



Touchless Biometrics: Securing a Post-Pandemic World

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Abstract

The COVID-19 pandemic irrevocably altered our perception of public health, hygiene, and personal interaction, accelerating the demand for solutions that minimize physical contact. Once, using a fingerprint scanner, pressing a PIN, or touching a shared surface felt routine. During the pandemic, these simple actions suddenly became potential vectors for contagion. Touchless biometrics — technologies that capture unique biological characteristics without physical contact — have emerged as a crucial response. From facial recognition at airports to voice authentication in banking apps, “no touch required” is becoming the new standard, combining hygiene, convenience, and security [1, 5].

Keywords: touchless biometrics, contactless authentication, facial recognition, AI security, post-pandemic technology, biometric market.

1 Why Everyone Is Talking About It

Touchless biometrics has moved from niche to mainstream due to three major factors:

- **Health & Hygiene First:** Post-pandemic, people prefer avoiding shared surfaces. Touchless systems eliminate these risks [5].
- **Faster, Frictionless Access:** Airports, banks, offices, and retail outlets increasingly favor seamless flow — no fumbling with ID cards, keys, or PIN codes [6].
- **AI-Powered Accuracy:** Modern AI enhances the speed and reliability of facial, iris, and voice recognition, improving security and user experience [1].

2 Key Touchless Biometric Modalities

Table 1 compares four different biometric modalities, outlining how they work, their key benefits, and where they are typically used. It highlights the trade-offs between factors like convenience, security, and application context.

The applications are everywhere:

- **Healthcare:** Facial recognition expedites patient check-ins, reducing queues and contact. Iris and palm vein scanners ensure secure access to sensitive areas without physical touch [7].
- **Airports & Travel:** Facial recognition at e-gates and checkpoints accelerates passenger flow and reduces surface contact, streamlining security processes [4].

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Table 1. A comparison of modern biometric modalities, their advantages, and applications.

Modality	Description	Advantages	Typical Applications
Facial Recognition	Analyzes unique facial features	Quick, touch-free, widely adopted, AI-enhanced accuracy	Smartphones, offices, airports
Iris Recognition	Captures intricate iris patterns from a distance	Highly accurate, stable over a lifetime, non-invasive	High-security sites, data centers
Palm Vein Recognition	Maps subcutaneous vein patterns using near-infrared light	Internal patterns are secure, intuitive, hygienic	Healthcare, manufacturing, corporate access
Voice Recognition	Analyzes vocal characteristics (pitch, tone, style)	Hands-free, remote-friendly	Banking, call centers, smart home devices

- **Corporate & Commercial Spaces:** Offices use touchless access, attendance tracking, and even elevator controls, fostering safer workplaces [8].
- **Retail & Hospitality:** Self-checkout kiosks, touchless payments, and hotel check-ins via facial recognition or smartphone apps enhance hygiene and customer convenience [2].
- **Government & Public Services:** Secure document access and identity verification for public services benefit from touchless biometrics while maintaining hygiene standards.

The key modalities and their major application areas are illustrated in Figure 1.

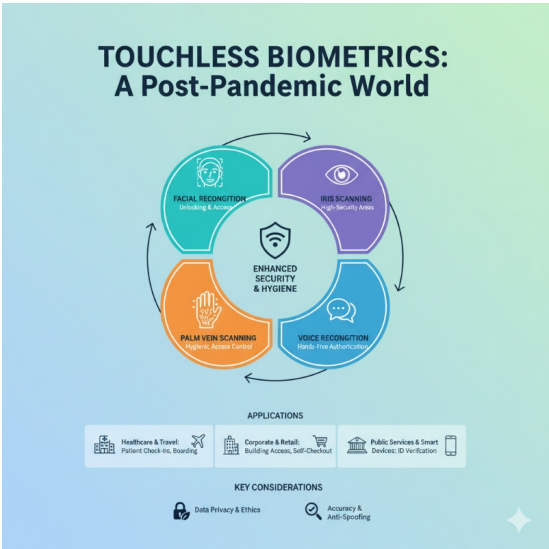


Figure 1. Key touchless biometric methods and their application areas. (Image source: Generated by Gemini.)

3 Market Trends and Numbers

The market for touchless biometrics is expanding at lightning speed. Analysts forecast impressive growth throughout the next decade. For instance, the global contactless biometrics market is projected

to reach USD 47.30 billion by 2032, up from USD 17.35 billion in 2025 [1]. Other studies show even more aggressive trends. According to Zion Market Research [8], the market could hit USD 100.1 billion by 2032, representing a remarkable 20.1% CAGR. Similarly, Polaris Market Research (2024) estimates a rise from USD 17.72 billion in 2024 to USD 66.33 billion by 2032. Even conservative forecasts show strong momentum. Grand View Research [5] predicts the market will grow from USD 17.5 billion in 2024 to around USD 46.6 billion by 2030, while The Business Research Company [7] expects USD 50.66 billion by 2029.

Beyond the contactless niche, the overall biometric systems market — including both contact and touchless solutions — is also growing, expected to jump from USD 36.57 billion in 2024 to USD 113.22 billion by 2032 [3]. This convergence of estimates — from conservative to ambitious — clearly signals that touchless biometrics is no short-term trend. Instead, it is a long-term industry transformation, accelerated by post-pandemic demands for hygiene, speed, and digital security.

4 Challenges to Consider

Despite its benefits, touchless biometrics raises important concerns:

- **Privacy:** Facial recognition and other biometric data can lead to ethical and surveillance questions [8].
- **Data Security:** Unlike passwords, biometrics cannot be reset; stolen iris or fingerprint data is permanent [5].
- **Bias & Accuracy:** Performance may vary across demographics, raising fairness concerns [3].

Robust encryption, secure storage, and transparent

policies are essential to address these challenges.

5 The Future of Touchless Biometrics

Experts foresee expansion beyond airports and offices:

- **Smart Cities:** Biometric access to transport, buildings, and payments [4].
- **Digital Wallets:** Voice or face scans replacing PINs [2].
- **Virtual Healthcare:** Doctors verifying patients via iris or facial recognition for telemedicine [7].

Passwords, ID cards, and physical keys may soon feel as outdated as flip phones.

6 Conclusion: Touch-Free Tomorrow

Touchless biometrics is not just a technological upgrade; it represents a cultural shift shaped by the pandemic. What began as a health necessity has become a long-term innovation, enabling faster, safer, and smarter interactions across industries.

In a post-pandemic world, security is less about what you carry (cards, keys, passwords) and more about who you are — no touch required.

Data Availability Statement

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Conflicts of Interest

Muhammad Saqlain Aslam is an employee of AI Research Center, Hon Hai Research Institute, Taipei 114699, Taiwan.

Ethical Approval and Consent to Participate

Not applicable.

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