Virtual Reality and Augmented Reality

AR Interaction

Dr. Fatma ElSayed

Computer Science Department
fatma.elsayed@fci.bu.edu.eg

Different Types of AR Interaction

Browsing Interfaces

- simple (conceptually!)

3D AR Interfaces

- expressive, creative, require attention

Tangible User Interfaces

- Embedded into conventional environments

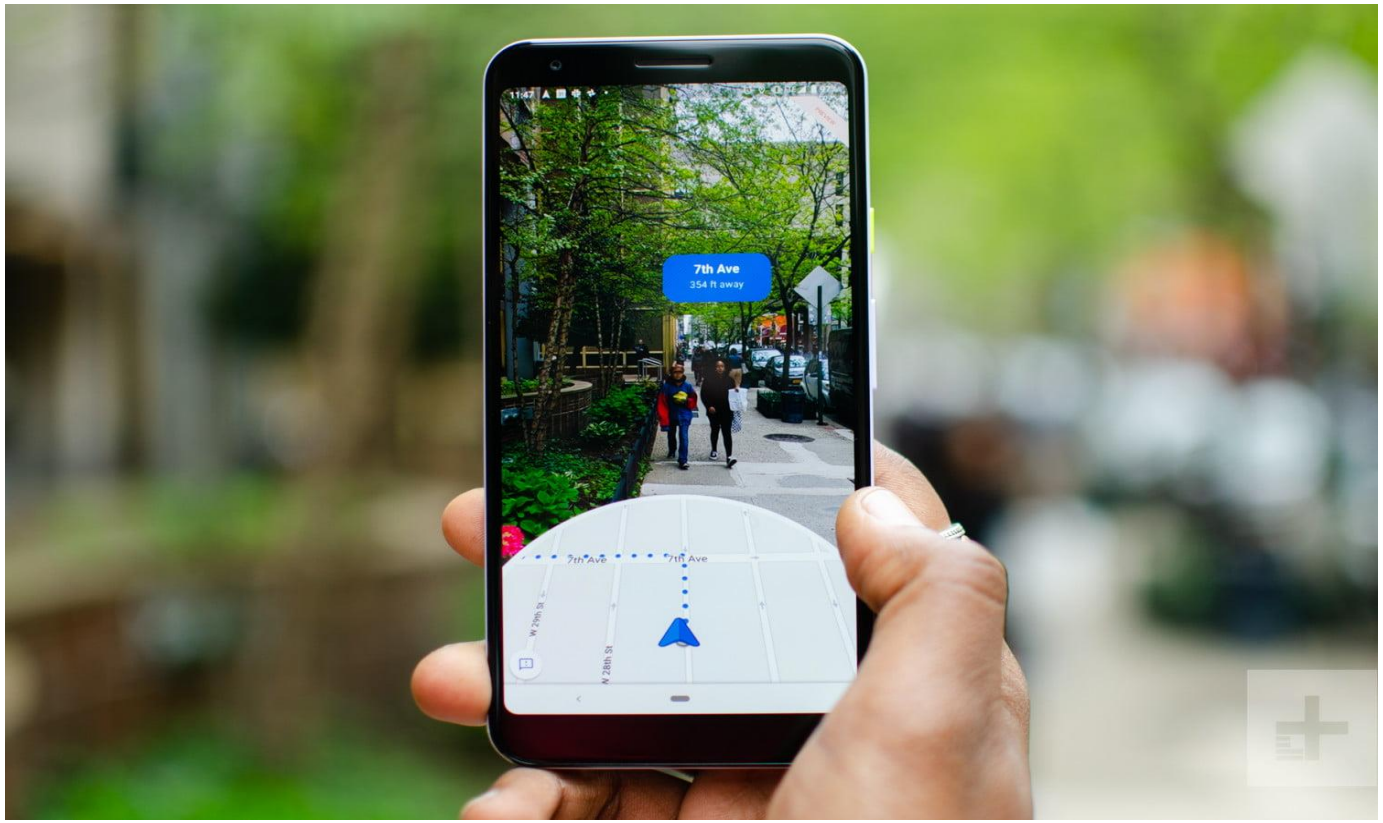
Tangible AR

- Combines TUI input + AR display

Level of interaction increases

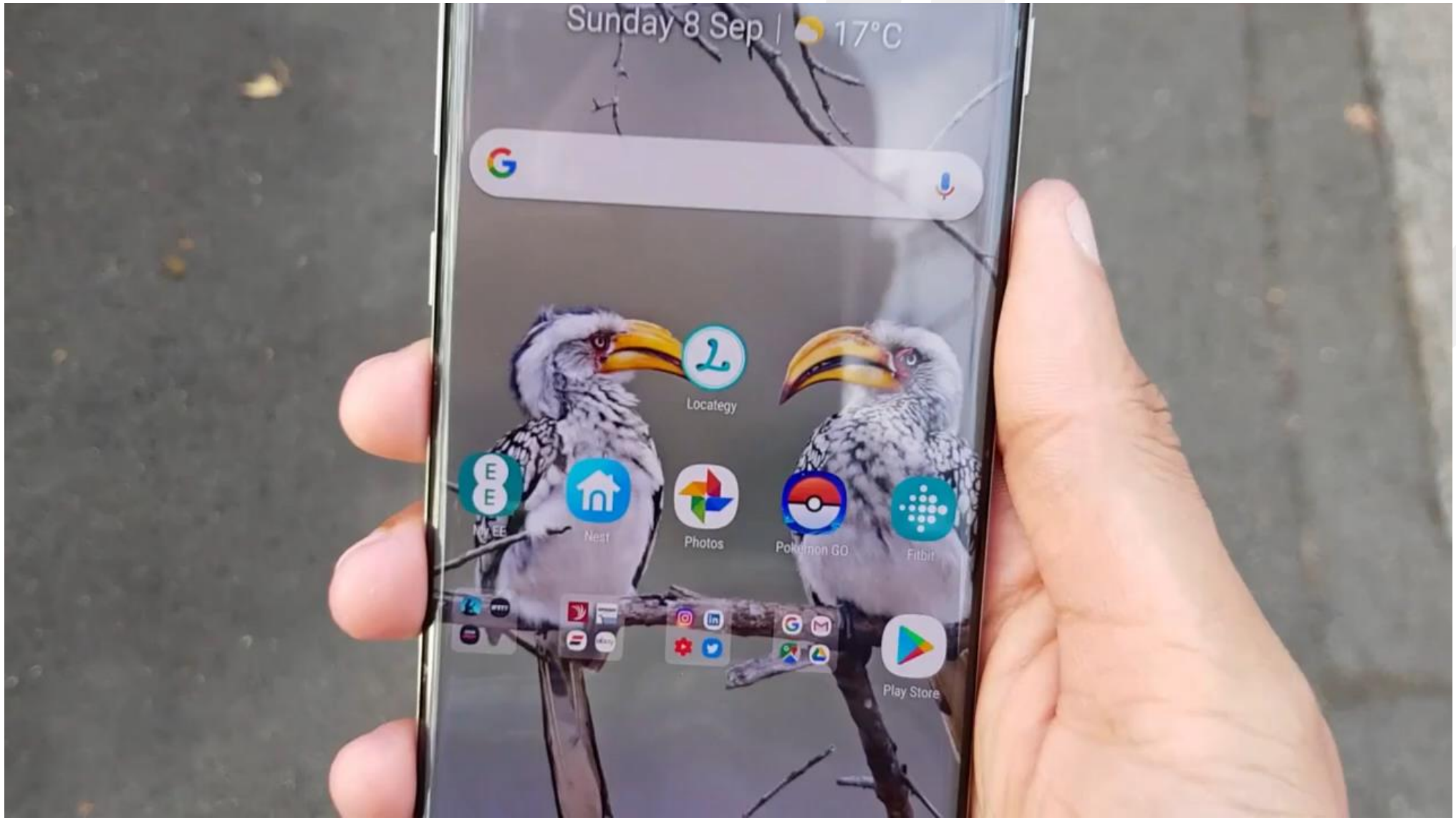
Browsing Interfaces

- Simple overlays of information in the real world.
- Allow users to view augmented content without much effort.



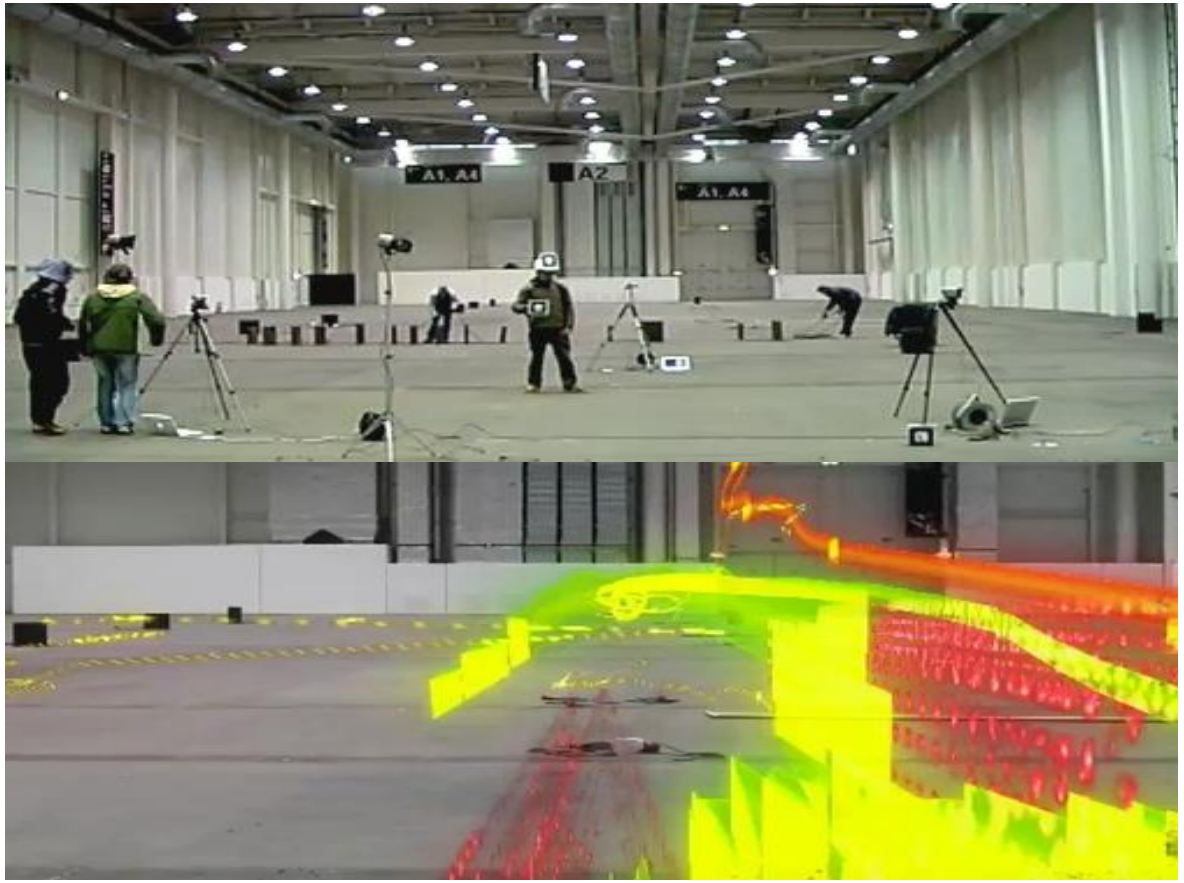
Example: Google Maps AR Mode

Live view in Google maps

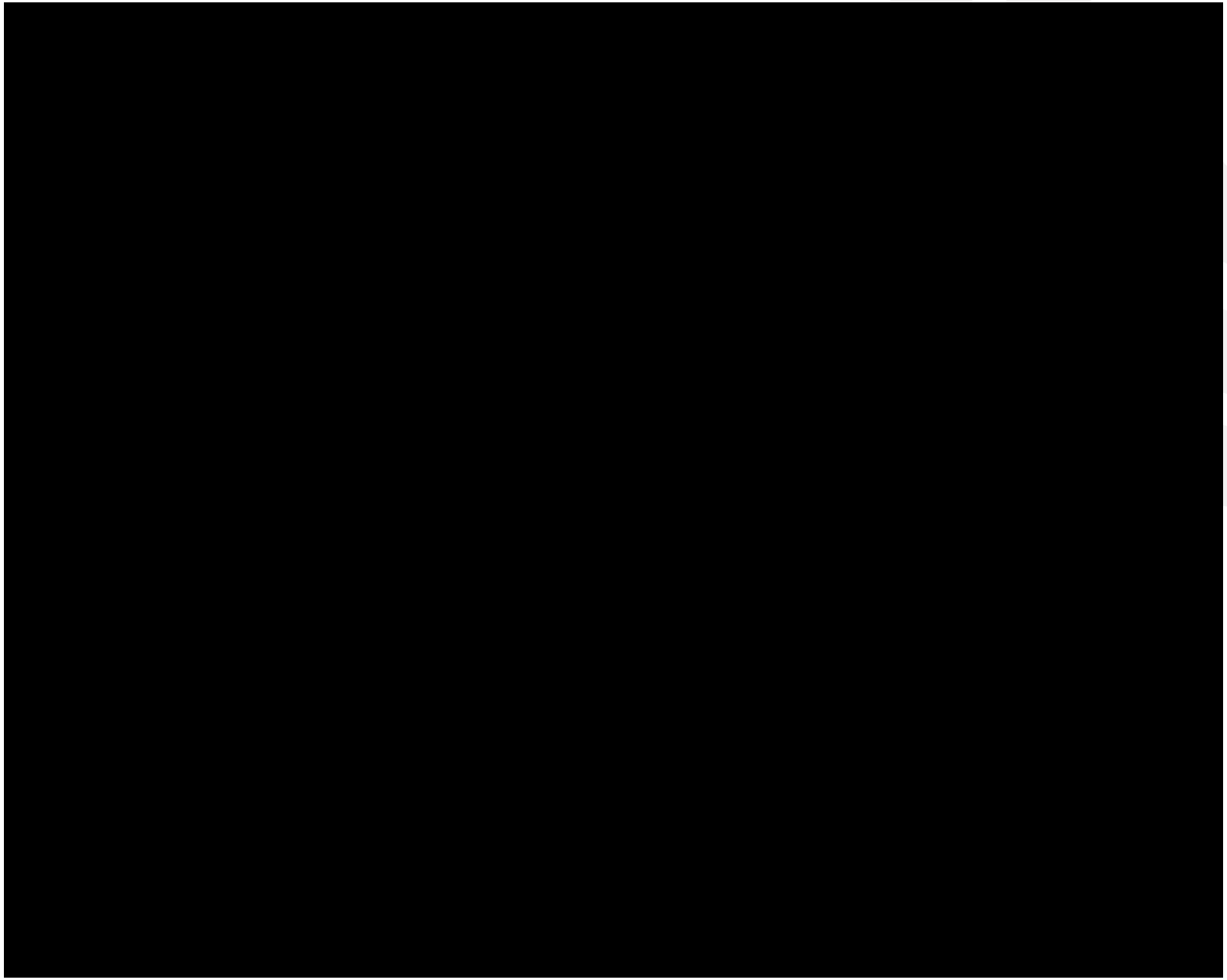


3D AR Interfaces

- Make the user part of a virtual 3D environment.
- Allow users to interact with 3D models or environments.



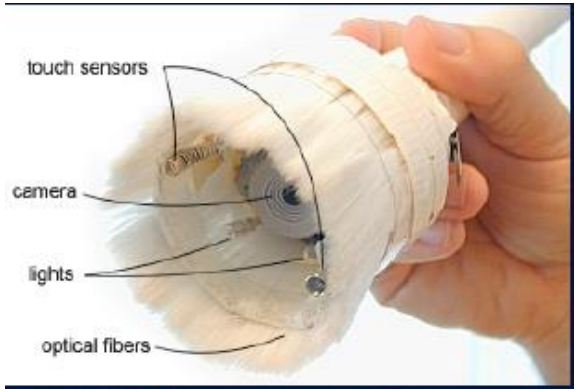
Example: AR Graffiti

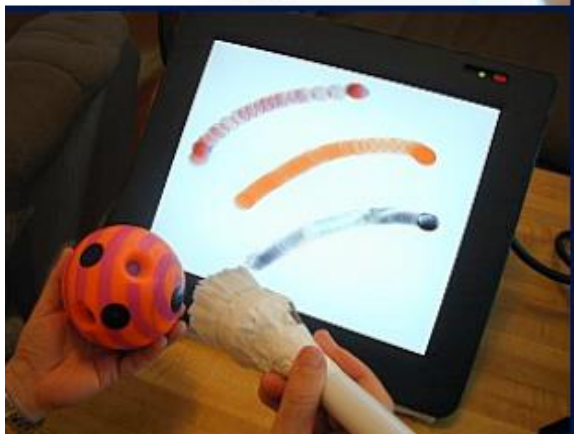


Tangible User Interfaces (TUI)

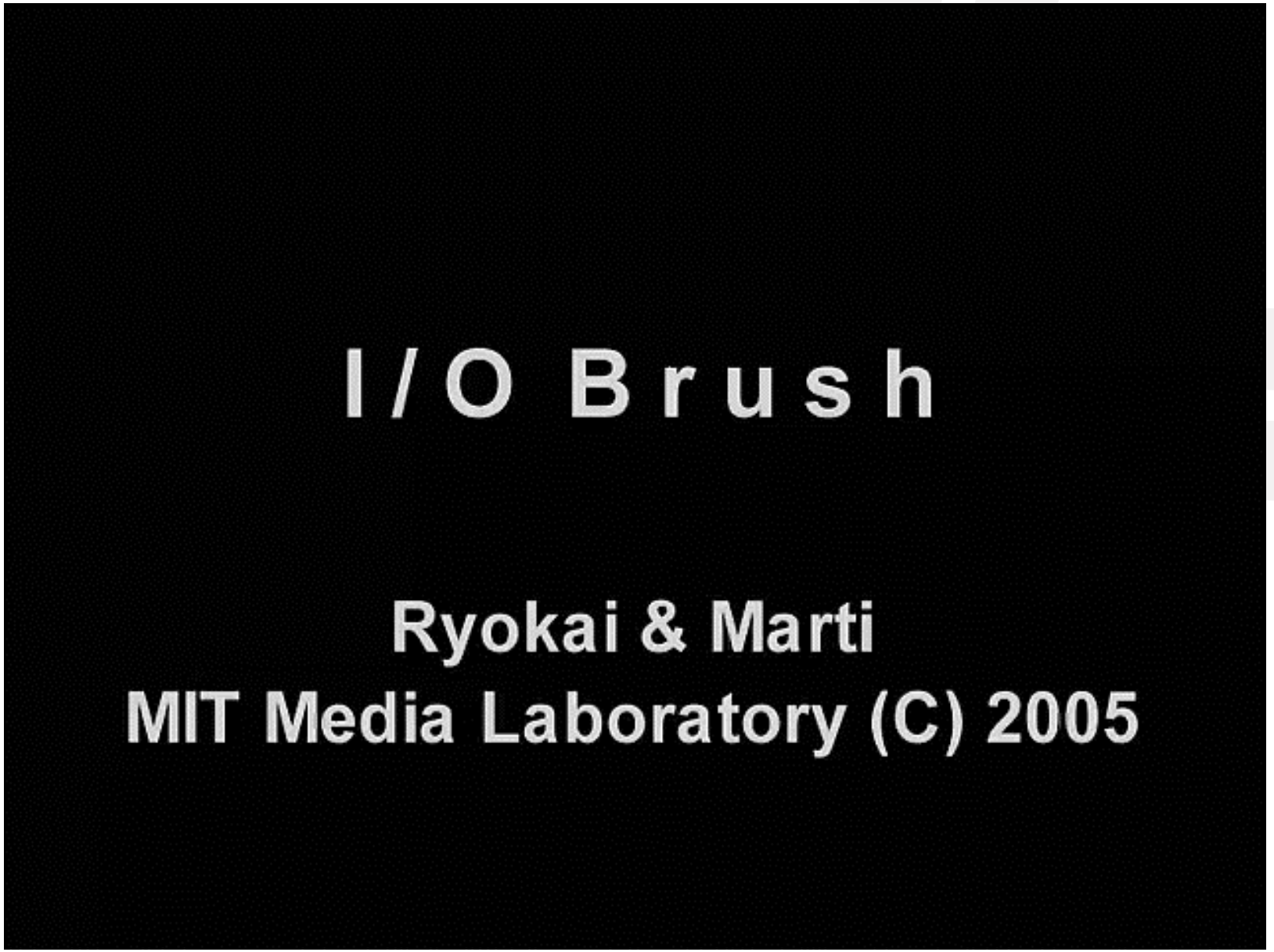
- Virtual images are projected on a surface.
- Physical objects are used as controls for virtual objects

Example: I/O Brush





https://www.youtube.com/watch?v=04v_v1gnyO8

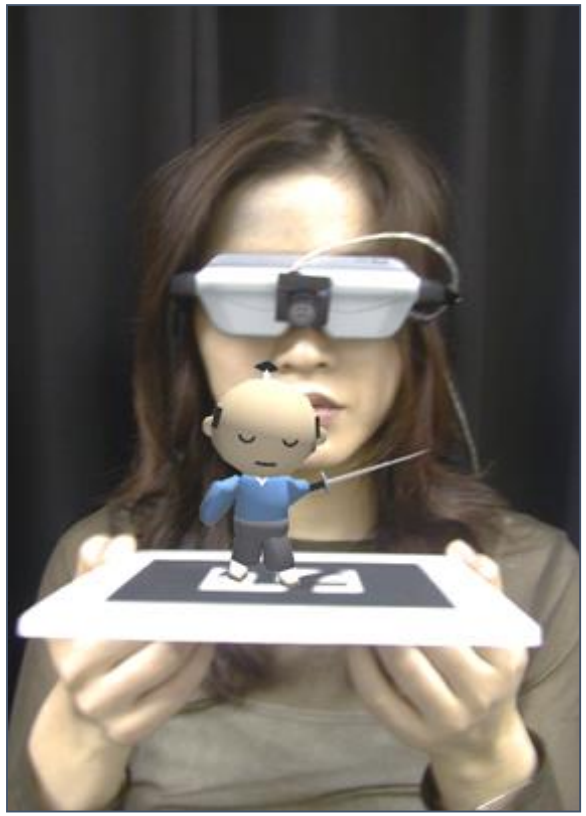

I/O Brush
Ryokai & Marti
MIT Media Laboratory (C) 2005

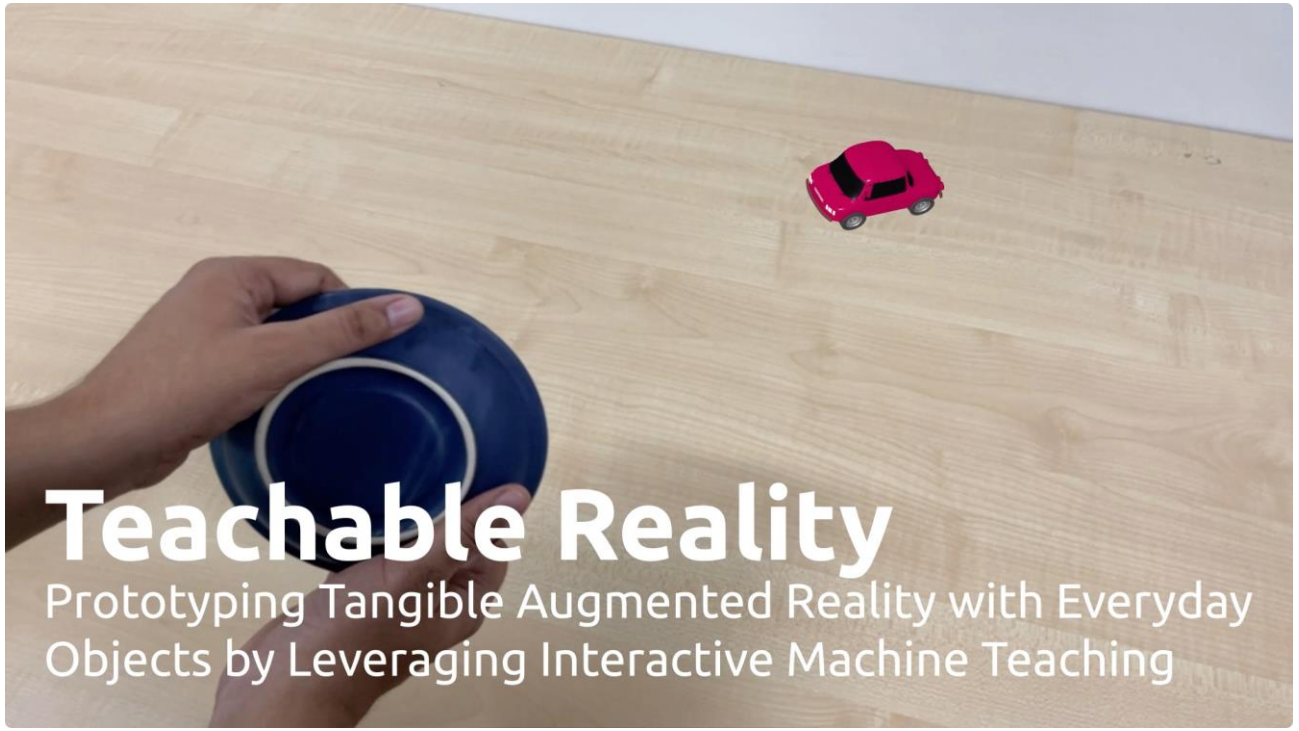
Many Other Examples

- **Triangles (Gorbert 1998)**
  - Triangular based story telling
- **ActiveCube (Kitamura 2000-)**
  - Cubes with sensors
- **Reactable (2007-)**
  - Cube based music interface

Tangible AR

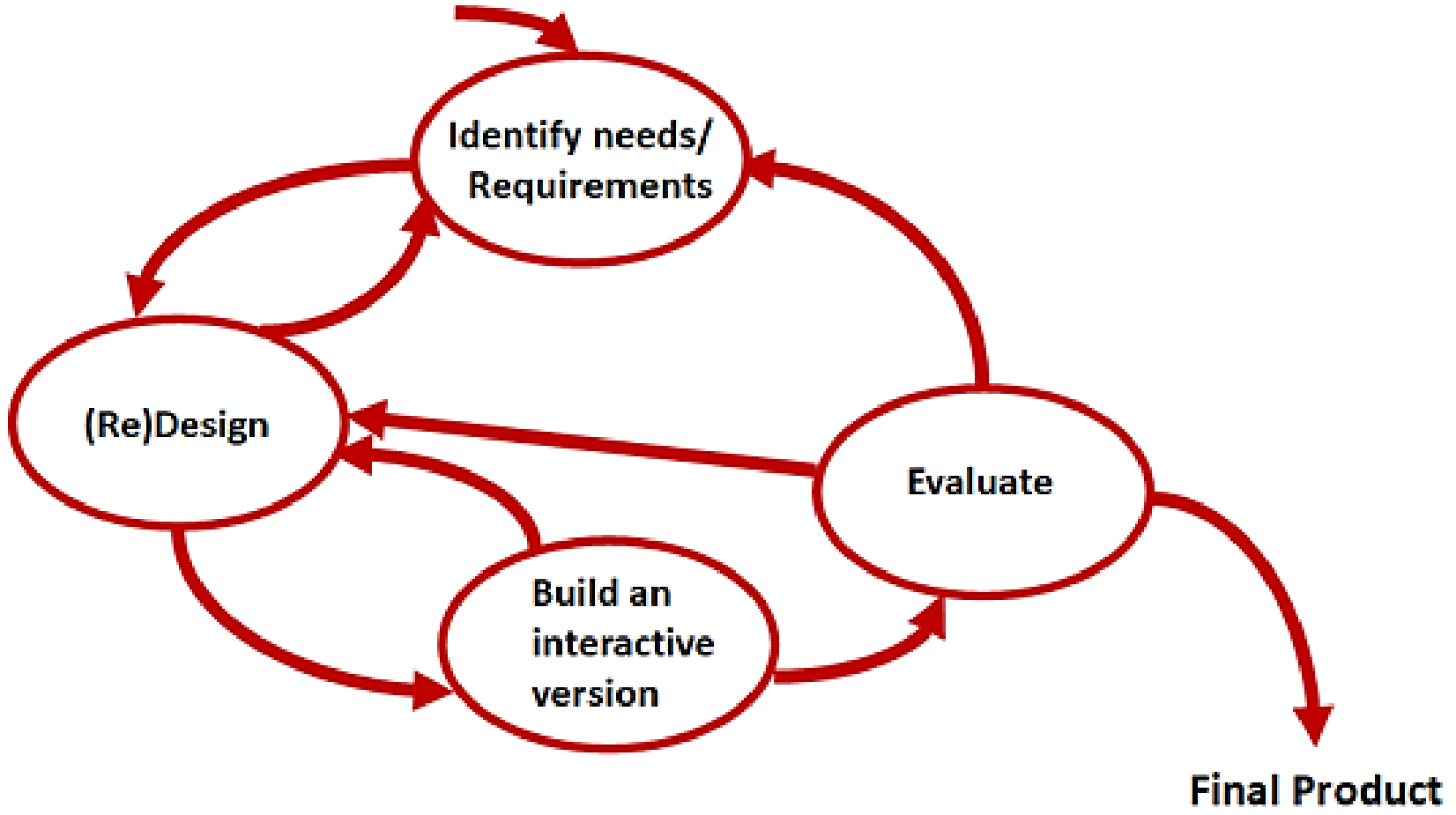
- TUI + AR = Tangible AR
- Users manipulate real objects that affect the virtual elements they see.





Designing AR Interfaces

Typical Interaction Design Cycle



Develop alternative prototypes/concepts and compare them, and iterate, iterate, iterate....

Typical Interaction Design Cycle

Identify Needs/Requirements: Understanding the goals of the AR application, identifying user needs, and setting requirements.

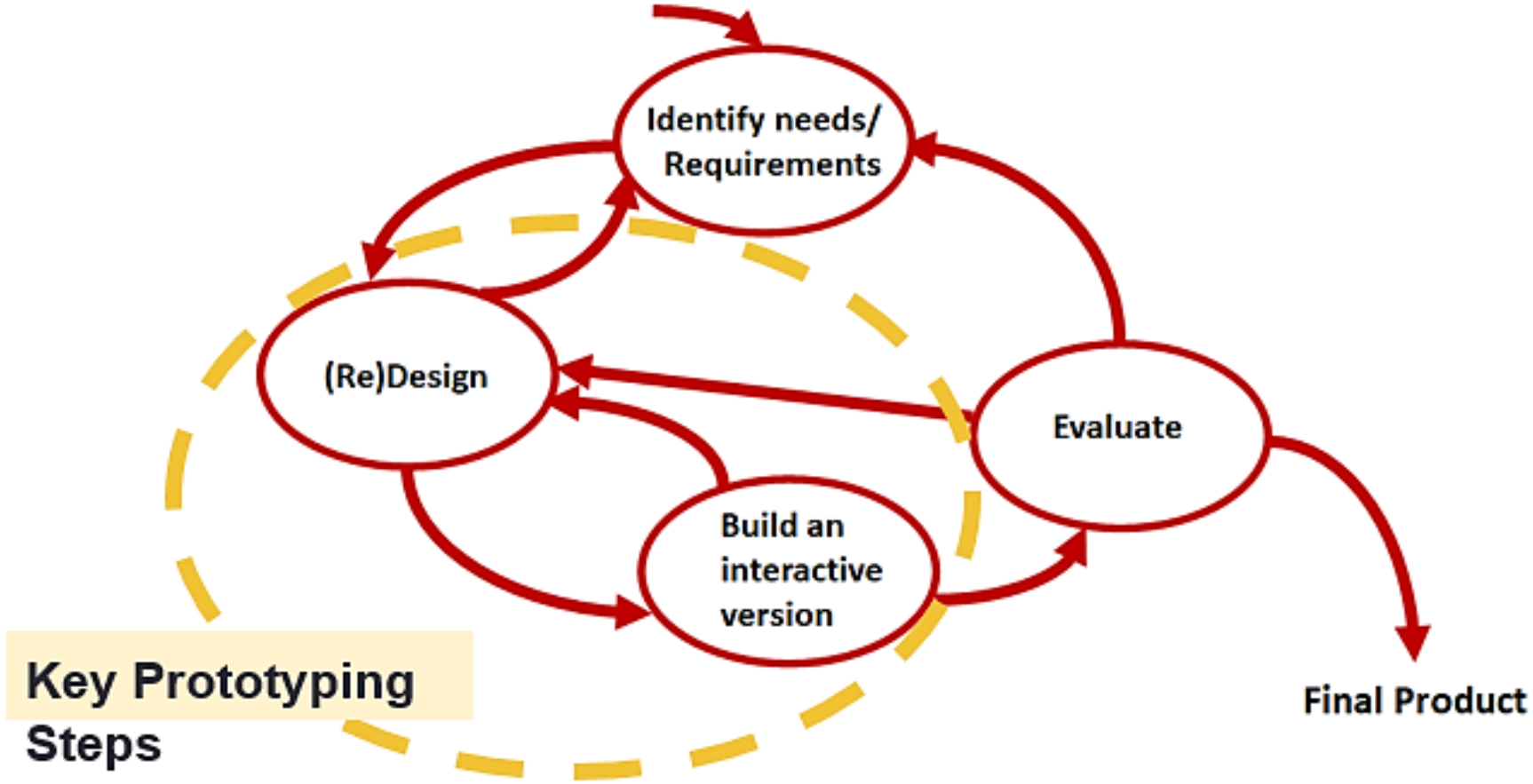
(Re)Design: This includes planning the interface, interactions, and AR elements such as 3D models, animations, and user interactions with virtual objects.

Build an Interactive Version: A prototype version of the AR application is developed that demonstrates core features and functionalities.

Evaluate: The prototype is tested with users to gather feedback. This includes usability testing, observing user interaction, and identifying any challenges or improvements needed.

Iterative Process: Feedback from the evaluation leads to redesigning or refining the AR application. This cycle continues until the final production.

Prototyping



Understanding the goals of the AR application, identifying user needs, and setting requirements.

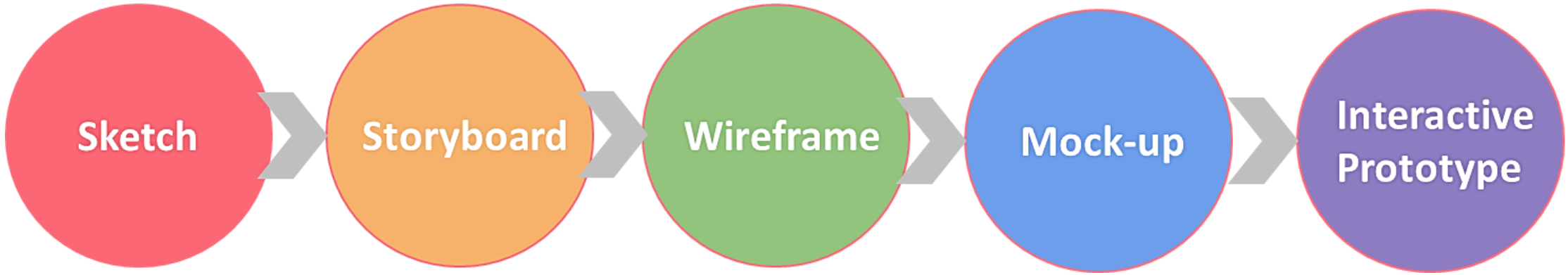
Why Prototype?

- Quick visual design
- Capture key interactions
- Get initial user feedback
- Focus on user experience
- Communicate design ideas
- “Learn by doing/experiencing”

XR Prototyping Tools

- **Low Fidelity (Concept, visual design)**
  - Sketching
  - Photoshop
  - PowerPoint
  - Video
- **High Fidelity (Interaction, experience design)**
  - Interactive sketching
  - Desktop & on-device authoring
  - Immersive authoring & visual scripting
  - XR development toolkits

From Sketch to Prototype



Your Most Valuable Prototyping Tool..

Sketching

Sketching is not about drawing
It is about design.

Sketching is a tool to help you:

- express
- develop, and
- communicate design ideas

Sketching is part of a process:

- idea generation,
- design elaboration
- design choices,
- engineering

Key Attributes of Sketching

Quick

- Work at speed of thought

Timely

- Always available

Disposable

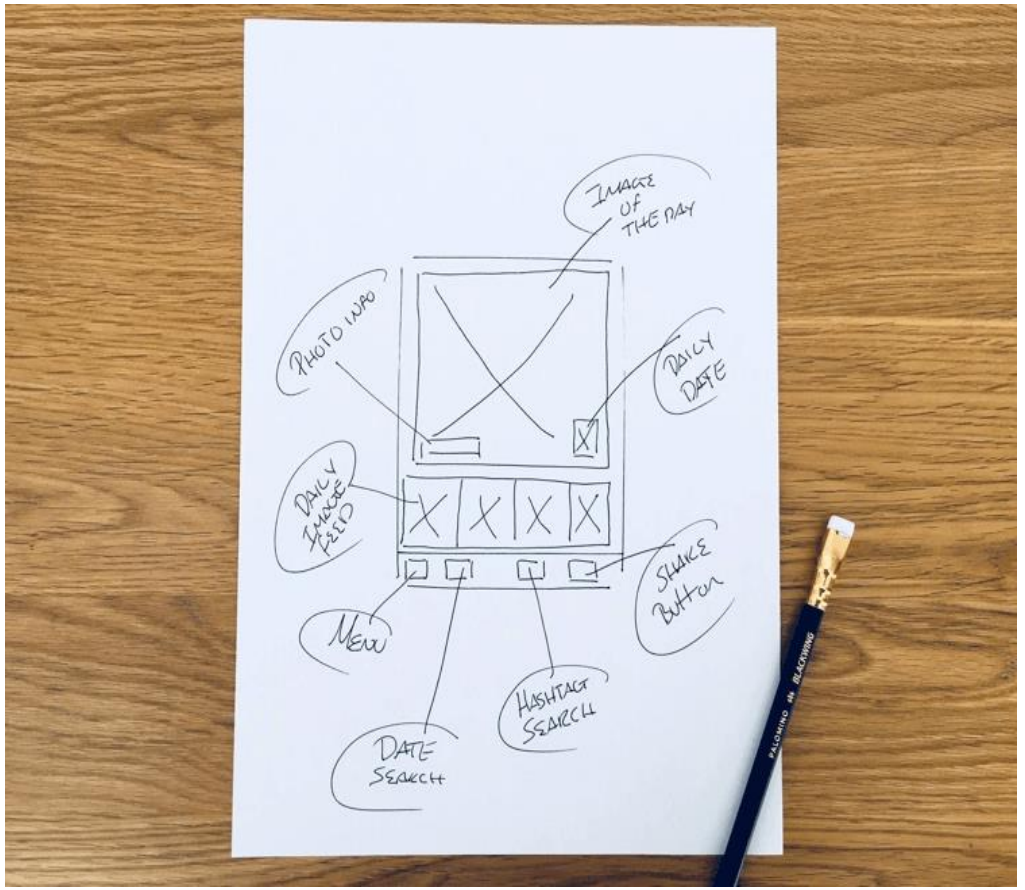
- Inexpensive, little investment

Plentiful

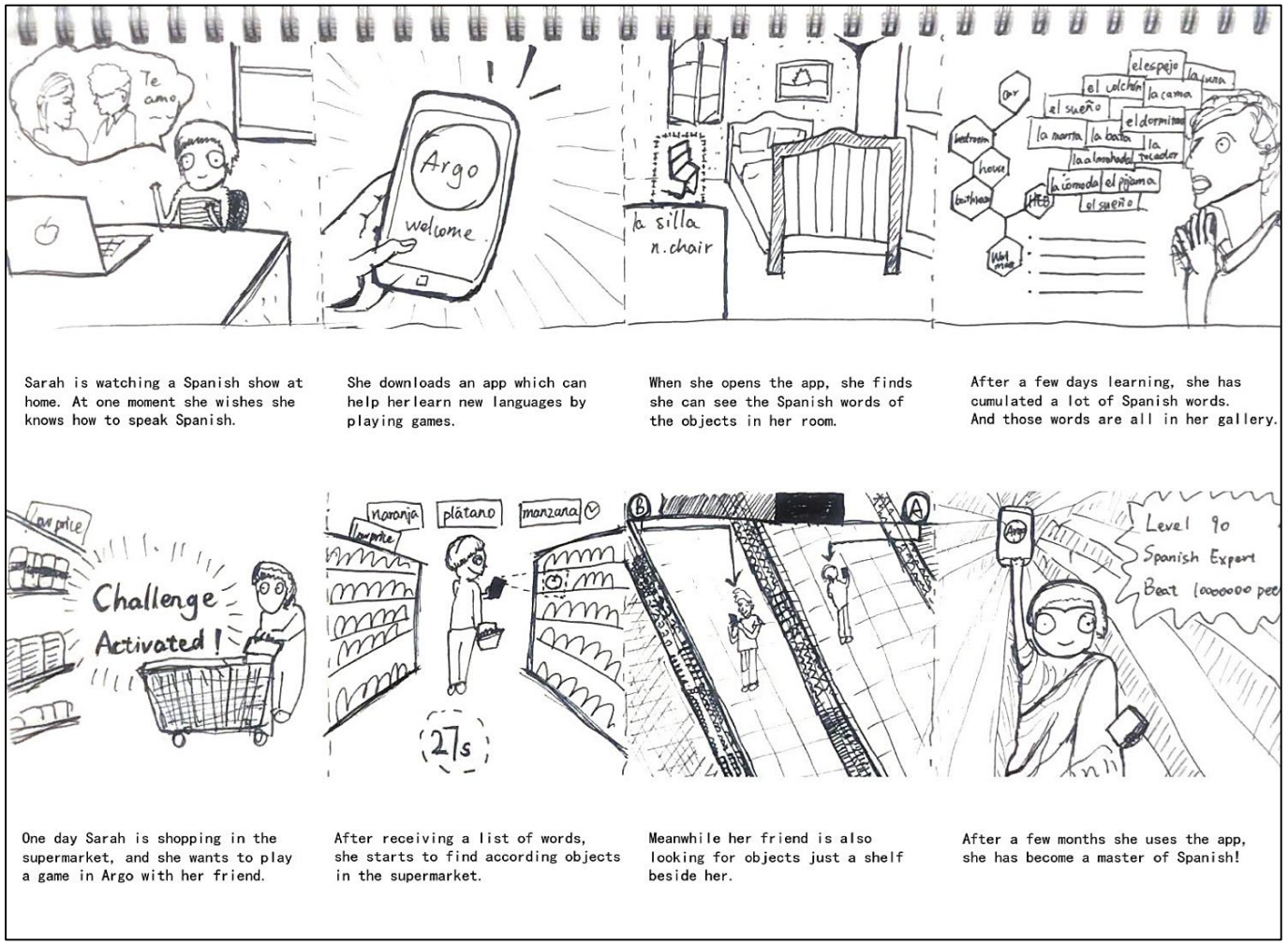
- Easy to iterate

A catalyst

- Evokes conversations



Storyboarding - Describing the Experience



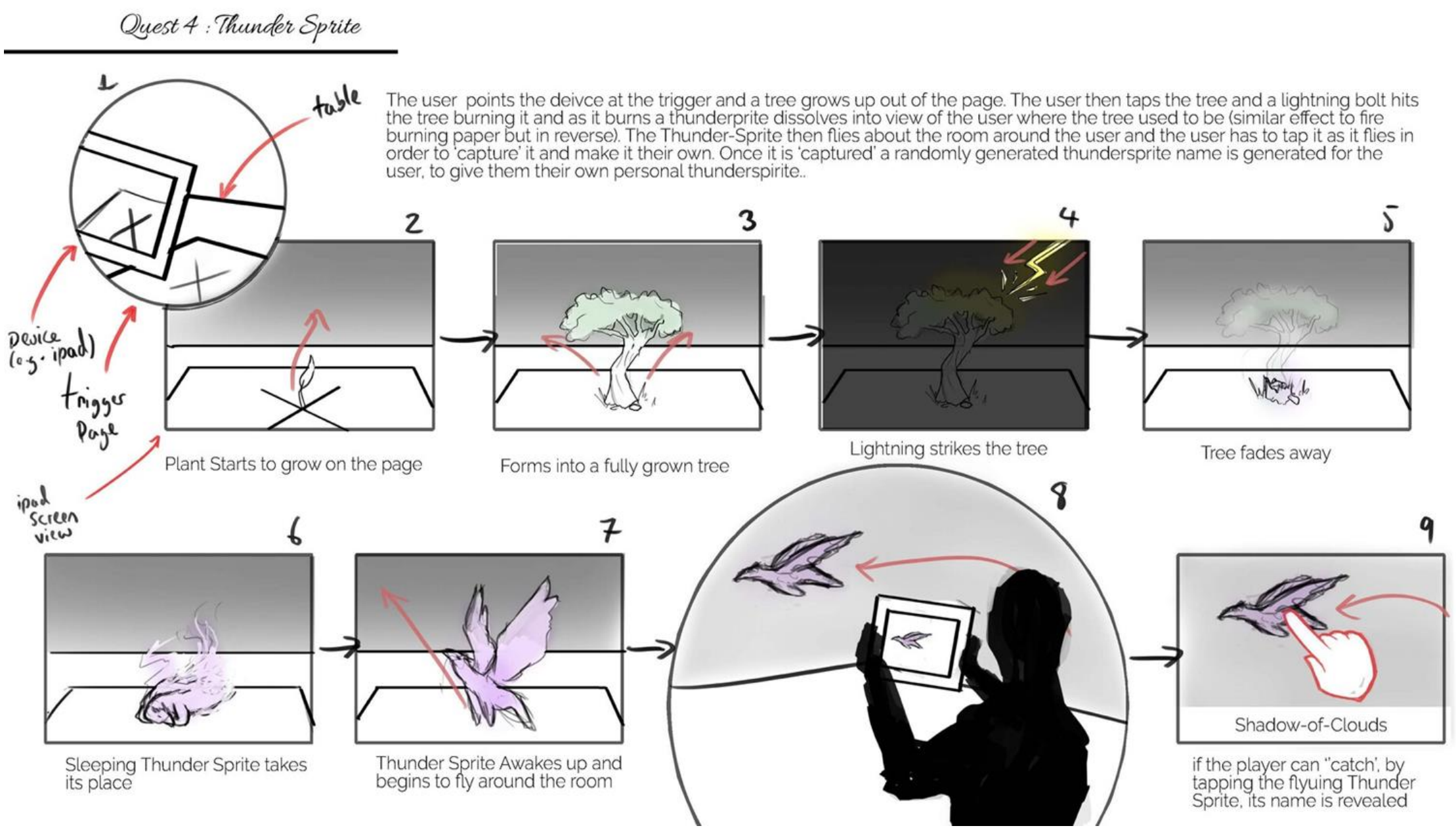
http://monamishra.com/projects/Argo.html

Key Elements

1. **Scenario:** Storyboards are based on a scenario or a user story. The role that corresponds to that scenario is clearly specified

2. **Visuals:** Each step in the scenario is represented visually in a sequence. The steps can be sketches, illustrations, or photos.

3. **Captions:** Each visual has a corresponding caption. The caption describes the user's actions, environment, emotional state, device, etc.



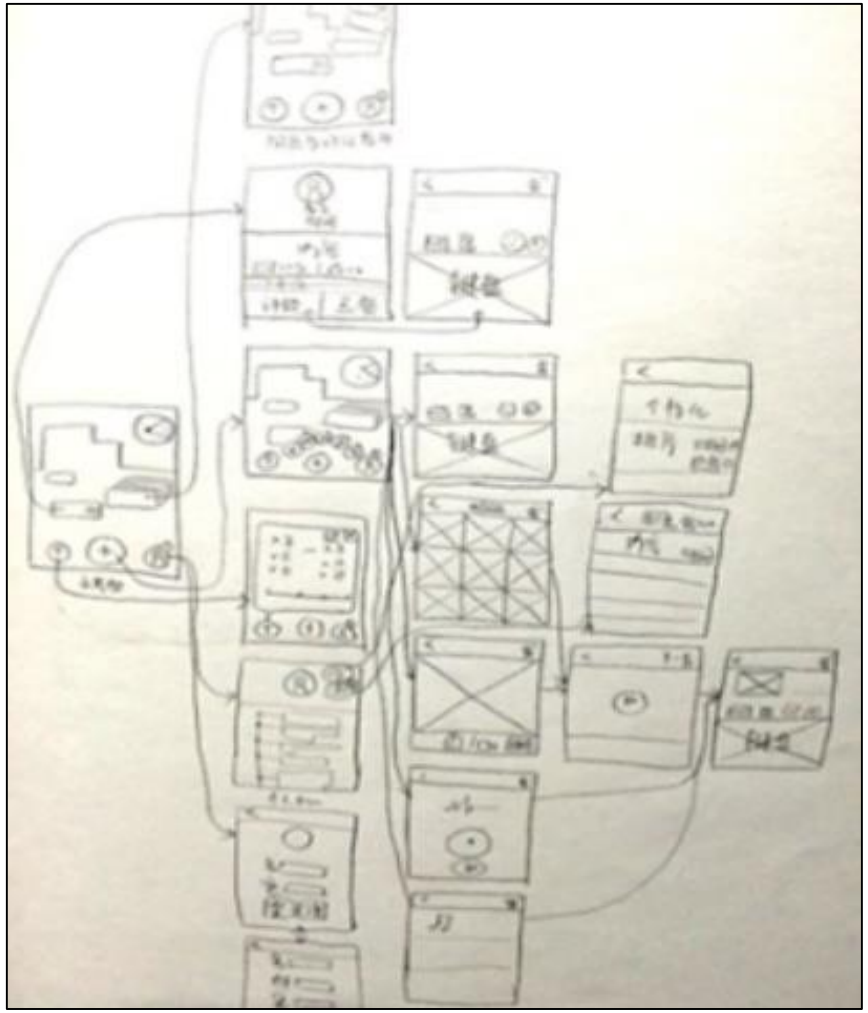
https://smol_inklings.artstation.com/projects/XBr8b3

Wireframes

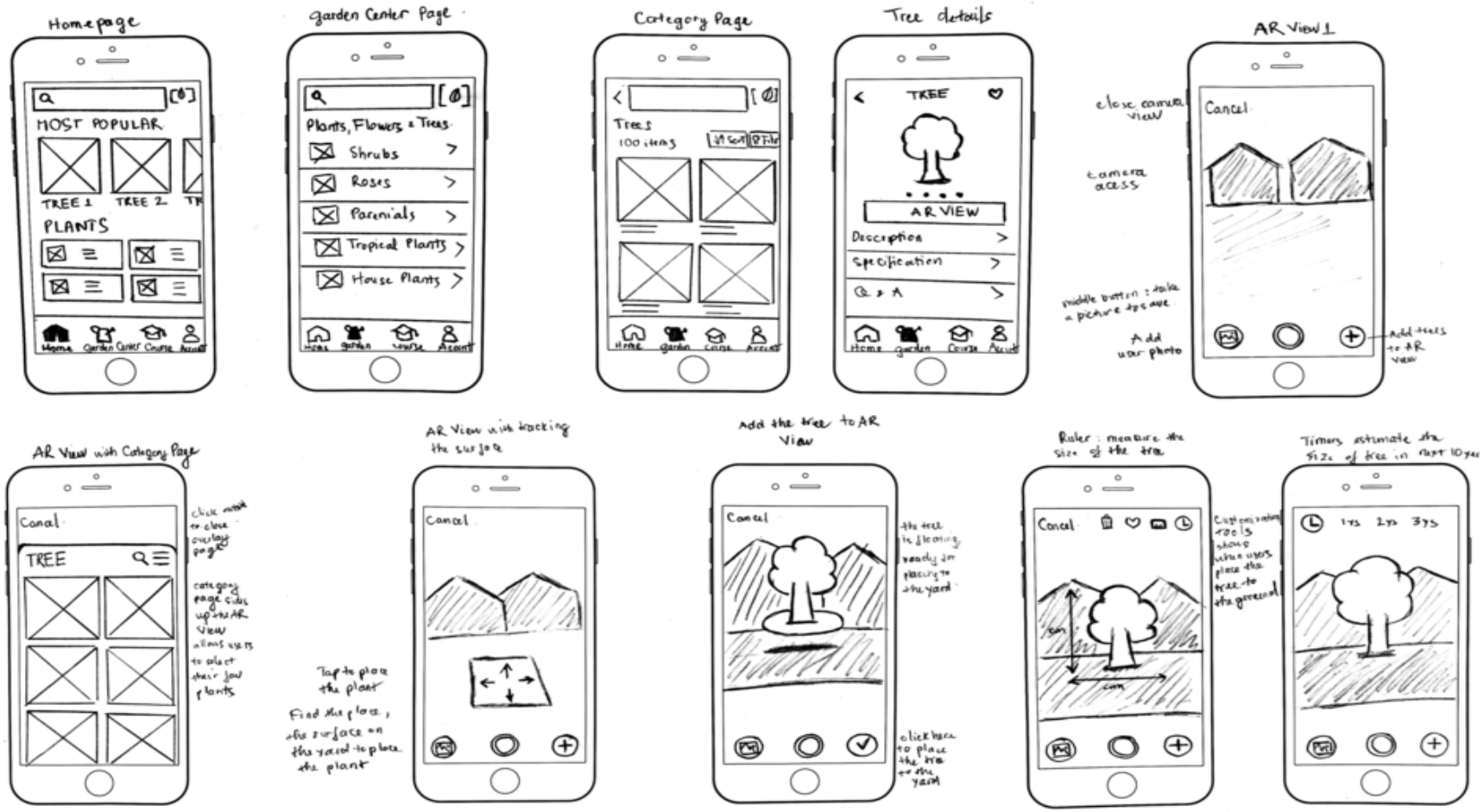
It’s about

- Functional specs
- Navigation and interaction
- Functionality and layout
- How interface elements work together
- Defining the interaction flow/experience

Leaving room for the design to be created



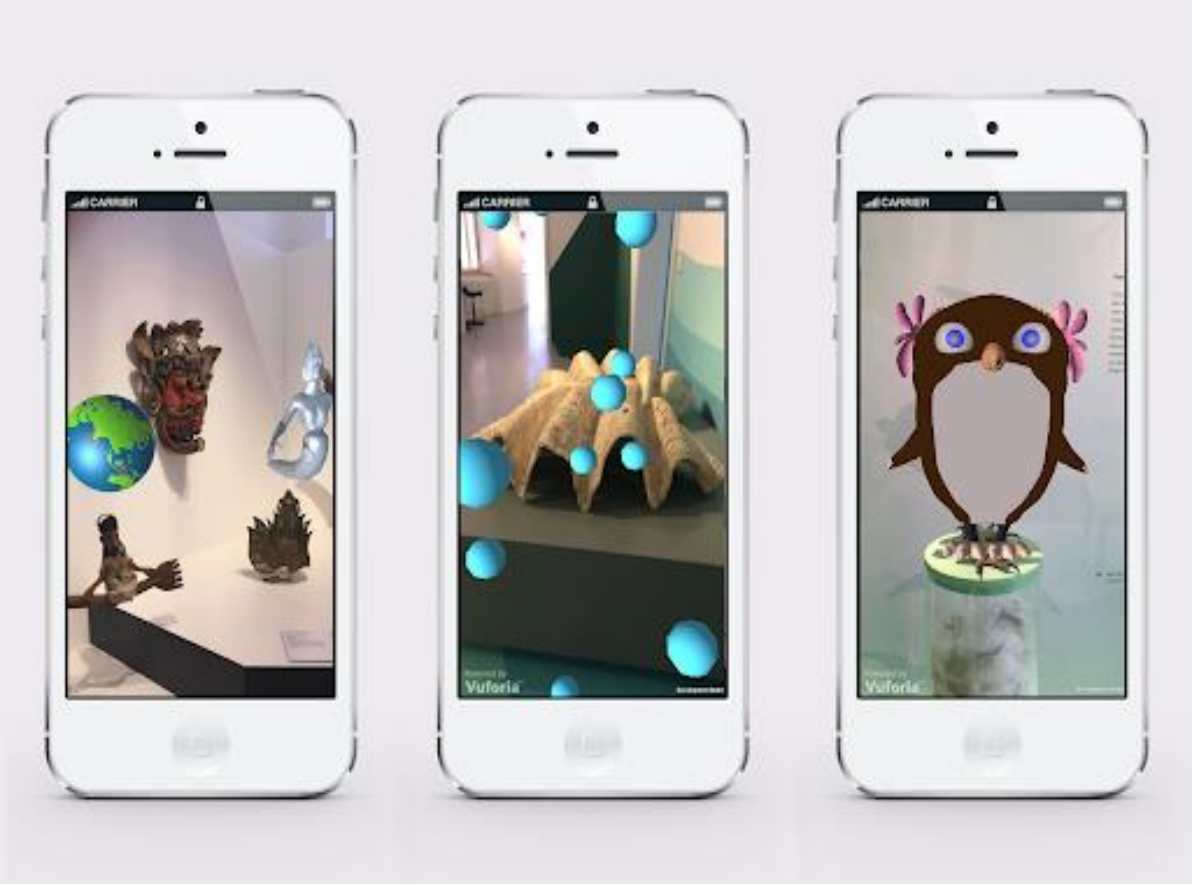
Example Wireframe



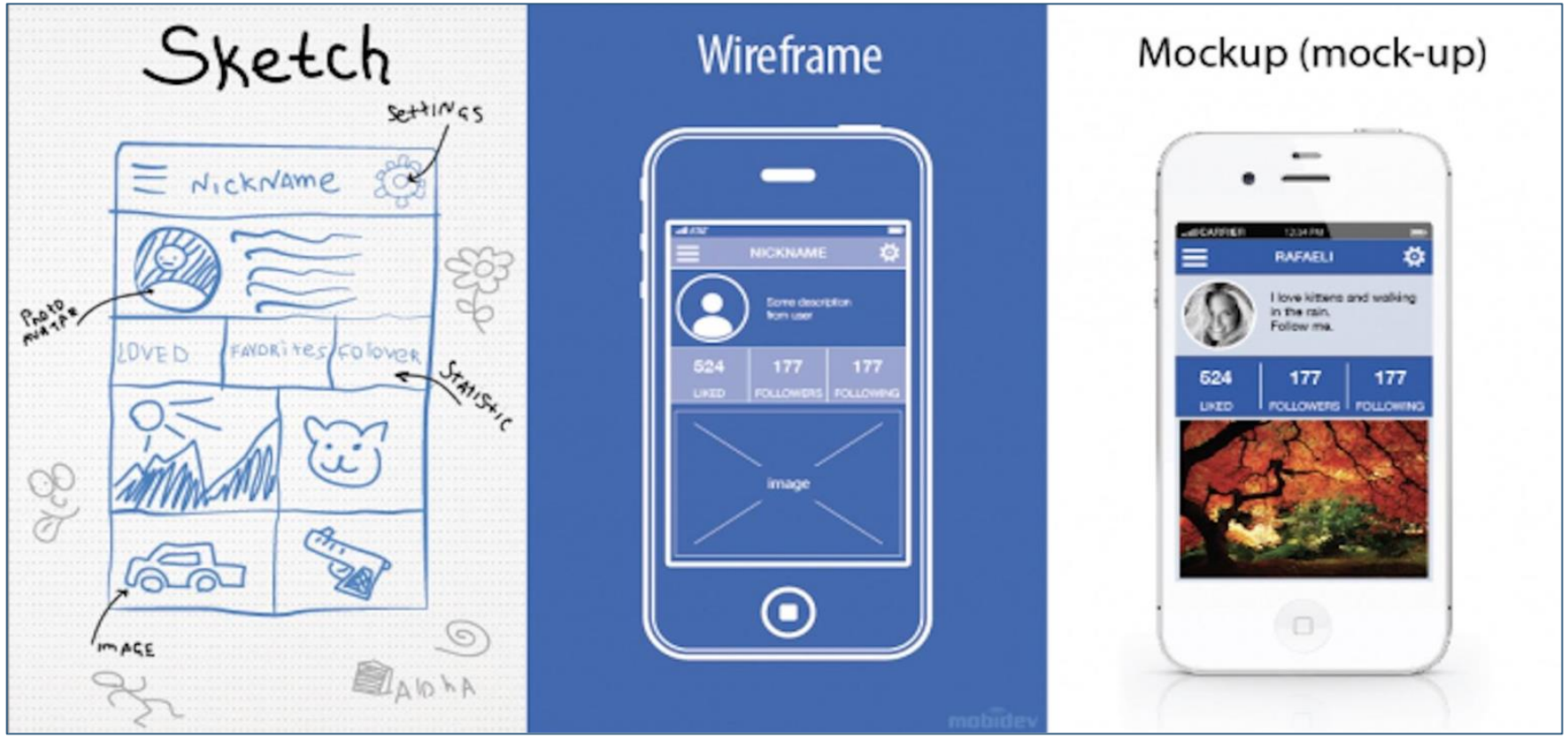
Mockup

It’s about

- Look and feel
- Building on wireframe
- High fidelity visuals
- Putting together final assets
- Getting feedback on design



Sketch vs. Wireframe vs. Mock-up



Low Fidelity | Low to Medium Fidelity | Medium to High Fidelity

IDEATE | **FLOW** | **VISUALIZE**

It Is Your Turn

Start collecting data about AR Applications

THANK YOU