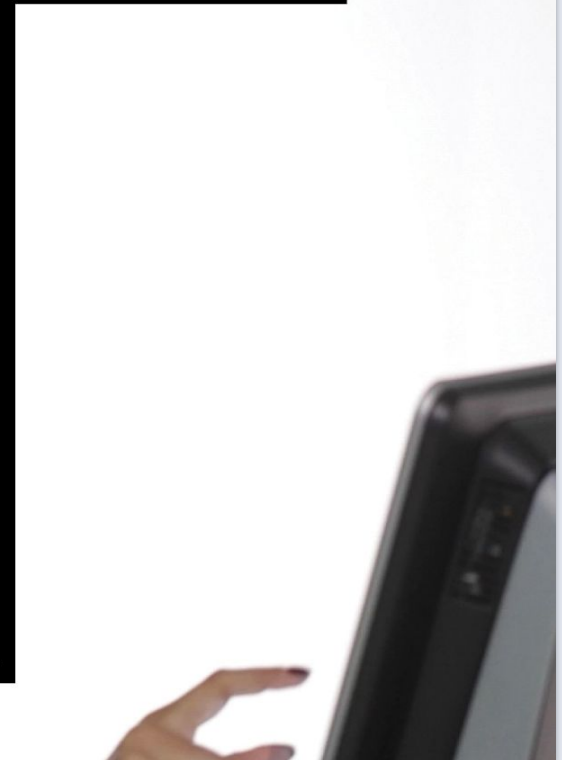
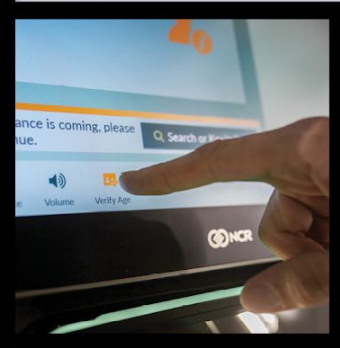


# White paper

## Yoti Age Scan - Public version Executive Summary

March 2021





# Doing things differently

Age verification is just one innovative use of our digital identity technology. We built it to give everyone a secure and private way of proving how old they are in different everyday scenarios: from age checking on social platforms and online stores, to supermarket self-checkouts, bars and clubs. In this executive summary we'll explain everything you need to know about the new way to prove your age. For the full version please visit [www.yoti.com/age\\_scan\\_wp](http://www.yoti.com/age_scan_wp)

<b>Yoti's commitment to ethical use of AI technologies</b>	<b>2</b>
<b>Data used to build the model</b>	<b>3</b>
<b>How can people opt out of R&amp;D?</b>	<b>3</b>
<b>In-app biometric information and opt out screens</b>	<b>4</b>
<b>Accuracy by age, gender and skin tone</b>	<b>5</b>
<b>False Positives</b>	<b>6</b>
<b>Example use cases</b>	<b>7</b>
<b>Ease of integration</b>	<b>7</b>
<b>Our accreditations</b>	<b>7</b>

## Yoti's commitment to ethical use of AI technologies

At Yoti, we take our ethical responsibilities as a company developing new technology very seriously. Our Data Protection Officer has completed a formal Privacy and Ethics Impact Assessment for Yoti age-checking solutions, which is available on request to organisations seeking to assess these services. It covers Yoti both as a data controller for our own use of age-checking solutions with our own users, and as a data processor when offering age-checking solutions to corporate customers. We have also obtained an ISAE 3000 assurance report from one of the top four global auditing firms, validating our age checking services as being in accordance with the British Standards Institution's PAS1296 code of practice.

We have set up an internal Ethics Committee with members from several different areas of our business, to consider ethical issues related to our technology and its use. We used frameworks such as 'Responsible 100' and 'Digital Catapult' as starting points for the scope of these considerations. Findings of the Committee are shared with Yoti's senior management teams, Board of Directors and our Guardian Council. We have hosted two roundtable sessions to get feedback from a range of industry practitioners on unintended consequences of our technologies. Participants from the UK included the University of Warwick, the University of Keele, the Home Office Biometrics Ethics Committee, the Children's Commissioner's Office for England, the NSPCC, the ICO, GCHQ, and groups such as Women Leading in AI, and techUK.

We have also been actively reaching out to organisations representing various minority groups to seek their views and input, including the UK transgender charity, Sparkle. We have signed the Safe Face Pledge, which encourages companies using artificial intelligence to ensure that facial recognition technology is not misused. We have asked the US Centre for Democracy & Technology to perform a deep dive with full access to our CTO and tech team. We have sought comment from World Privacy Forum and Future of Privacy Forum. In addition, we commissioned a report from a leading academic which reviews the accuracy and bias mitigation of the Age Scan algorithm.

## Data used to build the model

Developing a machine-learning system to estimate human ages requires a data set of facial images of verified age. These are obtained by Yoti with consent during the onboarding process for the Yoti app. By training our deep neural network on what faces of different ages look like, the software can then accurately estimate an age of a face it has not seen before. By tagging our data set with metadata on gender, skin tone and other characteristics we can ensure the training data is not skewed to one demographic more than another, and when testing our model we can report on accuracy rates across gender, as well as other factors. The more data we have, the better the software gets and the more accurate the results.

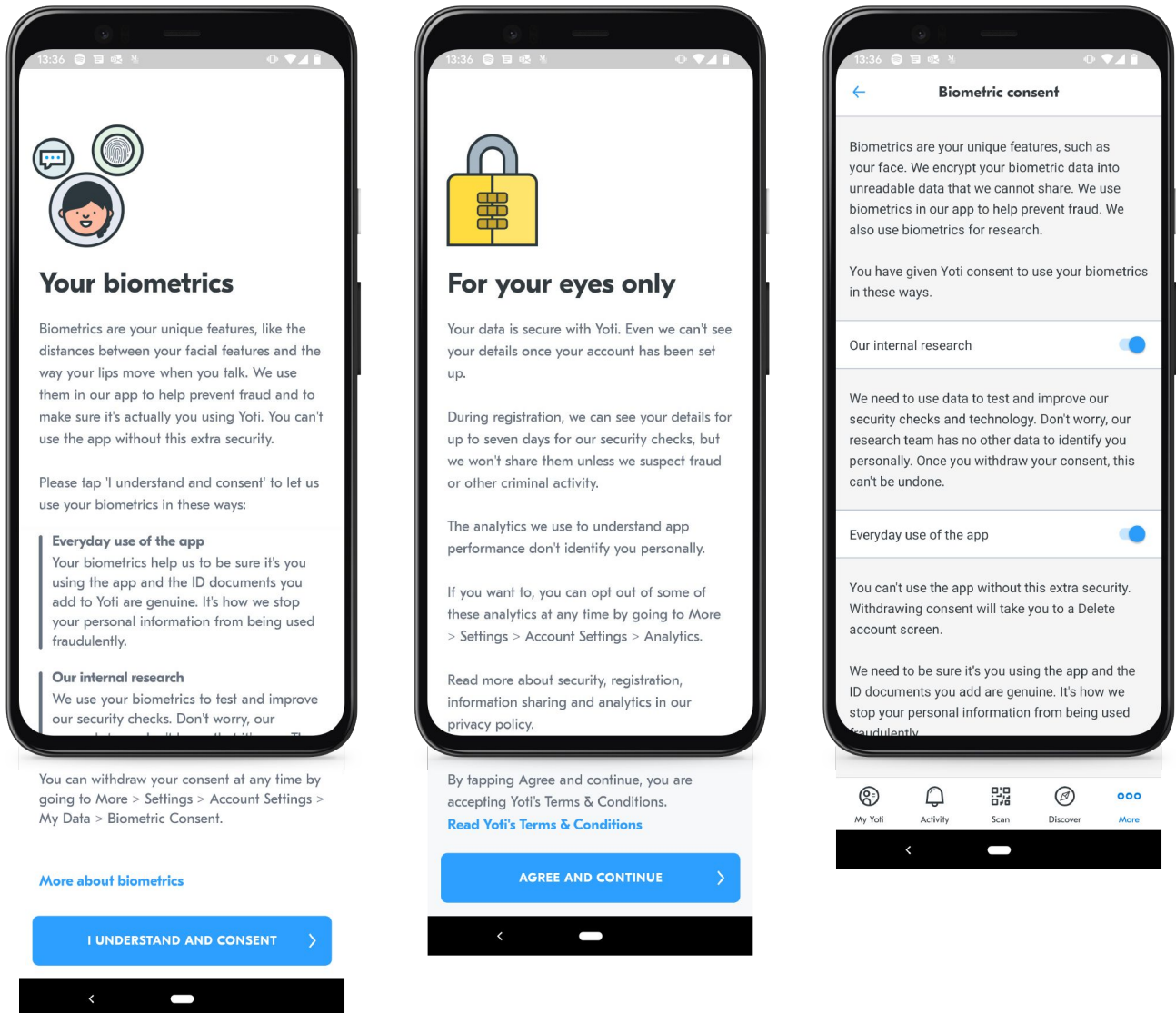
## How can people opt out of R&D?

We provide information to users at onboarding about our use of biometrics with links to more details, including the privacy notice, where the use of user data for R&D is extensively detailed. Annex 1 shows the current onboarding screen and the screen where users can opt out of their data being used for R&D activity. Any user can go to the app settings at any time and opt out of R&D use of their data. This prevents further data from that user being sent to R&D, and it deletes all the data associated with that user that is on the R&D server and available for R&D to use. We have chosen to automatically delete the existing data when a user opts out or deletes their account, even though we do not legally have to under the research provision in GDPR article 17(3)(d).

Note: we use a privacy-by-design approach (hashed numbering) so that although we can find data of a specific user to action the data deletion, there is no way to recreate a specific user's identity from the R&D data.

## On-boarding and R&D opt-out screens in the Yoti app

We provide information to users at onboarding about our use of biometrics with links to more details, including the full privacy notice, where the use of user data for R&D is extensively detailed. Users can opt out of their data being used for R&D activity at any time, via the settings on the app.



## Accuracy by age, gender and skin tone

We recommend that Age Scan is tested for parity of outcomes with different demographics in every use case where it is deployed. The table below shows our testing results for Age Scans accuracy for persons of different age, gender and skin tone.

Age Band	Gender								
	Female				Male				All
	Skin Tone (Fitzpatrick Scale)								
	Type I & II	Type III & IV	Type V & VI	All	Type I & II	Type III & IV	Type V & VI	All	
	MAE	MAE	MAE	Average MAE	MAE	MAE	MAE	Average MAE	Average MAE
13-15	1.43	1.80	2.11	1.78	1.14	1.44	1.67	1.42	1.60
16-17	1.10	1.17	1.25	1.17	0.90	1.10	1.07	1.03	1.10
18-24	2.01	1.97	1.96	1.98	1.65	1.84	1.91	1.80	1.89
25-29	2.84	3.35	4.24	3.48	2.23	2.49	2.60	2.44	2.96
30-39	3.17	3.84	4.18	3.73	2.70	2.99	3.17	2.96	3.34
40-49	3.14	3.80	4.72	3.89	2.78	3.01	3.22	3.00	3.44
50-60	3.21	4.59	5.74	4.51	2.93	3.57	3.76	3.42	3.97
All	2.09	2.60	2.39	2.36	1.87	2.31	2.42	2.20	2.28

## False Positives

By a 'false positive', we mean a situation where, for a given age of interest, Age Scan would incorrectly estimate that a subject was over that age, when in fact they were under it.

When Age Scan is deployed in any given use case, we recommend configuring a threshold age above the age of interest, thus creating a 'buffer' to provide an acceptably low false positive rate.

The table below presents results of our testing, considering an age of interest of 18, showing false positive rates for various buffer sizes (thresholds).

		Actual Age				Average False Positive Rate (weighted equally for each age)
		14	15	16	17	
<i>Test Sample Size</i>		2,626	6,929	10,357	10,367	
<i>Thresholds (years)</i>	20	0.80%	1.00%	2.20%	4.95%	2.24%
	21	0.27%	0.49%	1.08%	2.70%	1.13%
	22	0.15%	0.22%	0.66%	1.50%	0.63%
	23	0.04%	0.14%	0.31%	0.87%	0.34%
	24	0.04%	0.09%	0.18%	0.56%	0.22%
	25	0.00%	0.07%	0.10%	0.27%	0.11%



## Example use cases

**Social media** - enabling a site to triage 20–100 million users and ascertain if people are under or over age for an age gated area e.g. for 13–17s or over 18s

**Reporting sexting images** - enabling an under 18, with or without a document to share the fact that they are under 18 and so entitled to 'be forgotten' and apply to share a url and have that indecent image removed

**Dating, Adult content, Gambling sites** - enabling people without documents to be able to prove that they are over 18 to access an age restricted area, to meet national laws. Avoid inappropriate contact between adults and minors.

**Retail and ecommerce** - enable people without ID documents to prove age (24% of UK citizens over 18 do not have photo ID, so unable to buy age restricted goods); reduce the volume of aggression, abuse to retail staff at the point of challenging for age (6000 incidents of abuse per day), reduce training burden on retailers (to train staff to review and recognise fake and international IDs), give people an option to not have to carry physical ID (1.4 million people lose either passport or driving license each year in the UK and are at increased risk of identity theft and fraud - with direct and indirect cost to the individual of over £1k).

## Ease of integration

Integration takes on average 2-4 hours; it is simple via our API. More information for developers can be found [here](#).

### Reviewed by



### Some of our accreditations





To find out more visit  
[yoti.com](https://yoti.com)