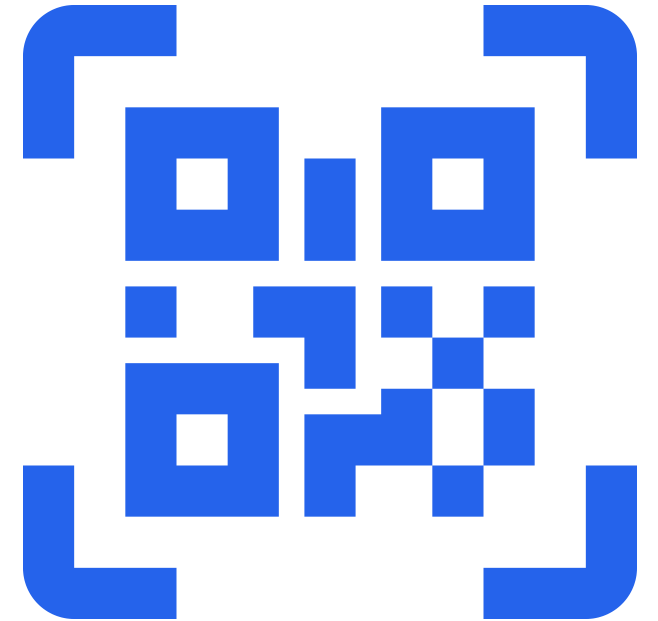# QR/Barcode Scanner Library Comparison

Reference Benchmark: Scanbot SDK (Commercial - Best-in-class)

Comparing: `html5-qrcode` vs `zbar-wasm` vs `qr-scanner`

Executive Summary

Library	Technology	Performance	Status
Scanbot	WebAssembly (C/C++)	★★★★★	Commercial
qr-scanner	WASM + Native API	★★★★	✅ Active
zbar-wasm	WebAssembly (C)	★★★★	✅ Active
html5-qrcode	JavaScript	★★★	❌ Unmaintained

Why Scanbot is the Benchmark?

- **Scan Speed:** 0.04 seconds (~40ms)

- **Technology:** Native C/C++ compiled to WebAssembly

- **Same codebase** as iOS/Android native SDKs

- **Consistent 60+ FPS** performance

- Works on damaged, small, distant barcodes

- Low-light environment support

Technology Architecture

Library	Core Engine	Threading
Scanbot	C/C++ → WASM	Web Workers
qr-scanner	WASM + BarcodeDetector	Web Workers
zbar-wasm	C (ZBar) → WASM	Supports Workers
html5-qrcode	JavaScript (zxing-js)	Main Thread ⚠️

Key Insight: WebAssembly = Near-native performance

Performance Comparison

Metric	Scanbot	qr-scanner	zbar-wasm	html5-qrcode
Avg Scan	~40ms	~29ms	~35ms	~47ms
Worst Case	Stable	Stable	Stable	**1000ms** ⚠️
Frame Rate	60+ FPS	~34 FPS	~30 FPS	~17 FPS
Misreads	Near 0	0	Low	Occasional

Why html5-qrcode is Slower

- ❌ Pure JavaScript (no WebAssembly)

- ❌ Runs on **main thread** (blocks UI)

- ❌ Performance spikes up to **1000ms**

- ❌ Only **17 FPS** vs 34+ FPS

- ❌ Uses unmaintained zxing-js

- ❌ **383 open issues**, no fixes

Bundle Size Comparison

Library	Minified	Gzipped
qr-scanner	59 kB	**16 kB**
qr-scanner (native)	15 kB	**5.6 kB**
zbar-wasm	330 kB	~100 kB
html5-qrcode	150 kB	~50 kB

Winner: qr-scanner (smallest footprint)

Supported Formats

Format	Scanbot	qr-scanner	zbar-wasm	html5-qrcode
QR Code	✅	✅	✅	✅
Code-128	✅	❌	✅	✅
EAN-13	✅	❌	✅	✅
UPC-A	✅	❌	✅	✅
Data Matrix	✅	❌	❌	✅
PDF-417	✅	❌	❌	✅
Total	**20+**	**1**	**12**	**16**

Features Comparison

Feature	qr-scanner	zbar-wasm	html5-qrcode
Camera Stream	✅	Manual	✅
Image File Scan	✅	✅	✅
Multi-barcode/Frame	❌	✅	❌
Flash Control	✅	Manual	✅
Built-in UI	❌	❌	✅
TypeScript	✅	✅	✅

Browser Support

Browser	qr-scanner	zbar-wasm	html5-qrcode
Chrome 57+	✅	✅	✅
Firefox 53+	✅	✅	✅
Safari 11+	✅	✅	✅
Edge 16+	✅	✅	✅
iOS Safari	✅	⚠️	✅ (15.1+)
Android	✅	✅	✅

⚠️ zbar-wasm: Issues on iPhone 14 Pro/Pro Max

API Comparison: qr-scanner

```javascript
import QrScanner from 'qr-scanner';

const scanner = new QrScanner(
  videoElement,
  result => console.log(result.data),
  { highlightScanRegion: true }
);

await scanner.start();
```

✅ Simple API | ✅ WebWorker | ❌ No built-in UI

API Comparison: zbar-wasm

```javascript
import { scanImageData } from 'zbar-wasm';

// Get image data from canvas
const imageData = ctx.getImageData(0, 0, width, height);

// Scan for barcodes
const symbols = await scanImageData(imageData);
symbols.forEach(s => console.log(s.decode()));
```

✅ Multi-format | ✅ WASM | ❌ Manual camera handling

API Comparison: html5-qrcode

```javascript
import { Html5QrcodeScanner } from 'html5-qrcode';

const scanner = new Html5QrcodeScanner("reader", {
  fps: 10,
  qrbox: 250
});

scanner.render(
  (text) => console.log(text),
  (err) => console.warn(err)
);
```

✅ Built-in UI | ✅ Easy setup | ❌ Slow | ❌ Unmaintained

Maintenance Status

Library	Status	Last Update	Issues
qr-scanner	✅ Active	2025	~30
zbar-wasm	✅ Active	2024	~20
html5-qrcode	❌ Unmaintained	2023	**383**

> ⚠️ **Warning:** html5-qrcode has no active development

Known Issues & Limitations

qr-scanner

- QR codes only (no barcodes)
- No built-in UI

zbar-wasm

- iPhone 14 Pro/Pro Max issues
- LGPL license (copyleft)
- 330 kB bundle size

html5-qrcode

- **Unmaintained** - no bug fixes
- Performance spikes to 1000ms

Performance Score vs Scanbot

Library	Score	Closeness
Scanbot	100%	Reference
qr-scanner	~85%	Very Close
zbar-wasm	~80%	Close
html5-qrcode	~50%	Far

Cost Analysis

Library	License	Cost
Scanbot	Commercial	$$$
qr-scanner	MIT	Free
zbar-wasm	LGPL-2.1	Free
html5-qrcode	Apache-2.0	Free

Recommendation Matrix

Use Case	Recommended
QR Code Only	qr-scanner ⭐
Multi-format Barcodes	zbar-wasm ⭐
Quick Prototype	html5-qrcode
Production + Budget	Scanbot
Smallest Bundle	qr-scanner
Node.js Support	zbar-wasm

Migration from html5-qrcode

To qr-scanner (QR only):

```
npm uninstall html5-qrcode
npm install qr-scanner
```

To zbar-wasm (Multi-format):

```
npm uninstall html5-qrcode
npm install zbar-wasm
```

Final Verdict

Best Free Alternatives to Scanbot:

Need	Choice
🎯 QR codes only	qr-scanner
📊 Multiple barcode formats	zbar-wasm

Both use **WebAssembly** for near-native performance!

Key Takeaways

1. **WebAssembly** is the key to smooth scanning

2. **qr-scanner** is closest to Scanbot for QR codes

3. **zbar-wasm** best for multi-format barcodes

4. **Avoid html5-qrcode** - unmaintained & slow

5. Consider **native BarcodeDetector API** for Android

References

- Scanbot SDK Docs

- qr-scanner GitHub

- zbar-wasm GitHub

- html5-qrcode GitHub

- MDN BarcodeDetector

Thank You

Report Generated: December 2025

Questions?