

Using biophilic illusions to promote well-being and nature connectedness in interior spaces

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Windows play a crucial role in providing nature connection to building occupants



The role of windows

Connection with nature

Multi sensory stimulation

Real-time nature information



(Heerwagen, 1990)

Technological advances have made it possible to build habitable spaces without windows



(Jenzen, 2016)

Biophilic Illusions are **hybrid physical-digital design interventions** that **emulate nature in the built environment** with the goal of providing **non-rhythmic variation, multisensory stimulation** and **real-time nature connection**

Define

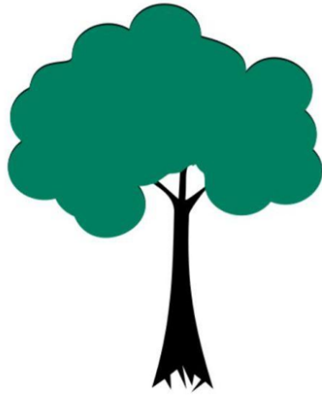
Ideate

Prototype

Test

OUTDOOR NATURE

INDOOR NATURE EMULATION



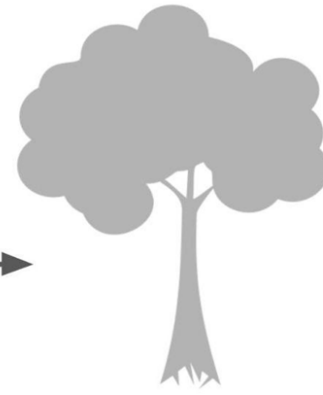
Non-rhythmic variation

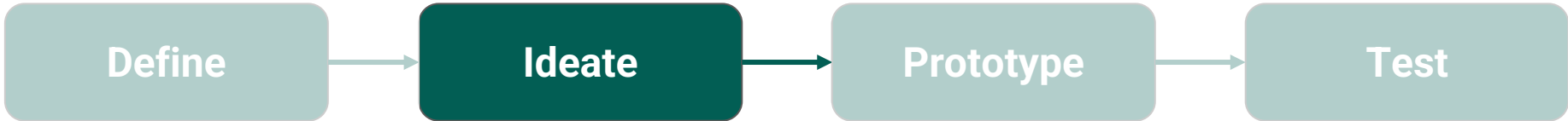



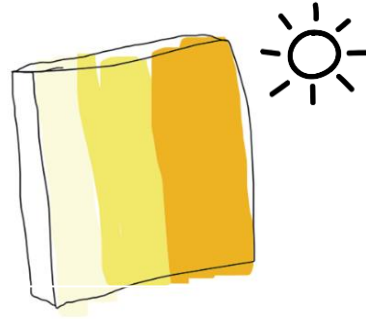


Multi-sensory stimulation



Real-time information





	Define	Ideate	Prototype	Test	
		Wind-animated tree shadow	Sun-animated lighting	Wind-animated airflow	Location-responsive sounds
					
Sense Stimulation		Visual	Visual	Haptic	Acoustic
Dynamism/Change		Real-time	Real-time	Real-time	Near real-time
Nature Information		Wind speed and direction	Light direction,color and intensity	Wind speed, and direction	Times of likely presence of birds and rain

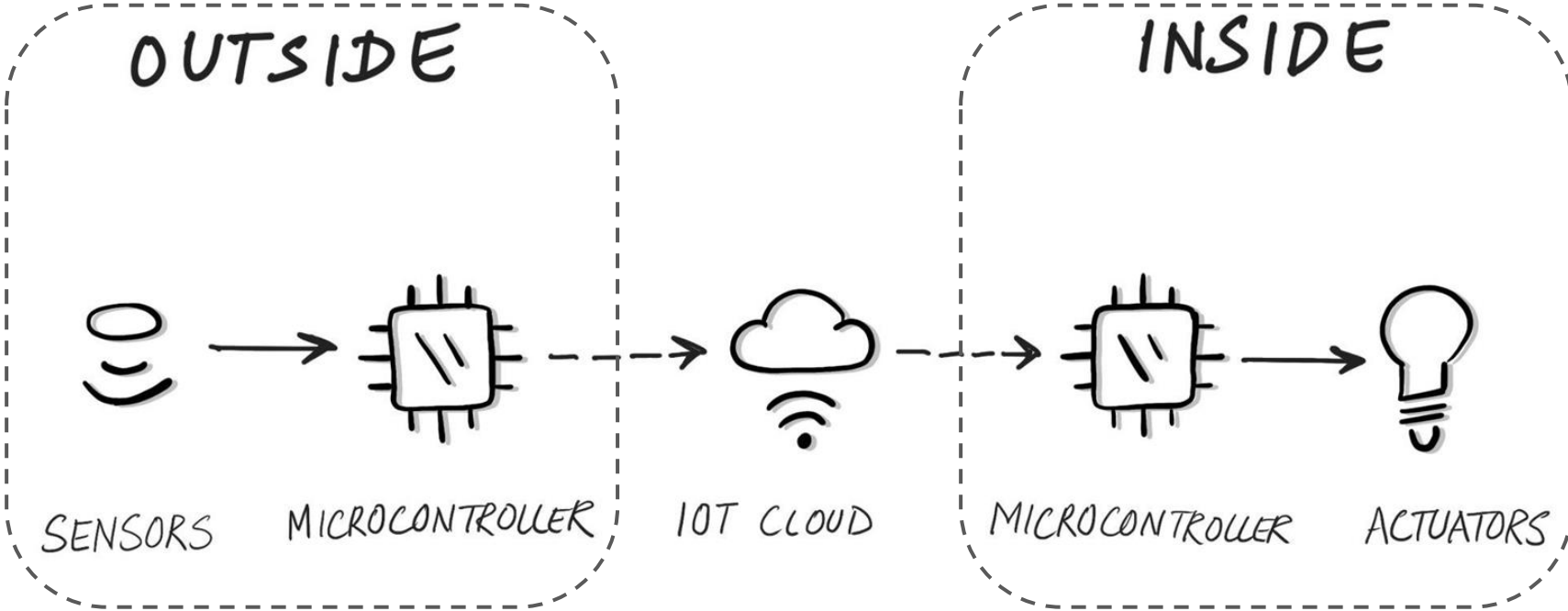
Define

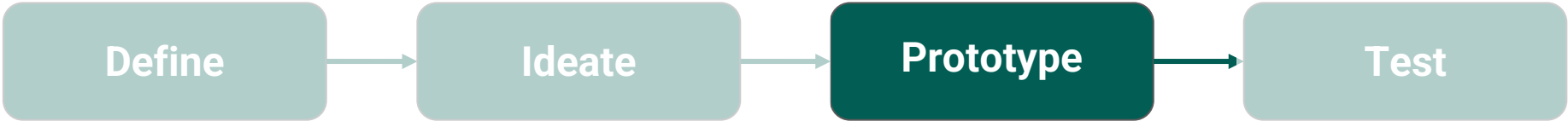
Ideate

Prototype

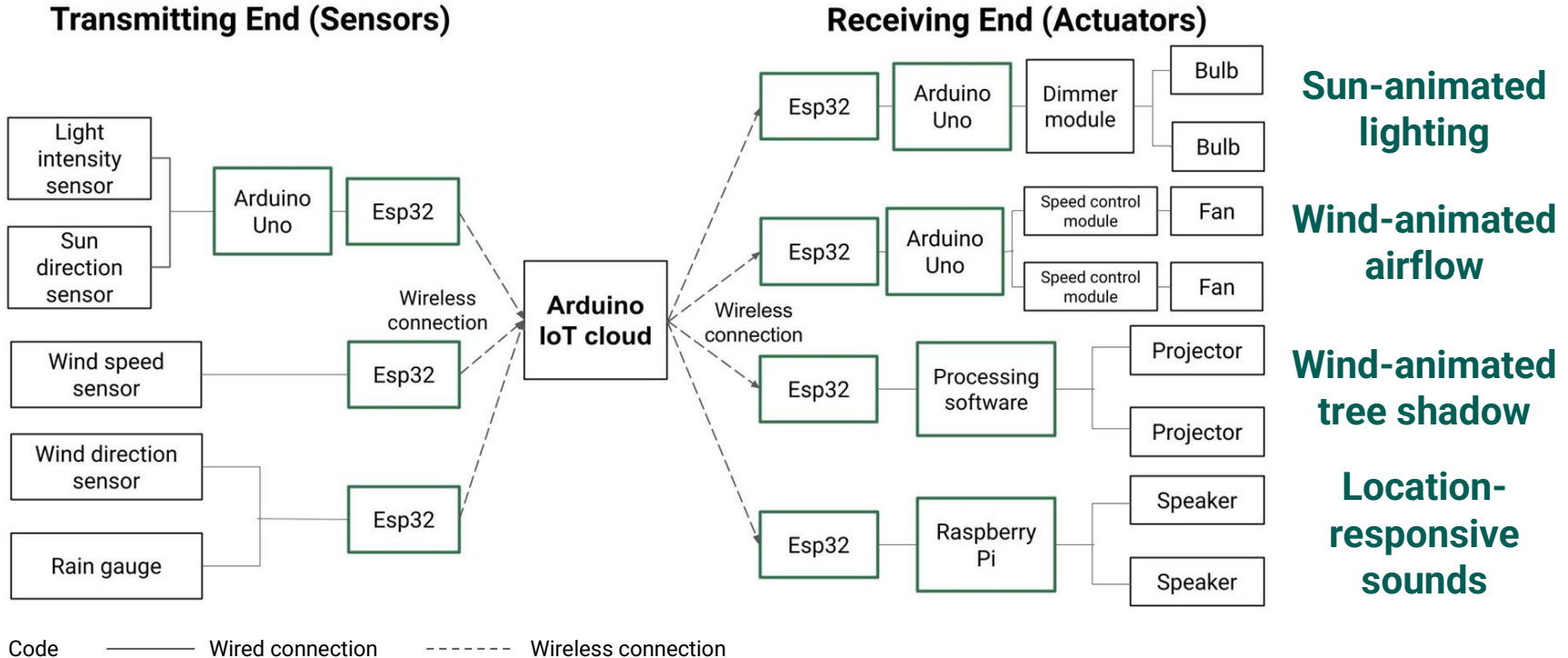
Test

Biophilic Illusions system architecture





Block diagram summarizing the overall system architecture



Define

Ideate

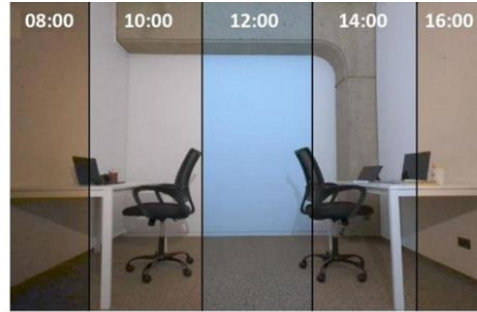
Prototype

Test

Low-fidelity prototypes for proof of concept and technology acceptance testing



*Wind-animated
tree shadow*



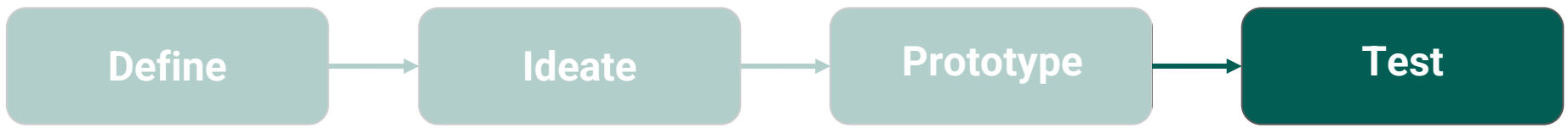
*Sun-animated
lighting*



*Location-responsive
sounds*

Objectives

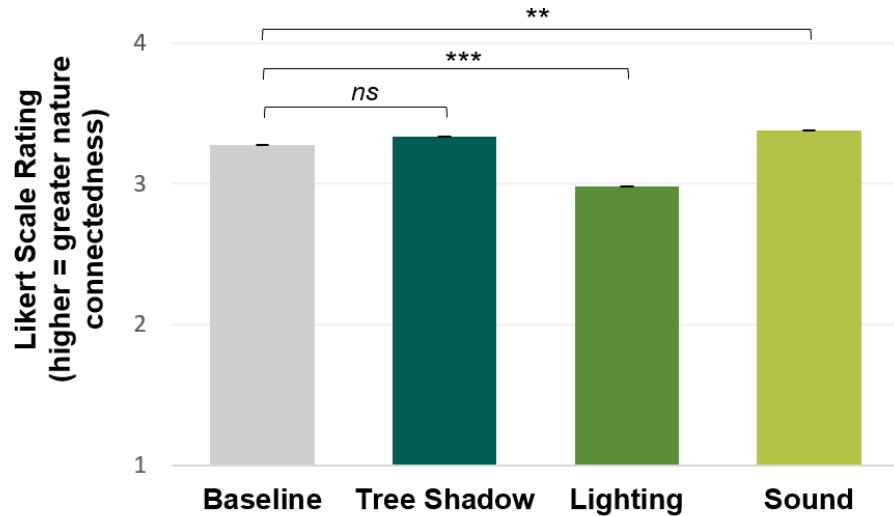
- Nature connectedness and Feelings of Relaxation
- Technology acceptance



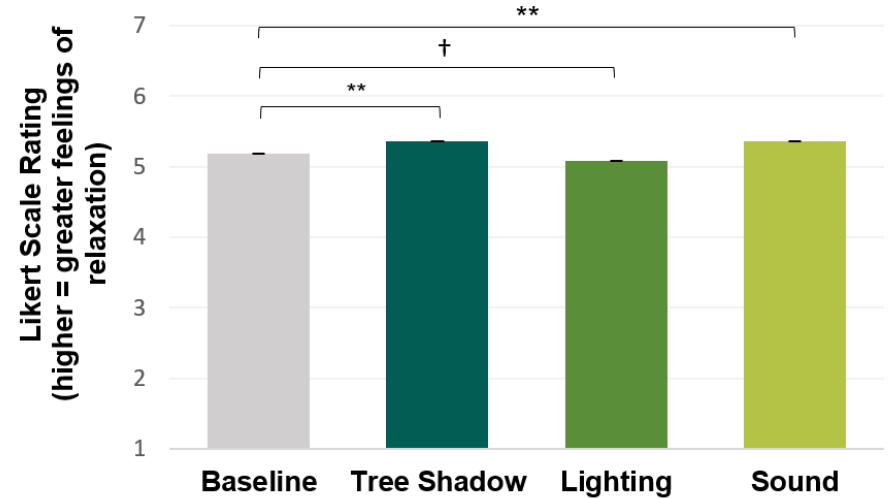
Testing of low-fidelity prototypes revealed promising results

N = 345

Nature Connectedness



Feelings of Relaxation



Error bars are standard error

*** $p < 0.001$; ** $p < 0.01$; * $p < 0.05$; + $p < 0.1$; ns = not significant

Define

Ideate

Prototype

Test

Qualitative feedback from participants - *what do you like about this design?*

Wind-animated tree shadow

"I enjoy seeing the trees moving in the wind. I think **this would help me to feel more connected to nature** in the work space."

"I like the **natural feel** that comes from the moving shadow."

Sun-animated lighting

"It could be **useful for people like me with seasonal affective disorder**... if it was mimicking a SUMMER day, all year."

"It gives you a **sense of being outside** because it simulates the natural sunlight."

Location-responsive sounds

"I really enjoy hearing the birds chirping, it is a very **relaxing sound** which would be good to experience in a work space."

"I like the natural noises that **make me feel like I have the window open**."