

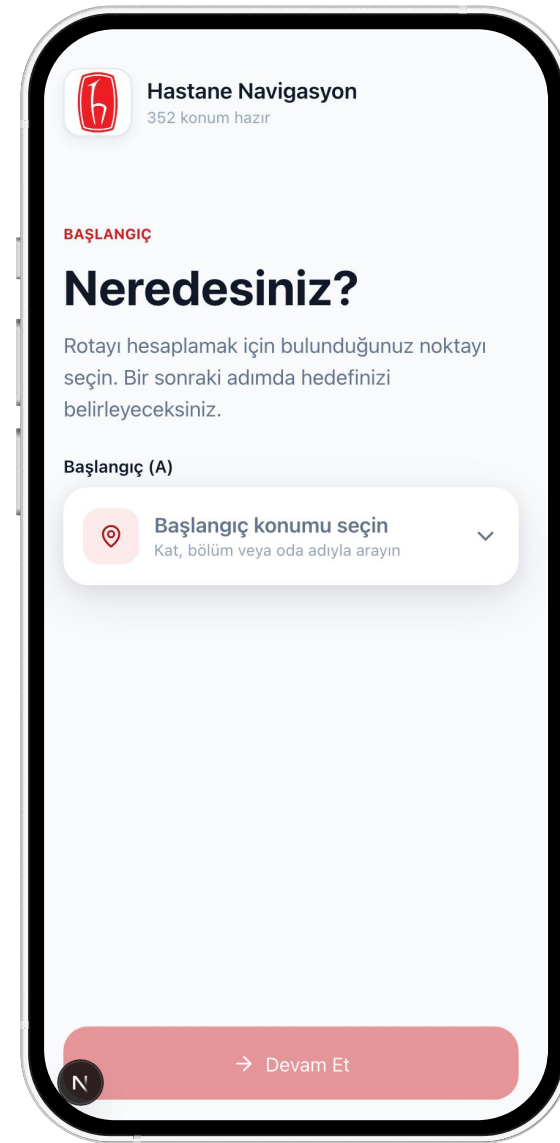


Hacettepe Hospital Indoor Navigation System

An LLM-assisted, graph-based wayfinding solution for complex hospital environments

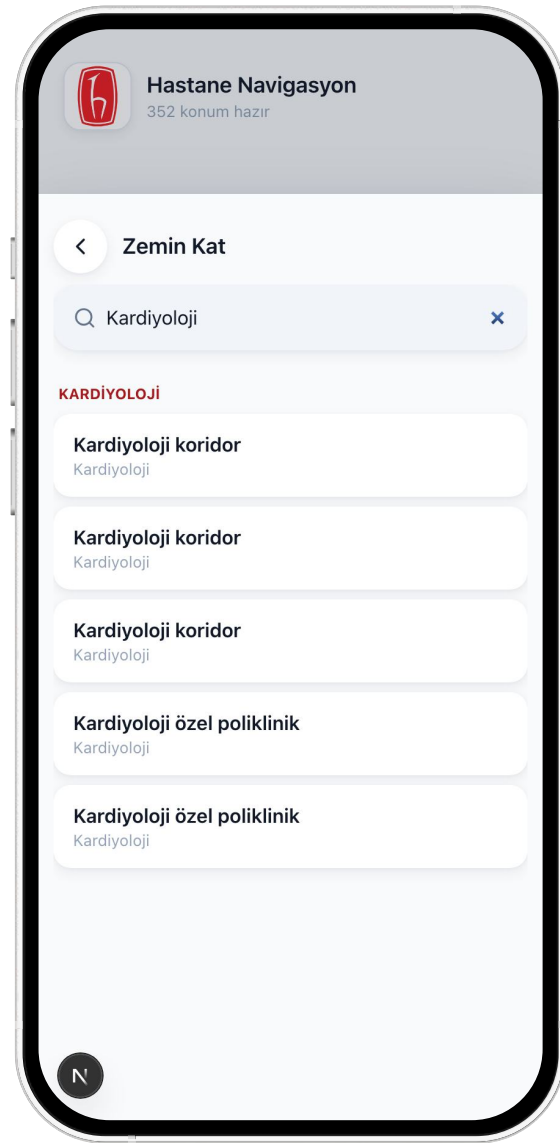
THE USER JOURNEY

From “Where am I?” to “You have arrived.” in six taps



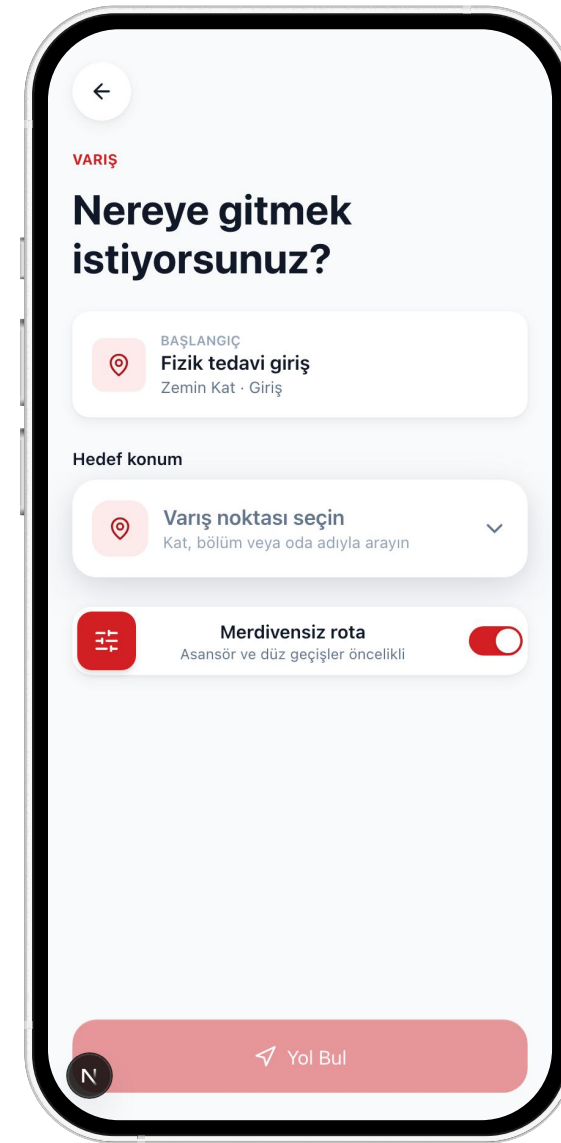
1. Open the app

Mobile-first start screen asks “Where are you?” — 352 locations indexed and ready.



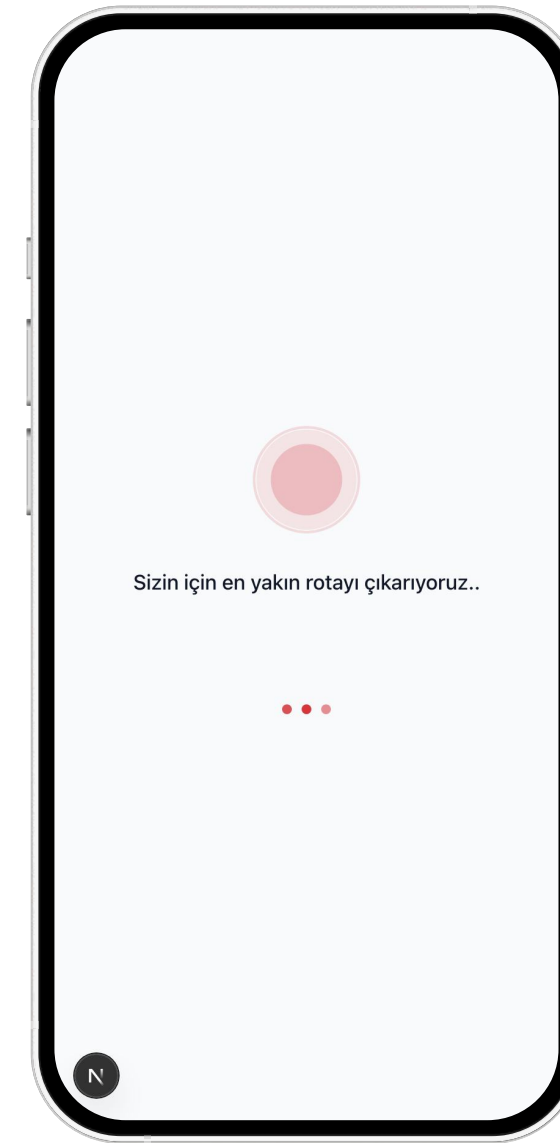
2. Search a department

Live, accent-aware search across all floors. (Kardioloji, Ortopedi etc.)



3. Set the destination

Pick the goal and toggle “Stair-free routing” for elevators-only paths.



4. Calculate the route

Backend runs Dijkstra on a 267-node graph! LLM rewrites the raw steps.



5. Follow step by step

One landmark-based instruction at a time, with progress bar and step type.



6. Arrive at your goal

Final step shown clearly. Tap “Varışa Geç” to confirm arrival.

1 The Problem

Hacettepe Hospital spans multiple buildings, 8 blocks and 5 floors with hundreds of departments. Patients, visitors and new staff routinely get lost.

GPS does not work indoors and existing signage is static — it cannot adapt to a user's starting point or accessibility needs.

2 Why It Matters

✓ **Faster access**
Patients reach appointments without backtracking.

✓ **Accessibility**
Step-free access for limited mobility users.

✓ **Reduced staff load**
Fewer ad-hoc directions asked at info desks.

✓ **Reusable framework**
Pipeline scales to any large institutional building.

3 System Architecture

Hospital Floor Plans (PDF/DWG)

Manual Node + Edge Annotation

Graph (JSON adjacency list · 267 nodes · 587 edges)

Dijkstra Pathfinding (FastAPI · Python)

MiniMax LLM · Step-by-step Turkish Instructions

Next.js Web App (mobile-first UI)

Each layer is independently testable; the LLM is optional and the system gracefully falls back to raw step text without an API key.

4 How It Works

- 1 User picks a starting location and destination from a searchable, floor-grouped list of 352 known places.
- 2 FastAPI backend runs Dijkstra on the JSON graph. An avoid_stairs preference reroutes through elevators when needed.
- 3 Each edge in the resulting path carries a raw Turkish instruction (corridor / stairs / elevator).
- 4 The LLM rewrites the raw steps into clear, landmark-based Turkish guidance with structured step indices.
- 5 The web UI shows one step at a time with a progress bar — users tap “Tamamlandı” to advance.

5 By The Numbers

267 graph nodes

587 edges

352 named places

16 vertical (inter-floor) connections