

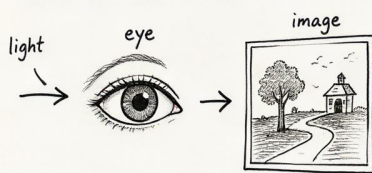
SKETCHBOOK

FROM VISION TO ECHO

BatSense explores how spatial awareness might be reimagined through bat echolocation. Instead of relying only on vision, the project translates distance and direction into sound, vibration and visual feedback. This logbook records the process from research to prototyping, testing and reflection.

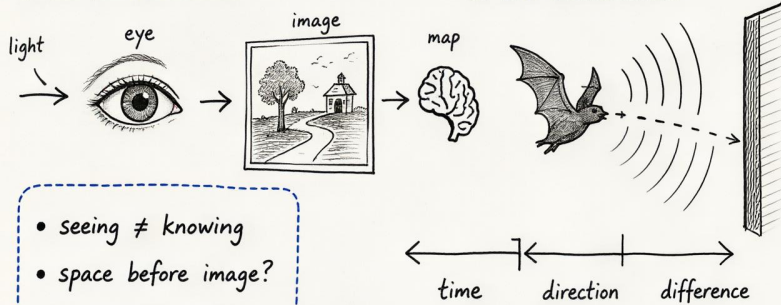
PART A: QUESTIONING THE VISUAL DEFAULT

1. HUMAN PERCEPTION



- seeing ≠ knowing
- space before image?
- an echo is data

2. BAT ECHOLOCATION



REFLECTION

START
HERE.

This first stage of BatSense reframed the project from a visual interface problem into a sensory translation problem. Early research suggested that echolocation is not about producing images, but about understanding space through time, direction and change. The initial prototype therefore focused on connecting hardware sensing, computational processing and human feedback into one multisensory system.

KEY TAKEAWAYS

- 🔍 Research shapes form.
- 🔧 Hardware is part of communication.
- 📶 Distance becomes sensation.
- 🔄 Testing will change the design.

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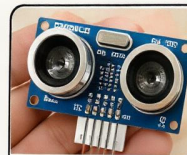
Space can be sensed before it becomes an image.

KEY LEARNING

- ★ Vision is not the only interface.
- ★ Echo is information.
- ★ Sensing must be translated.
- ★ The body can become the interface.

PART B: BUILDING THE SYSTEM

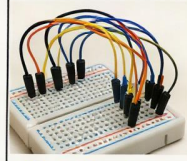
3. HARDWARE COMPONENTS



HC-SR04
ultrasonic sensor
(2-400cm range)



Arduino Mega 2560
ATmega2560 • 54 I/O
16MHz • 5V

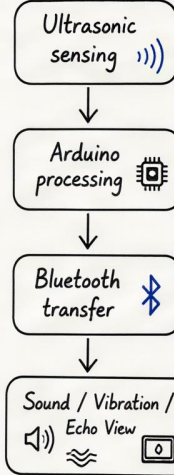


Breadboard +
Jumper Wires
prototyping & connections



Hardware Setup
integrated circuit
overview

4. SIGNAL CHAIN

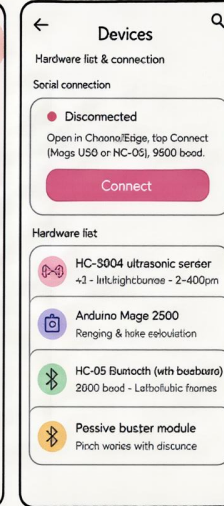


TOOLS / COMPONENTS

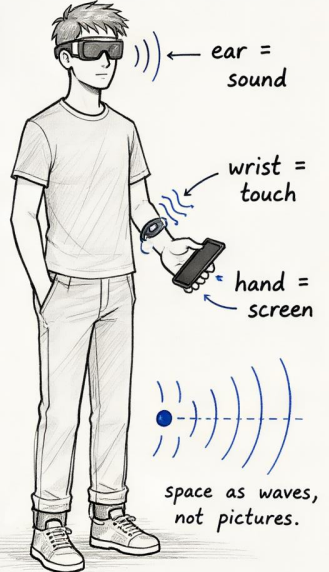
- HC-SR04 ultrasonic sensor
- Arduino Mega 2560
- HC-05 Bluetooth
- Breadboard + jumper wires
- Buzzer / vibration feedback
- Phone interface

PART C: DESIGN DIRECTION

5. ECHO VIEW



6. BODY AS INTERFACE



NEXT UP:

- ☐ Build tri-channel array
- ☐ Calibrate distance mapping
- ☐ Design vibration patterns
- ☐ Test in open space

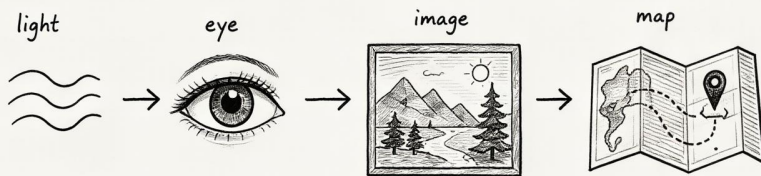
SKETCHBOOK

LEARNING FROM BAT ECHOLOCATION

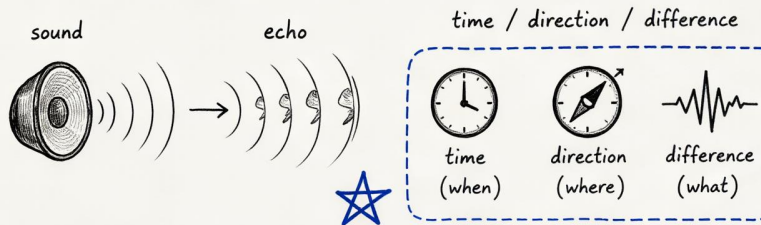
Bats explore and navigate in the dark by sending out sounds and listening to the echoes that return. These echoes carry rich spatial information about the world — not as pictures, but as patterns in time, direction, and change. Our goal is to study this natural sense of space and translate its principles into human-centered interfaces.

PART A: HUMAN VS BAT

1. HUMAN PERCEPTION (VISION)



2. BAT PERCEPTION (ECHOLOCATION)

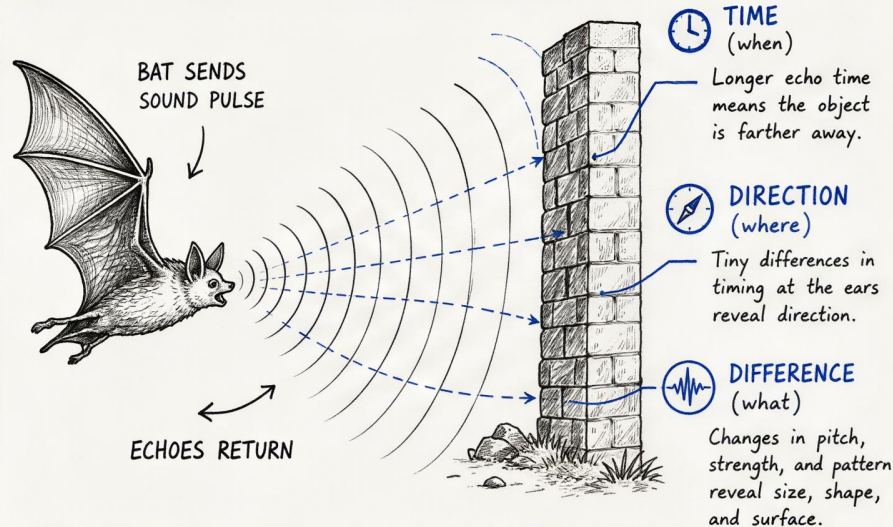


REFLECTION

LISTEN
THEN
UNDERSTAND.

Bats don't build pictures — they build understanding from echoes over time. The challenge for us is to respect this difference and avoid forcing vision-like outputs. Instead, we should design systems that communicate in ways that are natural, fast, and easy to learn — using sound, touch, and simple visuals together.

PART B: INFORMATION INSIDE AN ECHO



From a returning echo, bats build a 3D understanding of space — fast, flexible, and continuously updated.

KEY TAKEAWAYS

- Time of echo = distance.
- Direction comes from tiny timing differences.
- Changes in the echo reveal what the object is like.
- Echoes update continuously — sensing is dynamic.

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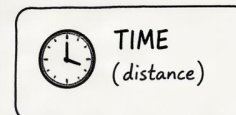
BATSENSE / PAGE 02

KEY LEARNING

- ★ An echo is not a picture.
- ★ Time carries distance.
- ★ Direction can be sensed.
- ★ Translation matters more than imitation.

PART C: FROM BIOLOGY TO DESIGN QUESTION

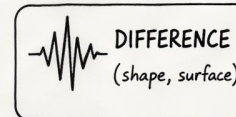
FROM ECHOLOCATION



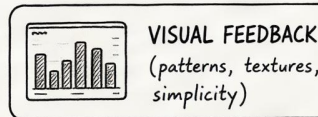
TRANSLATE TO



TRANSLATE TO



TRANSLATE TO



DESIGN QUESTION: How can we translate echo cues into clear, minimal, and actionable feedback for people?

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An echo turns space into information.

NEXT UP:

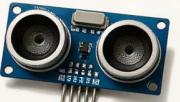
- ☐ Echo cue mapping cheat sheet
- ☐ Feedback design ideas
- ☐ First low-fi sketch
- ☐ User story brainstorm

SKETCHBOOK

SOURCING & PREPARING THE HARDWARE

Before building, I bought and studied the core electronic components needed for BatSense. Understanding what each part does helps me plan the system, design the wiring, and avoid mistakes later on. This page documents what I purchased, what each part is for, and how they work together.

PART A: WHAT I BOUGHT

① Arduino Mega 2560 R3 (Rev3)  ¥63.2 x1	② HC-SR04 Ultrasonic Sensor  ¥26.9 x1	③ HC-05 Bluetooth Module  ¥15.3 x1	④ Vibration Motor (coin type)  ¥2.89 x1
⑤ Jumper Wires (M-M)  ¥2.59 x1	⑥ Breadboard (400 tie points)  ¥3.3 x1	⑦ Battery Holder (2x18650 w/ switch)  ¥4.03 x1	⑧ USB Cable (Type-B)  (included) x1

★ Total spent (approx): ¥118 All parts tested on arrival - no DOA!

REFLECTION

FROM
IDEA
↓
TO
COMPONENTS

It feels exciting to move from ideas on paper to real components in hand. Each part is a building block of a system that will listen, sense, and inform. The more I understand these parts now, the smoother the build will be later.

KEY TAKEAWAYS

- 🛒 Sourcing wisely keeps costs low.
- 📖 Know each part's role before wiring.
- 🔗 Compatibility matters (voltage & logic).
- 🔧 Test early to save time later.

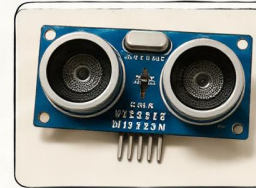
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WHY THESE PARTS?

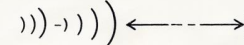
- ★ Low cost & widely available.
- ★ Great for learning & prototyping.
- ★ Compatible with Arduino Mega.
- ★ Enough I/O & sensors for BatSense v1.

PART B: COMPONENT OVERVIEW



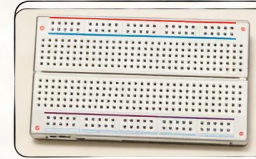
HC-SR04 ULTRASONIC SENSOR

- Measures distance using sound waves.
- Range: ~2cm - 400cm
- Trigger (TRIG) and Echo (ECHO) pins.



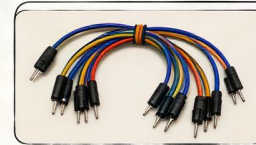
ARDUINO MEGA 2560

- Main brain of BatSense.
- Many I/O pins for sensors & modules.
- 54 Digital I/O, 16 Analog inputs.



BREADBOARD

- Solderless prototyping.
- Easy to test and change circuits.
- Power rails for + and - distribution.

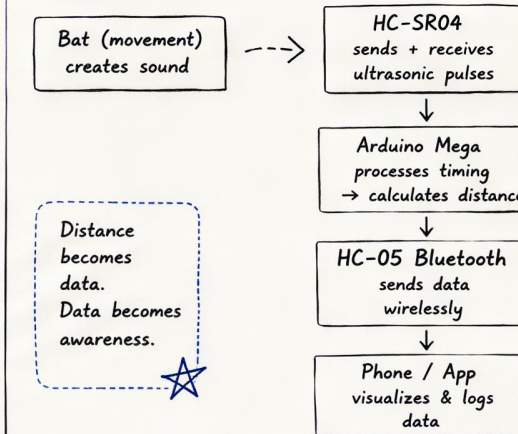


JUMPER WIRES

- M-M wires for connections.
- Different colors help with tracing and debugging.

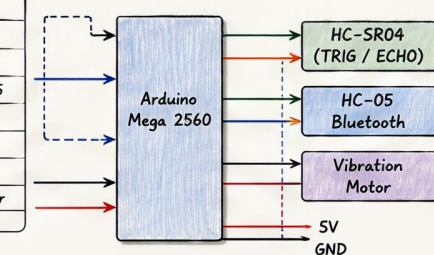
PART C: WIRING LOGIC

1. SIGNAL FLOW



2. SIMPLIFIED PIN MAP (MEGA 2560)

Component	Mega Pin(s)	Notes
HC-SR04 TRIG	D7	Output from Mega
HC-SR04 ECHO	D8	Input to Mega
HC-05 TXD	D1 (RX1)	Receive from HC-05
HC-05 RXD	D0 (TX1)	Send to HC-05
Vibration Motor -	D9 (PWM)	Vibration control
Vibration Motor -	GND	Ground
Power (SV)	SV	Sensors & BT power
Ground	GND	Common ground



THIS PAGE IN ONE LINE:

A sensory interface starts as a kit of parts.

NEXT UP:

- ☑ Test HC-SR04 distance readings
- ☐ Pair HC-05 with phone
- ☐ Build breadboard prototype
- ☐ Log first data to Serial Monitor

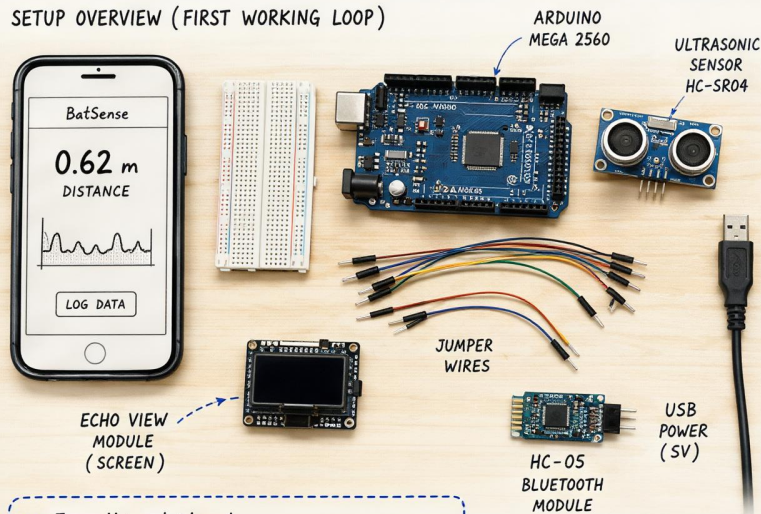
BUILDING THE FIRST PROTOTYPE

FROM PARTS TO A WORKING SENSING LOOP

Today I turned loose parts into the first working BatSense loop. The sensor sends ultrasonic pulses, the Arduino reads and processes, Bluetooth sends the data, and the result appears (or is felt/heard). It's a simple loop — but it's alive.

PART A: FROM PARTS TO LOOP

SETUP OVERVIEW (FIRST WORKING LOOP)



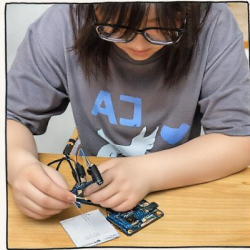
- Everything laid out. One goal: get data to move end-to-end.

REFLECTION

START HERE.

Seeing numbers move on the screen when I waved my hand felt like magic. This was the first time the full loop worked: sense → think → send → show. There's still tuning to do, but the foundation is real. From now on, every small improvement builds on this loop.

PART B: FIRST ASSEMBLY



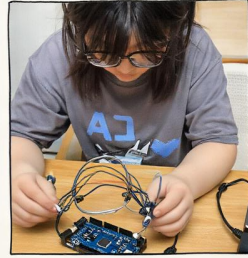
1. Connecting HC-SR04 to Arduino.
Trig → D9
Echo → D10
SV & GND



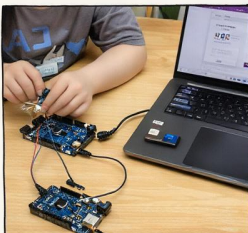
3. Checking sensor power and connections. (Both sides)



- * First reading on screen: 0.62 m
Success feels tiny... and huge.



2. Powering the board via USB.
LED on! (alive)



4. Data appears in Echo View through Bluetooth!



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KEY LEARNING

- ★ Real feedback needs all parts connected and tuned.
- ★ Small wiring mistakes = no data.
- ★ Seeing numbers appear was exciting!



PART C: SYSTEM FLOW

1. ULTRASONIC SENSING



→ Sends ping, receives echo, measures time.

2. ARDUINO PROCESSING



→ Calculates distance, filters noise, prepares data.

3. BLUETOOTH TRANSFER



→ Sends data wirelessly (HC-05).

4. OUTPUT / FEEDBACK



→ You see, hear, or feel the result.

WHAT WORKED FIRST

- ✓ Sensor readings came through.
- ✓ Bluetooth connection successful.
- ✓ Echo View showed real-time distance.
- ✓ Vibration motor responded.



WHAT NEEDED ADJUSTMENT

- Stability of readings in open spaces.
- Filtering to reduce spikes.
- Vibration intensity mapping.
- Enclosure / mounting still to design.



KEY TAKEAWAYS

- 🔍 A complete loop makes the project come alive.
- ⚙️ Wiring + power + code must all be correct.
- 📶 Bluetooth opens the door to mobile feedback.
- 🔄 Small adjustments now = big improvements later.



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The project became real when data moved through a complete loop.



NEXT UP:

- ☐ Improve signal stability
- ☐ Add low-pass filtering
- ☐ Map haptic intensity
- ☐ Enclosure + wearability
- ☐ Field test with bats!

DEBUGGING THE SYSTEM

FROM FAILURE TO UNDERSTANDING

The build didn't work the first time. Errors, missing ports, and strange serial output turned into a trail of clues. Debugging became part of the design process, revealing how all the pieces connect.

PART A: ERROR MOMENTS

1. FLASH FAILED

A fatal error occurred:
Could not open COMS,
the port is busy or
doesn't exist.
(PermissionError(13,
拒绝访问., None, 5))

FAILED - check errors above.

❌ port busy
→ tried again
→ still failed

2. INVALID HEADER

```
18:37:47.485 -> invalid header: 0xffffffff
18:37:47.485 -> invalid header: 0xffffffff
18:37:47.485 -> invalid header: 0xffffffff
18:37:47.485 -> invalid header: 0xffffffff
18:37:47.435 -> invalid header: 0xffffffff
...
18:37:47.529 -> invalid header:ESP-ROM:esp22x2-20210227
18:37:47.529 -> rst:0x7 (T60MOT_SYS_RST),boot:0x29
18:37:47.529 -> Saved PC:0x40049621
```

❌ invalid header
→ bad or wrong flash content?

3. GARBLED SERIAL OUTPUT

```
COMS
Γ1010-k9T 5*xAcg*I-08- xP*880FM.BAIPG
DF90*608 Y
Γ0002000;000=4=008f63z000 2
A00*08:000000+20B 0+004=8F000*A00*00I4
E1.9200 800C: 8180600f8Ca-g0*g**~gA
```

❌ garbled output
→ not the expected logs

4. NOT THE EXPECTED BOOT

```
18:29:05.438 -> mode:DIO, clock div:1
18:29:05.438 -> load:0x3fce2820, len:0x588
18:29:05.438 -> load:0x403c8700, len:0xc04
18:29:05.438 -> load:0x403c6700, len:0x2x78
18:29:05.438 -> entry 0x403c8908
18:29:05.816 -> ESP-ROM: esp32x3-20210327
18:29:05.816 -> rst:0mc (RTC_SW_CPU_RST), boot:0x26
18:29:05.816 -> Saved PC:0x4037a051
```

❌ only ROM boot messages
→ app not running

PART B: HOW I CHECKED IT

1 Re-flash official firmware (full)

- erase + flash
- all required files

```
Erasing flash...
Chip erase completed successfully
Writing bootloader + partition table + app.

Wrote 16334 bytes ... (180.6 kbit/s).
Mash of data verified.
```

reflash test ☒

2 Test serial output after reset

- open Serial Monitor

```
COMS
18:29:05.438 -> mode:DIO, clock div:1
18:29:05.438 -> load:0x3fce2829, len:0x588
18:29:05.438 -> load:0x403x8709, len:0x04
...
```

serial output seen ☒

3 Confirm board is working

- ROM logs
- stable boot

```
ESP-ROM: esp32s3-20210327
Build: Mar 27 2021
rst:0x7 (TG0MOT_SYS_RST), boot:0x29
Saved PC:0x40049621
...
```

board OK ☒

4 Check ports and settings

- correct COM#
- 115200 baud



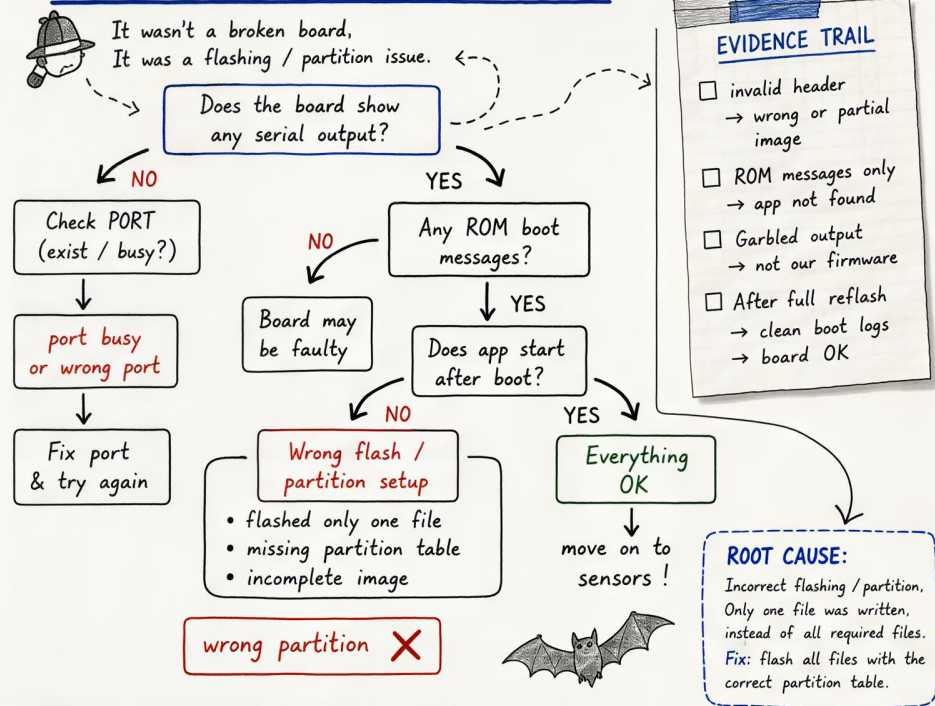
port good ☒

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KEY LEARNING

- ★ Debugging crosses hardware, software, and configuration.
- ★ Symptoms are clues, not dead ends.
- ★ Verify each layer before guessing.
- ★ Small fixes → big insight.

PART C: WHAT THE REAL PROBLEM WAS



REFLECTION

Errors felt like walls at first, but each one pointed to a missing piece. By slowing down and checking one thing at a time—firmware, serial output, ports, settings—the system became clear. Debugging didn't just fix the problem; it built confidence and a deeper mental map of how everything works together.

KEY TAKEAWAYS

- 🔍 Observe the symptom carefully.
- ⚙️ Change one variable at a time.
- 📋 Use evidence to guide the next step.
- 🎯 The cause is usually in configuration.

THIS PAGE IN ONE LINE:

Debugging revealed the relationships inside the system.

NEXT UP:

- ☐ Read clean sensor data
- ☐ Translate echoes
- ☐ Build the visual interface
- ☐ Store & reflect the data

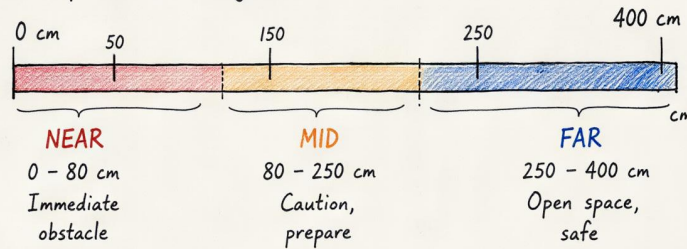
TRANSLATING DISTANCE INTO FEEDBACK

TURNING SENSOR NUMBERS INTO SENSATIONS

BatSense measures distance (cm) with ultrasonic echoes. This page shows how that number is mapped and translated into three feedback channels: sound, vibration, and visual. The goal: support perception, not overload it.

PART A: DISTANCE MAPPING

Ultrasonic sensor gives distance 0-400 cm. We map that to meaningful zones.



LINEAR MAPPING EXAMPLE (0-400 → 0-100%)

DISTANCE (cm)	MAPPED VALUE
0	100%
80	75%
150	50%
250	25%
400	0%

Distances > 400 cm are treated as "no echo". We cap at 400 and fade feedback out.

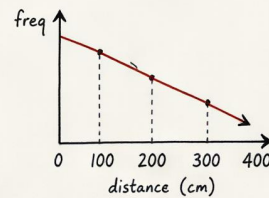
STRONG FEEDBACK
WEAK FEEDBACK

REFLECTION

Distance alone is abstract. By mapping it across multiple channels, BatSense speaks a language the body can understand. The challenge is balance—clear signals, minimal noise, and context-aware feedback. I keep testing thresholds and timing to make the system support awareness without distraction.

PART B: THREE FEEDBACK CHANNELS

1. SOUND (pitch or beeping pattern changes with distance)

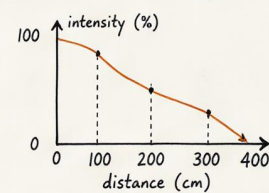


Example beeps:

- 0-80 cm |||||
- 80-250 cm |||||
- 250-400 cm |||
- >400 cm ...

Higher pitch = closer
Slower beeps = farther

2. VIBRATION (motor intensity varies)

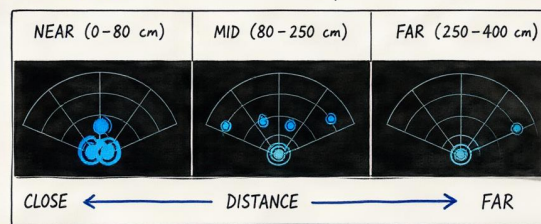


Motor behaviour:

- 0-80 cm strong buzz ~~~
- 80-250 cm medium ~~~
- 250-400 cm light ~~~
- >400 cm off —

Stranger buzz = closer

3. VISUAL (Echo View radar & particles shift with direction & distance)



Visual rules:

- More particles when near
- Brighter + bigger when close
- Fade & shrink when far

Direction from left to right on radar.

KEY TAKEAWAYS

- Map raw distance → zones → feedback strength.
- Use three channels to support, not compete.
- Responsiveness matters: fast near, calm far.
- Design for clarity, not maximum information.

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KEY LEARNING

- Raw data is not the user experience.
- Mapping + translation = meaning.
- Multiple channels help, but must stay clear.



PART C: CODE TO BEHAVIOUR

1. ARDUINO (sensor → distance)

```
long t = pulseIn(echo, HIGH, 30000);  
int d = clamp((t * 0.034 / 2));  
if (d > 400) d = 400; // cap  
Serial.println(d);
```

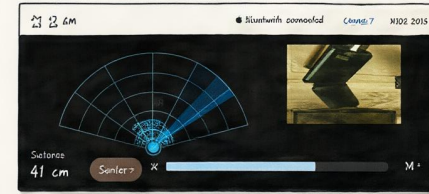
← ultrasonic echo time
← convert to cm
← cap at 400 cm
← send out

2. ANDROID (distance → update)

```
val d = sample?.front ?: sample?.left  
if (d != null && d < 400) {  
    updateBar(binding.track1, d)  
    binding.tvDist.text = d.toString()  
    updateAudio(d)  
    updateVibration(d)  
    updateRadar(sample)  
}
```

← distance parsing
← update feedback
← left / right / center

3. ECHO VIEW UI (visual feedback)



← radar sweep & particles
← distance bar
← camera preview

4. BLUETOOTH FRAMES (data transport)

Format: <L, R, F, Vx, Vy, Vr, Fy, Vf> + '\n'
Example: <120, 320, 240, 10, -5, 2, 1, 1>

← newline end

DESIGN QUESTION

?

- What should be heard?
- What should be felt?
- When should a screen help?
- How do we avoid overload?
- How fast should feedback react?

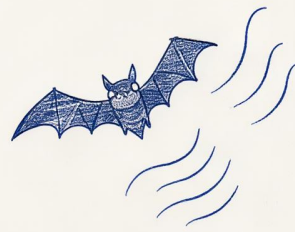
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A number becomes a sensation when it is translated.



SKETCHBOOK

BUILDING THE DIGITAL COMPANION



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BATSENSE / PAGE 07

DESIGN DECISION

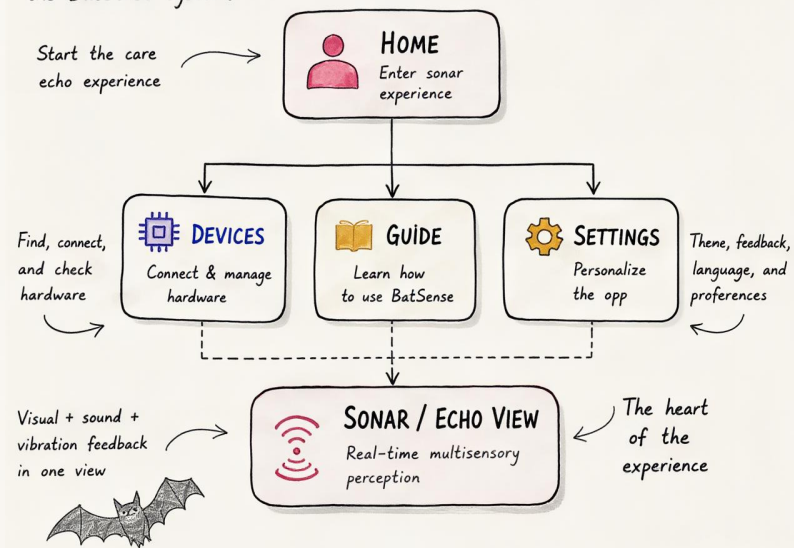
★ The screen supports perception — it does not define it.



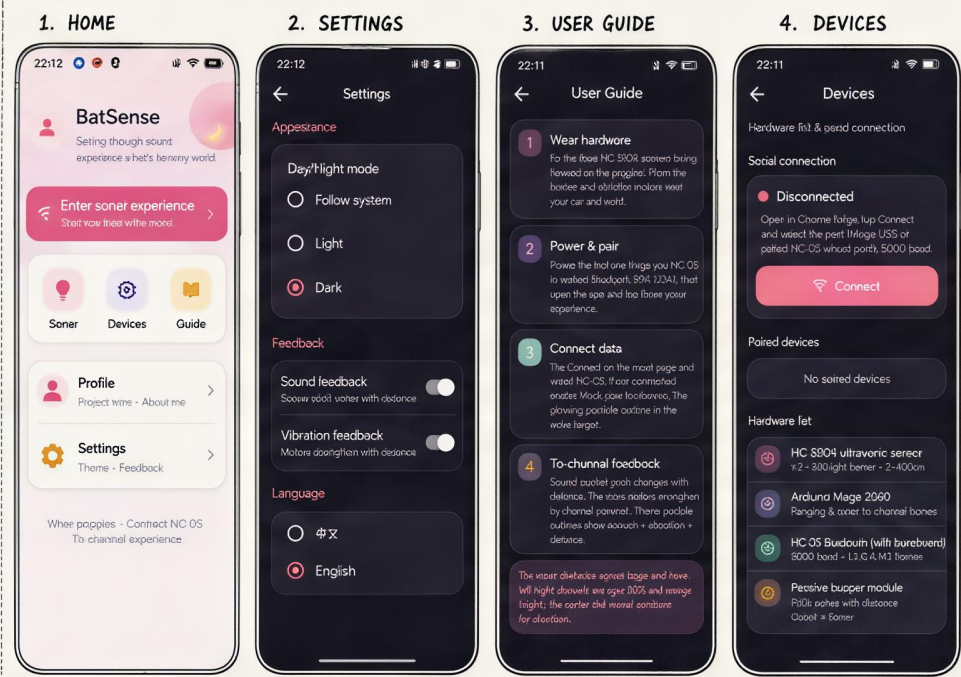
BatSense is not just hardware — it's an experience. This page captures how we designed the app to connect, configure, and visualize bat echolocation in real time. The screen became a companion that supports perception across sound, vibration, and vision.

PART A: APP STRUCTURE

A simple structure that mirrors how users explore and control the BatSense system.



PART B: KEY INTERFACES



PART C: WHY THE SCREEN CHANGED

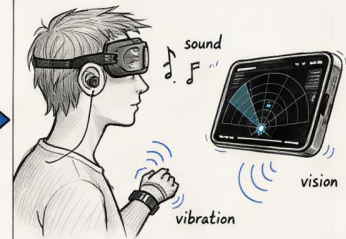
At the beginning, we imagined the screen as the main interface. Through testing, we learned that real perception comes from the body, the senses, and the environment. The screen became a support layer, not the core.

BEFORE: PRIMARY INTERFACE IDEA



- Heavy focus on visual interface
- Screen as the main feedback
- Less emphasis on body-based cues
- One sense dominates

AFTER: SUPPORT & CONFIRMATION LAYER



- Multisensory perception is primary
- Screen confirms and adds context
- Frees user to focus on the world
- More natural and immersive

- 🌐 Language: Support 中文 and English. Default is English for wider accessibility.
- 🌙 Day/Night Mode: Follow system / Light / Dark. Dark mode reduces glare in the field.
- 🔊 Sound Feedback: Buzzer pitch varies with distance. Can be toggled on/off.
- 🔊 Vibration Feedback: Motors strengthen with distance. Toggle to save power or reduce fatigue.
- 🔗 Device Connection: Connect via Bluetooth (HC-05) or social port (Maga USB). 9600 baud by default.

NOTES

- ✓ Keep setup simple
- ✓ Reduce screen dependence
- Let body be the primary sensor
- Use screen only when needed

REFLECTION

Designing the app taught us that technology should adapt to human perception, not the other way around. By simplifying navigation and letting the body lead, the screen now helps users connect, calibrate, and understand — without taking focus away from the world around them.



KEY TAKEAWAYS

- 🎯 Clear structure helps users focus on perception.
- 🤝 Easy connection = more time for exploration.
- 👁️ Screen confirms, body perceives.
- ★ Simplicity unlocks real-world experience.

THIS PAGE IN ONE LINE:

The screen became a companion, not the whole experience.





FIRST USER TESTS

PEOPLE. REAL SPACES. REAL BEHAVIOR.



08.2026

BATSENSE / PAGE 08

KEY LEARNING

- ★ People rely on distance first.
- ★ They want confirmation.
- ★ Too much info = confusion.
- ★ Repeat + compare = trust.



PART A: TEST SETUP

Short, informal sessions in familiar spaces.
Goal: see how first-time users understand and use BatSense without instructions.

1. TEST CONTEXT

2. SENSOR IN HAND

3. PHONE SCREEN

4. ASSEMBLED SYSTEM

Living rooms, hallways, tables, and doorways.
Common daily paths.

Pick up the sensor like a small tool.
Point it forward.

Echo View shows distance + direction with radar + preview.

HC-SR04 + Arduino + Bluetooth link to the app.



PART B: WHAT I OBSERVED

Typical flow I saw across all testers (first-time use).

1 PICK UP SENSOR

2 MOVE TOWARD OBJECT

3 LISTEN / FEEL THE FEEDBACK

4 CHECK SCREEN

5 COMPARE & TRY AGAIN

Takes it naturally, curious and cautious.

Slow steps, arm extended, scanning ahead.

Focus on beeps and vibration. Adjusts distance.

Looks for distance + direction info to confirm.

Repeats movement from different spots to compare signals.



The loop of moving → feeling → checking → comparing happened in every test. They built their own rhythm quickly.

PART C: EARLY FEEDBACK

"I knew something was there before I saw it."

→ Understood distance before direction.

"I always checked the screen to be 100% sure."

→ Checked the screen for confirmation.

"I moved it again from here to compare the sound."

→ Repeated movement to compare signals.

"Sometimes too many beeps and I didn't know which way."

→ Feedback overload in some moments.



WHO TESTED?

Mom (46)
Careful, observant
Took time to trust the feedback.

Dad (49)
Analytical
Liked comparing signals.

Sister (20)
Quick learner
Focused on screen and direction.

Friend (21)
Curious, playful
Tried many angles and distances.

4 participants - varied ages first-time BatSense users



REFLECTION

START HERE.



Watching real users was eye-opening. They didn't need a long explanation to start - but they all created their own patterns. Distance came first, then direction. The screen became a confirmation tool, not the first place they looked. Overload appeared when too many beeps stacked up. These insights are more valuable than any assumption.



KEY TAKEAWAYS

- Distance first: users sense space before direction.
- Screen is for confirmation, not primary sensing.
- People repeat movement to build confidence.
- Simplify feedback to avoid overload.



THIS PAGE IN ONE LINE:

Users taught me how the system was actually read.



NEXT UP:

- ☐ Tune beep frequency and patterns
- ☐ Add multi-level distance zones
- ☐ Improve screen clarity and hierarchy
- ☐ Run longer tests in different environments

★ ITERATION AFTER TESTING

HOW TESTING SHAPED THE DESIGN

Real-world testing with different users showed what worked, what confused, and what felt natural. This iteration clarifies the roles of each feedback channel so the body can understand space more easily and learn over time.

PART A: BEFORE / AFTER

BEFORE TESTING (TOO MUCH FROM EVERYWHERE)

**SOUND**
tried to give distance + direction + meaning

**VIBRATION**
tried to give alerts + direction + status

**VISUAL**
tried to show everything constantly



RESULT:
Overload, confusion, and unclear priority.

AFTER TESTING (CLEAR ROLES, BETTER FLOW)

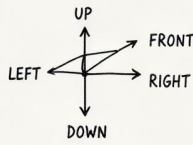
**SOUND = PROXIMITY / DISTANCE CUE**
Simple distance sense.
Closer → stronger / faster.
Farther → weaker / slower. ✓

**VIBRATION = BODILY CUE / URGENCY / CHANNEL**
Encodes intensity, proximity and channel change. ✓

**VISUAL = CONFIRMATION & LEARNING**
Supports understanding, pattern learning, and system feedback. ✓

RESULT:
Clearer understanding, less overload, more confidence.

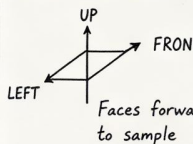
PART B: BODY AS INTERFACE

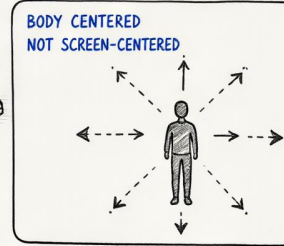
HEAD ORIENTATION SAMPLES SPACE


EAR = SOUND
Distance / proximity cue.
More intensity when closer, less when farther.

WRIST = VIBRATION
Encodes intensity, urgency, and channel change.
Body feels before mind interprets.

HAND / SCREEN = VISUAL
Confirm, explore, and learn.
Not constant—check when needed.

SENSOR ORIENTATION

Faces forward to sample space.

BODY CENTERED NOT SCREEN-CENTERED




08.2026
BATSENSE / PAGE 09

KEY LEARNING

- ★ Each channel has one clear job.
- ★ Less competition, more clarity.
- ★ The body learns through use and repetition.

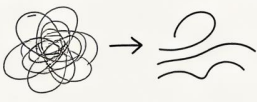


PART C: WHAT I CHANGED

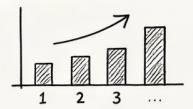
★ Proximity was easier than direction. Users understood near vs far faster than left vs right.



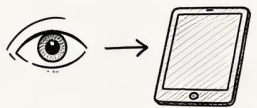
★ Too much feedback competes for attention. Simplified roles reduced confusion and improved response.



★ Repetition improves understanding. Patterns become clearer after multiple uses and short sessions.

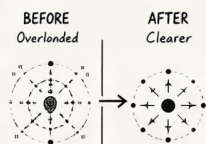


★ Screen checking becomes part of learning. Users check the screen to confirm and discover patterns over time.



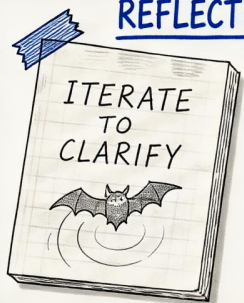
TEST EVIDENCE (SNAPSHOTS)

USER FEEDBACK (QUOTE)
"The vibration tells me something is close. Then I check the screen to learn more."
— Tester 8

BEFORE vs AFTER
BEFORE Overloaded
AFTER Clearer


ECHO VIEW EXAMPLE


REFLECTION



ITERATE TO CLARIFY

Testing showed that my first design asked too much from every channel. By giving each sense one clear role, the system became easier to understand and more natural to use. The body can now receive, feel, and decide—then use the screen when it wants to confirm or learn.

KEY TAKEAWAYS

- 🔍 Start simple: one channel, one job.
- 👂 Proximity before direction.
- 🔄 Repetition builds understanding.
- 👁️ Visual supports learning, not constant guidance.

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More feedback is not always more clarity.



NEXT UP:

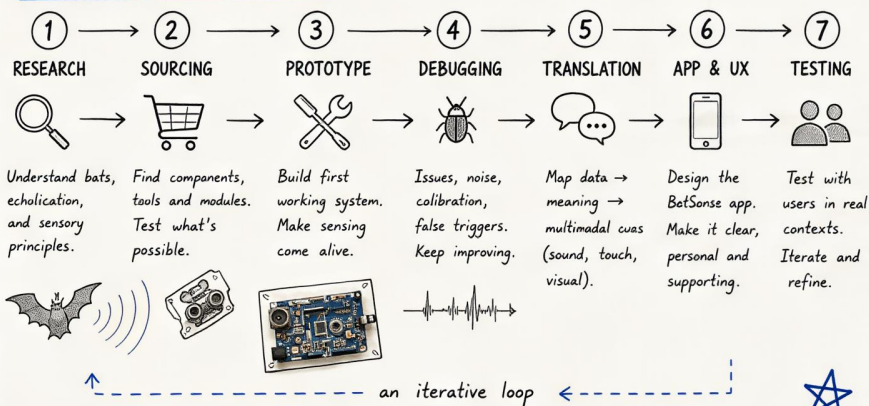
- ☐ Direction through head turns
- ☐ Map exploration sessions
- ☐ Long-term usage test
- ☐ Refine learning flow

FINAL REFLECTION

WHAT BATSENSE TAUGHT ME

BatSense began as a question about how bats understand space without sight. It grew into a system that senses the world, translates it into human language, and returns it through sound, touch, and visual cues. This project changed how I think about design, data, and above all—people.

PART A: PROJECT JOURNEY



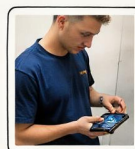
RECAP MOMENTS



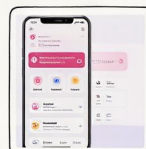
Building the hardware foundation.



Prototyping made ideas real.



Testing sound and haptic feedback.



Designing the BatSense app experience.



Real-user testing in context.



Moving from project to purpose.

REFLECTION

This journey taught me that technology alone is not the answer. Empathy, observation and constant iteration are. BatSense is not the end—it's a starting point for rethinking how we interface with the world. I'm proud of how far it's come, and excited for where it can go next.

KEY TAKEAWAYS

- Research shapes focus.
- Good data needs good interpretation.
- Purpose gives design meaning.

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Seeing is not the only way to know space.

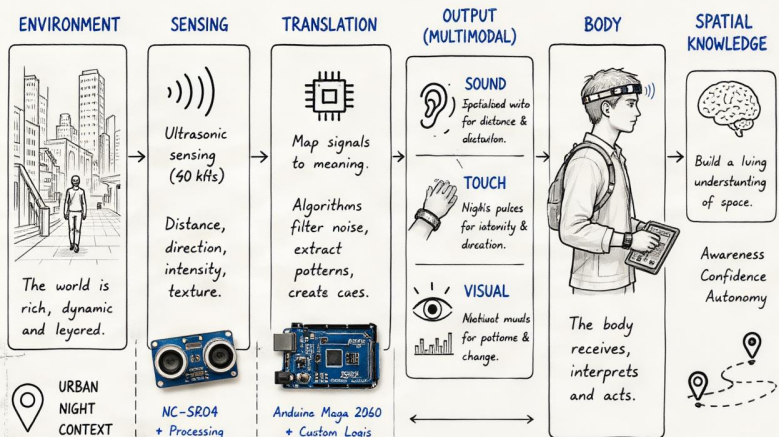
08.2026
BATSENSE / PAGE 10

KEY LEARNING

- Real understanding comes from translation.
- The body is not a user—it is part of the system.
- Design must adapt to people, not the other way around.
- Perception can be trained and expanded.

PART B: WHAT BATSENSE BECAME

A closed loop between world, body and meaning.



PART C: WHAT I LEARNED

- Translate, don't imitate. Nature inspired the idea, but people guided the design. Translation makes it human-centred.
- The body changes the interface. Interfaces live on, around and through the body. Comfort, context and movement matter.
- Perception must be learned. Spatial sensing isn't instant. Training, feedback and practice build new ways of knowing.

NEXT UP:

- Field beta with more users
- Improve haptics & personalization
- Expand to indoor navigation
- Open-source hardware & app

FUTURE POTENTIAL

- Accessible navigation
- Education & training
- Wildlife research tools
- Search & rescue aid
- Inclusive smart cities

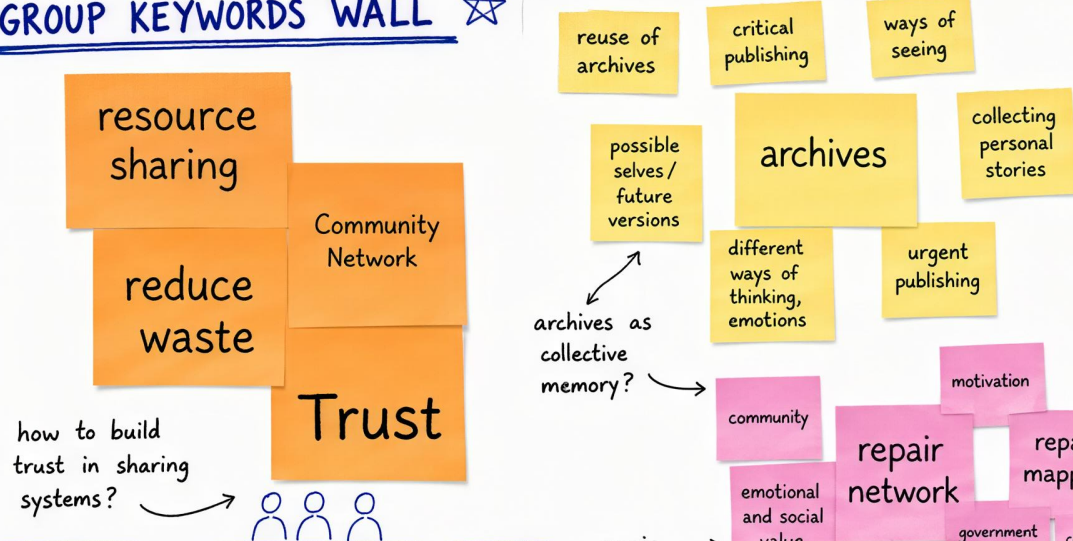
SKETCHBOOK

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JULY 2026

EARLY GRADUATION PROJECT IDEAS

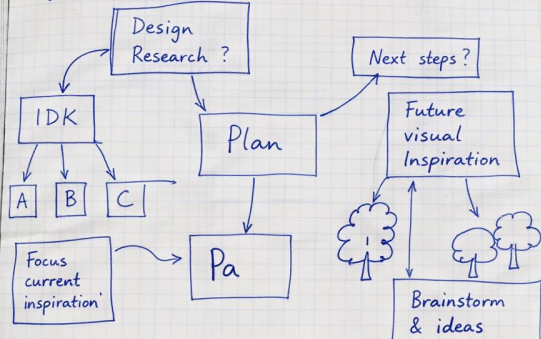
This page records our early group tutorial / brainstorming session. We each shared keywords and possible directions for our graduation projects. Seeing ideas together helped us spot patterns, overlaps, and themes worth exploring further. ☆

GROUP KEYWORDS WALL ☆



MY QUICK NOTES (FROM EARLY DISCUSSION) ☆

my goal: you research + plan your future



POTENTIAL CONNECTIONS ☆

- Archives + Digital Media → preserving & sharing stories
- AI + Trust → data transparency, co-intelligence
- Repair Network + Community → social & emotional value
- Sustainable Design + Daily Use → long-term behaviour change
- Entire Food System + Circular Economy → systemic solutions

NOTES TO SELF

At this stage, the field of possibilities feels huge!
My task is to dig deeper, connect dots, and find a meaningful direction. ♡

KEY OBSERVATIONS

- ✓ Communication is a recurring theme.
- ✓ Trust and relationships appear in many clusters.
- ✓ Systems thinking (e.g., food, trade, transport).
- ✓ Everyday use and behaviour are important.
- ✓ Many ideas reveal hidden or invisible structures. ♡

TODAY'S REFLECTION ♡

Hearing everyone's keywords helped me see patterns I didn't notice before. The discussion revealed that my project could move from broad interests toward a more focused research question. ☆

“ Good design listens, connects, and makes the invisible visible. ☆

SKETCHBOOK

09.06.2026

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FIELD VISIT · THE DESIGN MUSEUM, LONDON

① INTRO / CONTEXT

On 9th June 2026, our class visited The Design Museum in London with our tutor. I observed how exhibitions communicate ideas through space, objects, graphics, and interaction. The museum showed how design thinking, making, and user experience come together to solve real human needs.



DESIGN MUSEUM
KENSINGTON, LONDON



TODAY'S OBJECTIVE

- Observe how ideas are displayed
- Understand visitor experience
- Look at process, not just products
- Connect learnings to BatSense project



VISIT NOTES

Museum as a communication system.
Objects, graphics, space, light, material,
and interaction work together to make
meaning visible and memorable.



② WHAT I SAW IN THE MUSEUM



A ABSTRACT VISUAL LANGUAGE / COLOUR EMOTION



Bold colour, movement, contrast.
Emotion and meaning before words.
Visual rhythm guides attention.



B FRAMED SKETCHES / TRANSLATING DRAWING



Simple drawings, clear framing,
negative space. Ideas become
objects through curation.



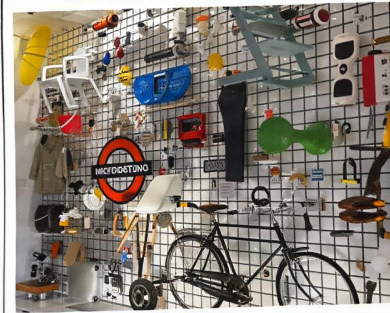
C BEHIND-THE-SCENES MAKING / PROCESS TRANSPARENCY



Process on display. Not hidden.
Shows experimentation, testing,
and real making environment.



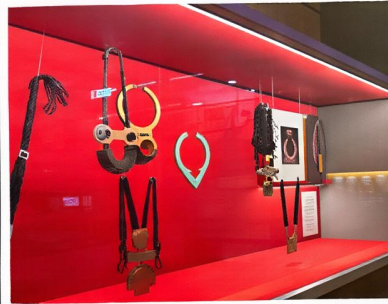
D WALL OF OBJECTS / TAXONOMY OF EVERYDAY DESIGN



Objects grouped by function and
relationship. Design solves many
needs across daily life.



E SENSORY DISPLAY / JEWELLERY & BODY



Material, form, and body connection,
Wearables communicate identity,
feeling, and interaction.



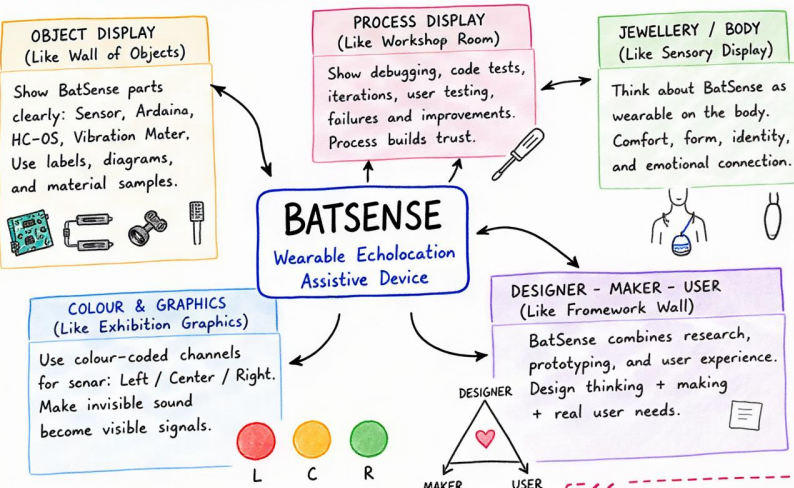
F DESIGNER-MAKER-USER FRAMEWORK



Human-centred lens. Design sits
between making and using. The
system needs all three.

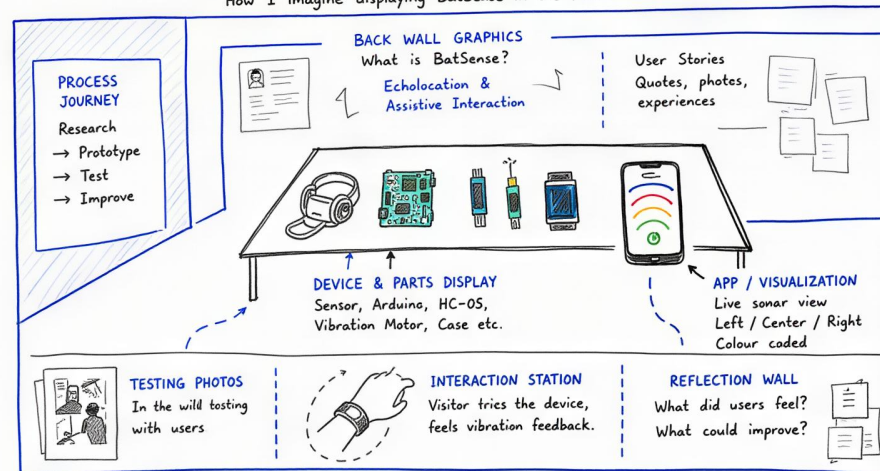


③ CONNECTION TO MY PROJECT — BATSENSE



④ EXHIBITION IDEA SKETCH

How I imagine displaying BatSense in the future



⑤ KEY LEARNINGS / INSIGHTS



- ✓ Museums communicate through arrangement, not only text.
- ✓ Display can reveal process as well as outcome.
- ✓ Colour and material help guide attention and perception.
- ✓ My project can be framed as a sensory translation system.
- ✓ BatSense could be exhibited through objects, interaction, and user testing evidence.
- ✓ Design is a bridge between technology, humans, and context.



⑥ REFLECTION



The visit to The Design Museum changed how I think about my final project. I realized BatSense is not just electronics — it is a story about perception, assistive interaction, and human experience. Exhibitions can make invisible things visible and relatable. I want to design the final showcase as a narrative journey: from sound → signal → sensation → confidence. This logbook page will help me design the exhibition with clarity, empathy, and impact.

GOOD DESIGN LISTENS, CONNECTS, AND MAKES
THE INVISIBLE VISIBLE.



66 The best exhibits don't just show objects — they reveal ideas, processes and human stories.

99

THANK YOU TUTOR!



SKETCHBOOK

2026.06

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ITALY FIELD OBSERVATION II — VENICE / PISA / FLORENCE / MILAN



TODAY'S OBJECTIVE

- Compare different urban logics
- Study water, bridges, landmarks, monumentality, everyday life
- Connect observations to BatSense multisensory navigation



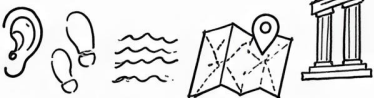
VISIT NOTES

Four cities, four spatial characters. Water, stone, scale, and daily sensations shaped how I moved, understood, and remembered.

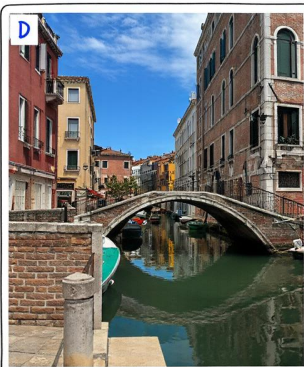


① INTRO / TRAVEL OBSERVATION ☆

Across Venice, Pisa, Florence, and Milan, I saw how each city creates a different spatial logic. Water channels and bridges guide movement in Venice. Landmarks orient the body in Pisa. Monumental façades in Florence and Milan shape emotion and scale. Everyday life — smells, tastes, sounds — completes the city experience beyond sight.



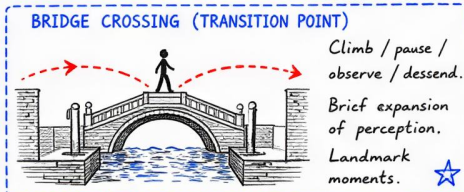
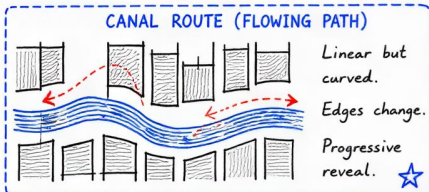
② PART A: VENICE — WATER / BRIDGE / SEQUENCE ☆



Canals are dynamic boundaries. Bridges are crossing points that compress the body then open up new views.

→ Sightlines are often short and bent.

→ Navigation happens by sequence + sound. Water reflects light, buildings, movement — always changing.

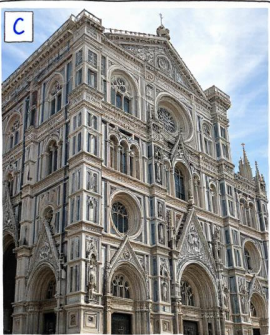


Climb / pause / observe / descend.

Brief expansion of perception. Landmark moments.



④ PART C: SURFACE / DETAIL / SCALE ☆



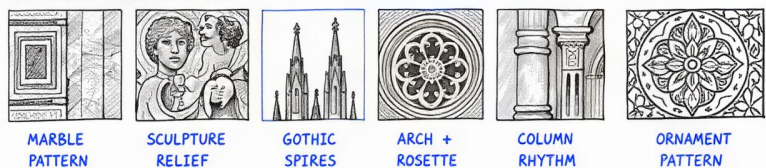
Florence and Milan cathedrals show how material, ornament, and verticality create unforgettable spatial cues.

Detail invites close sensing; scale creates awe.

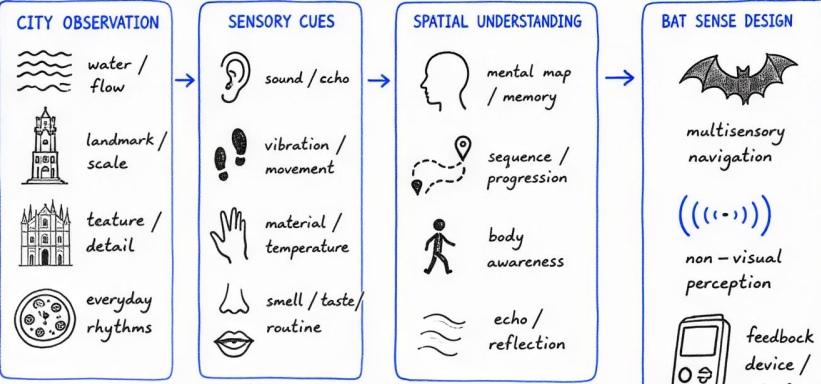
Iconic form a instant orientation + emotional response.



MATERIAL + DETAIL NOTES



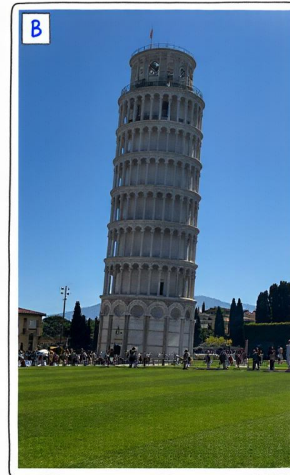
⑤ PROJECT LINK → BAT SENSE ☆



TOOLS + METHODS



③ PART B: LANDMARKS + ORIENTATION ☆



The Leaning Tower of Pisa acts as a strong orientation anchor from many points in the city.

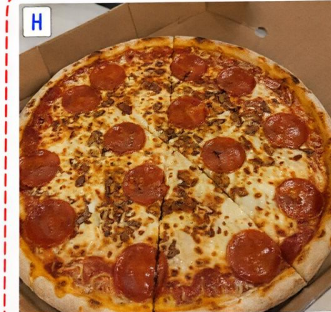
Its tilt is felt both visually and bodily — our balance responds.

Landmarks help build skyline memory and support navigation without a screen.

They are reference points for direction and distance.



⑧ EVERYDAY SENSING



SMELL: coffee, bread, sea air, flowers

TASTE: pizza, gelato, simple, satisfying

SOUND: water lapping, voices, footsteps, bells

ROUTINE: markets, meals, conversations

Everyday life adds layers of meaning to the city.



⑥ KEY TAKEAWAYS ☆

- Navigation can be auditory and bodily, not only visual.
- Landmarks support memory and orientation.
- Water changes reflections, boundaries, and routes.
- Isonic architecture shapes emotion and scale.
- Cities are experienced through all senses and routines.



⑦ REFLECTION

This trip expanded my view of BatSense. It's not just a device for navigation — it's a way to understand place through echo, movement, material, smell, taste, and memory. Each city taught me that spatial experience is layered, dynamic, and personal. I want BatSense to help people build their own sensory maps of the world.



SKETCHBOOK

2026.06

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ITALY FIELD OBSERVATION I — ROME / VATICAN



TODAY'S OBJECTIVE

- Observe architecture as a sensory system
- Listen to space, not just look
- Note materials, scale, light, echoes
- Connect learnings to BatSense project



VISIT NOTES

Rome + Vatican showed how space speaks through time, material and movement. Architecture is a composer of experience.

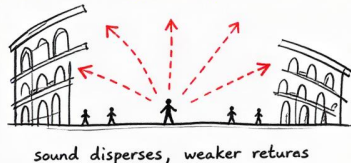


① INTRO / FIELD NOTE

During the Italy trip in late June 2026, architecture was observed not only visually but as a sensory system. Ancient stone, arches, domes, and street textures suggested new ways of thinking about how BatSense could communicate space through echo, timing, material, and movement.

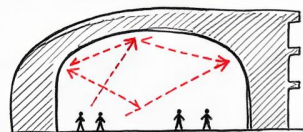


OPEN ARENA (EXPOSED)



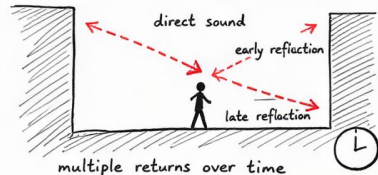
sound disperses, weaker returns

ENCLOSED PASSAGE (CAVITY)



sound bounces, stronger layered echo

SOUND REFLECTION IN HARD STONE



multiple returns over time

Arches, cavities, curved walls, ruin geometry create rich, unpredictable echo patterns.

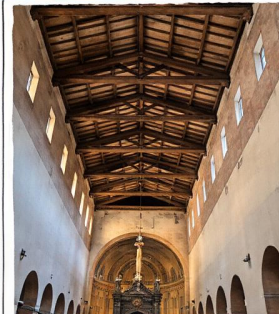
- hard stone a strong reflection
- voids and edges produce layered returns
- space is read over time



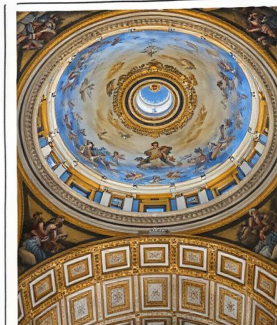
③ PART B: PANTHEON + SACRED SPACE



monumental facade, massive presence.



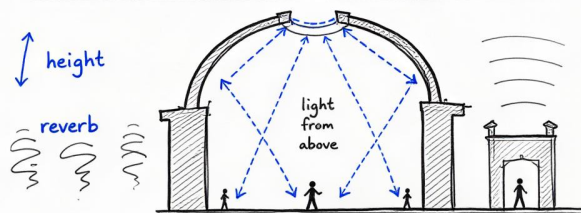
timber roof + stone walls, warm material echo.



painted dome, light from above.

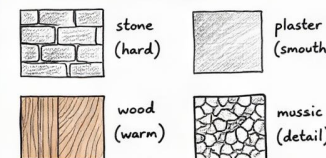


scale, symmetry, reverberation.



- vertical scale
- long reverberation
- symmetry helps orientation.
- space perceived through delay + resonance not just sight

MATERIAL DIALOGUE



④ PART C: STREET AS INTERFACE



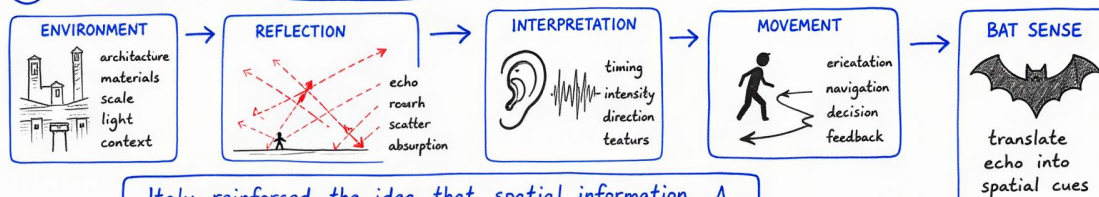
Cobblestone texture, façade rhythm, and urban enclosure guide the body. Navigation begins in the body before it becomes a map.

- rhythm of footsteps
- texture underfoot
- consistent street walls
- pace shapes perception

→ the city is an interface between body and space.



⑤ PROJECT LINK → BAT SENSE



Italy reinforced the idea that spatial information can be translated across senses.



⑥ KEY TAKEAWAYS

- Material answers back.
- Space can be heard as well as seen.
- Scale can be felt through reverberation.
- Movement is part of navigation.
- BatSense can translate echo into spatial cues.

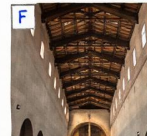


⑦ REFLECTION

Rome and the Vatican helped reposition BatSense from a device idea toward a broader question: how can design reveal space through multisensory experience? Here, space is not just seen; it is felt, heard, and lived. BatSense must work with time, material and the body to make the invisible visible.



PHOTO / MATERIAL NOTES



STONE
rough
massive
carries
echo



BRICK
porous
absorbs
some
echo



WOOD
warm
softens
sound



MOSAIC /
PLASTER
detail
scatters
sound

CHINA FIELD OBSERVATION I — NATIONAL MUSEUM OF CHINA



TODAY'S OBJECTIVE

- Observe museum navigation and display systems
- Study how objects are interpreted through graphics
- Notice tactile / accessible interaction
- Connect curatorial methods to BatSense project

VISIT NOTES

Back in China, this visit shifted my attention from city-scale space to museum-scale communication. Route, label, touch, light, and object all work together to make history understandable.



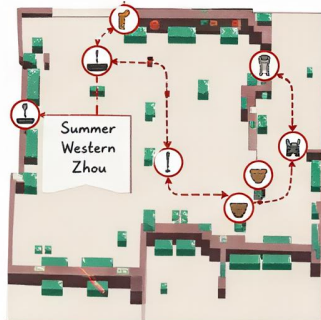
① INTRO / VISIT CONTEXT

In August 2026 I visited the National Museum of China in Beijing. Compared with the Italy pages, this visit made me think less about urban architecture and more about how a museum translates invisible knowledge into readable experience. Maps, labels, cases, tactile displays and spatial sequence all frame how visitors understand objects. This became directly relevant to BatSense as a project about sensory translation.



② PART A: ROUTE / MUSEUM AS INFORMATION SYSTEM

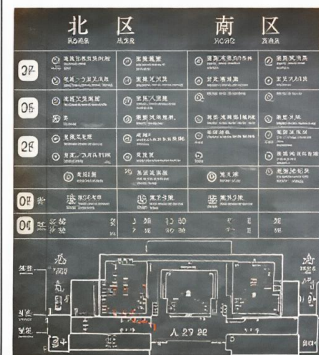
A SUMMER WESTERN ZHOU ROUTE MAP (Highlights)



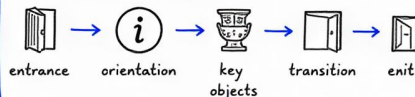
B BROADER FLOOR PLAN OVERVIEW (North / South Areas)



C FLOOR DIRECTORY / ORIENTATION BOARD



A ROUTE LOGIC (Simplified)



B PLAN READING (Key)



- Wayfinding here is not only directional. It also sets expectations, pacing, and attention.
- A museum map works like an interface: complexity is reduced into an actionable path.

③ PART B: OBJECT AS SIGNAL — LI GUI / BRONZE COMMUNICATION

A LI GUI VESSEL (Western Zhou)



- double cars (vertical handles)
- animal-head handle (detail)
- tasteful pattern (main motif)
- square base (structural stability)

B INSCRIPTION + PATTERN CALLOUTS



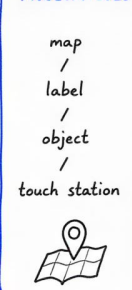
铭文: 戎王德周 (共32字)
Inscription records King Wu's campaign against Shang.

云雷纹 / 凤纹 (装饰纹样)
Cloud & thunder motif / patterned ornament.

- Object meaning is not immediately visible. The museum uses labels, diagrams, chronology and callouts to decode the vessel for the visitor.
- History becomes legible through mediation.

⑤ PROJECT LINK — BATSENSE

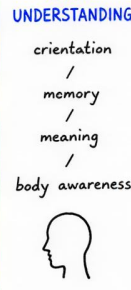
MUSEUM CUES



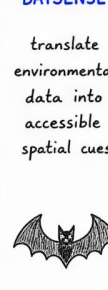
SENSORY TRANSLATION



USER UNDERSTANDING



BATSENSE

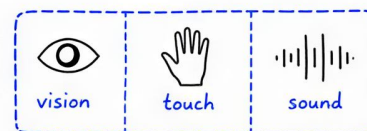
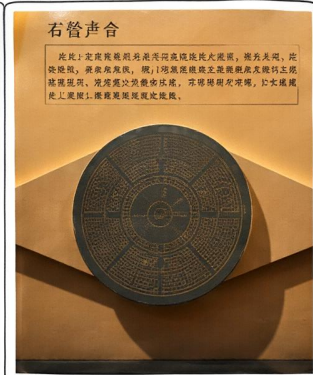


A museum curates history; BatSense curates spatial information.

④ PART C: TOUCH + ACCESSIBLE DISPLAY



- Touch opens another route to knowledge.
- Accessibility is not an extra feature — it is a design principle.
- Non-visual access turns culture into bodily understanding.



⑥ KEY TAKEAWAYS

- Good exhibitions communicate through route, not only text.
- Objects become understandable through layers of translation.
- Touch creates a strong non-visual bridge to culture.
- Accessibility improves the experience for everyone.
- BatSense should communicate space as clearly as museums communicate history.

⑦ REFLECTION

This visit reframed BatSense as more than a device. A good museum does not simply show artifacts; it choreographs perception. Through maps, cases, labels, lighting, and touch, invisible information becomes memorable and meaningful. I want BatSense to borrow this curatorial logic, transforming raw spatial data into an embodied, inclusive experience.

"GOOD DESIGN MAKES THE INVISIBLE READABLE."





This second page records the bodily side of the visit. What mattered was not only what I saw, but how I approached, paused, compared scale, followed shadows, and remembered forms afterwards. The museum became a lesson in sensory choreography.

② PART A: BODY AS SCALE / GESTURE AS MEASURE ☆

After mapping the museum as an information system, I looked more closely at perception itself. In the gallery, light, touch, scale reference, viewing distance, and movement all changed how artifacts were understood. This helped me think about BatSense not just as an assistive device, but as a carefully staged sensory experience.



A body reference makes size immediate.



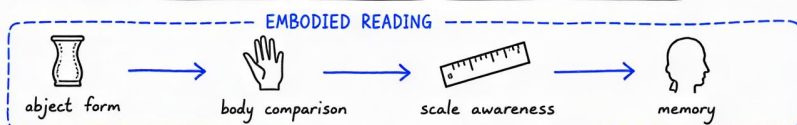
Gesture helps compare reach, height, and relation.

- the body becomes a measuring tool
- scale is often understood through proximity
- hands create empathy and connection

③ PART B: SHADOW / LIGHT / INDIRECT PERCEPTION ☆



- shadow reveals silhouette before detail
- light does not just illuminate — it edits attention
- perception can be indirect, partial, and still meaningful



④ PART C: DISPLAY / DISTANCE / MOVEMENT ☆



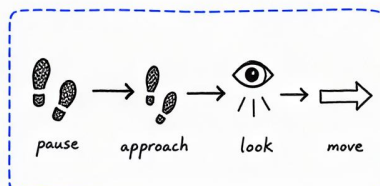
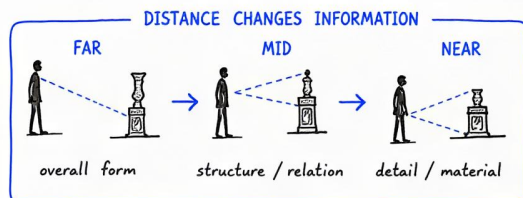
Exhibitions are read in sequence, not all at once.



Glass, spacing, and lighting create pacing.



Far = silhouette / Near = detail /
Moving = comparison.



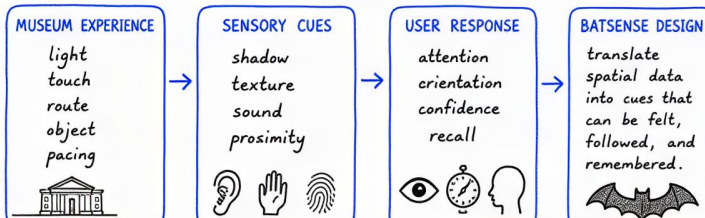
⑤ PART D: ICON + MEMORY ☆



Strong colour
staging and
iconic form
make the object
easy to remember.
Display design
shapes emotional
memory.

→ memory anchor

⑥ PROJECT LINK → BATSENSE ★



A good exhibition guides perception; BatSense can guide navigation in the same way.

⑦ KEY TAKEAWAYS ★

-  Perception is shaped by lighting, not only by objects.
-  The body is a tool for reading scale and relation.
-  Distance changes what becomes perceptible.
-  Shadow can communicate form before detail.
-  Exhibition design is a choreography of attention.
-  BatSense should support orientation through clear sensory cues.

⑧ REFLECTION

At the National Museum I became interested in modes of access: touch zones, careful lighting, route maps, iconic displays, and the slow rhythm of moving through galleries. These are all communication decisions about who gets to understand. For BatSense, this suggests a system where sound, touch, and movement cooperate, allowing users to build spatial confidence without relying on vision alone.

GOOD DESIGN CHOREOGRAPHS HOW INFORMATION IS FELT.

“ The museum does not only present objects — it stages perception.

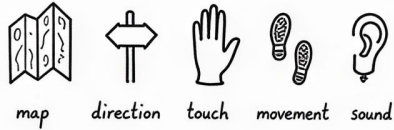




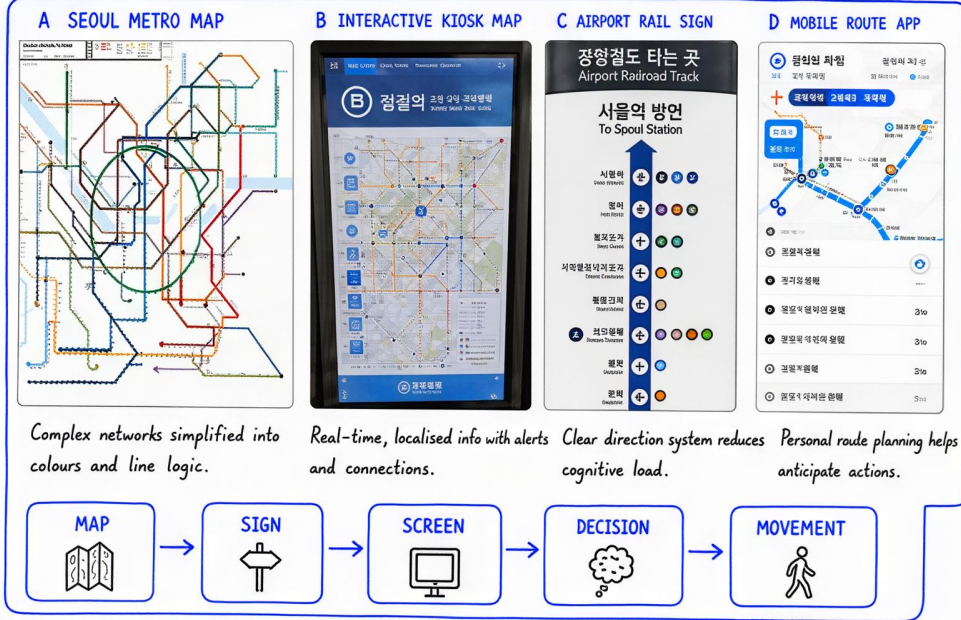
SEOUL FIELD OBSERVATION I – METRO / WAYFINDING / MULTISENSORY NAVIGATION

① INTRO / VISIT CONTEXT

In July 2026 I travelled around Seoul using the metro for most of my movements. I noticed how urban navigation is built from many layers: maps, signs, screens, gates, tactile surfaces, braille, and bodily movement. This relates strongly to BatSense – both translate space into actionable cues that help people make confident decisions.



② PART A: CITY AS INFORMATION SYSTEM ☆



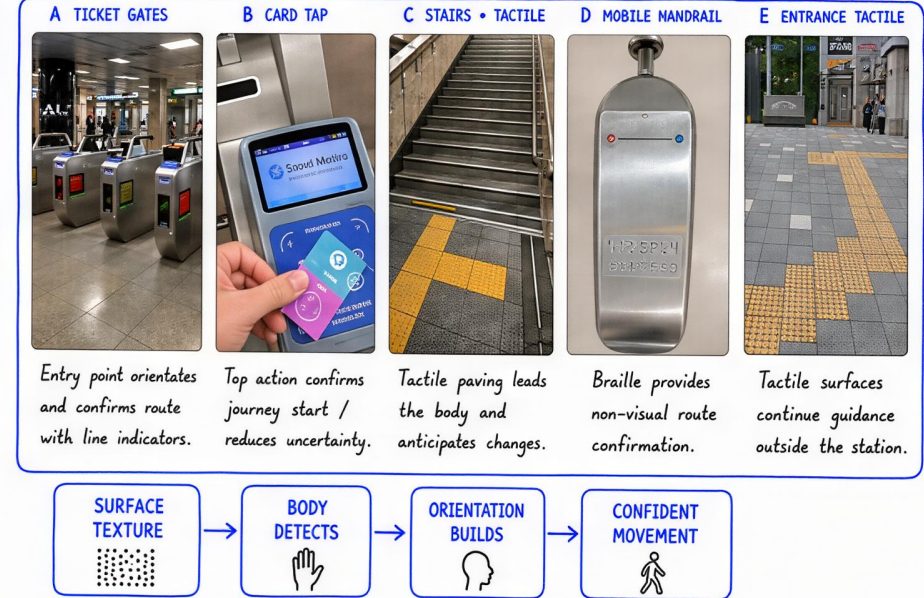
TODAY'S OBJECTIVE

- Observe Seoul Metro navigation and access systems
- Study maps, signs, screens, gates, tactile cues
- Notice how touch + movement guide decisions
- Connect learnings to BatSense project

VISIT NOTES

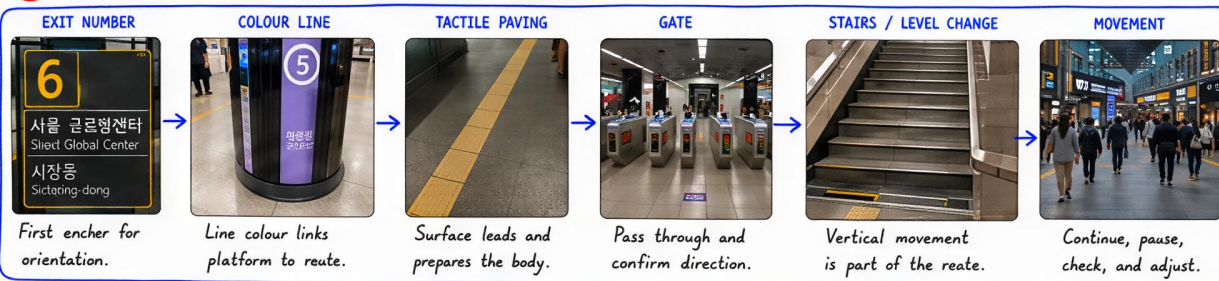
In Seoul I focused on how people find their way through many layers of information and cues. I paid close attention to touch, surfaces, and non-visual communication.

③ PART B: TOUCH / ACCESS / ROUTE CUES ☆



• Wayfinding is not a single image – it is a sequence of cues distributed through the environment.

④ PART C: NAVIGATION AS EMBODIED ACTION ☆

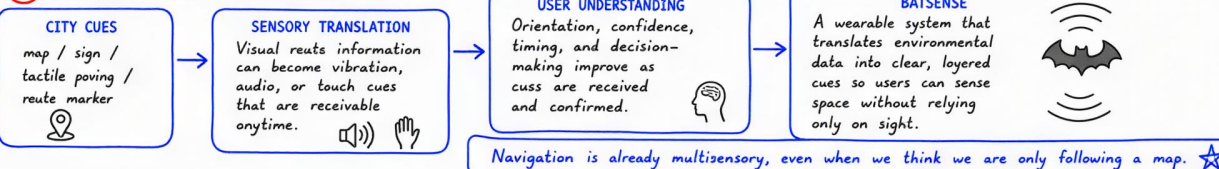


- Direction is distributed across multiple media.
- Touch supports navigation, not only vision.
- Route understanding is built progressively.
- Accessibility cues benefit all users.

⑥ KEY TAKEAWAYS ☆

- 💡 Good wayfinding distributes information clearly.
- ✋ Navigation combines visual, tactile, and bodily cues.
- 👤 Accessibility is a core design principle, not an extra.
- ↔ Urban systems choreograph attention and movement.
- 🦇 BatSense could learn from transit design to guide users progressively.

⑤ PROJECT LINK → BATSENSE ☆



⑦ REFLECTION ♥

Seoul made me think of BatSense less as a gadget and more as a communication system for movement. The city already teaches people through signs, surfaces, screens, and small acts of interaction. It is a choreography of attention. BatSense can translate environmental data – distance, obstacles, direction, changes in level – into similarly clear, inclusive cues. Good design respects how the body already navigates.



“GOOD DESIGN GUIDES THE BODY, NOT ONLY THE EYE.”



TODAY'S OBJECTIVE



- Observe how streets, screens, and hanok contexts shape perception and movement
- Study light, scale, material, slope, and thresholds
- Translate insights to BatSense design

VISIT NOTES

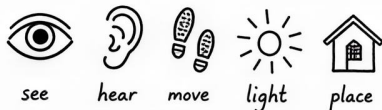


Seoul showed me two extremes: highly mediated digital streets and quieter, material-based hanok spaces. Both teach the body how to read the city.



① INTRO / SECOND LENS ☆

After looking at Seoul as a navigation system, I began noticing another layer. Streets, media facades, night lighting, crowd density, slopes, and traditional architecture all shape how the body understands the city. Maps cannot fully describe atmosphere, brightness, sound, material, or pace.



② PART A: STREET / SCREEN / ATTENTION ☆



Narrow streets with dense signage compete for attention.



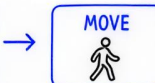
Bright commercial streets guide awareness through light and movement.



Traffic flow and rhythm become strong cues for direction and pace.



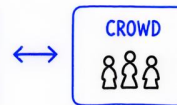
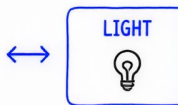
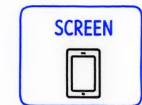
Big screens pull focus and can make the city feel visually overloaded.



③ PART B: DIGITAL CITY / SCALE / VISUAL OVERLOAD ☆



- Big screens reshape scale perception.
- Brightness edits attention.
- Visual information can dominate urban experience.



Interacting layers create overload and selective seeing.

④ PART C: HANOK / THRESHOLD / MATERIAL / SLOPE ☆



Sloped lanes slow movement and open framed views.



Tiled roofs, wood, and stone create a calm, tactile environment.



Sequence of thresholds builds anticipation and spatial memory.



Interior-exterior thresholds connect body and material closely.



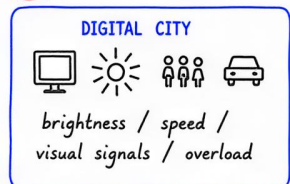
Material details and craft carry time and human presence.

⑥ KEY TAKEAWAYS ☆

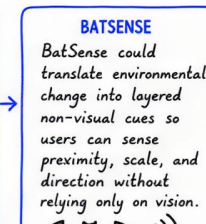
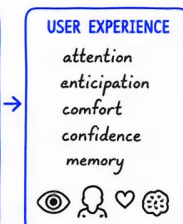
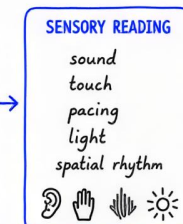
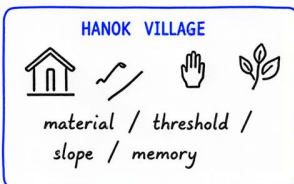
- Urban perception is multisensory and layered.
- Screens intensify attention but can also overload it.
- Traditional spaces highlight the power of threshold and material.
- Movement and slope shape how we understand space.
- BatSense should support how the body already reads and navigates environments.



⑤ PROJECT LINK → BATSENSE ☆



VS.



“The city speaks through many senses. Design should listen to all of them.”

What the map cannot show, the body still feels.



⑦ REFLECTION ♥

Seoul taught me that good communication design is not only about displaying information, but about choreographing how information is sensed, paced, and remembered. The city showed two extremes: highly mediated digital streets that demand attention, and quiet, material-based hanok spaces that invite slow, embodied awareness. BatSense can learn from both—providing clear cues and overload and deep, calm cues that connect people to place.



“GOOD DESIGN
MAKES SPACE FELT,
NOT JUST SEEN.”





TODAY'S OBJECTIVE

- Observe tactile systems, braille maps, and assisted crossing cues
- Study how inclusive guidance is embedded into everyday movement
- Translate these findings into BatSense design insights



VISIT NOTES

Hong Kong made accessibility feel visible yet integrated.

Guidance often happens through the floor, the handrail, the button, and the body rather than only through screens.





1 INTRO / VISIT CONTEXT

In August 2026 I visited Hong Kong and explored malls, streets, slopes, and public infrastructure. I noticed how inclusive navigation is embedded into everyday movement through tactile strips, braille maps, crossing aids, and support systems. These cues work with the body, not against it, making movement safer, clearer, and more confident.

 touch

 map

 route

 slope

 access

2 PART A: INTERIOR TACTILE GUIDANCE

A CUSTOMER SERVICE AREA

B BRAILLE / TACTILE MAP

C LIFT CORRIDOR



Floor-embedded cues organise movement and reduce visual dependence.

Touch-based maps translate complex interiors into accessible orientation.

Continuous tactile lines connect route, threshold, and level change.

SURFACE

MAP

ROUTE

LIFT

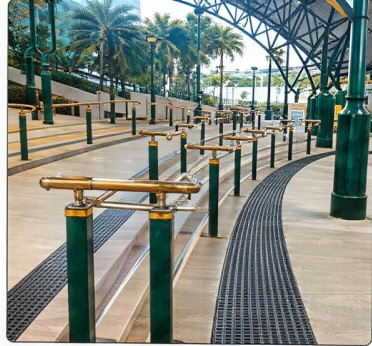
ACTION

3 PART B: ACCESS / SUPPORT / GUIDED MOVEMENT

A POWERED WHEELCHAIR SOCKET

B SLOPED ROUTE WITH HANDRAILS

C CROSSING AID BUTTON



Accessibility includes support infrastructure, not only directions.

Slope, railing, and tactile texture guide the body through level change.

Crossing assistance adds a timed audio cue at a critical decision point.

TOUCH

SUPPORT

TIMING

CONFIDENCE

4 PART C: NAVIGATION AS EMBODIED SEQUENCE

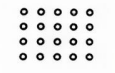
TACTILE CUE

ORIENT

MOVE

CROSS

ARRIVE



Feel the surface over underfeet.

Understand direction and context.

Follow the path with the body.

Use assistance to cross safely.

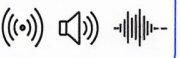
Reach the place with confidence.

URBAN CUES

SENSORY TRANSLATION

USER EXPERIENCE

BATSENSE



tactile strip / braille map / crossing signal / slope / service point

vibration / pulse / audio confirmation / directional cue

orientation / anticipation / reduced uncertainty / inclusive movement

a wearable system that translates environmental information into layered non-visual guidance

6 KEY TAKEAWAYS

- Good wayfinding can be embedded into materials and surfaces
- Accessibility works best when cues are continuous across thresholds
- Navigation should support different bodies, not one default body
- Non-visual cues reduce cognitive load in complex environments
- BatSense can learn from cities that guide progressively and inclusively

7 REFLECTION

Hong Kong showed that inclusive navigation is not an extra feature but part of how the city quietly teaches movement. Tactile strips, braille plans, ramps, and crossing aids communicate before the eye fully processes them. BatSense could extend this logic by turning environmental change into clear layered feedback.



“ INCLUSIVE WAYFINDING GUIDES THE BODY BEFORE IT ASKS THE EYE. ”



HONG KONG



2026.08
PAGE 20



A CITY TRIP + A BIG MATCH

In August, my brother and I travelled to Hong Kong to watch Manchester City play against Inter Milan. It was more than just a match - it was an experience of the city, the fans, the energy, and our shared passion for the team.



OUR VIEW ♥

The atmosphere was incredible!
The stadium was loud, exciting, and full of blue!



MANCHESTER CITY
VS
INTER MILAN



CITY MASCOTS! ♥

So happy to meet them!

Proud to be Cityzens.



BEFORE THE MATCH



RED TAXIS
A symbol of Hong Kong!



CROWDED STREETS
So many people, so much life.



VICTORIA HARBOUR
The city lights are amazing at night.



OUR TICKETS ☆



THE MATCH



A tough game, but City showed great spirit!

We cheered, we sang, we believed!

THE JOURNEY



FLIGHT
HOME → HONG KONG

MTR
FAST, CLEAN,
EASY TO NAVIGATE

STADIUM
WALKING WITH
THOUSANDS OF FANS!



WARM UP
Seeing the players up close!



WALK OUT
Goosebumps moment.

REFLECTION

This trip reminded me that football connects people from different places and cultures. It's more than a sport - it's emotion, community, and memories.



HONG KONG,
YOU WERE
AMAZING!

