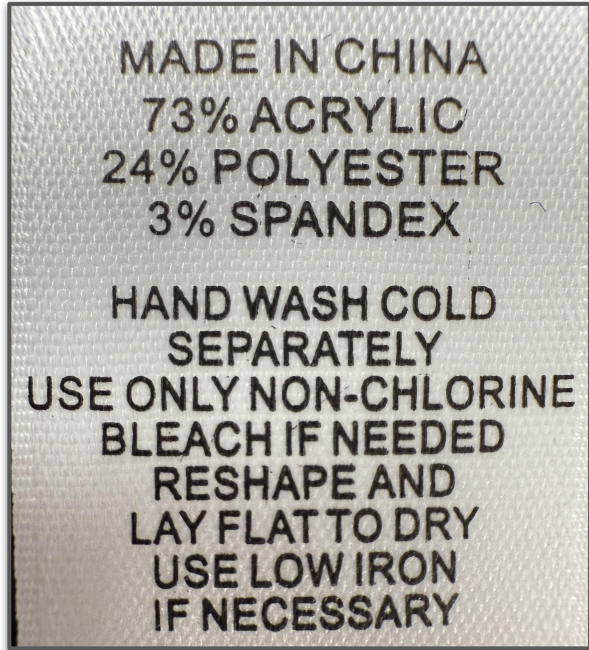


EcoTag: Scan Your Clothes, Save the Planet



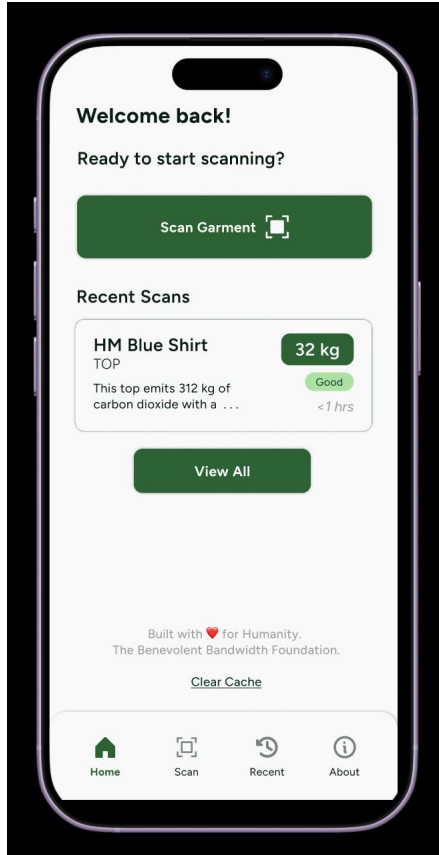
- **What is EcoTag?**

- A mobile and web app designed to estimate the carbon footprint of clothing items
- Originated at Georgetown: Marie Vaughan's research project under Prof. Dan Loehr
- B2 Foundation intake in January 2026

- **How it Works:**

- User points their phone camera at a garment tag
- AI reads key data points: materials, manufacturing origin, and care instructions
- The app calculates total CO₂ emissions across the garment's entire lifecycle

UI/UX: Shows detailed carbon insights & EcoRating



- **Emissions Breakdown:** After a scan, the app displays a detailed breakdown of CO₂ emissions covering
 - Material, manufacturing origin, care, End-of-Life
- **EcoRating System:**
 - Garment receives a rating: **Poor**, **Average**, or **Good**
 - Determined from CO₂ footprint vs. industry benchmarks

The UI is a single, cross-platform app developed with React Native Expo Go for Android, iOS, and web.

Backend: Started with traditional OCR

Accuracy not great; latency unacceptably high for real-time app 🤔

Metric	Result	Notes
Success Rate	72.3% (55/76)	Successfully extracted Origin or Materials.
Avg Latency	25.94s / image	High due to 5x brute-force inference loop.
Throughput	0.04 img / sec	Current capacity: ~144 images per hour.
Peak RAM	1.1 GB	Very lightweight; runs easily on consumer hardware.
Min Latency	6.05s	Occurs when the "Original" image works immediately.
Max Latency	49.38s	Occurs when the system forces all 5 filters.

Backend: Pivoted to Vision-Language Models

VLMs, particularly GPT models, achieved impressive accuracy and speed 🙌

Accuracy

	Model	N	Country Near+Exact
Traditional OCR	easyocr	86	72.1%
	pytesseract	86	64.0%
VLM	gemini	86	73.2%
	qwen3-vl	86	75.6%
	mistral-ocr2	86	68.6%
	GPT-4o, 5.2	86	86 / 86 = 100%

Latency

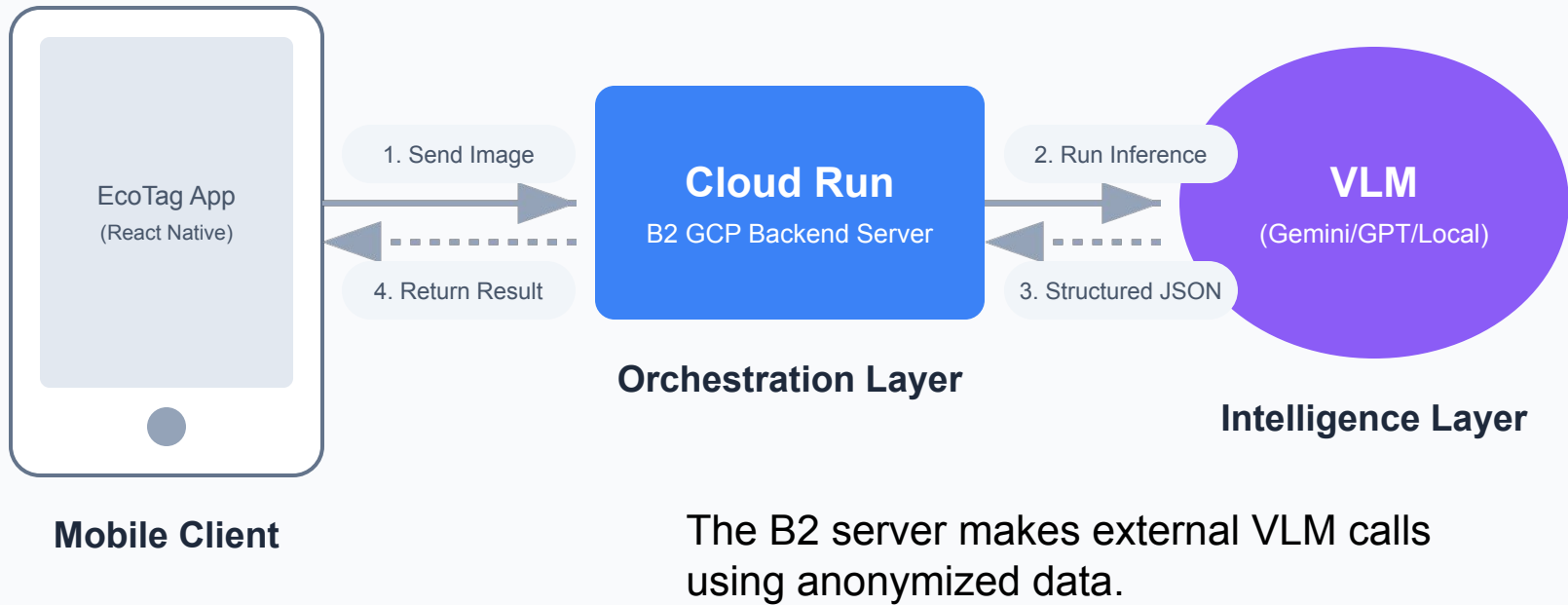
Model	Avg ms	P95 ms
gemini	3903.4	8419.7
qwen3-vl	10076.2	15859.8
mistral-ocr2	9784.9	6882.2
GPT-4o	3607	5174

GPT 5.2 avg latency ~ 1.7 sec

Caching optimizations helped achieve < 1s latencies

Metric	No Cache	Exact	Semantic + CLIP	Tiered	Notes
Success Rate	100%	100%	100%	100%	200 / 200 successful runs each
Mean Latency (ms)	1706.34	877.16	703.93	457.98	Tiered fastest overall
Overall Hit Rate	0%	62%	63%	63%	Semantic and tiered tied on hit rate
Miss Rate	100%	38%	37%	37%	—
Exact Hit Rate / Count	0% / 0	62% / 124	0% / 0	60% / 120	—

EcoTag End-to-End System Architecture



Security & User Privacy: "No-Human-Data" Principle



Local First

All scan history and image indices are stored in a local SQLite database. Data never leaves your device without explicit knowledge.



Auto-Wipe Policy

Sessions are capped at a 3-hour TTL. Associated data is automatically cleared when the session ends, requiring no user action.



Anonymization

Images are hashed using SHA-256 for cache lookups. Users are anonymized via a secure B2 API to maintain absolute privacy.

Deployment, User Rollout, and Future Vision

B2 Deployment

- EcoTag is currently being deployed on **B2's new GCP infra**.
- Deployment and testing are expected to be completed within the **next few weeks**.



Targeted Rollout

- Pilot rollout planned for university students, who are a prime target segment.
- The goal is to reach hundreds of users within the first two weeks to **measure real-world demand and usability**.



Future Vision

- Focus on **granular CO2** footprints and **location-specific** data.
- Make the technology **extensible beyond garments** to other consumer categories, such as plastic bottles and packaged food items.

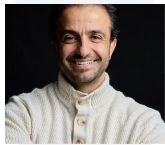


The EcoTag Contributor Team

B2 Foundation Advisors



Kal Mishra
Technical Advisor

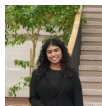


Nurtekin Savas
B2 Founder



Dan Loehr
Advisor

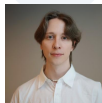
UC Davis CodeLab



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Sarayu Mummidi
Developer



Evan Liu
Developer



Sathvik Parasa
Developer



Alex Gardiner
Developer

Georgetown



Marie Vaughan
Researcher

Various



Eman Cickusic
Cloud Engineer

Product Demo: EcoTag in Action



Key Highlights

- Real-time garment tag scanning
- Lifecycle CO₂ footprint calculation
- Multi-item comparison dashboard
- Privacy-first local history storage

Click to view full video

[Watch Demo Video](#)