

Pedometer Web Application

A Real-Time Step Tracking Solution leveraging the Device Motion API for modern web browsers.

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Foundations of Edge AI

Overview

This web application delivers **real-time step tracking** directly within your browser, eliminating the need for native app installations.

- 📱 Uses device motion sensors (accelerometer)
- 🍏 Inspired by iOS Core Motion framework
- 📶 Advanced signal processing ensures accuracy



| Core Algorithm

Monitoring

Reads X, Y, Z acceleration values at ~50ms intervals.

Calculation

Computes the magnitude of the acceleration vector.

Smoothing

Applies a moving average filter (5 samples) to reduce noise.

Cooldown

Enforces a 300ms pause between steps to prevent double-counting.

| Key Features

Step Counter

Real-time tracking with start, pause, and reset controls.

Live Graph

Visualizes acceleration data with threshold lines & step markers.

Step History

Logs the last 10 steps with precise timestamps and pace.

Fallback

Simulation mode for desktops or devices without sensors.

Technical Architecture

Tech Stack

- ✓ **React + TypeScript** for robust component architecture
- ✓ **Tailwind CSS** for modern, responsive styling
- ✓ **Device Motion API** for accessing hardware sensors
- ✓ **Lucide React** for consistent iconography

Key Components

- ✓ **StepCounter.tsx**: Handles permissions & algorithm logic
- ✓ **AccelerationGraph.tsx**: Renders real-time canvas visualization
- ✓ **StepHistory.tsx**: Manages pace calculation & timestamp tracking

| Algorithm Logic

Magnitude Calculation


We convert the 3D acceleration vector into a single scalar value to detect total movement intensity.

$$a = \sqrt{x^2 + y^2 + z^2}$$

Threshold Detection

A step is registered when the smoothed magnitude exceeds **10.5 m/s²**.

Device Compatibility

Platform	Browser	Requirements	Experience
iOS	Safari	iOS 13+, HTTPS, Permission Prompt	Full Sensor Support
Android	Chrome / Firefox	Automatic Sensor Access	Full Sensor Support
 Desktop	Any Modern Browser	None (No sensors available)	Simulation Mode

| How to Use

1

Open App

Launch in Safari (iOS)
or Chrome (Android)

2

Tap Start

Grant motion sensor
permissions

3

Walk

Move normally;
counter increases

4

Monitor

View graph & history
in real-time

Use Cases



Fitness Tracking



Health Monitoring



Research & Edu



Prototyping

| Limitations & Future Roadmap

Limitations

- ✓ Accuracy depends heavily on hardware sensor quality.
- ✓ Works best when phone is in a pocket or hand.
- ✓ Irregular movement (running) may reduce accuracy.
- ✓ Requires active browser session (no background tracking).

Future Enhancements

- ✓ Daily step goals & progress indicators.
- ✓ Distance & calorie estimation algorithms.
- ✓ Data export (CSV) and social sharing.
- ✓ Integration with external health platforms.

Thank you for listening.