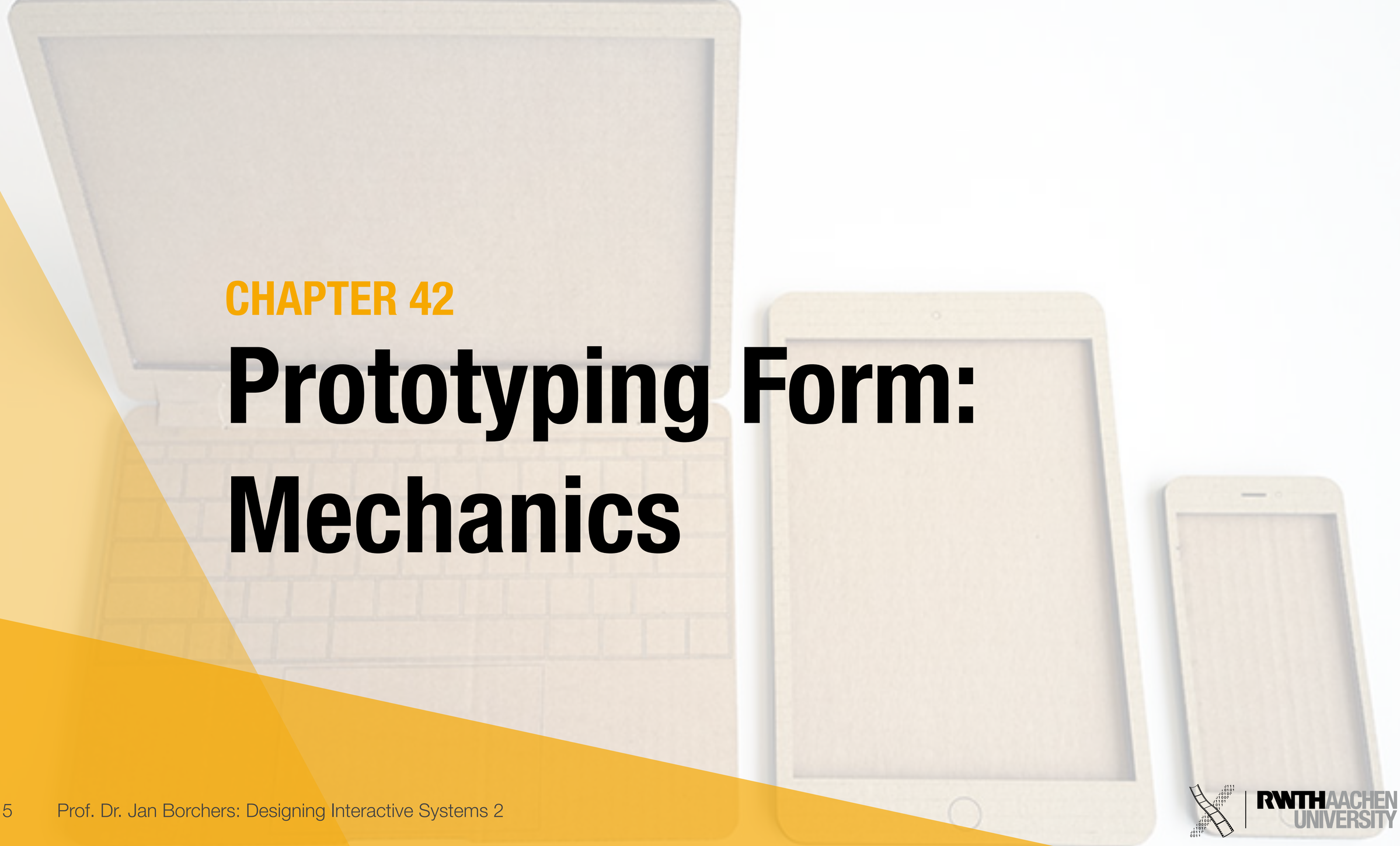
Ablage Bearbeiten Inhalt Etikett Spezial Mon 12:45:43
Macintosh HD
Über diesen Macintosh
Macintosh LC
Systemsoftware D1-7.5
© Apple Computer, Inc. 1983-94
Gesamtspeicher: 4.096K
Größter freier Block: 1.523K
Systemsoftware 2.543K
Papierkorb
Macintosh LC

Topics today

UI =  **Form** **+**  **Function** **+**  **Sensors & Actuators**

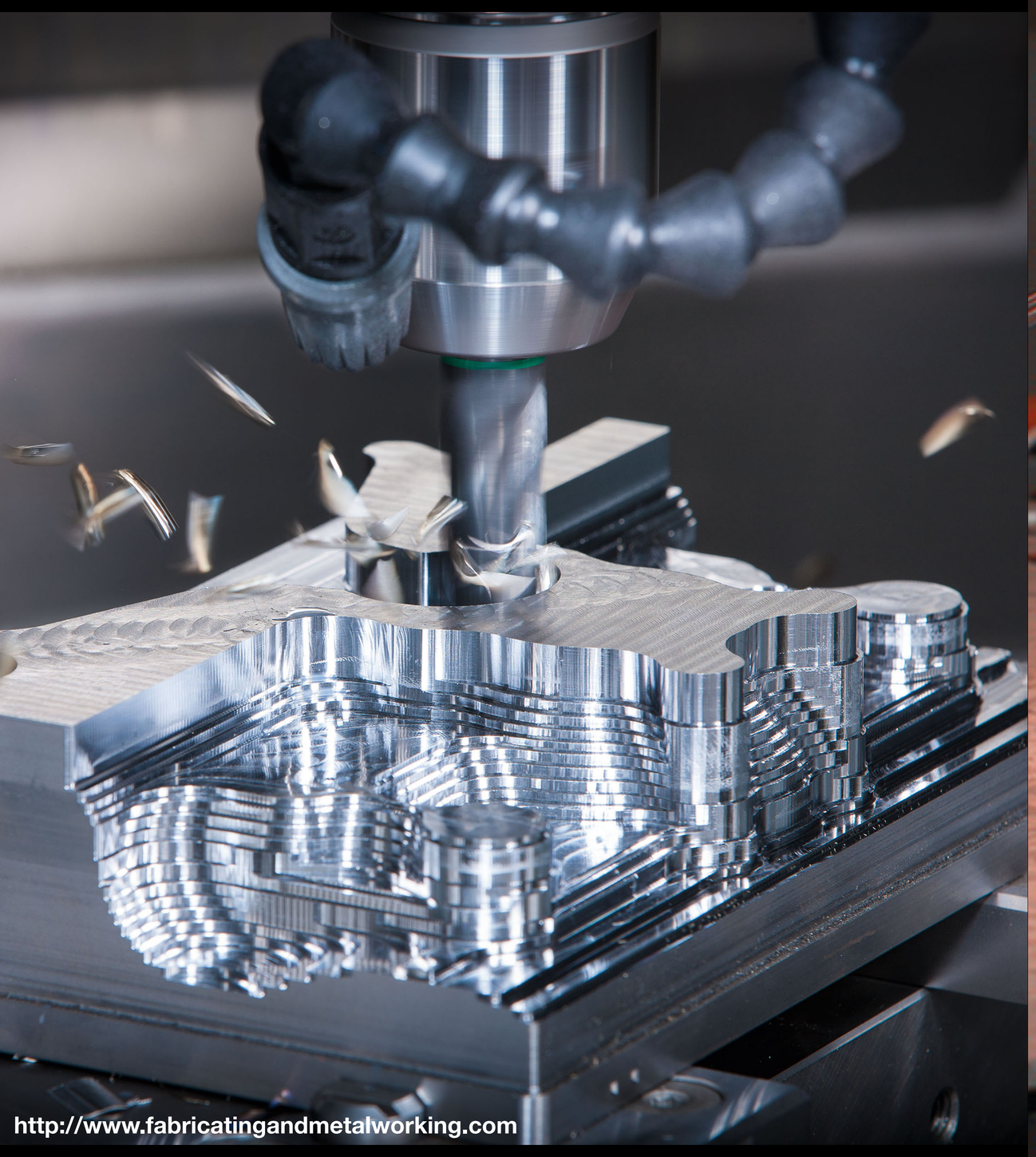
CHAPTER 42

Prototyping Form: Mechanics




pilot
WED • NOV 5
8:00 meet ed
9:00
10:00 Staff meeting
11:00 Send price list
12:00 Lunch
1:00 Touchdown spec
2:00 review meeting
3:00
4:00 Forecast meeting
5:00
6:00
Today
S M T W T F
Goto
Menu


MENU



http://www.fabricatingandmetalworking.com

http://en.hglaser.com

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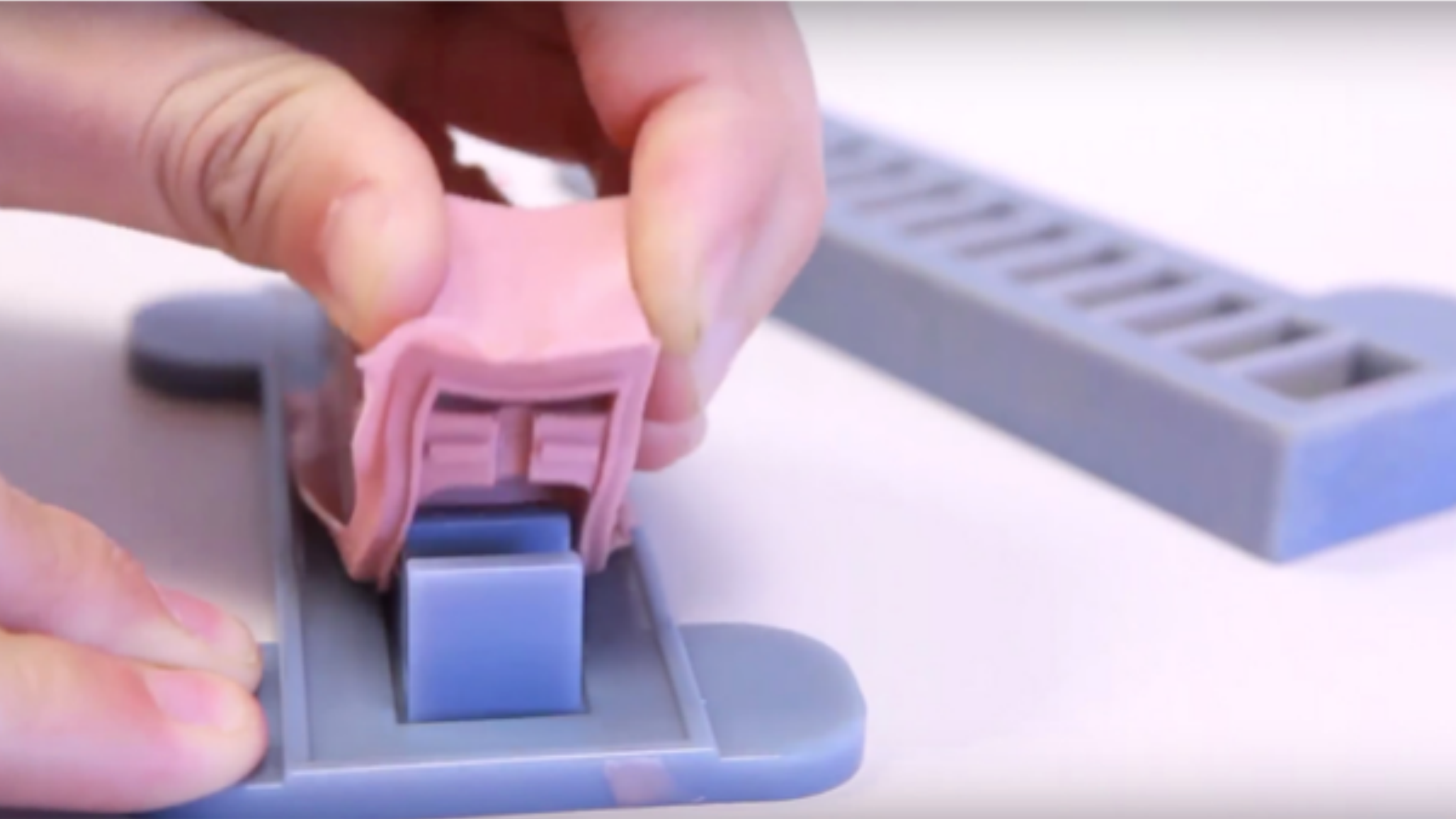
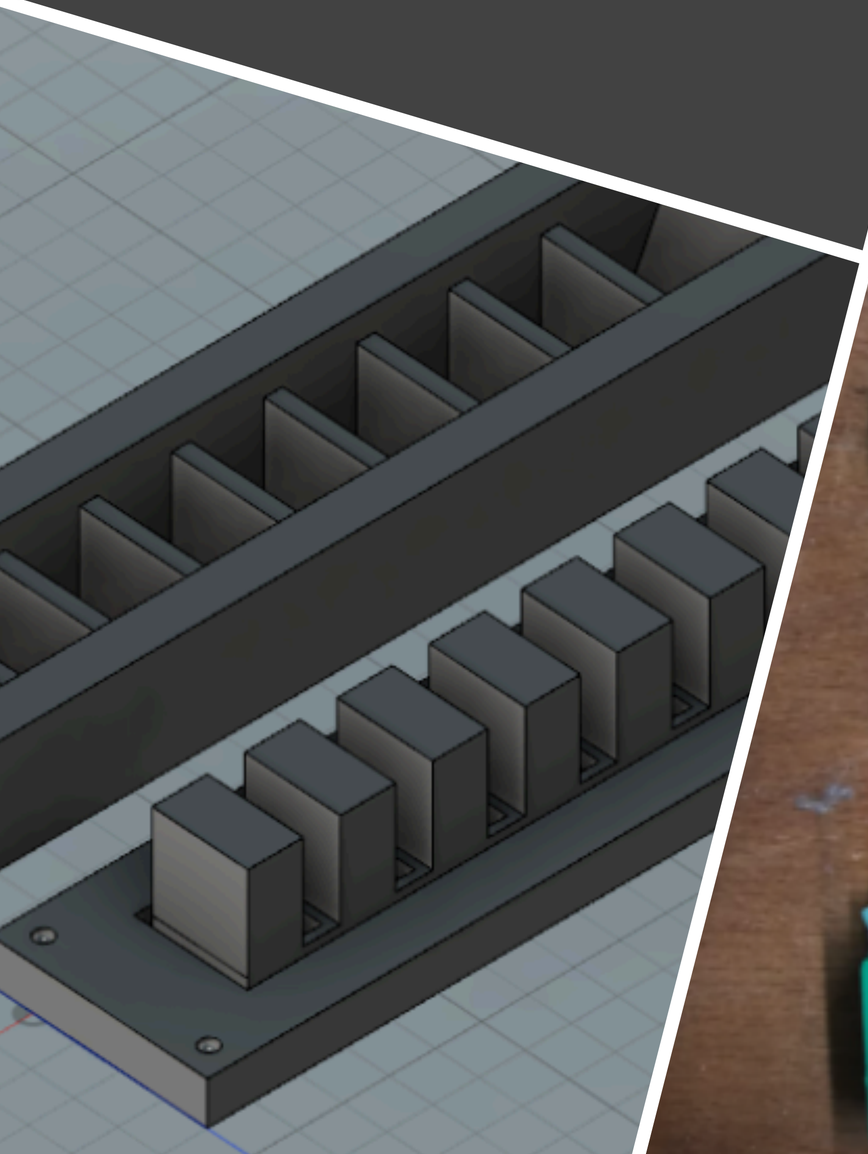
Source: Ultimaker Ultimaker Press Room Images



1. CAD Design



2. 3D Printing

3. Casting

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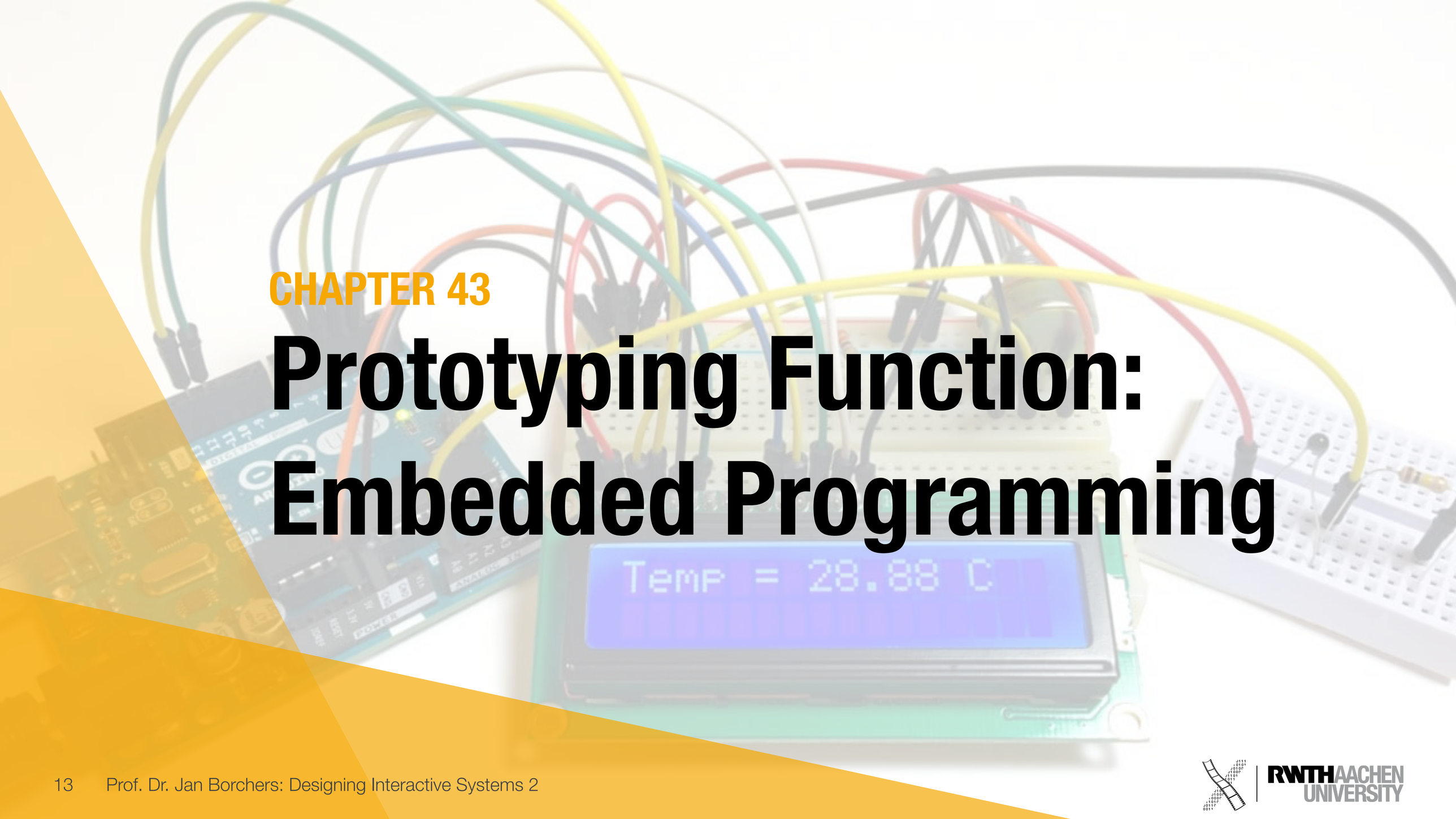
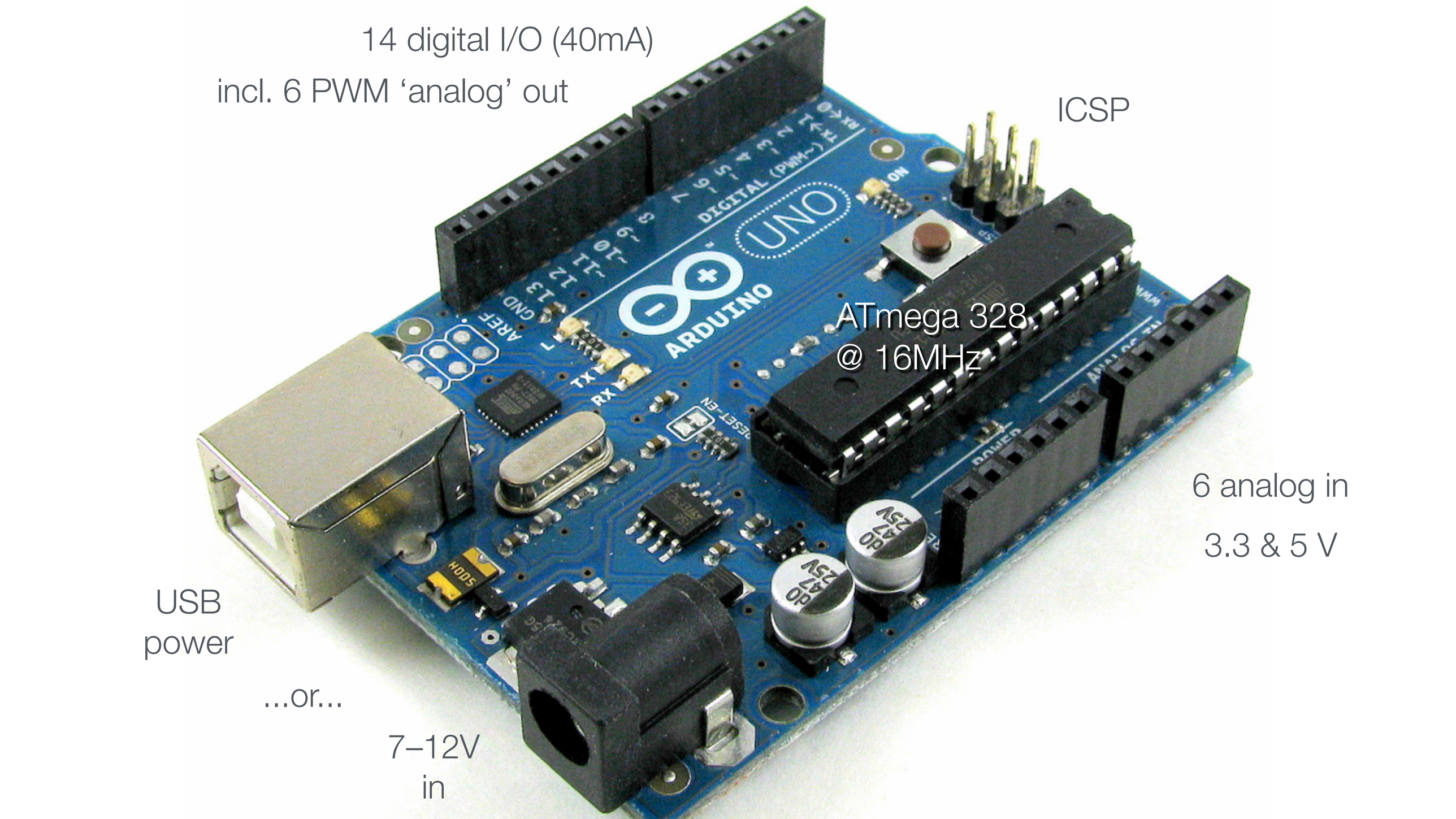
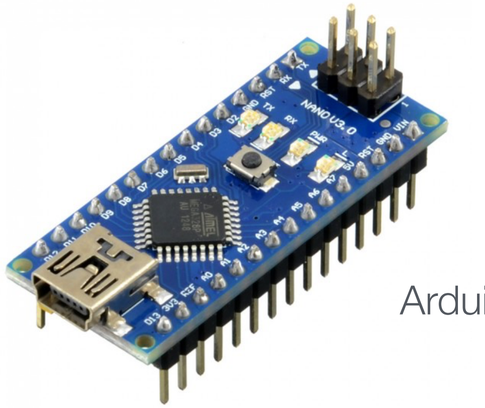
CHAPTER 43

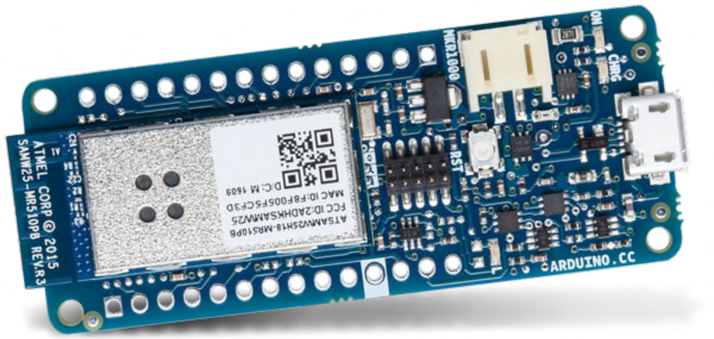
Prototyping Function: Embedded Programming



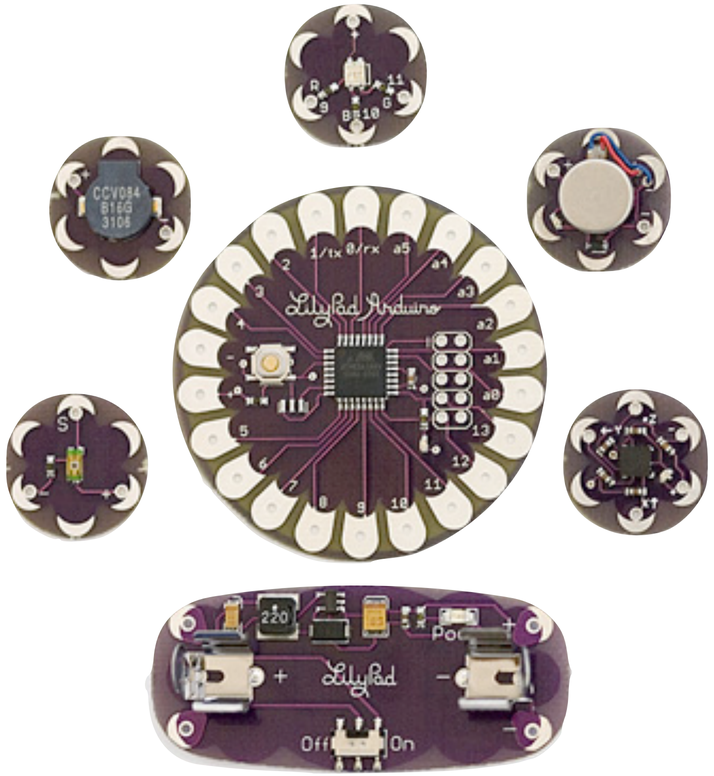

14 digital I/O (40mA)
incl. 6 PWM ‘analog’ out
ICSP
ATmega 328
@ 16MHz
6 analog in
3.3 & 5 V
USB
power
...or...
7–12V
in



Arduino Nano

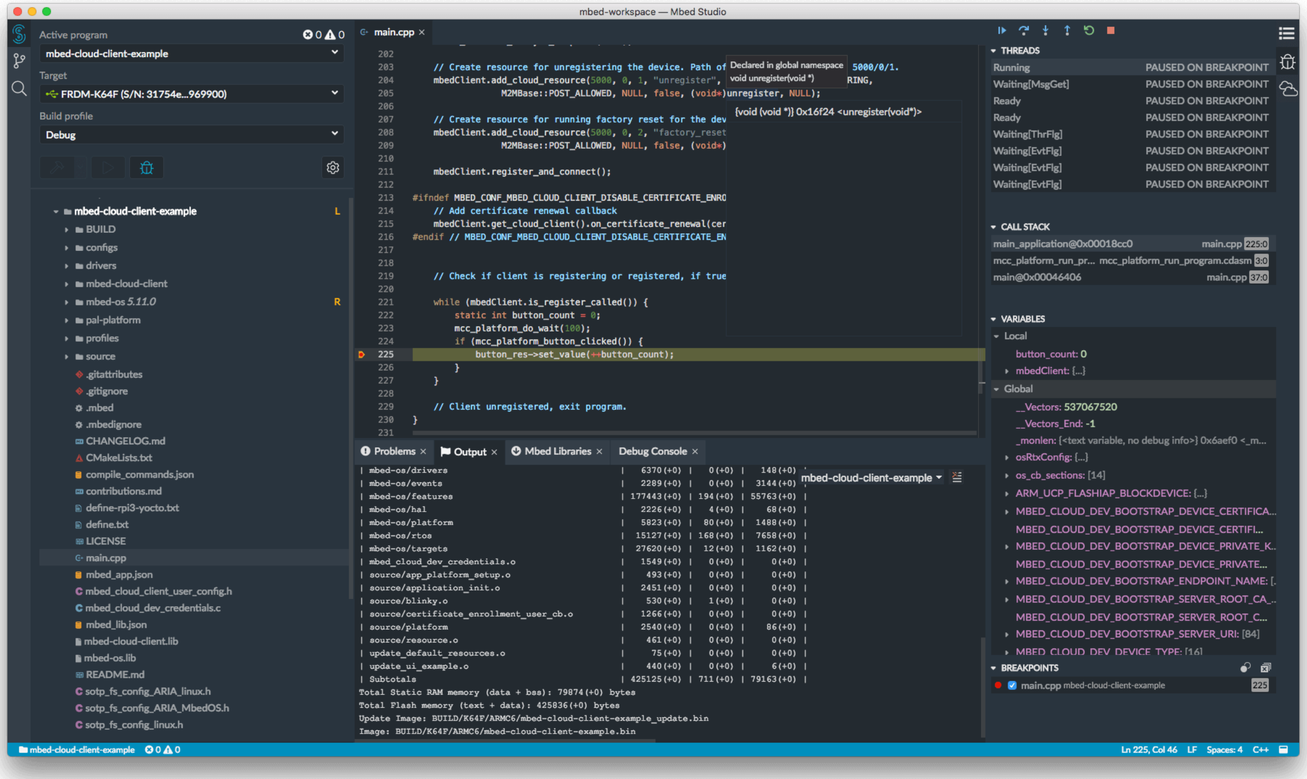


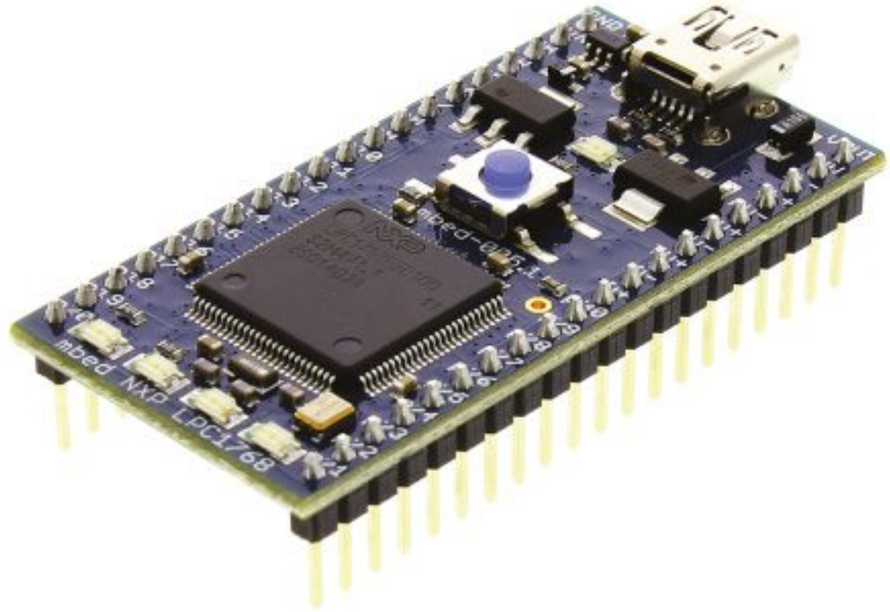
Arduino MKR



Arduino Lilypad

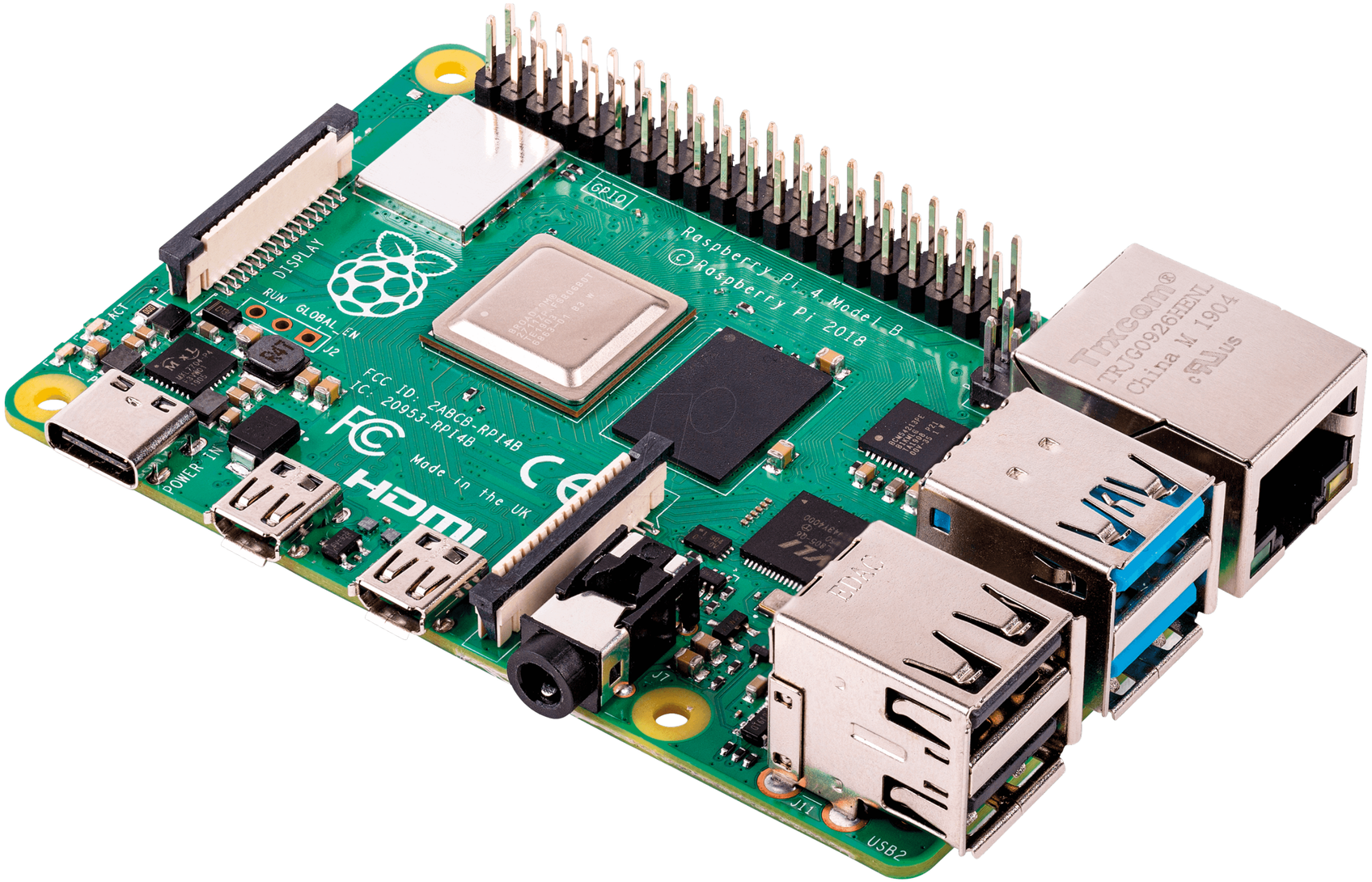
mbed



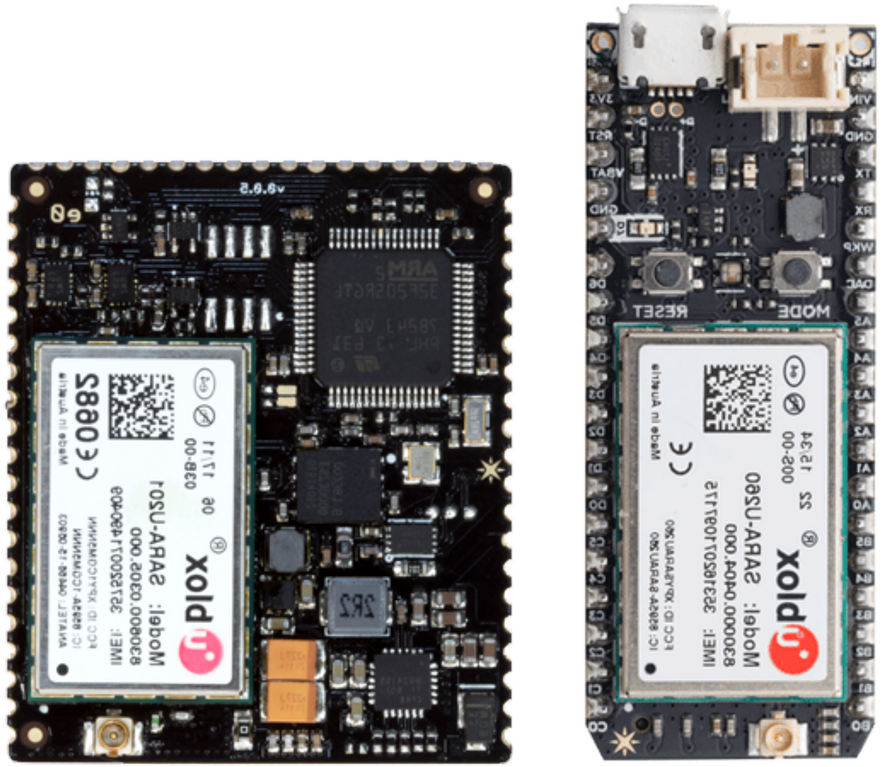


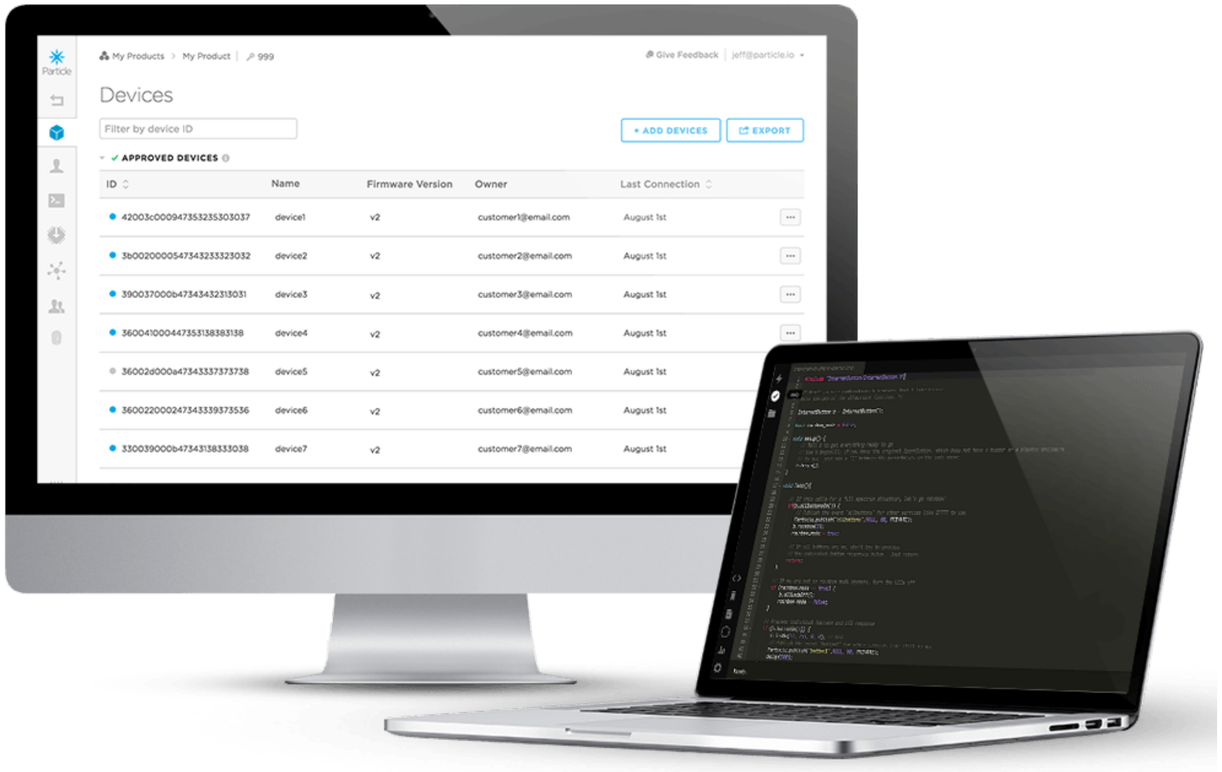
BBC micro:bit

Raspberry Pi



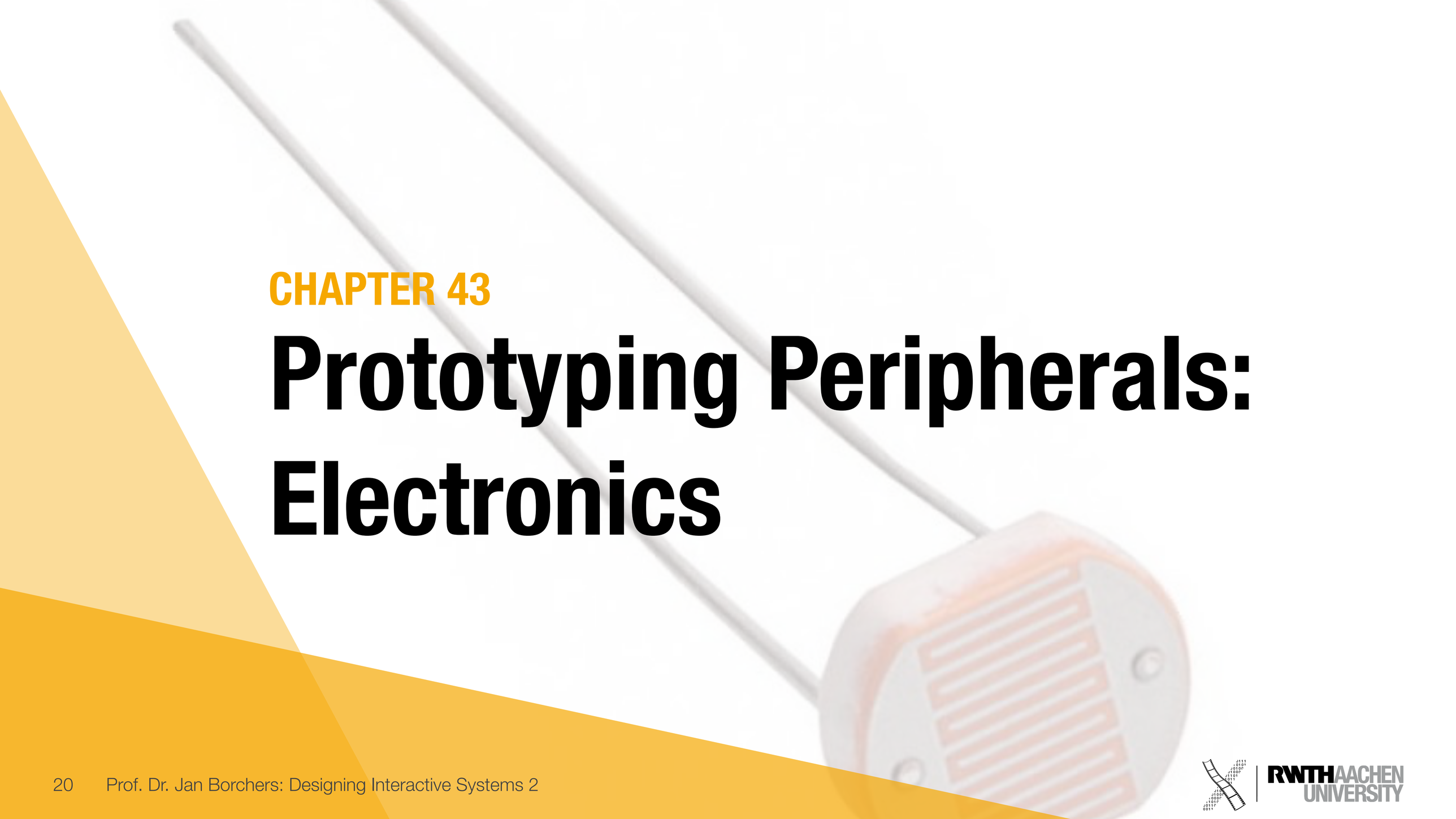
Particle



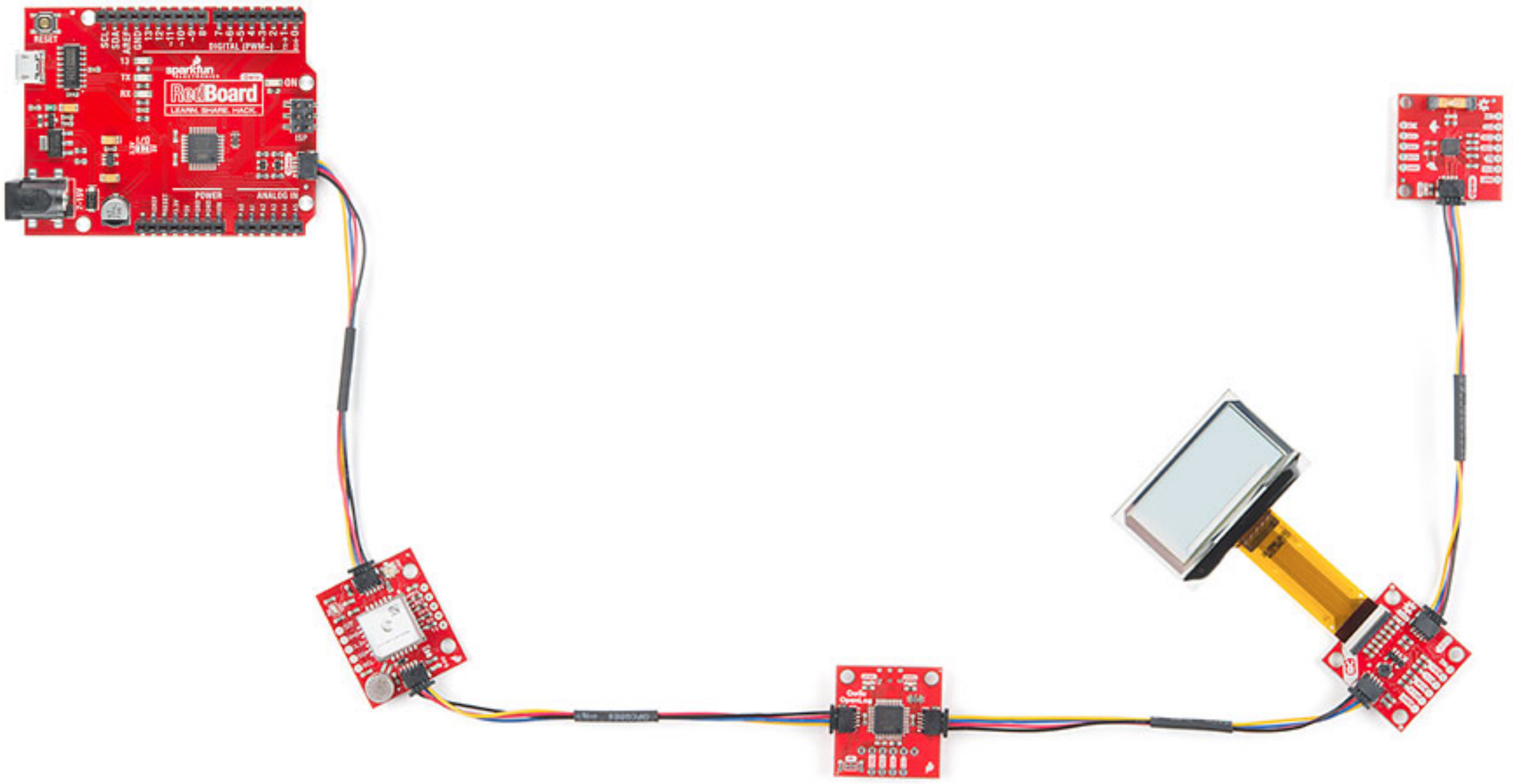


CHAPTER 43

Prototyping Peripherals: Electronics

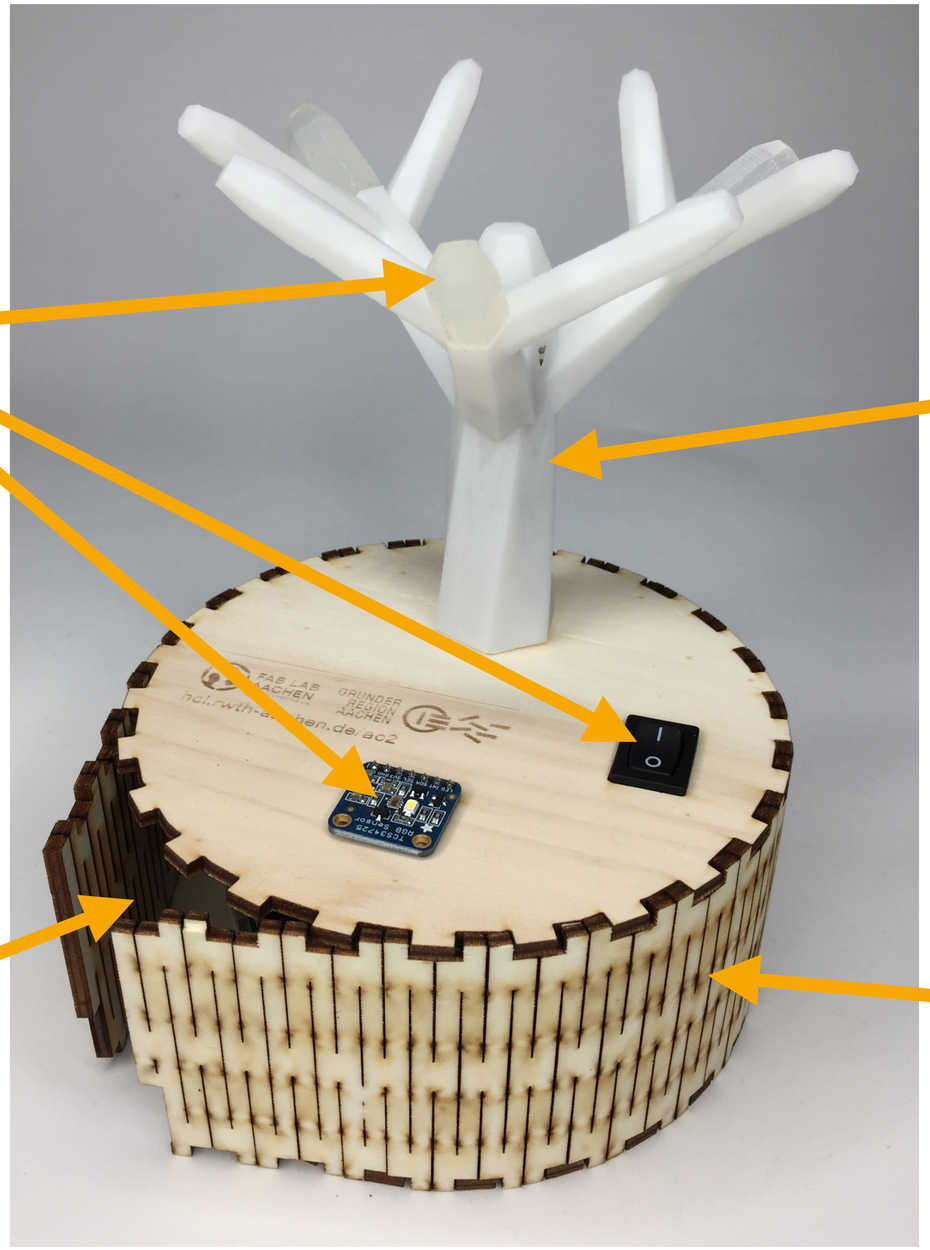


	In	Out
Digital	 	  
Analog	 	


RedBoard
LEARN. SHARE. HACK.
sparkfun

Peripherals:

LED, switch, colour sensor



Form
3D design, 3D print, casting

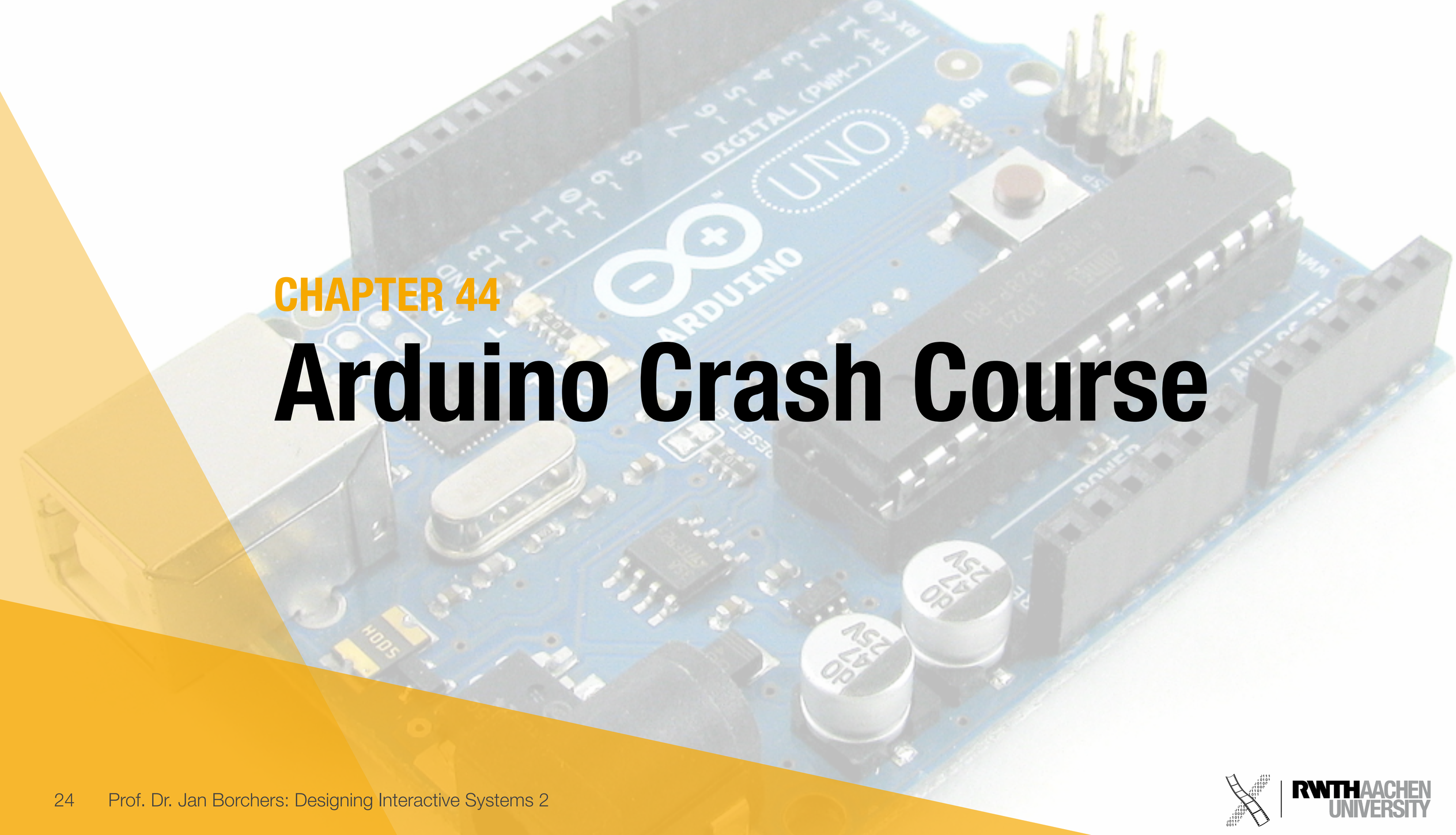
Function:

Programmed Arduino Board

Form
2D design, laser cutter

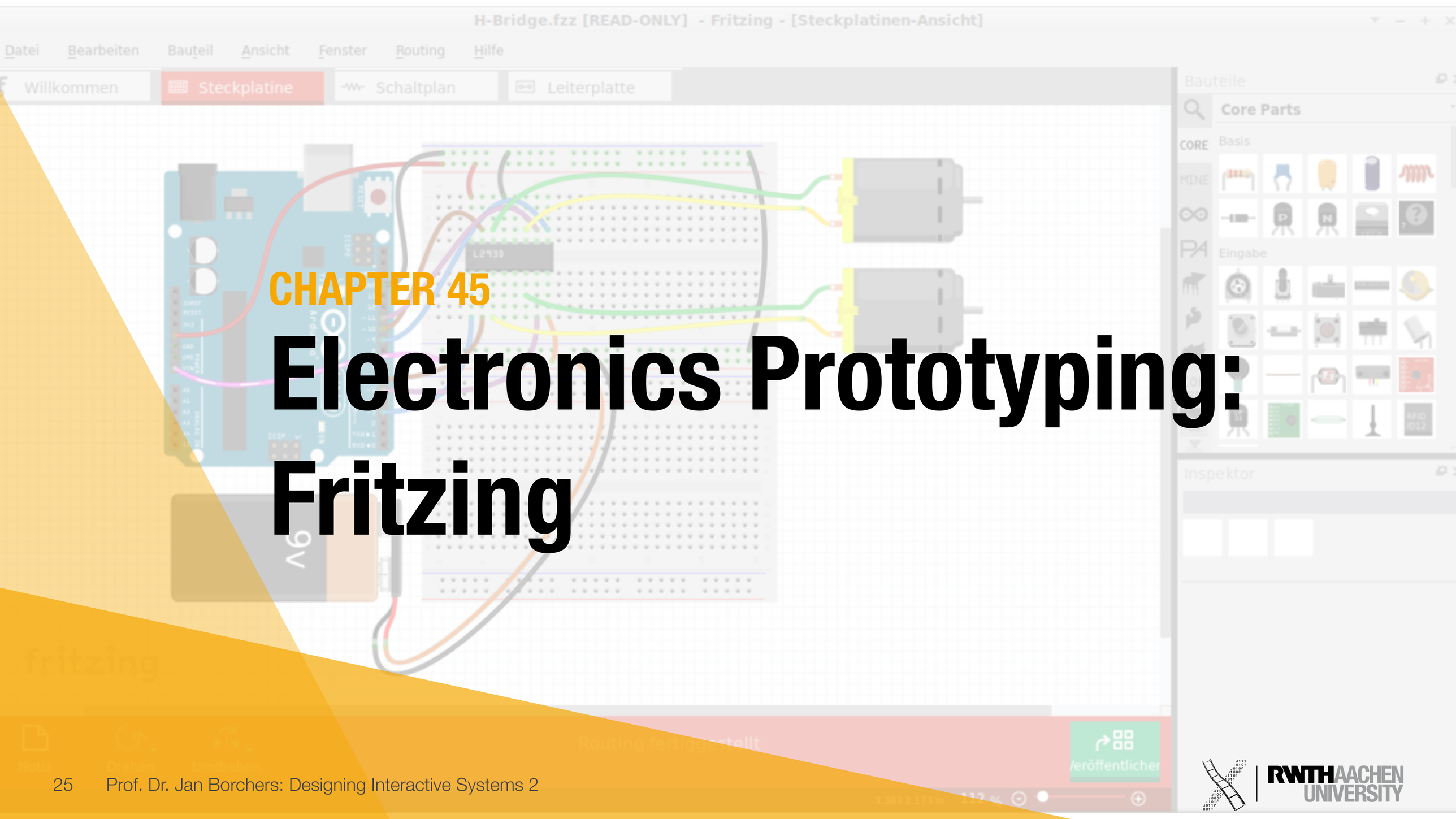
CHAPTER 44

Arduino Crash Course



CHAPTER 45

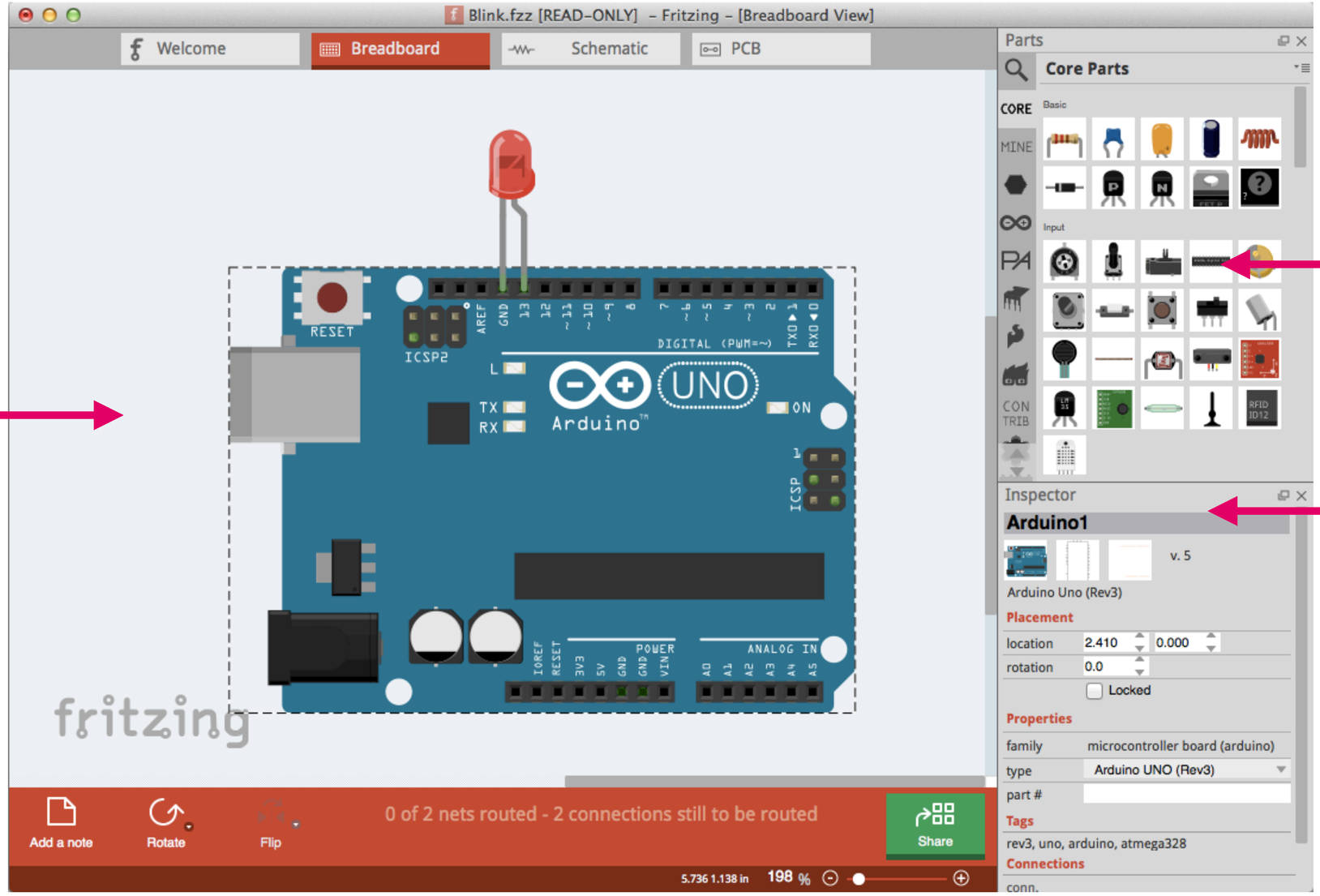
Electronics Prototyping: Fritzing



fritzing

- Open-source initiative
- Release: 2008
- Electronic design automation (EDA) tool for non-engineers
- Arduino-based prototypes
- Create schematics for prototyping or a PCB layout for manufacturing
- Key advance:
  - Drag & Drop realistic components
  - Software generated PCB design for manufacturing an Arduino shield

Interface



Canvas

Components

Properties

Demo Fritzing