



# Whitepaper

## THE FUTURE OF FACIAL RECOGNITION

This document will provide in-depth information about 'The Future of Facial Recognition and how liveness detection is changing the game in 2023.'

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# A word from our **FOUNDER**

*"Facial recognition technology has impacted a significant number of industries, but fraud and security breaches are still a concern.*

*This problem can be addressed through liveness detection.*

*Liveness detection is useful for preventing fraud and protecting user privacy by verifying that the individual is alive, not a spoof."*

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**Mujadad Naeem**

CEO of FACIA





# Introduction

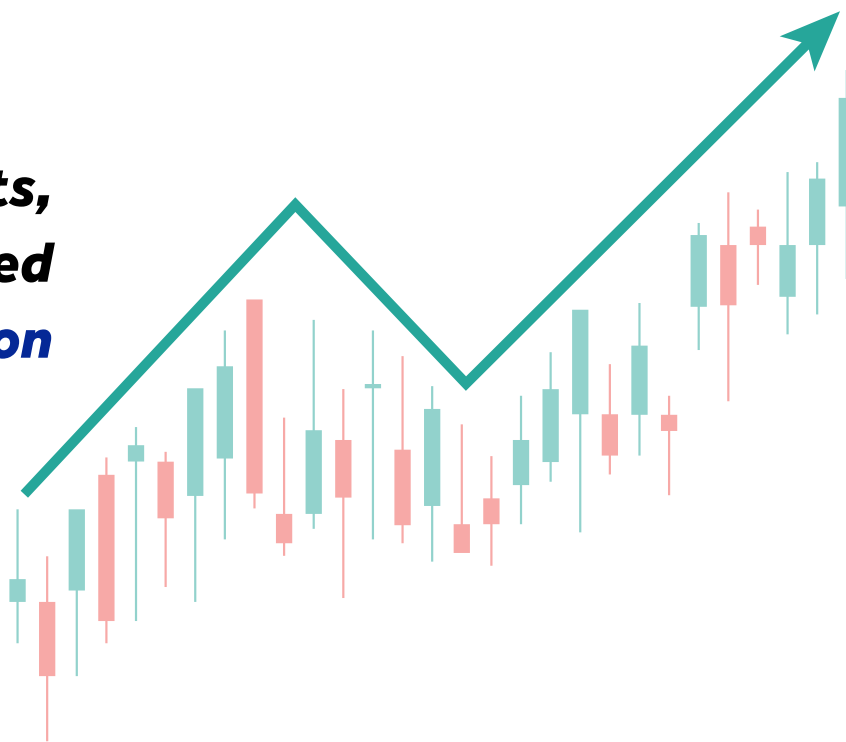
Facial recognition technology has become increasingly important in various industries due to its ability to identify and verify individuals through facial features. Despite the growing use of facial recognition technology, there has also been an increase in attempts to manipulate it, such as using fake images or videos. Here's where liveness detection comes in.

Liveness detection helps ensure the facial recognition system is not fooled by a fake or manipulated image. It detects whether a face is real by analyzing facial movement and depth. With liveness detection, facial recognition technology would be efficient, which could have serious consequences, particularly in the financial and security industries. Liveness detection is essential to enhance the accuracy and reliability of facial recognition technology and ensure its continued use in various industries.

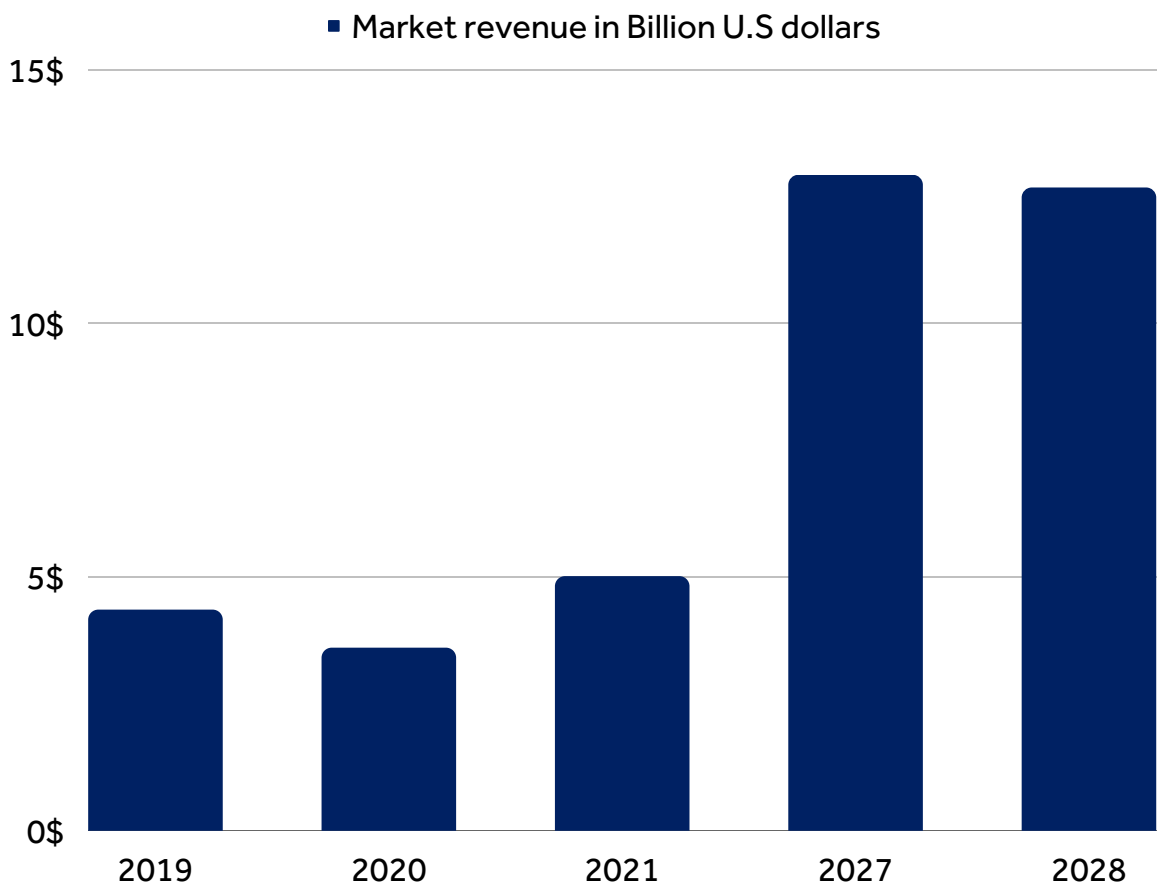
# Current State of Facial Recognition Technology

In recent years, facial recognition technology has made significant advances.

***“According to a report by MarketsandMarkets, the global facial recognition market is expected to grow from **\$3.2 Billion** in 2019 to **\$10.9 billion** by 2025, at a CAGR of 18.5%.”***



Facial recognition market size worldwide from 2019 to 2028(in billion U.S. dollars)



This growth is driven by increasing demands for surveillance and security systems, the widespread use of smartphones and other consumer devices with facial recognition capabilities, and the adoption of facial recognition technology across various industries.

The accuracy of facial recognition technology has improved significantly in recent years. Some systems claim to be nearly perfect.

A study by the [National Institute of Standards and Technology \(NIST\)](#) found that the best facial recognition algorithms can now match a person's identity with **99.97%** accuracy in some cases.

The improvement was achieved using deep learning algorithms and larger datasets for training.

It is possible to use facial recognition technology for various purposes, including security, law enforcement, marketing, and personalization.

Allied Market Research reports that security and surveillance applications accounted for the largest share of the global facial recognition market in 2019 and will continue to do so through 2025. As a result of the increased adoption of facial recognition technology for personalized marketing and patient identification, the retail and healthcare segments are anticipated to experience significant growth in the coming years.

However, there are also ethical and privacy concerns.

An American survey by the Pew Research Center found that **56%** of Americans are concerned about the use of FRT by law enforcement agencies and **59%** are concerned about the lack of regulation and law governing the use of the technology.

In response to these concerns, guidelines & regulations have been proposed to govern facial recognition use. Some countries have passed laws limiting or banning FR in specific contexts, such as public surveillance. Additionally, some facial recognition systems incorporate liveness detection technology to prevent the system from being tricked by manipulated or fake images.

## Do you know that facial recognition technology is expected to reach a market size of over \$9 billion by 2023?

In the global market for facial recognition, demand is multiplying due to the proliferation of smartphones and other consumer devices that include facial recognition systems and the adoption of facial recognition technology in various industries.

In the words of [Microsoft's president Brad Smith](#), "Using facial recognition technology for mass surveillance can encroach on democratic freedoms."

The accuracy of facial recognition technology has improved considerably, but there are also concerns regarding privacy and ethics. It is crucial to strike a balance between the potential benefits and potential risks associated with facial recognition.

Facial recognition technology must be used responsibly and ethically to protect individual privacy and civil liberties. It must also be regulated to ensure its use is ethical and safe.

## Benefits Of Facial Recognition:

- 1 **Enhanced Security:** Security and surveillance systems can use facial recognition technology to identify individuals and prevent unauthorised entry.
- 2 **Time-Savings:** The use of facial recognition technology can help speed up identification and authentication processes, including passport control.
- 3 **Improved Customer Service:** By Using facial recognition technology in retail can help personalize customer experiences by providing personalised recommendations.
- 4 **Improved Law Enforcement:** Law enforcement agencies can use facial recognition technology to locate missing persons and identify suspects.
- 5 **Public Safety:** Face recognition technology can identify and track potentially dangerous individuals, such as criminals or terrorists.

## Limitations Of Typical Facial Recognition System:

- 1 **Privacy Concerns:** Using facial recognition technology without consent raises significant privacy concerns.
- 2 **Bias and Inaccuracy:** Technology for facial recognition can be biased and inaccurate, particularly regarding race and gender, resulting in potential discrimination and misidentification.
- 3 **False Positives:** The use of facial recognition technology can result in false positives, misidentifying innocent individuals as criminals or suspects.
- 4 **Surveillance State:** Using facial recognition technology for mass surveillance can violate individual privacy.
- 5 **Hack-ability:** It is possible to hack facial recognition technology, resulting in the theft of biometric data and identity theft.

Looking for a more reliable facial recognition system that overcomes the limitations of traditional technology?

Facia, a facial recognition company with liveness detection capabilities, offers an advanced solution that can help mitigate privacy concerns, bias and inaccuracy, false positives, the potential for a surveillance state, and hackability. Contact us today to learn more about how our technology can benefit your organisation.



## What Is Liveness Detection?

In biometric authentication, liveness detection is used to prevent spoofing attacks by making sure the biometric sample comes from a live person and not a photograph, video, or other fake representation.

The purpose of the initiative is to strengthen the security and accuracy of biometric authentication methods that utilize the unique physical characteristics of individuals, including their faces, fingerprints, iris, or voice, to identify individuals. A fraudster could access sensitive data if liveness detection were not in place.

Several factors affect the effectiveness of liveness detection techniques, including the quality of biometric data captured, the complexity of the algorithm used, and the fraudster's ability to create convincing fake samples.

A Report from Grand View Research estimates the global market for liveness detection solutions to be worth **\$1.13 billion** in 2020 and to increase at **14.8% CAGR** from 2021 to 2028.

## How Liveness Detection Works?

- 1 Face recognition:** A liveness detection algorithm analyzes facial expressions, movements, and reflections to determine if the face presented is that of a living person.
- 2 Motion detection:** This method involves analyzing a person's movements in front of the camera to detect signs of life, such as blinking or breathing.
- 3 Challenge-response:** This technique involves presenting a challenge to the user, such as asking them to blink or move their head in a certain way and then analyzing their response to determine if it is consistent with that of a living person.

It is cited that the growing demand for biometric authentication is a significant factor in this growth, particularly in industries such as finance, healthcare, and government.

In the global market for facial recognition, demand is multiplying due to the proliferation of smartphones and other consumer devices that include facial recognition systems and the adoption of facial recognition technology in various industries.





**Liveness detection offers several advantages over traditional facial recognition technology, such as:**

Improved  
Accuracy

Fraud  
Prevention

Privacy  
Protection

Ease  
of Use

Cost-  
Effective

Enhanced  
Security

**Improved Accuracy:**

Liveness detection algorithms prevent false positives and reduce fraudulent activity, improving facial recognition accuracy.

**Fraud Prevention:**

The use of liveness detection prevents the use of stolen or fake identities during online banking, e-commerce, and border control applications.

**Enhanced Security:**

Liveness detection ensures that only real people can be identified, preventing attempts to bypass facial recognition systems using fake images or videos.

**Privacy Protection:**

Liveness detection safeguards personal biometric data from theft by detecting fake images or videos, preventing unauthorized access and protecting against identity theft.

**Cost-Effective:**

Liveness detection technology can be integrated with existing facial recognition systems, reducing the cost of implementing new authentication methods.

**Ease of Use:**

A liveness detection system is easy to use and does not require any additional input from the user. It automatically detects and authenticates the presence of a live person.



It offers several advantages, including increased accuracy, security, fraud prevention, privacy protection, and ease of use, as it detects liveness during facial recognition. As facial recognition technology continues to be adopted in various industries, the demand for liveness detection is expected to increase, making it an indispensable tool in ensuring the reliability and security of facial recognition systems.

Do you know that liveness detection technology can detect the difference between a real human face with up to 99% accuracy?

## Technical Details of How Liveness Detection Algorithms Work:

**The algorithms analyse various factors to determine whether a face is real. These factors include;**

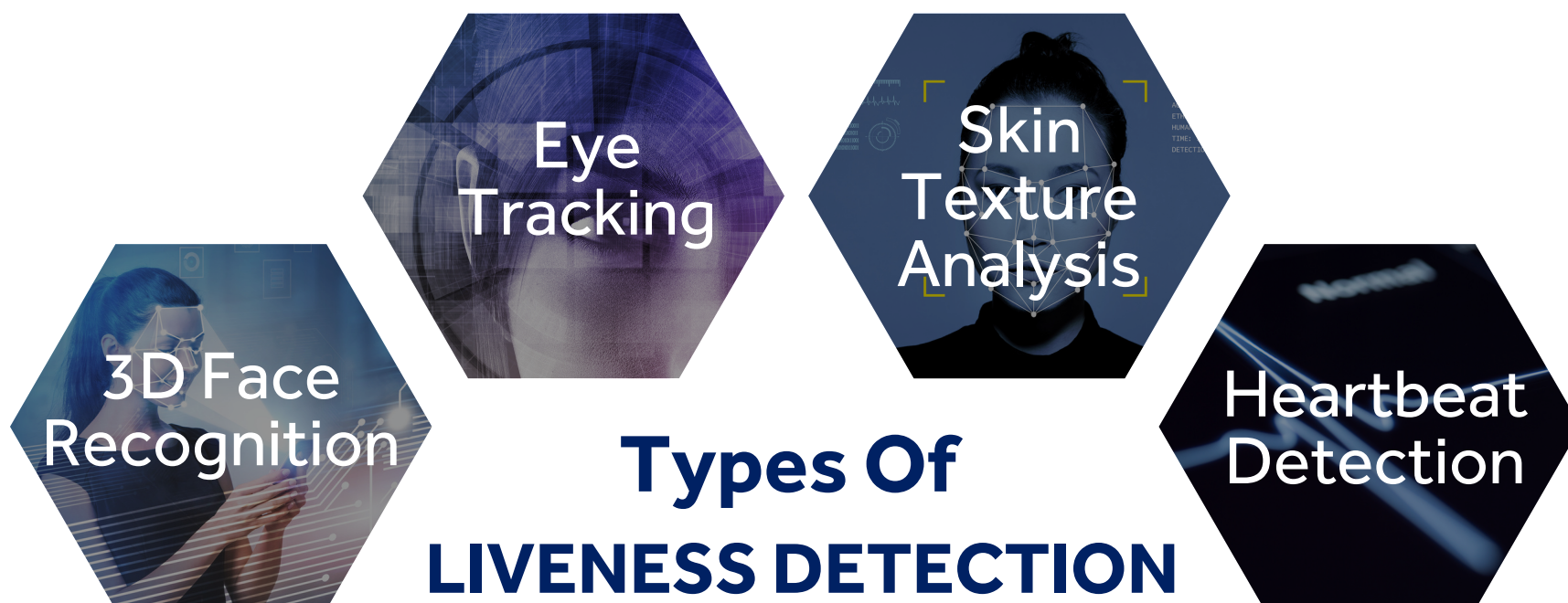
- Eye Movement
- Pupil Dilation
- Head Movement
- And Skin Texture Analysis

**Additionally, some systems use advanced techniques such as;**

- 3D Modeling
- Thermal Imaging
- Or Heartbeat Detection to improve the accuracy of liveness detection.

**Face recognition systems are becoming increasingly accurate and secure due to liveness detection.**

In a Report by Markets and Markets, the global liveness detection market is expected to grow from \$1.3 billion in 2020 to \$4.4 billion by 2025, at a compound annual growth rate of 27.1%.



- **3D Face Recognition:**

This technology uses a 3D model of the face to detect depth and movement, which makes it harder to bypass facial recognition systems.

- **Eye Tracking:**

Eye movement is used to determine whether or not the face being scanned is real.

- **Heartbeat Detection:**

Using sensors to detect the heartbeat of the person being scanned, this technology ensures that the face being scanned is real.

- **Skin Texture Analysis:**

This technology determines whether or not the face being scanned is real by analyzing the skin's texture.

## Legal and Regulatory Considerations

Legal and regulatory considerations can significantly impact the implementation of liveness detection technology in facial recognition. Various laws and regulations, including those relating to data privacy and biometric data collection, must be adhered to by companies and organizations. In the European Union, for instance, the General Data Protection Regulation (GDPR) imposes strict requirements for collecting and using biometric data, including obtaining explicit consent from individuals and implementing appropriate security measures.

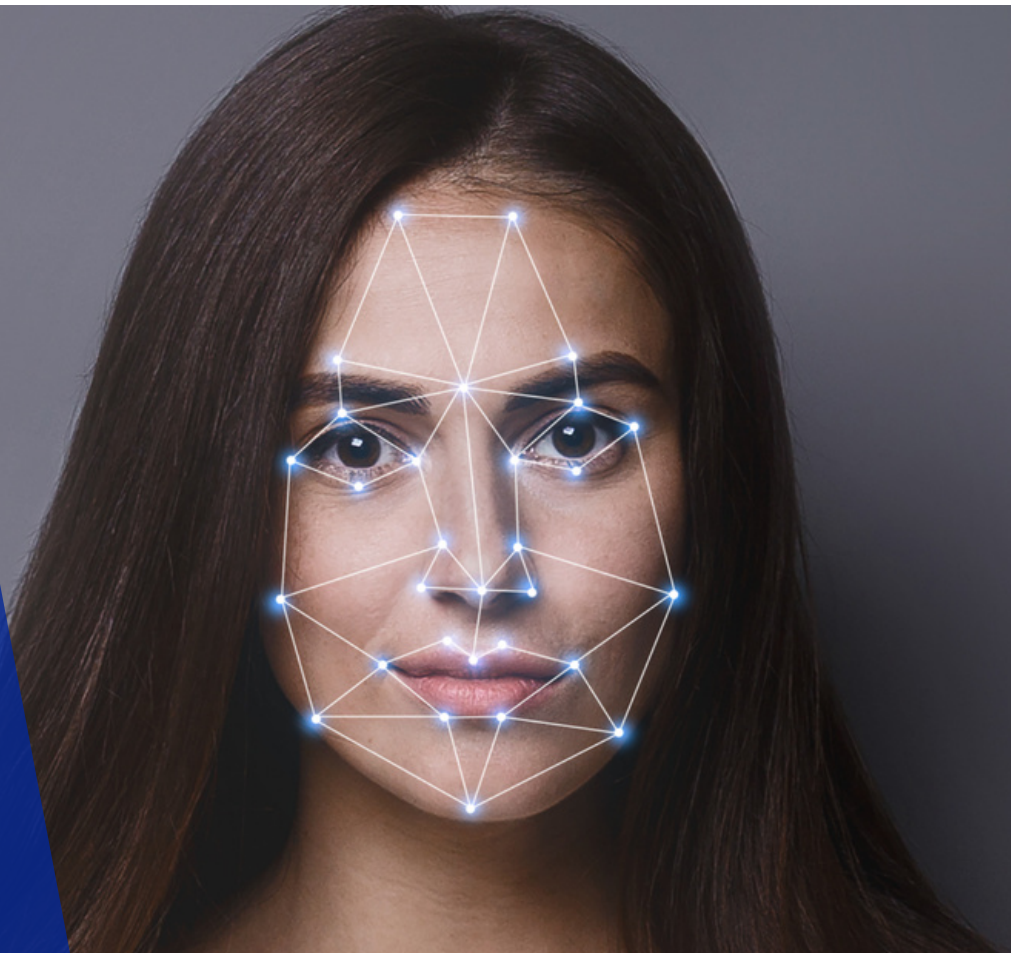
Moreover, the use of liveness detection technology also raises ethical and social concerns, such as potential discrimination and bias. It has been found, for example, that some facial recognition systems tend to be biased toward certain racial and ethnic groups, resulting in inaccurate identifications and false positives.

Some legal frameworks in the United States regulate facial recognition technology. The use of facial recognition technology by law enforcement agencies has been held by some states and municipalities, while others have banned it entirely.

For example, Washington passed a law in May 2021 regulating the use of facial recognition technology by law enforcement, requiring agencies to obtain a warrant or court order before using the technology.

Consequently, when implementing liveness detection technology into facial recognition systems, companies and organisations must consider legal and regulatory requirements carefully. By doing so, they can minimize potential risks and ensure compliance with applicable laws and regulations.

# Future of Facial Recognition with 3D Liveness Detection



With the continued advancement of liveness detection technology, its potential impact on the banking, retail, and healthcare industries is becoming increasingly significant. The future of facial recognition with liveness detection has a few key points to consider:

- **Trends and Advancements in Liveness Detection Technology:** Liveness detection technology continues to evolve and improve, with advances such as better 3D scanning and analysis, better tracking of facial movements and gestures, and better accuracy through AI and machine learning algorithms.
- Banking, retail, and healthcare are among the industries with the potential to be significantly impacted by liveness detection technology. In the banking industry, for example, liveness detection can help prevent fraud and improve security, whereas in retail, it can help personalize shopping. Banking, retail, and healthcare are among the industries with the potential to be significantly impacted by liveness detection technology. In the banking industry, for example, liveness detection can help prevent fraud and improve security, whereas in retail, it can help personalize shopping. Experiences and enhance customer engagement. In healthcare, liveness detection can be used to improve patient identification and reduce errors in medical records.

- Several potential benefits are associated with liveness detection technology, but some potential risks are also involved. Several concerns have been raised regarding privacy and data protection, as well as bias and discrimination in facial recognition algorithms. Furthermore, liveness detection technology may be used for surveillance purposes or in violation of individual rights.

Several potential future benefits and risks are associated with facial recognition with liveness detection. In the face of rapid technological advancement, companies and organizations must carefully consider the ethical implications of liveness detection and ensure that it is used responsibly and transparently.

Do you know that companies that have implemented liveness detection technology have seen up to a 90% reduction in fraudulent login attempts?



# Case Studies

## Companies That Have Successfully Implemented Liveness Detection In Their Authentication Systems:

### Atom Bank:

Atom Bank reported that its implementation of liveness detection technology resulted in a 12% increase in customer satisfaction and a 65% reduction in the time it takes to verify a customer's identity.

### Zoloz:

Zoloz reported that its clients have seen up to a 99.9% success rate in detecting fake identities and preventing fraud using liveness detection technology.

### City Bank:

City Bank reported that its implementation of liveness detection technology resulted in a 90% reduction in fraud and a 99% success rate in detecting fake identities.

### AirAsia:

AirAsia reported that its implementation of facial recognition technology with liveness detection had reduced the boarding time by 50% and improved accuracy to over 99%.

### Alipay:

Alipay reported that its implementation of liveness detection technology resulted in a 98.3% success rate in detecting fake identities and preventing fraud.

### HSBC:

The HSBC mobile banking app incorporates liveness detection technology to enhance security and prevent fraud. The software reduces the risk of spoofing attacks and protects users' privacy.





## Technical Challenges of Implementing Liveness Detection

Implementing liveness detection technology can be a complex process that requires careful consideration of several technical challenges, such as:

- **Integration with existing systems:**

Integrating liveness detection technology with existing authentication systems can be challenging. It requires careful planning and implementation to ensure the new technology works seamlessly with the existing infrastructure.

- **Hardware requirements:**

Liveness detection technology often requires specialized hardware, such as high-resolution cameras or sensors, which can be expensive and challenging to acquire.

- **Accuracy:**

Liveness detection algorithms rely on complex image analysis techniques to determine whether a person is live. Achieving high accuracy in this process can be challenging, particularly in environments with poor lighting or other environmental factors affecting image quality.

- **User acceptance:**

Liveness detection technology requires users to perform specific actions, such as blinking or moving their heads, which can be inconvenient or uncomfortable. Ensuring that users are willing to accept these requirements is a challenge.

## Potential solutions to these challenges include:

- **Careful planning and testing:**

Implementing liveness detection technology requires careful planning and testing to ensure it works seamlessly with existing systems.

- **Using existing hardware:**

Liveness detection technology requires users to perform specific actions, such as blinking or moving their heads, which can be inconvenient or uncomfortable. Ensuring that users are willing to accept these requirements is a challenge.

- **Continuous training:**

Liveness detection algorithms can be continuously trained to improve accuracy, which can help address issues with false positives and false negatives.

- **User education and awareness:**

Educating users about the benefits of liveness detection and how to use it effectively can help improve user acceptance and adoption.

# Conclusion

Liveness detection is a critical technology for improving facial recognition accuracy and security. By detecting whether a face is a live person or a static image, liveness detection can protect user privacy and prevent fraud. In addition to improving facial recognition systems' accuracy, liveness detection also helps to make them more reliable and effective.

Facial recognition technology with liveness detection has a bright future, but it is also a complex one. As well as the potential benefits of using liveness detection, such as improved security and fraud prevention, there are also potential ethical concerns and risks. It will be necessary for companies and organizations to carefully consider these issues and ensure that facial recognition systems are used responsibly and transparently as technology continues to evolve.

A company's or organization's ability to balance the potential benefits of facial recognition technologies with the ethical considerations and associated risks will determine the future of liveness detection in facial recognition technology.

Liveness detection has the potential to significantly boost the [accuracy](#), [security](#), and [reliability](#) of facial recognition systems with the right approach.

# About Facia

**Looking for a liveness detection solution that can address the technical challenges of implementing facial recognition technology?**

Take a look at Facia. Our advanced liveness detection technology is designed to provide high levels of accuracy while also addressing the hardware requirements, integration challenges, and user acceptance issues that can make implementing this technology challenging.

**We offer Face Identification, Face Detection, Face Verification, Gender Detection, Age Detection, Multi-face Detection, Face Grouping, Facial Coordinates, and Ethnicity Detection.**

**With Facia,** You can benefit from advanced algorithms that can detect even the most sophisticated attempts to deceive the system, ensuring your authentication process is as secure as possible. Our technology is compatible with various hardware and software solutions, making integrating your existing infrastructure easy.

So if you're looking to improve the accuracy, security, and convenience of your facial recognition technology, contact Facia today to learn more about our cutting-edge liveness detection solutions.



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