Contextualization/ Design check in

Sddec24-13

Konnor Kivimagi, Jason Xie, Gage Moorman, Nathan Cook

Overview

Design a test vehicle for Resistive Random-Access Memory(ReRAM) crossbar for proof of concept
- Utilize open-source design tools
- Submit fabrication application through Efabless shuttle program
- Create bring up plan to test device
- Create documentation for open-source tools for future users
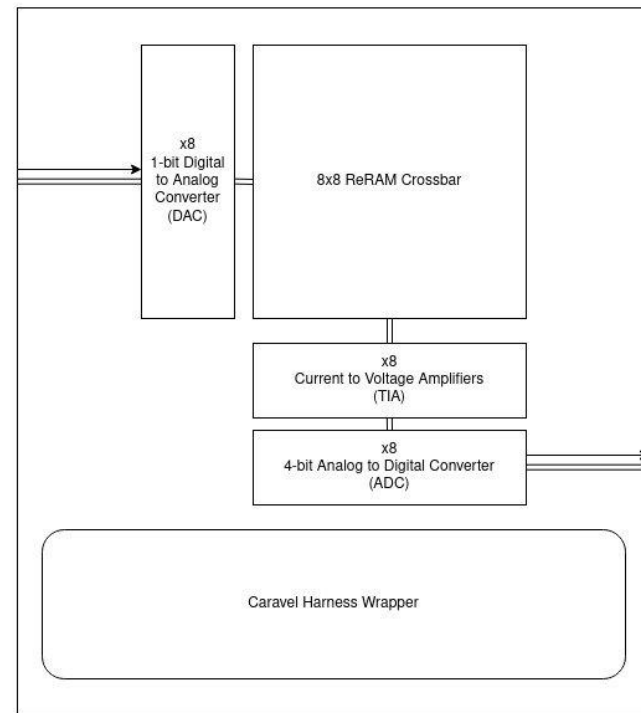
Artifacts(journey map)
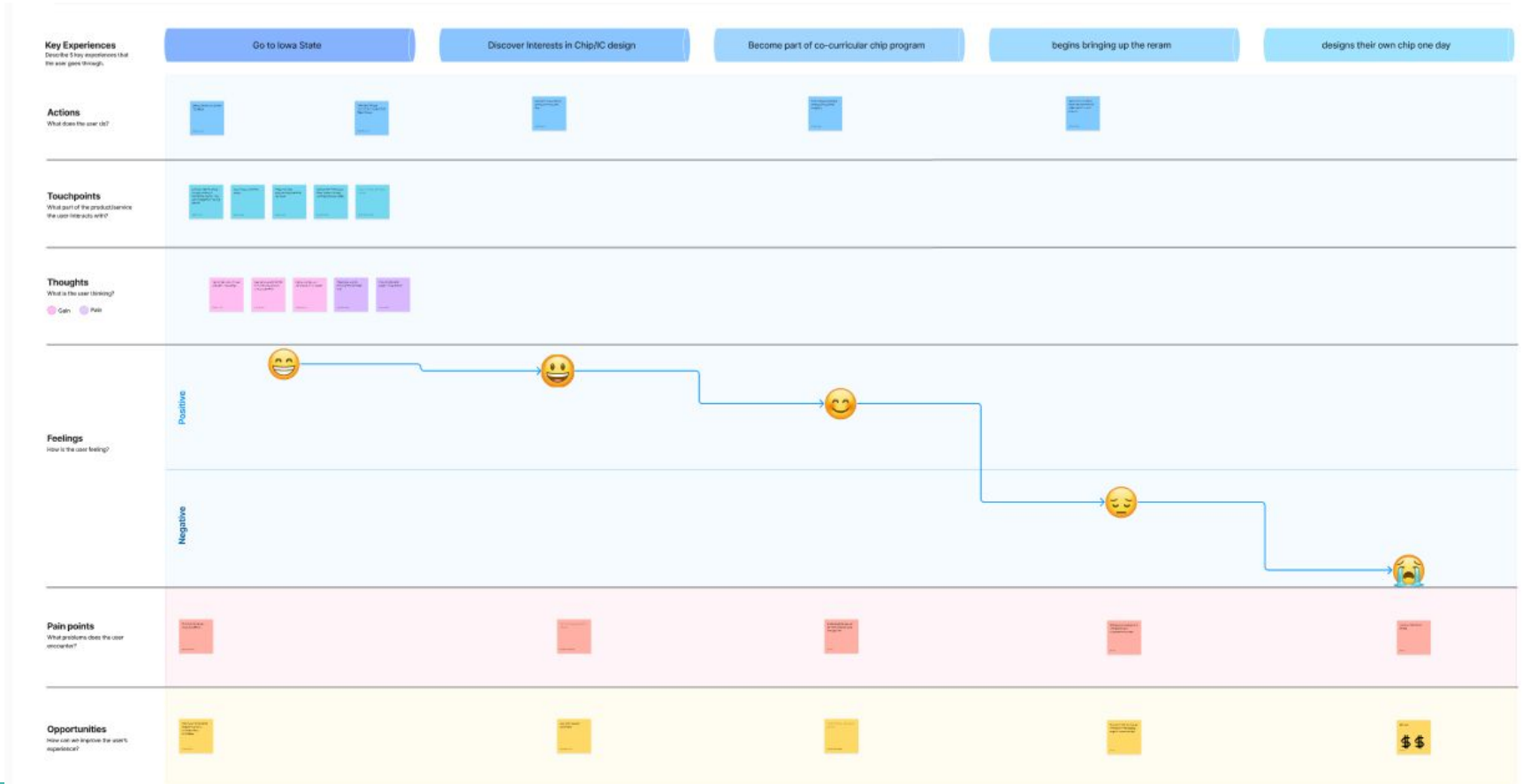
Artifacts(pros/cons)

	Alternative 1	2	3
Pros	Good experience for students	Useful in industry as it's new technology	
Cons	Not very interactive with users	Complex instructions for a starting EE student	Documentation may not be clear to beginners

Artifacts(technical complexity)

Internal Complex	External Complexity
Multiple sub components using methods that are new to us	ReRAM - cutting edge technology mostly used in education
IC design is used within this project which is a complex project	Open source software - may be well established but documentation is not the best
	Innaccurate spice models do to process design kit

Human

- Design performs compute operations
- Meets requirements set
- Can improve through higher quality surrounding circuits
    - Higher resolution ADC
    - Bigger crossbar

Economic

- Using existing technology and forcing it into performing a compute operation
- Improving on previous teams surrounding circuits
  - Higher resolution outputs

- Drawbacks
  - Finite amount of writes before degradation
  - However the idea is to write only once or twice

Technical

- Internal Complexity
    - Multiple surrounding circuits that need to be designed
        - ADC
        - DAC
        - TIA
    - IC design is very complicated by itself with lots of little details
- External Complexity
    - New technology
    - Very limited examples in the real world
    - Using open source tools
        - Undocumented
        - Not everything works