Urban Ant Navigation：

Exploring non-human communication in disrupted urban environments

Urbanization has posed multifaceted challenges to ants, including flattened surfaces, environmental pollution, and human activities—all of which disrupt their traditional foraging routes and habitats. As vital components of urban ecosystems, ants are frequently overlooked in urban planning. This project seeks to redesign urban spaces for ants, reimagining city layouts to create environments that better support their survival and foraging needs.

Project04

Final output: research artefact + 3–5 min narrated video (speculative scenario).



Research Focus

Study of urban ants' foraging behaviour and pheromone-based navigation within human-designed environments.

This research examines how ants communicate and re-orient themselves when pheromone trails are disrupted by urban surfaces and human activity.

Rather than treating the city as a planned system, this project approaches it as a fragmented sensory landscape experienced by a non-human user.



Observed surface conditions affecting pheromone trails

Objective

To rethink urban environments from a non-human perspective, foregrounding communication breakdowns rather than efficiency or optimisation.

- Surface texture (rough/smooth)
- Temperature / evaporation risk
- Vibration / footfall disruption



Why Ants as Non-Human Users?

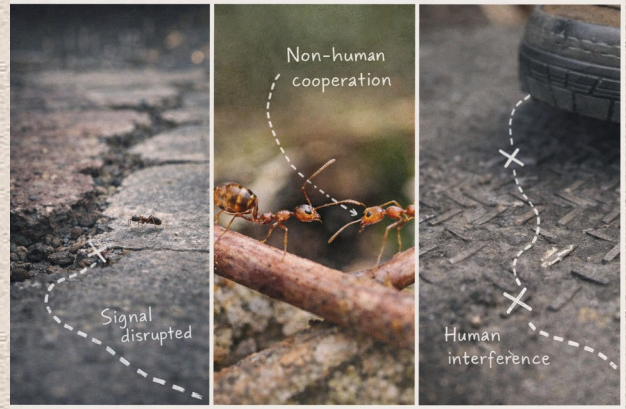
Project Goal

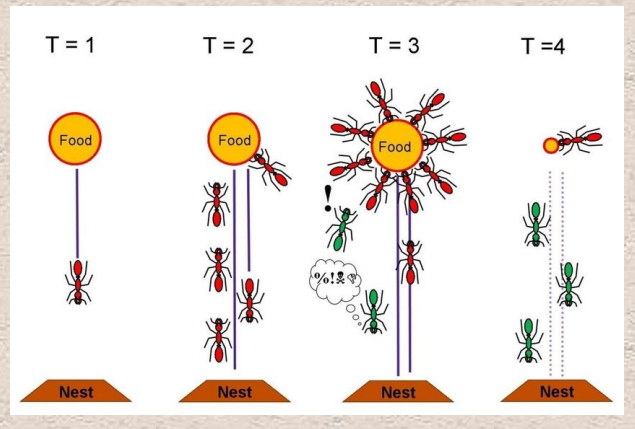
Integrate multi-species design to create more inclusive and sustainable urban environments.

Ants navigate cities through chemical traces rather than visual cues.
Their communication relies on fragile pheromone signals that are continuously shaped — and often erased — by urban materials, temperature, and human movement.

This makes ants a valuable non-human user for interaction design:
their navigation exposes how cities already function as sensory interfaces, unintentionally enabling or disrupting communication.







Research Questions







Which surfaces support or erase chemical traces? (material comparison + field photos)

How do human movements interfere? (observation + path mapping)

What happens when trails disappear? (speculative re-navigation storyboard)

This project adopts an empathic and speculative approach to non-human interaction design, focusing on communication breakdown rather than optimisation.

PACT Analysis: Urban Ant Navigation

People

- Worker ants
- Humans as unintentional disruptors

Activities

- Foraging
- Trail-laying
- Re-navigation after disruption

Contexts

- Pavement cracks
- Tiles & metal plates
- Weather & vibration

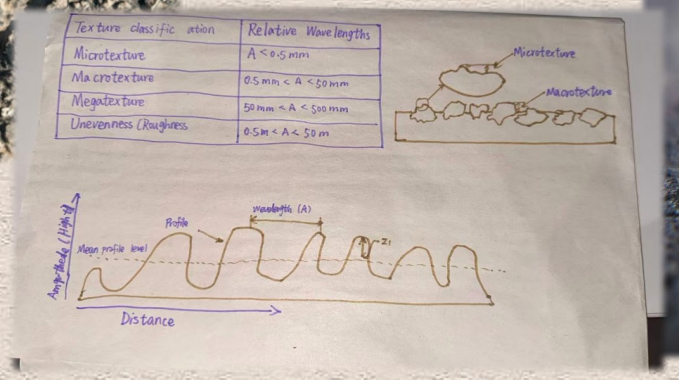
Technologies

- Pheromones as biological interfaces
- Urban materials as accidental interaction surfaces











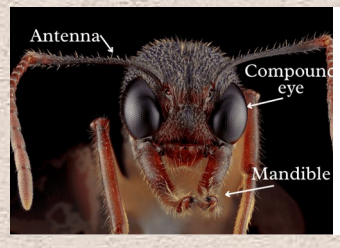
Methods

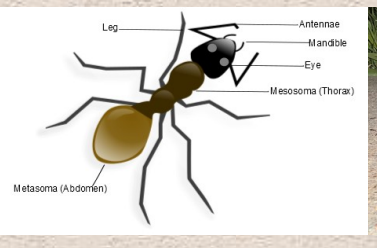
Observation
Recorded pauses, loops, and detours during navigation.

Path Mapping
Traced movement paths and marked signal loss points.

Material Attention
Compared surface textures (tile, metal, soil, concrete).

Non-Human Persona: Urban Worker Ant







How an ant senses the city

An ant does not navigate through maps, signs, or landmarks.
It relies on chemical traces, surface texture,temperature, and vibration to orient itself in space.

Modes of navigation

- Following pheromone gradients rather than fixed routes
- Adjusting movement in response to surface friction
- Pausing, looping, or re-routing when signals weaken

Points of breakdown

- Smooth or hot surfaces where pheromones evaporate
- Vibrations caused by human footsteps
- Weather conditions disrupting chemical traces

This perspective avoids anthropomorphism and focuses onsensing, movement, and breakdown rather than intention or emotion

Non-human Persona Profile

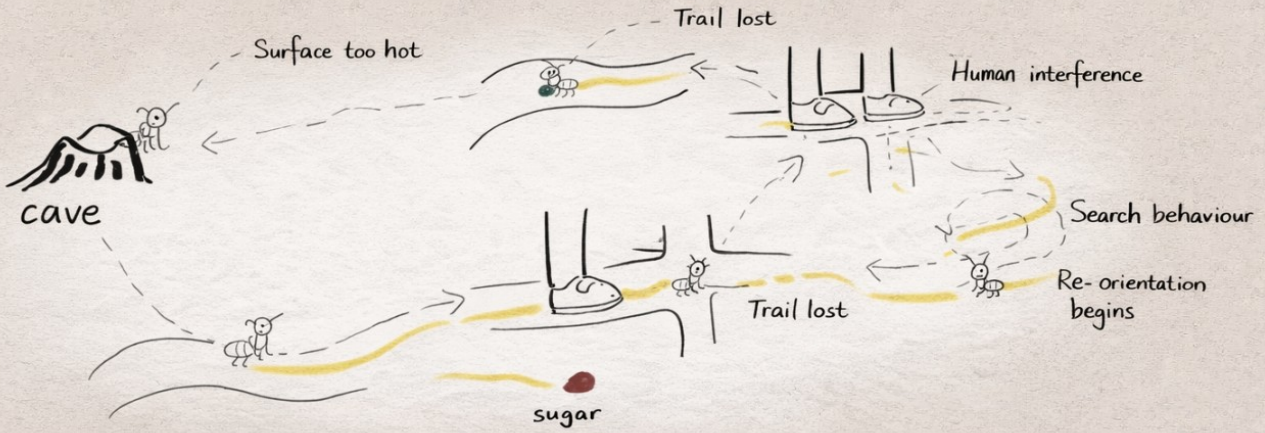
•Goal
Maintain continuous chemical trails to food sources.

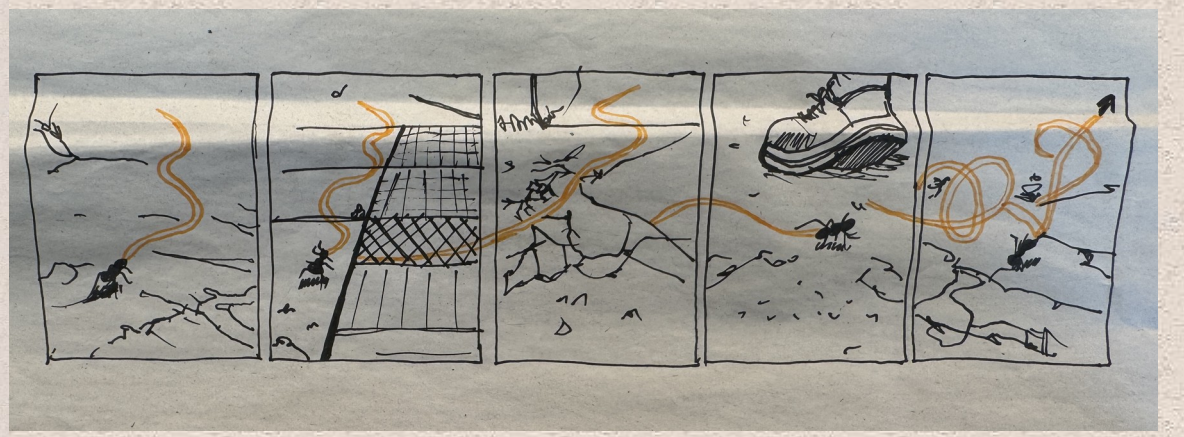
•Sensory Inputs
Chemical concentration, surface texture, vibration.

•Failure States
Trail evaporation, physical wiping, signal confusion.

•Coping Behaviours
Pausing, looping, rerouting, re-scouting.

A Speculative Foraging Journey





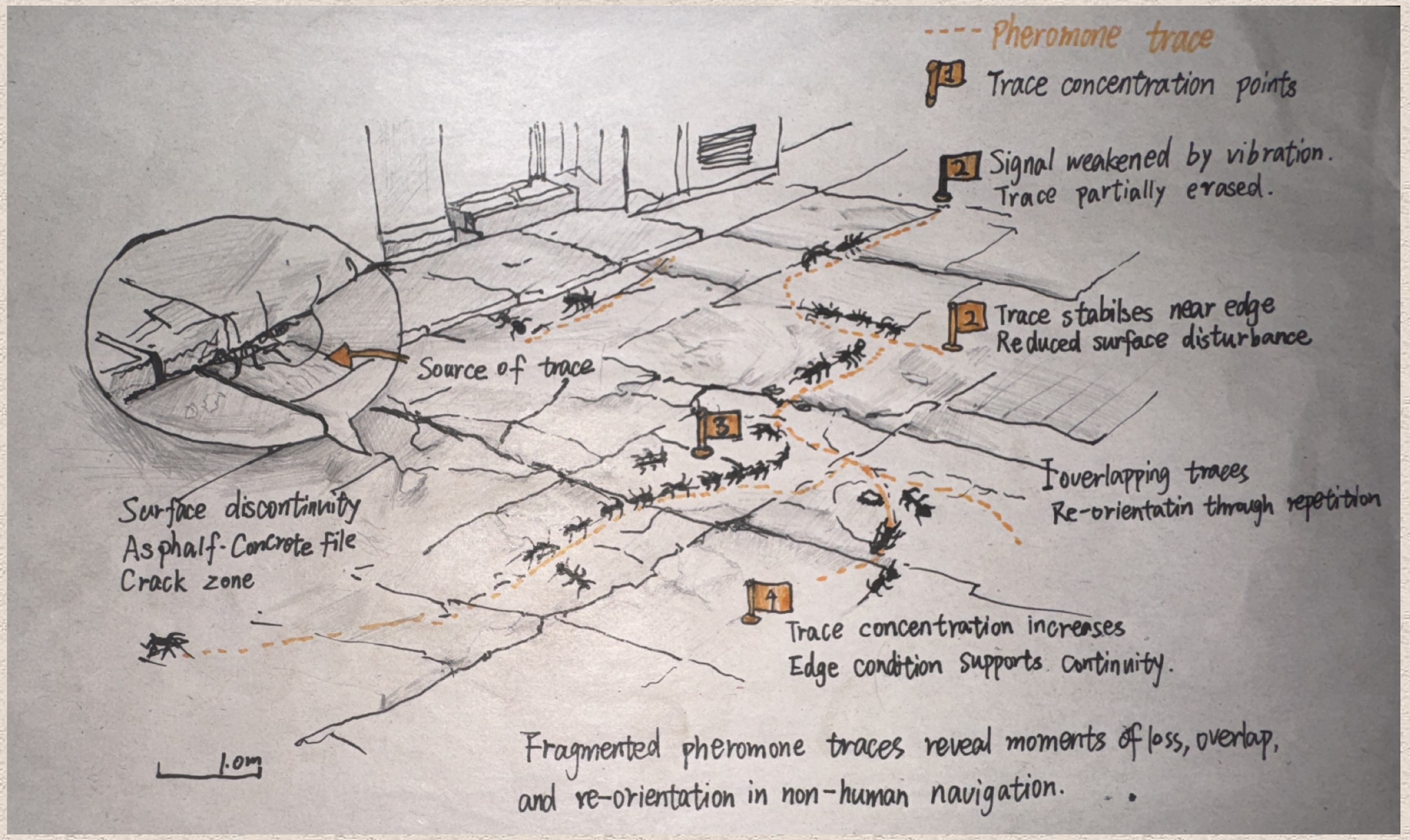
Signal established | Surface affectssignal strength | Trail reinforced | Siqnal erased bydisturbance | Loop, pause, reroute

This speculative sequence foregrounds fragility, interruption, and uncertainty rather than efficiency or optimisation.

signal | noise | stability | loss | recovery

1.Departure ->2.Scouting>3. Trail building >4.Human interference >5. Re-navigation

Research Artefact: Urban Ant Path Mapping



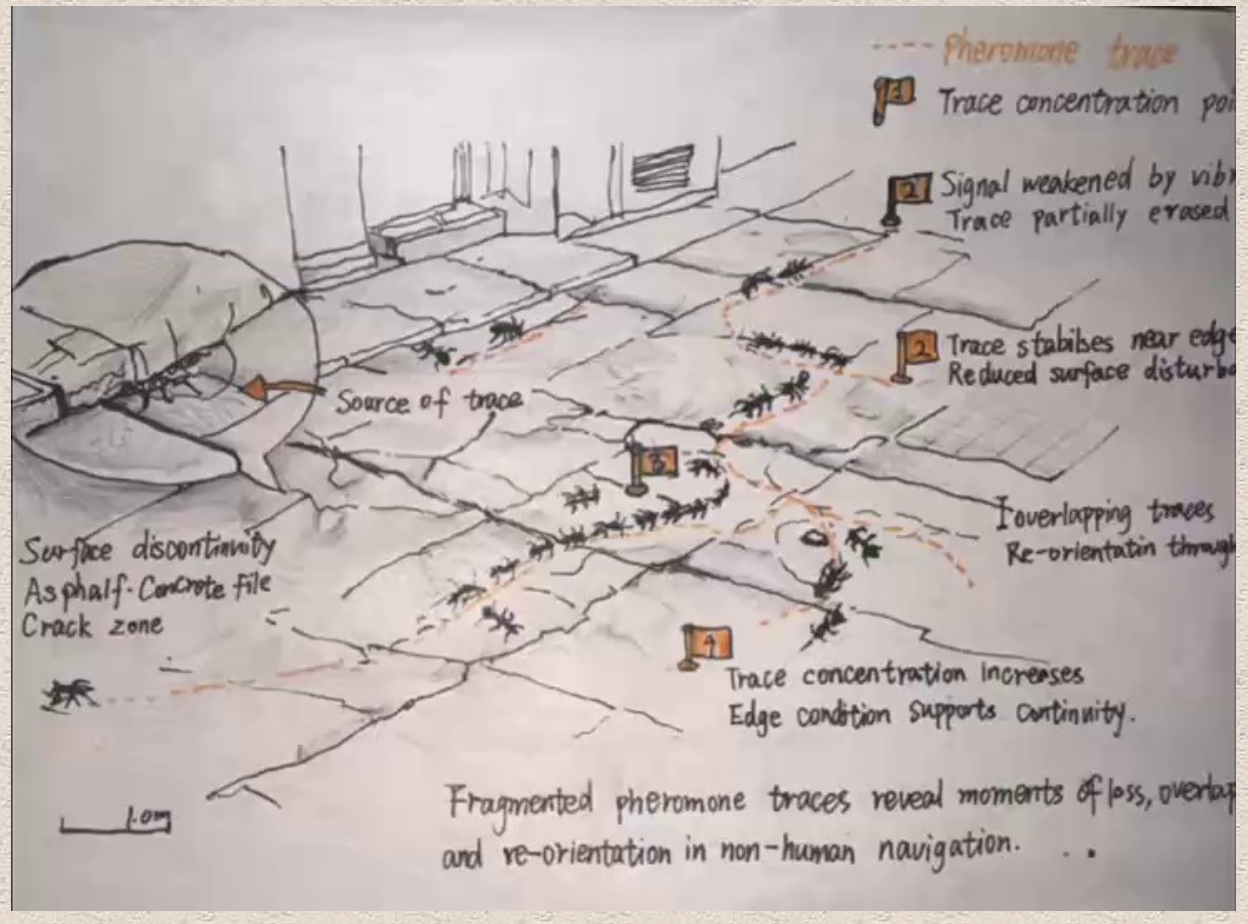
This mapping does not aim to optimise ant movement.
Instead, it visualises moments of loss, confusion, and resilience in non-human navigation.

The artefact functions as a speculative research probe, making invisible communication breakdowns visible and discussable.

Solid line → stable trail
Dotted line → weakened signal
Broken line → erased trail
Circle → hesitation / pause
Cross → human disturbance

This artefact visualises communication breakdown rather than efficiency, revealing how urban materials unintentionally shape non-human navigation.

Video production



A. Video Structure
Context
City as a sensory landscape.
Research
Observations of surface disruption and signal loss.
Scenario
Navigation breakdown and re-routing.
Implication
Cities already design against communication.

B. Visual Materials
Close-up urban surfaces
Path mapping artefact
On-screen captions: signal weakened / erased

https://youtu.be/ATP3_29Q2GA?si=xolJDSWhOCddHqBI

Final takeaway

Designing for ants is not about helping them move faster, but about noticing how cities already design against their communication.