Everyday Coding with Graphical User Interfaces

Ravi Chugh
Everyday Coding with Graphical User Interfaces
The original Chicago Ferris Wheel, built for the 1893 World's Columbian Exposition [Wikipedia]
Graphical User Interfaces (GUIs)
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circle1 = ...
Coding

circle1 = ...
line1 = ...
line2 = ...

"Draw"
Coding

\[ \text{circle1} = \ldots \]
\[ \text{pt1} = \text{left(circle1)} \]
\[ \text{line1} = \ldots \]
\[ \text{line2} = \ldots \]
circle1 = ...
pt1 = left(circle1)
pt2 = right(circle1)
line1 = ...
line2 = ...

"Relate"
Coding

circle1 = ...
pt1 = left(circle1)
pt2 = right(circle1)
line1 = ...
pt3 = top(circle1)
pt4 = bottom(circle1)
line2 = ...

"Relate"
circle1 = ...
pt1 = left(circle1)
pt2 = right(circle1)
line1 = ...
pt3 = top(circle1)
pt4 = bottom(circle1)
line2 = ...
rectArray = ...
function ferrisWheel ( numSpokes, spokeLen, rotAngle, sizeCar, radiusCenter, cx, cy ) { ... }
ferrisWheel(4, ...);
function ferrisWheel(numSpokes, spokeLen, rotAngle, sizeCar, radiusCenter, cx, cy) {
...
}

ferrisWheel(4, ...);
function ferrisWheel(numSpokes, spokeLen, rotAngle, sizeCar, radiusCenter, cx, cy) {
  ...
}
ferrisWheel(8, ...);
function ferrisWheel (numSpokes, spokeLen, rotAngle, sizeCar, radiusCenter, cx, cy) {
  ...
}
ferrisWheel(8, ...);
function ferrisWheel(
  numSpokes,
  spokeLen,
  rotAngle,
  sizeCar,
  radiusCenter,
  cx,
  cy
) {
  ...
}

ferrisWheel(8, ...);
function ferrisWheel(
  numSpokes,
  spokeLen,
  rotAngle,
  sizeCar,
  radiusCenter,
  cx,
  cy)
{
  ...
}
ferrisWheel(8, ...);
function ferrisWheel(numSpokes, spokeLen, rotAngle, sizeCar, radiusCenter, cx, cy) {
  ...
}
ferrisWheel(16, ...);
function ferrisWheel(numSpokes, spokeLen, rotAngle, sizeCar, radiusCenter, cx, cy) {
  ...
}
ferrisWheel(16, ...);
Coding with GUIs

Program

Draw
Coding with GUIs

Program

Relate
Coding with GUIs

Program

Relate
Coding with GUIs
Coding with GUIs

Program

Group
Coding with GUIs

Program

Tweak
Coding with GUls

Program

Tweak
Coding with GUIs

Coding with Less Keyboard

Coding with More Mouse
Bidirectional Programming
[PLDI 2016, OOPSLA 2018]

Live Programming by Example
[POPL 2019, ICFP 2020]

Hybrid Text-GUI Code Editors
[ICSE 2018, VL/HCC 2020]

Output-Directed Programming
[UIST 2016, UIST 2019]
Sketch-n-Sketchn

Coding + GUIs for Graphics
Sketch-n-Sketch  Coding + GUls for Graphics

Demo
Sketch-n-Sketch  Coding + GUIs for Graphics
Sketch-n-Sketch

Coding + GUls
Coding + GUIs for Web Apps

Sketch-n-Sketch

Current file: Untitled (1b: Table of States)

```
let headerRow =
  let styles = [padding] in
  Html.tr [] [] (List.map (Html.th styles []) headers)
in
let stateRows =
  let colors = ["yellow", "white"] in
  let drawRow i row =
    let color = List.nth colors (mod i 2) in
    let columns =
      List.map
        (Html.td [padding, ["background-color", color]])
    (Html.td [data-value="39", style="padding:3px;background-color:yellow"] Hartford, CT) /td>
  </tr>
</table>
```

State | Capital
--- | ---
Alabama | Montgomery, AL
Alaska | Juneau, AK
Arizona | Phoenix, AZ
Arkansas | Little Rock, AR
California | Sacramento, CA
Colorado | Denver, CO
Connecticut | Hartford, CT

GUI: HTML Value
Auto Sync

Output Editor
Update Program
L23 Inserted [ye], L23 Replaced [lightgray] by [low]
Revert to Original Program

Styles | Computed | Event Listeners | DOM Breakpoints
--- | --- | --- | ---
element.style {
  padding: 3px;
  background-color: yellow;
}
td[Attributes][Style] yellowgreen greenyellow lightgoldenrodyellow

Light yellow

html body div div.work-area div.main-panels div.panel output-panel div#outputCanvas table tr td
Sketch-n-Sketch  Coding  +  GUls for Web Apps

Demo
```ocaml
let headers = ["State", "Capital"] in
let rows = List.map (
  [state, abbrev, cap] -> [state, cap + ", " + abbrev])
  states
in
let padding = ["padding", "3px"] in
let headerRow = List.map (Html.th styles [] headers) in
let stateRows = List.map (Html.tr [] (List.map (Html.td padding) row))
in
Html.table [padding] [] (headerRow :: stateRows)
```

[https://www.youtube.com/watch?v=pp6yQPrd6bw](https://www.youtube.com/watch?v=pp6yQPrd6bw)
Demo Coding + GUIs for Web Apps
Coding + GUIs for Web Apps

Mikaël Mayer
CTO

Aseem Bhardwaj
CEO

PHP, JavaScript, HTML, CSS, SQL, …
Coding + GUIs for Web Apps

Demo

Graphical Word Processor for every website

Ever had a website made by a developer, and you could not maintain it easily afterwards? We have the solution for you. Thaditor is a no-code user-friendly interface that lets you visually edit hand-coded website yourself.
Coding + GUls for Web Apps

Graphical Word Processor for every website

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Coding + GUIs for Web Apps

Demo

Graphical Word Processor for every website

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Coding + GUIs for Web Apps

Mikaël Mayer
CTO

Aseem Bhardwaj
CEO

Alec Blagg
Skúli Guðmundsson
Vincent LaGrassa
Tharzen

2019
- University of Chicago
- Tharzen Incorporated
- Polsky Accelerator
- Finalist in George Shultz Innovation Fund
- Tharzen 1.0 - Paying customers for HTML websites

2020
- Top 5 at NVC National program
- Sep 2020: Pre-seed financing round

2021
- WordPress plugin available

"A feeling of easiness like Microsoft Word... this is amazing."
Customer, Financial Services Company (2019)

"Such a solution would pay for itself... This is a must-have for any large corporate marketing division."
CMO, Potential Enterprise Client (2020)

CONTACT: aseem@tharzen.com
Coding + GUIs
C++
2D Graphics
Web Apps

GUIs
Adobe Illustrator
Google Web Designer
Bidirectional Programming
[PLDI 2016, OOPSLA 2018]

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Thanks!

Nick Collins  
Brian Hempel  
Justin Lubin  
Mikaël Mayer  
Cyrus Omar

Grace Lu  
Mitch Spradlin  
Jacob Albers
For questions or to request a meeting, please use the partnering request form available on the Ignite home page.

Ravi Chugh
@ravi_chugh
http://ravichugh.net/

Mikaël Mayer
@MikaelMayer
http://www.mikaelmayer.com/

Sketch-n-Sketch
http://ravichugh.github.io/sketch-n-sketch/

Tharzen
https://tharzen.com/