

# The Arm 2020 Predictions Report

5G | SMART IoT TECH | AI

As the 5G rollout begins and artificial intelligence spreads into more and more smart Internet of Things devices, consumers are ready to embrace the benefits that this new wave of technology will offer in 2020



Introduction

(Click these links to explore the report)

## 5G, Smart IoT Tech and AI Dominate Public Interest in This Year's Survey

Welcome to the second Arm Predictions Report, the result of an annual survey into global consumer attitudes and expectations toward the latest technology trends.

This year's findings, drawn from a sample of 750 people in the run up to the 2019 holiday season by research firm Northstar, paint a picture of cautious optimism. Despite growing concern over whether device makers are doing enough to secure customer data, we're welcoming more smart technology into our lives and homes than ever before.

Consumers feel that something big is coming—and for many, that something is 5G. In fact, when we asked respondents to name the one thing that changed the way they thought about tech in 2019, the most common answer given was the arrival of 5G infrastructure.

AI, 5G and the Internet of Things (IoT) are grouped together in this report as we believe the simultaneous maturation of these technologies will revolutionize how we use data. The IoT will gather it more abundantly, AI will process it more intelligently and 5G will distribute it faster and with higher capacity.

We refer to this interplay as the *Fifth Wave of Computing*, and it's something that will touch every aspect of technology, from the most unique industrial applications to the mainstream smart devices finding their way into consumers' homes.

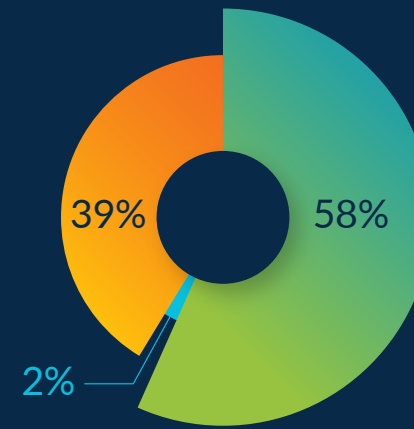
And it's consumers that we put first and foremost in this report. How are these new technologies perceived by their end users? Who's excited? Who's concerned? What's topping wish lists this holiday season, and what's still struggling for consumer mindshare?

Whatever your interest in technology—casual user, influencer or developer—we hope this report provides a useful window into public opinion, as well as some exciting predictions from Arm along the way.

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The Year in Review

## The Role of Technology in 2019 vs 2020



In 2019, technology has become more a part of my life

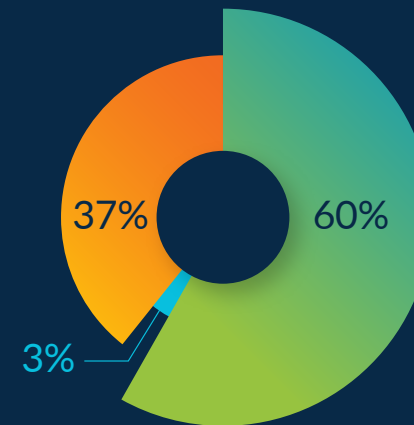
The impact of technology on my life hasn't changed

In 2019, technology has become less a part of my life

Region					
UK	GERMANY	FRANCE	NORTH AMERICA	CHINA	JAPAN
48%	45%	56%	54%	95%	47%
% More a part of my life					

% More a part of my life	Age		
	18-29	30-49	50+
74%	65%	38%	

## Time Spent Using Technology in 2019 vs 2018



I spent more time using technology

I spent the same amount of time using technology

I spent less time using technology

Region					
UK	GERMANY	FRANCE	NORTH AMERICA	CHINA	JAPAN
46%	51%	60%	58%	93%	47%
% Spent more time using technology					

% Spent more time using tech	Age		
	18-29	30-49	50+
74%	65%	38%	

## In the News

## 5G, Folding Phones and Failed Cryptocurrencies

Which technology headlines piqued public interest in 2019? Some specific events stood out for us—and we wanted to understand to what degree these headlines had reached consumer radars too. 5G was big news, especially in China where 34 percent more respondents were aware of the 5G network rollout than had heard about China landing a probe on the dark side of the moon.

We also asked our respondents to tell us about any other notable stories in 2019, with some truly interesting insights into how the news can shape the public's view of technology. Savvy respondents noted reasons to be cautious over cryptocurrencies, flagship mobile processors getting a 5G injection and the defeat of a human champion at the ancient Chinese board game Go by Google's AlphaGo AI.

## Arm Predicts

Consumers Wise Up to Sustainability  
Benefits of AI in Endpoint Devices

Tech will find itself squarely under the sustainability spotlight in 2020, with the rising carbon footprint of power-hungry traditional datacenters a mainstream discussion. As a result, tech-savvy digital activists such as Greta Thunberg will start talking about the greenhouse gas reduction benefits of running AI processing closer to where data is collected, at the network edge and in endpoint devices.

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## The Year in Review

arm  
NEWS

GLOBAL 5G NETWORK ROLLOUT BEGINS: 69%

SAMSUNG UNVEILS FOLDING PHONE: 46%

CHINA LANDS PROBE ON DARK SIDE OF MOON: 30%

PARALYSED MAN WALKS USING  
MIND-READING EXOSKELETON: 28%

FIRST FORTNITE GAMING WORLD CUP: 19%

10:50 | ☀

Other headlines that shaped our respondents' view of technology in 2019:

DRONES SHUT DOWN LONDON'S GATWICK AIRPORT // MORE THAN 1,000 CRYPTOCURRENCIES HAVE ALREADY FAILED // HUAWEI BUILDS 5G MODEM INTO FLAGSHIP KIRIN 990 PROCESSOR // GO PLAYER BEATEN BY GOOGLE AI // GOOGLE STADIA BRINGS CLOUD GAMING TO DEVICES // 5G TO CREATE NEW ERA OF ARTIFICIAL INTELLIGENCE

Top Purchases 2019

## Smart Speakers & Wireless Earbuds Knock 4G Smartphones from Top Spot

2019 was the year the first 5G-ready smartphones became available in the countries we polled, with China leading adoption rates – almost 1 in 5 respondents from the country said they'd upgraded already. Adoption rates in the US, Europe and Japan are significantly lower (all 5 percent), but global excitement over 5G is far more evenly spread. This may suggest that adoption may be linked to network availability or affordability rather than lack of interest.

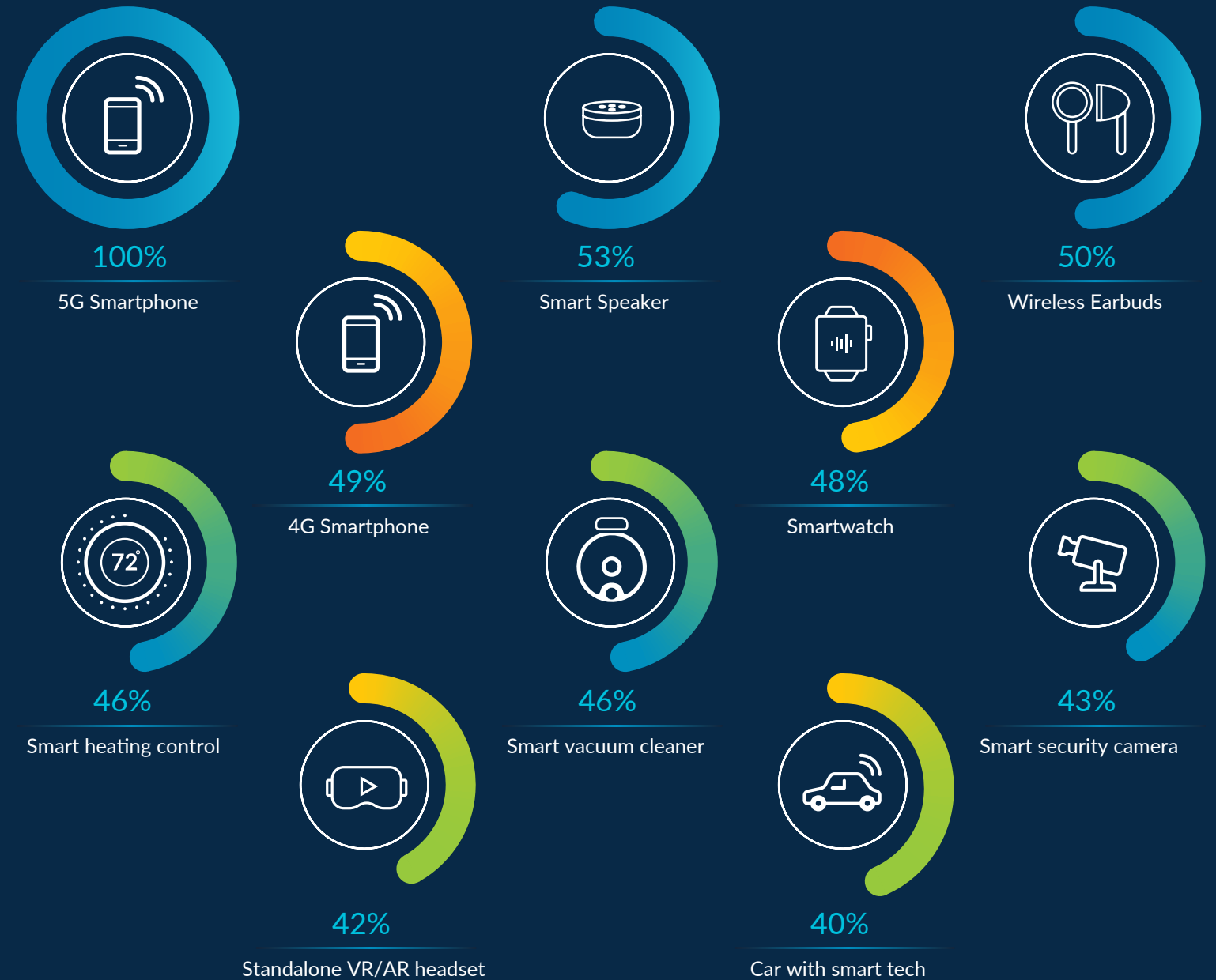
Meanwhile, smart audio—smart speakers and wireless earbuds—displaced 4G smartphones as the next most purchased device across the whole of 2019. Strong sales of smart home appliances such as heating controls, security cameras and vacuum cleaners proved that consumer enthusiasm for outsourcing household management to AI-powered technology was strengthening.

### Arm Predicts

#### Unmissable Immersive Experiences take VR Mainstream in 2020

Fewer than 1 in 10 respondents now want a VR headset as a gift but the technology will receive a major boost in 2020 thanks to new high-profile immersive experiences coming: including Half Life: Alyx, the long-awaited next chapter in Valve software's celebrated Half Life gaming franchise, and VR content in a range of sports and venues during the 2020 summer Olympics in Tokyo. 2020 will be a turning point for VR with headsets becoming must-have content viewing devices for tech-advanced businesses. By December, they will also be making serious inroads onto consumer gift lists.

## Percentage of Owned Devices Purchased This Year



## Consumers Prioritize 'Do-All' Devices Such as Smartphones, Laptops, Tablets over Smart Home Tech

Every year new smart device categories emerge, each promising new and innovative ways to perform everyday tasks. But while consumers are warming to smart home gifts, the smartphone remains the undisputed king of the Christmas list for a third of respondents. And while general phones remain festive favorites, the models with the most allure are those packing 5G technology.

With 5G smartphones commanding a premium, and no currently-available 5G offering from Apple, it's perhaps understandable why 5G handsets haven't yet knocked 4G devices from their throne. But with a year to prove its mettle, we expect 5G to dominate holiday wish lists in next year's survey.

Interestingly, when it comes to gift-giving this year, the results are far less cut-and-dried. Smartphones retain the top spot, with almost 1 in 6 respondents wrapping one up for a loved one this year. However, the humble Bluetooth speaker proves just as enticing a gift to give: it may not be cutting-edge technology, but it's an affordable stocking filler.

It's also worth noting that while the vast majority (93 percent) of respondents would be happy to receive one or more of the smart gadgets on our list, nearly a third admitted they weren't going to give any. Wooden horse, anyone...?

### Points of View

#### Much More Than A Cellphone

*"My smartphone does everything my computer does but faster and the camera is fantastic... now I feel like I don't need a computer or a camera."*

Female, 30-39 years, Japan

## Top Gifts to Receive and Give This Holiday Season



Spending

## Majority Will Spend More on Tech Gifts This Year, Despite Tighter Purse Strings for Some

Last year, 1 in 5 people said they were planning to spend 'a lot' more than they did in 2017 on smart tech products. We see the trend continuing in 2019 with almost a quarter of respondents expecting to spend more this holiday season than they did last year. As with respondents' expectations in 2018, the prevailing justification for spending big in 2019 is a perceived uptick in features and performance.

Of the minority (13 percent) of buyers who said they'll be spending less on gifts than they did last year, more than half cited personal circumstances as the key reason for showing restraint. Only 3 percent of respondents said they were curbing their spending because this year's tech wasn't something they wanted to give or receive. This suggests that while manufacturers are on the right track with their technology, affordability remains just as important a feature.

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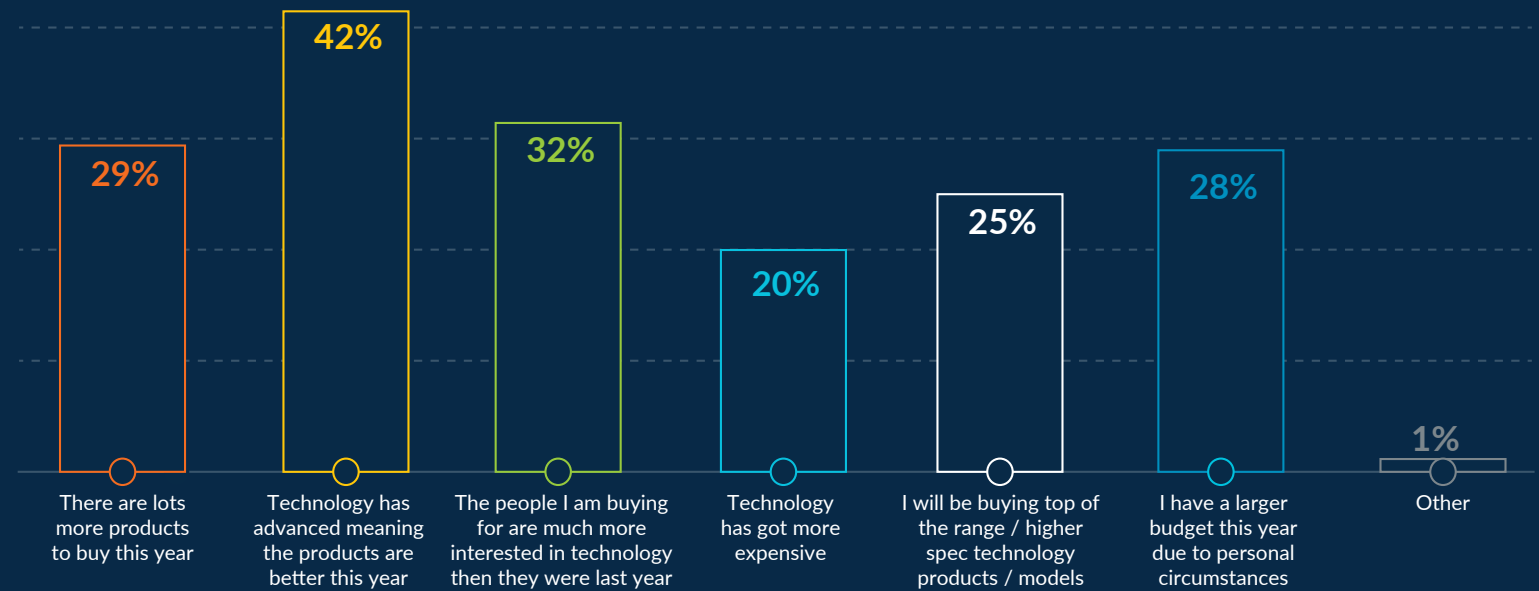
This Holiday Season

**Arm Predicts**

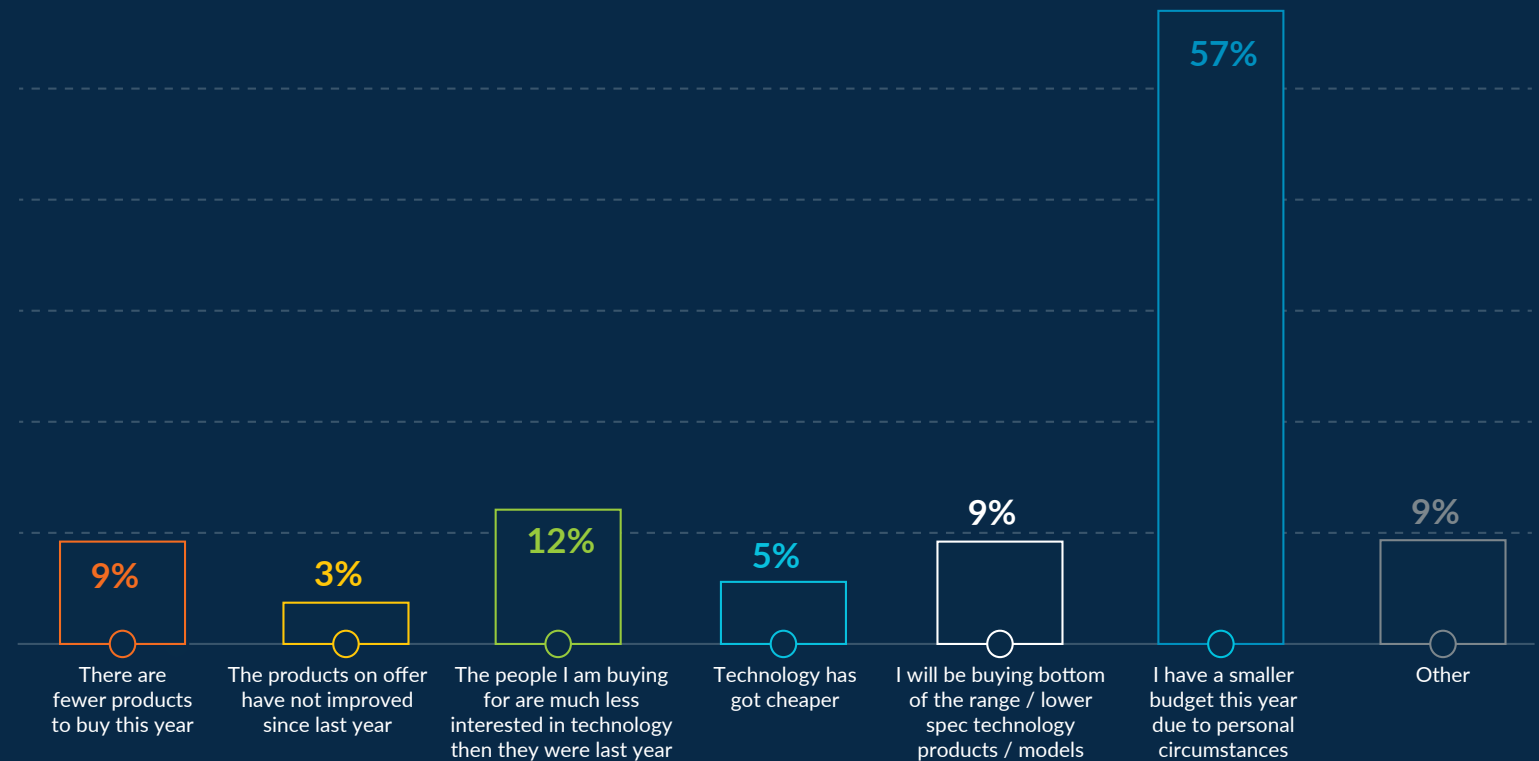
**Retailers Use AI to Tailor Customer Experiences**

2020 will see a symbiosis of AI and customer data used by top retailers to provide unique, targeted customer experiences. In-store IoT tech such as infrared foot traffic monitors, beacons and interactive kiosks will work with customer data platforms (CDPs) to provide new data insights informed by customers' Point of Sale transactions, web browsing, mobile apps and customer call centers. Initially, this may feel slightly intrusive to some customers, but they'll get more on board as they start to benefit from more rewarding shopping experiences and personalized deals giving them better value.

## Reasons to Spend More on Technology



## Reasons to Spend Less on Technology



Personal Devices

## Smart Devices Everywhere in China—Smartphones Most Owned Device Globally

Smart devices are becoming increasingly ubiquitous. In fact, only 3 percent of 18-29 year olds don't own a single smart device—though that rises to 21 percent in the 50+ category. In China, the number of respondents not owning any smart devices is a big, fat zero. Across the board, the device most likely to be owned is—you guessed it—the smartphone (79 percent).

Devices with screens (smartphones, tablets, TVs) remain the most-owned device category. However, newer tabletop smart displays and video calling devices such as Facebook's Portal and Amazon's Echo Show are still somewhat niche, with only 8% ownership, suggesting their value has yet to be seen.

The smart vacuum cleaner crept onto our top ten owned devices list this year, yet its outdoor cousin—the smart lawnmower—takes the dubious title of least-owned device with only 3 percent of respondents possessing one globally. Interestingly, France stands out in its adoption of robot help: almost 1 in 10 respondents in France told us they own a smart lawnmower.

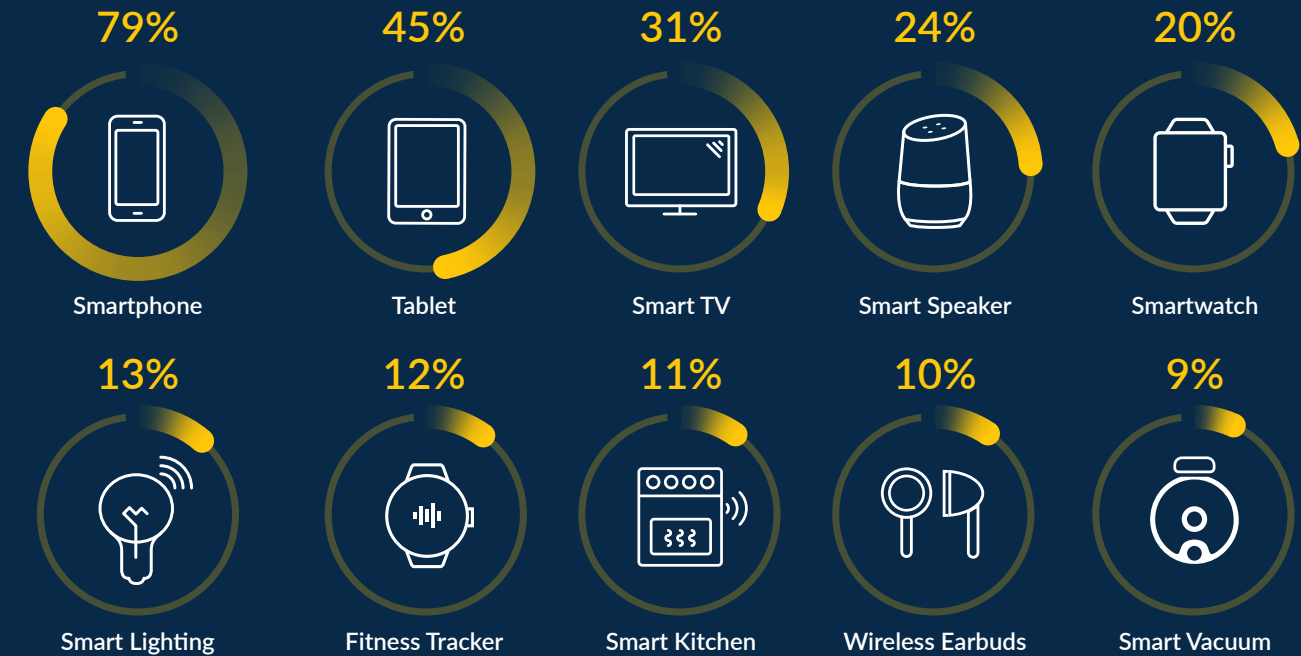
As we found last year, consumption remains the order of the day in 2019—entertainment functions such as music and video streaming are the primary application of smart technology in consumers' homes (54 percent).

### Arm Predicts

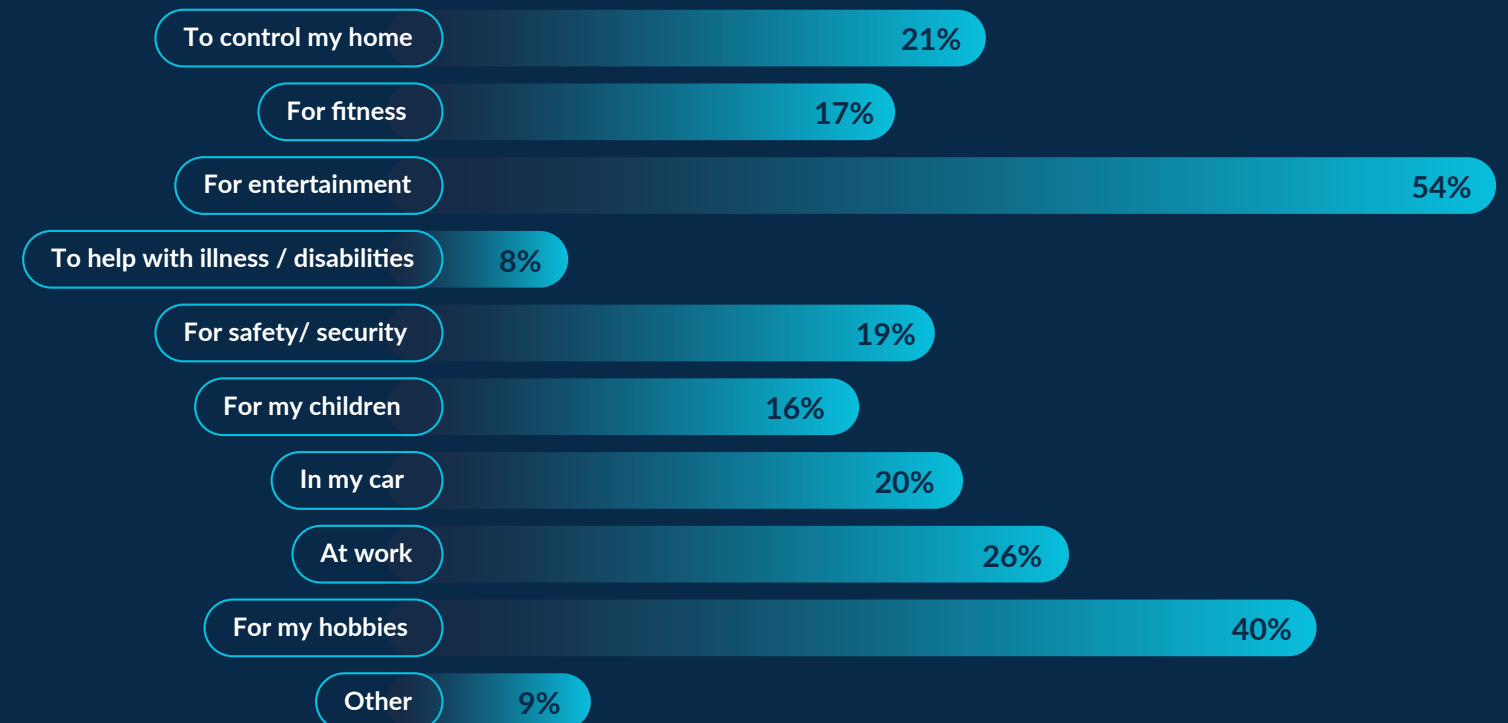
#### 8K Smart TVs Hit 1 Million Mark

Despite the fact that 8K video sources are not yet available for the vast majority of consumers, we think the broadcasting of the 2020 Tokyo Olympics in 8K will lead to a wave of early adopters looking for the best possible live experiences—short of physically attending the games.

## Most Owned Devices



## Uses for Smart Technology





Smart Cars

## Smart Car Ownership Low, But Smart Tech Features Will Affect Future Car Purchases

While smart car technologies such as advanced driver assistance (ADAS) and voice control are rapidly becoming a major differentiator in a crowded market, few people can upgrade to brand-new smart vehicles as regularly as they do with other smart devices.

Perhaps that's why only 13 percent of respondents said they currently owned an advanced smart car.

Despite this, interest in in-car technology remains strong with almost half of respondents claiming they were excited by the allure of a higher-tech driving experience, and a whopping 83 percent said smart technology would have an impact on which car they bought next.

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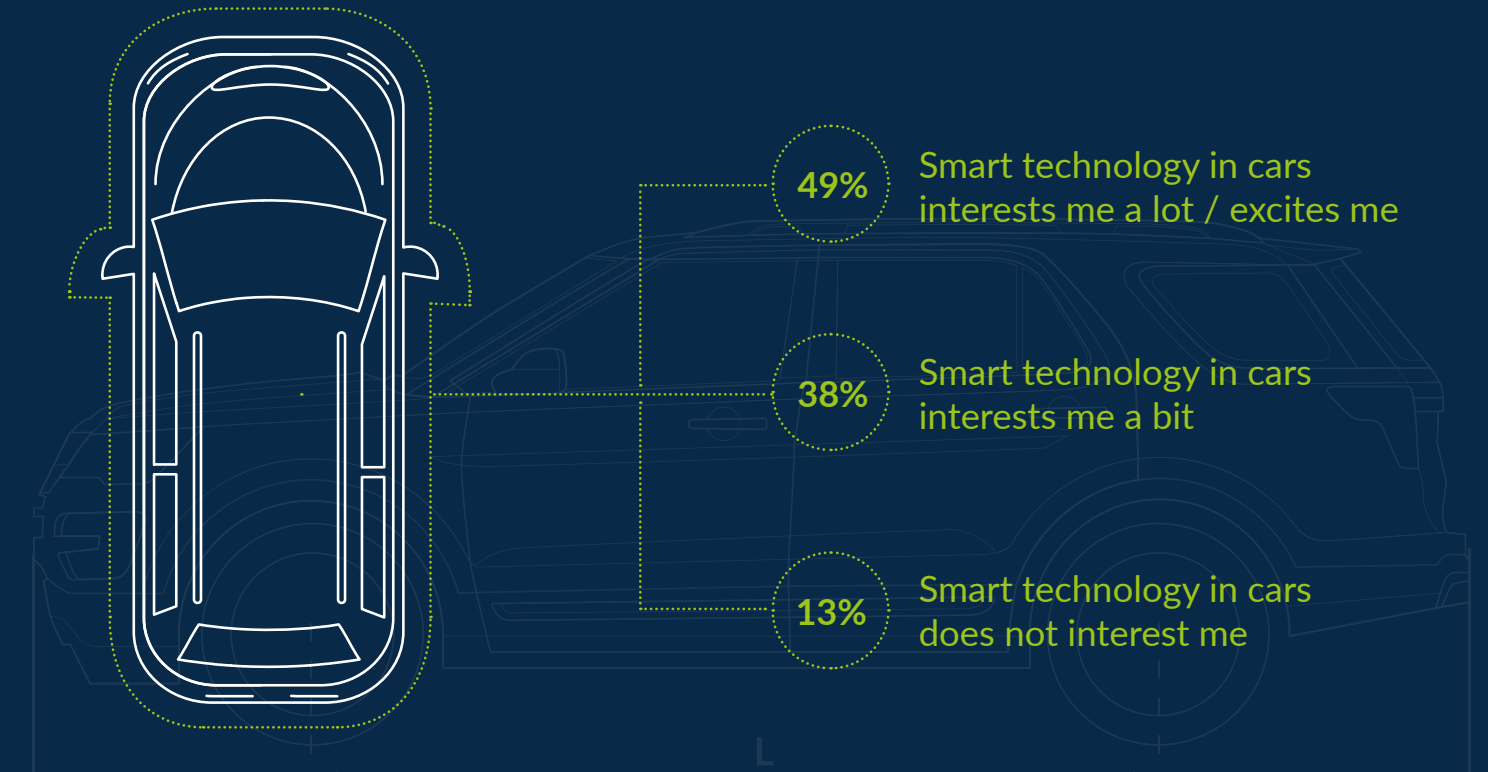
Smart Technology

### Arm Predicts

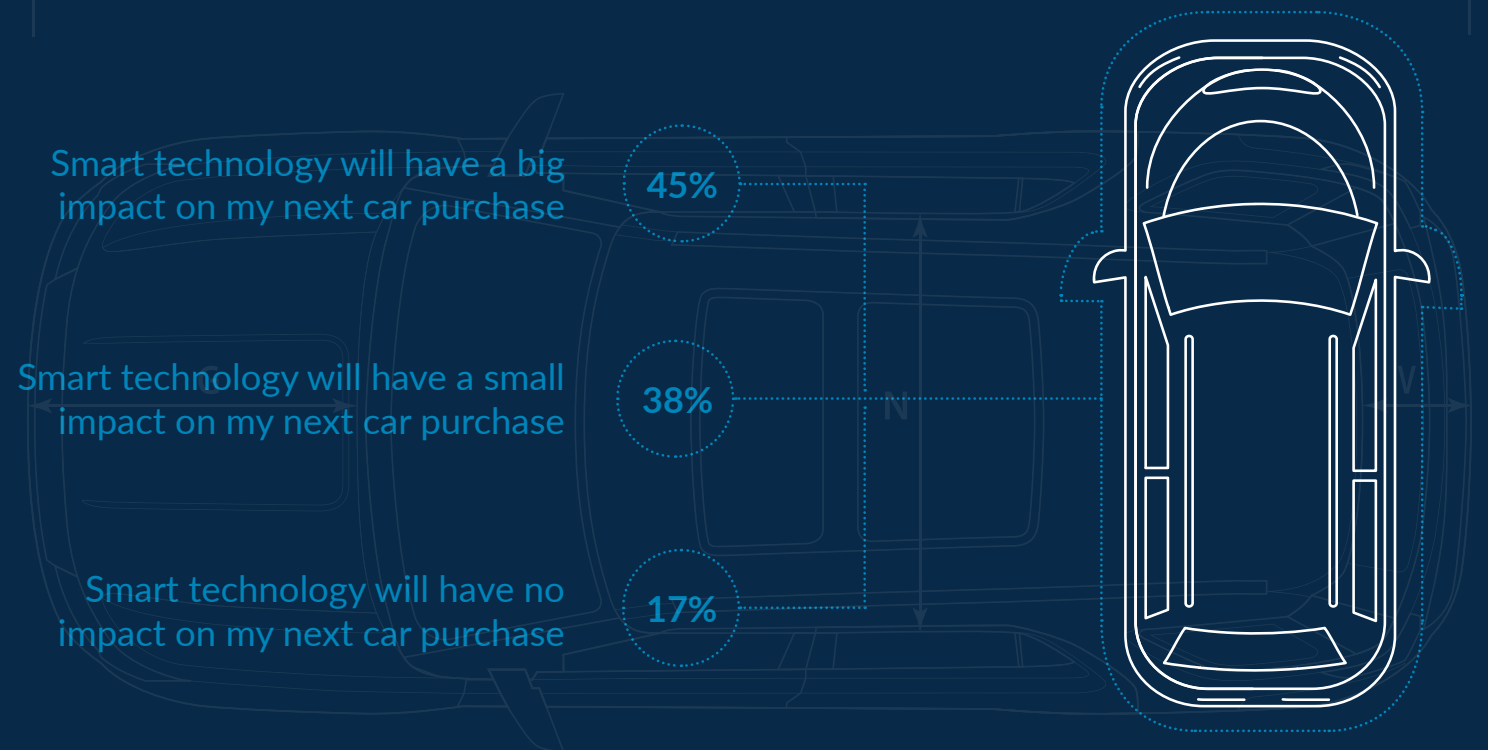
#### 5G Opens Up New Routes for Automakers

In 2020, 5G will open up new levels of automotive connectivity enabling carmakers to explore new infotainment experiences for passengers, including multimedia streaming and more responsive navigation. It'll also open up benefits in vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communications, with potentially life-saving features such as detailed dashboard alerts that warn of unseen dangers ahead.

## Interest in Smart Technology in Cars



## Impact of Smart Technology on Next Car Purchase





## Convenience & Improved Quality of Life Top Reasons to Love Smart Cities

Awareness of smart technology in cities, from the presence of ride-sharing apps to smart payment systems and traffic lights that adjust timings based on traffic flow, continues to grow—albeit at a similar rate to last year.

But while we're yet to see a massive uptick in smart city engagement, 65 percent of respondents noticed more technology in cities than last year, and an even greater proportion (69 percent) said they expected to see more still in 2020. Perhaps even more importantly, the public is beginning to recognize the big benefits smart technology can bring to the urban environment, seeing it as highly conducive to a better quality of life.

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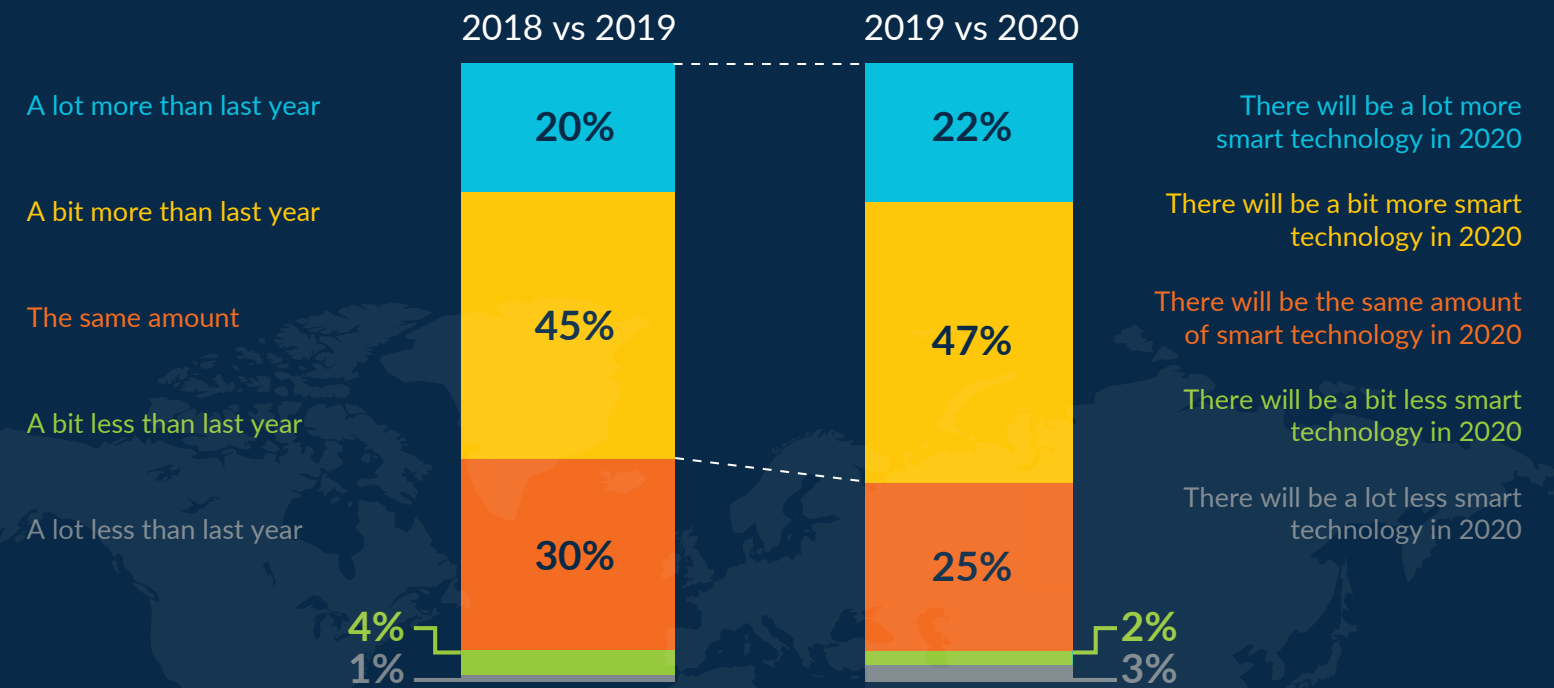
Smart Technology

### Points of View

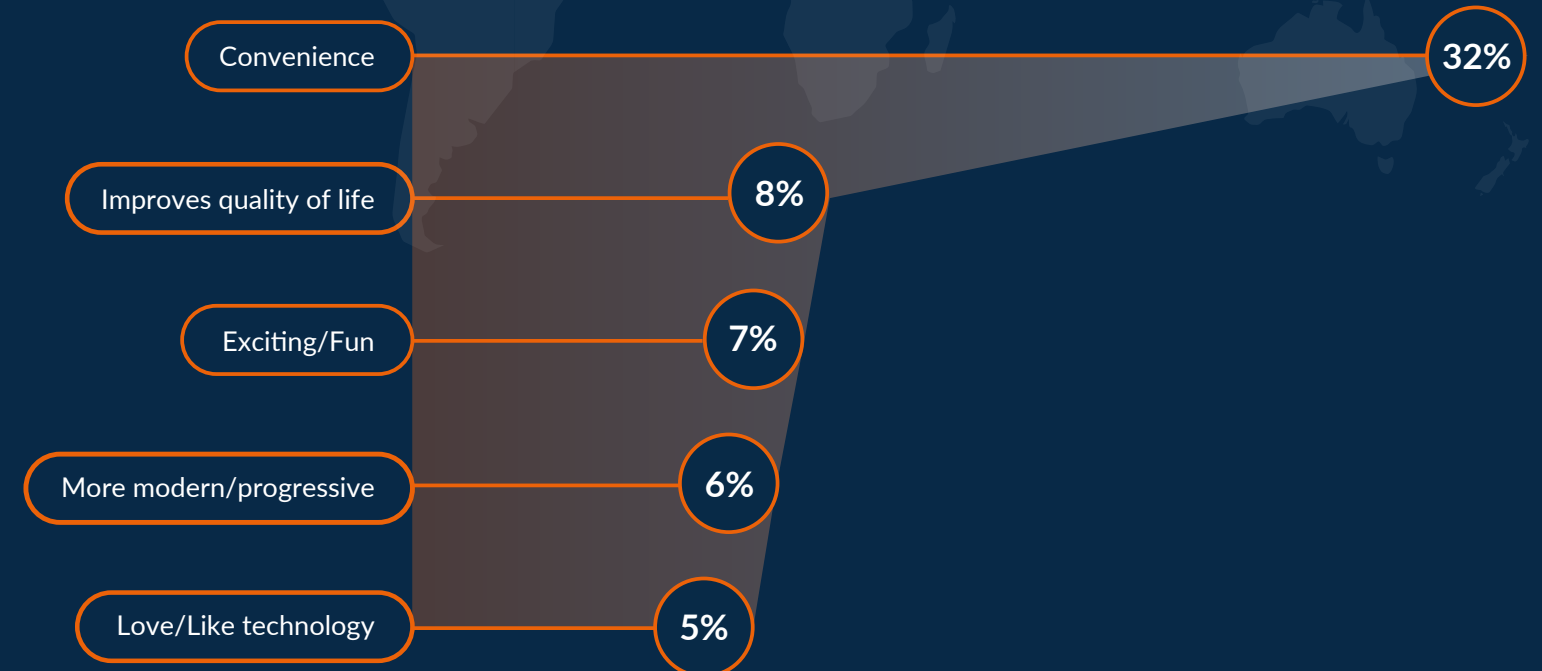
#### Smart Cities Improve Quality of Life

*"From banking and shopping to buying tickets and reducing queuing, smart technology in cities saves me time and effort and increases quality of life for humanity" — Female, 30-39 years, China*

## Smart City Technology Trends



## Why People Love Smart Technology in Cities



Artificial Intelligence (AI)

## Consumers Expect More AI Everywhere, Seek out Intelligent Devices in 2020

Awareness of artificial intelligence is strong overall, with just 14 percent of respondents professing not to know anything about it. Expectations for the technology's proliferation remains at similar levels to last year's survey and continue to demonstrate how highly anticipated an AI-driven future is—with over two-thirds predicting we'll see a lot more AI deployed next year.

AI is increasingly seen as a must-have feature in smart devices, with a small but noticeable increase in the number of respondents (70 percent) aiming to buy one or more AI-powered device next year compared to last year's survey (64 percent).

A notable minority (29 percent) of users don't expect to buy any AI-powered devices next year, though there's a positive correlation between this and the 28 percent of respondents stating they wouldn't buy any smart devices in 2020. As the majority of smartphones and smart home devices now employ AI at some level, it might be that users do not yet fully understand the enabling technology behind common features like facial recognition, computational photography and natural language processing (NLP).

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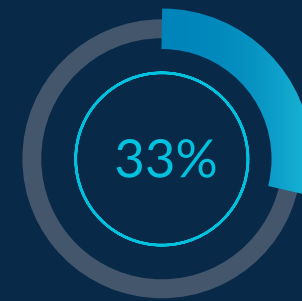
AI, 5G and IoT

### Arm Predicts

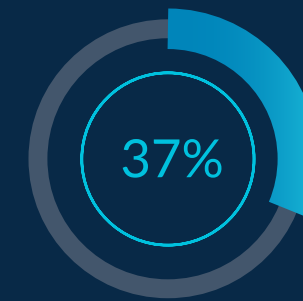
#### AI named Time Person of the Year 2020

In 2017, Unanimous AI's artificial Swarm intelligence accurately predicted Time magazine's Person of the Year for the second year running. But with AIs deployed in increasingly noteworthy pursuits in 2019, from [predicting flood impact in Malawi](#) to [aiding the fight against global terrorism](#), we predict that an AI itself could be named Time Person of the Year in December 2020.

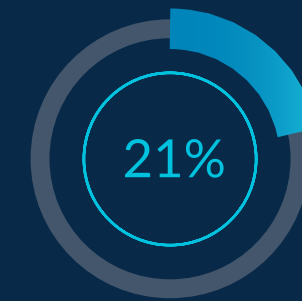
## Anticipation for AI in 2019



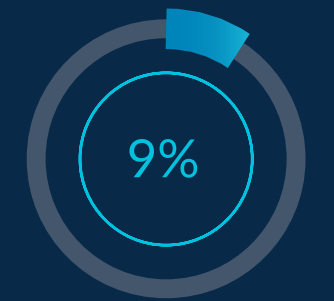
I expect AI to become hugely more widespread than it is now



I expect AI to become a lot more widespread than it is now

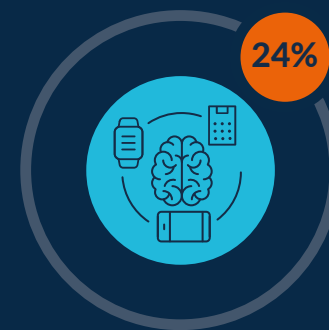


I expect AI to become somewhat more widespread than it is now

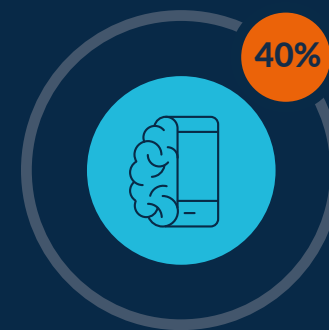


I don't expect AI to become more widespread than it is now

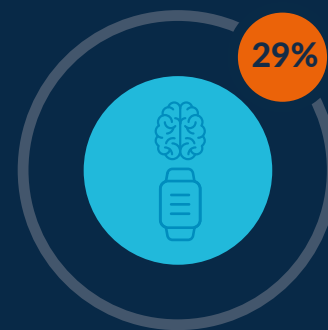
## Likelihood of Buying an AI Device in 2020



I expect to buy multiple devices that are AI-powered



I expect to buy at least one device that is AI-powered



I don't expect to buy any devices that are AI-powered



I will actively look to buy devices that are not AI-powered

## 5G Phones Coveted in 2020, but Price Premium Polarizes Potential Customers

Despite its comparative adolescence, awareness of 5G is already on a par with AI globally, with fewer than 1 in 5 people not knowing what it is. And with two-thirds of respondents expressing positivity about 5G and nearly a third welcoming it with open arms, it's clear that 5G is well on its way to winning consumer confidence.

It's not all a bed of roses though, as there is a residual level of apprehension over the 5G network rollout. Respondents in France and Germany were most concerned (15 percent)—while in China, just 1 percent of respondents expressed some negative feeling towards the technology.

On the positive side, almost a quarter of respondents told us they'll definitely buy a 5G smartphone in 2020. Interest is significantly higher (41 percent) in China than it is in the EU (16 percent), with the US representing the global average (21 percent).

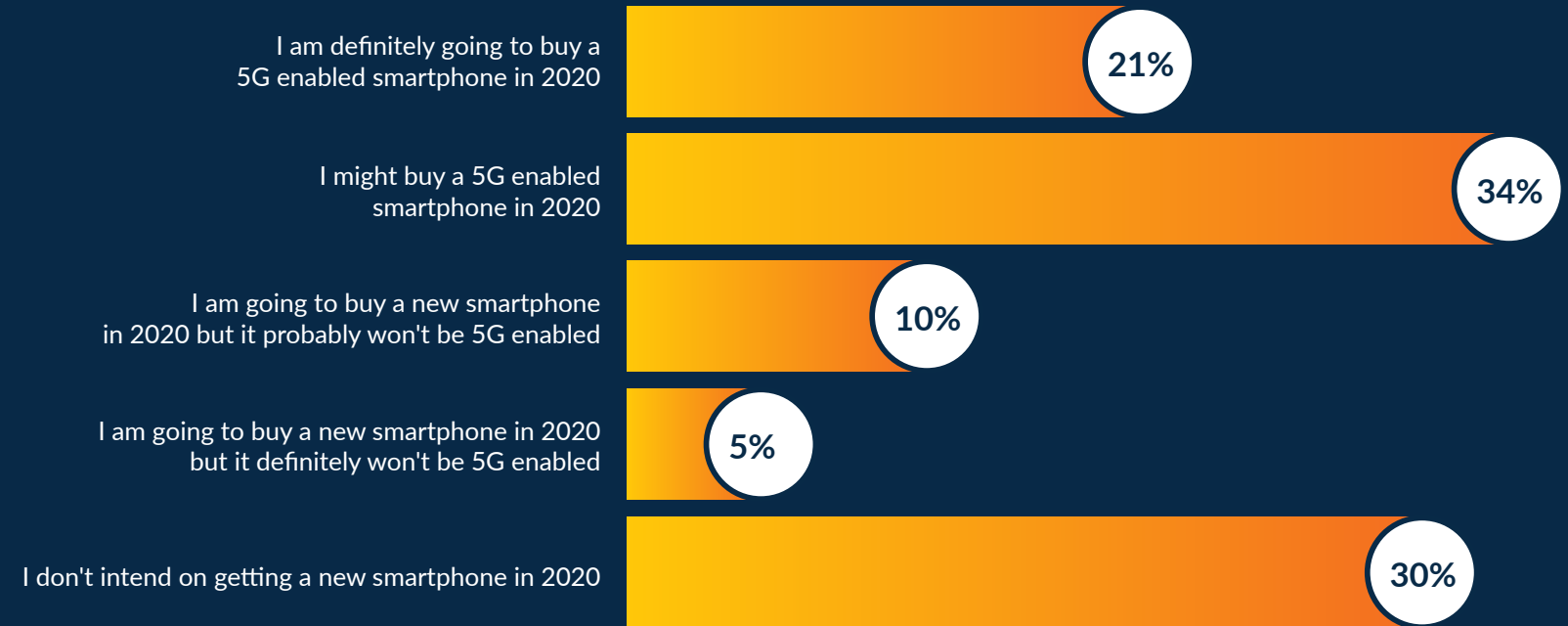
However, when we pointed out to those considering a purchase that 5G phones and subscriptions are likely to command a premium throughout 2020, reactions became polarized—with a quarter saying any premium would put them off upgrading to 5G, while another quarter said they'd pay whatever it takes to get the upgrade. Age provides the greatest variation here—those aged 50+ were most resistant to paying more (39 percent), while those aged 18-30 were most willing (32 percent) to spend big.

### Arm Predicts

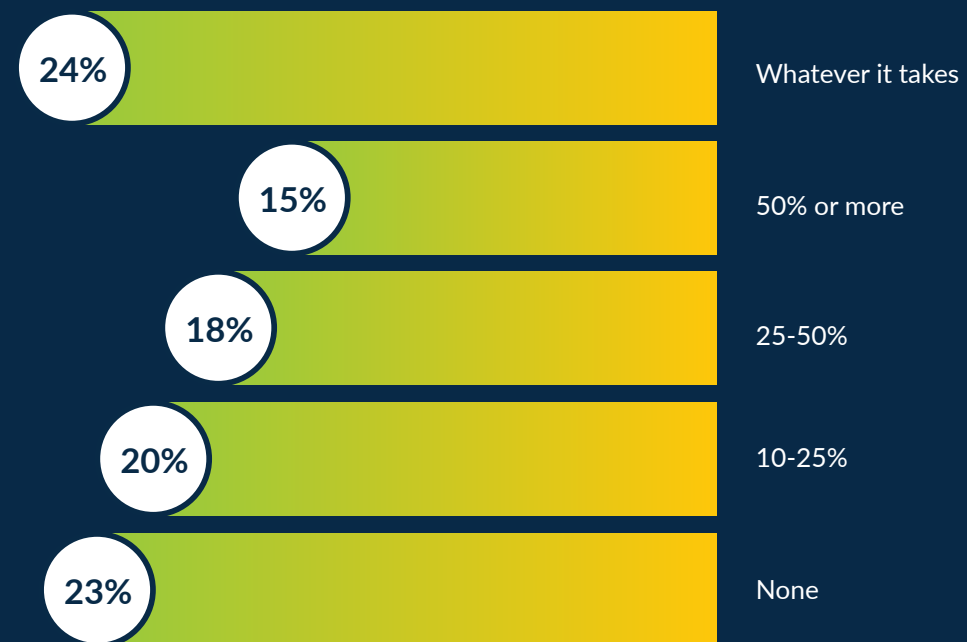
#### 5G Reduces Reliance on Public WiFi

2020 will see the start of the slow death of Wi-Fi in public spaces as the speed, security and reliability of 5G negates the need to connect devices to public WiFi. Home Wi-Fi will still play an important role in connecting smart devices on a local network and it will be reinvigorated by the new Wi-Fi 6 standard.

## Likelihood of 5G Device Purchase in 2020



## Acceptable Premium for 5G in 2020





## Internet of Things (IoT) Still Not Widely Recognized, Despite Widespread Device Ownership

The advance of artificial intelligence (AI) has been a shot in the arm for the Internet of Things (IoT). Given the ability to think for itself, the IoT is shrugging off its original definition as a network of tiny industrial sensors and grown to embrace a diverse host of AIoT (AI + IoT) endpoint devices, all the way from smartphones to autonomous vehicles.

Yet while the industry may categorize any endpoint device as an IoT device, that's not a message recognized by consumers as 40 percent of respondents admitted they had no idea what the Internet of Things is!

This is perhaps why opinion over whether the impact of the IoT is so evenly spread. Despite a comfortable majority (60 percent) expecting some impact in 2020, that same 60 percent say the IoT has yet to demonstrate a major role in their lives. Job started, but certainly not done.

### Arm Predicts

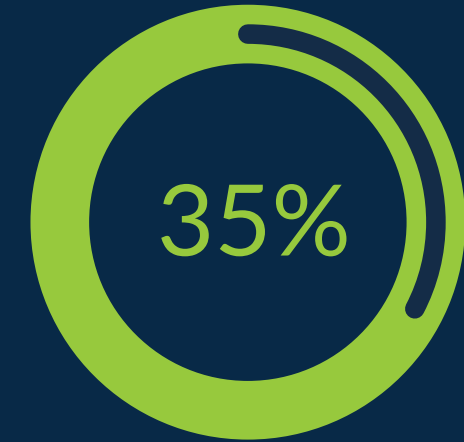
#### AI Will Drive IoT Data in 2020

The value of Internet of Things data in commercializing artificial intelligence will become apparent in 2020, with more than half of all extensive IoT-enabled companies using physical real-time data from IoT devices to advance their AI business goals.

## Perceived Impact of IoT in 2020



I expect the IoT to significantly impact my life in 2020



I expect the IoT to slightly impact my life in 2020



I don't expect the IoT to impact my life too much in 2020



I don't expect the IoT to impact my life at all in 2020

2018 vs 2019

## Consumers Increasingly Wary of How Private and Secure Their Data Is

In Arm's experience, many companies have historically weighed investment in security against the cost of extending their time-to-market or introducing design complexity. But as the world moves toward a trillion connected devices over the next 20 years, consumers increasingly expect their devices to be born secure, upgradable and managed from end to end.

Yet with the majority of respondents feeling just as concerned as last year over the privacy and security of their data and almost a third expressing greater concern, it's clear that the trust simply isn't there yet. This has to be an industry priority.

### Points of View

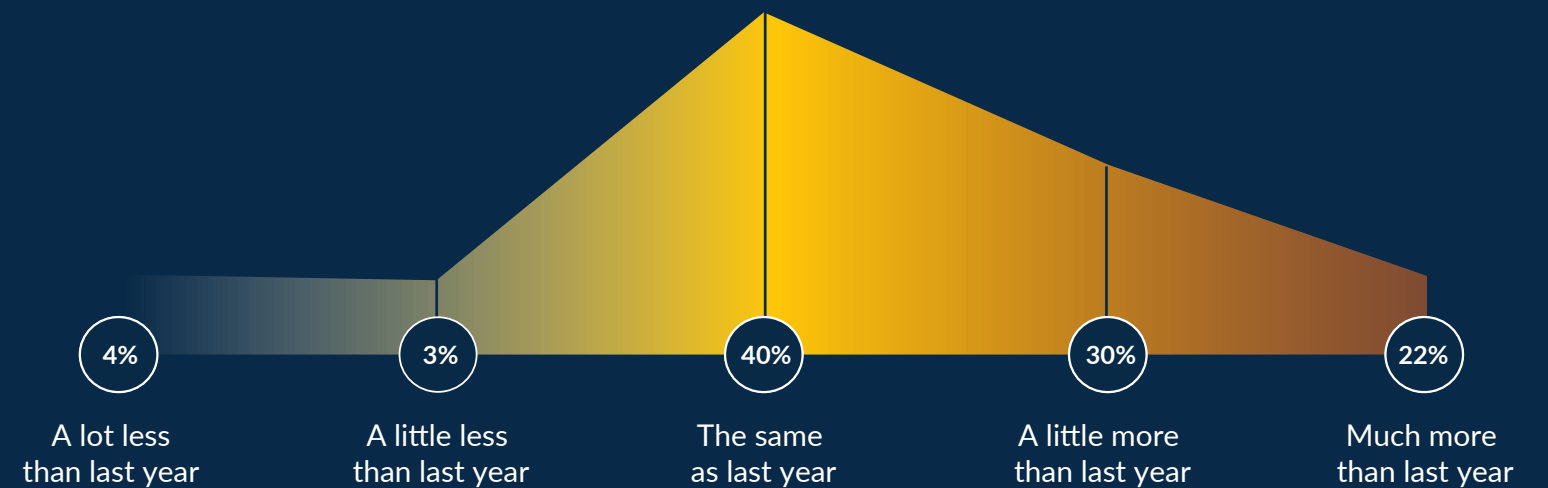
#### Companies Aren't Serious About Personal Data

*"People have bought into giving up privacy for convenience. Given the number of data breaches each year, it's evident companies aren't being serious about the personal information they gather. It's our job to determine what, if any, we allow them to have. If we don't take control they'll just take what they want, when they want."* — Male, 50-59 years, USA

## Concern over Data Privacy and Security in 2019



## Data Privacy and Digital Security as a Factor in Purchase Decisions



## Consumers Would Pay Premium for Robust Security, but Unsure What to Look For

Security is a growing factor in consumers' buying decisions. So much so that two-thirds of respondents said they'd be willing to pay a premium of 20 percent or more for a device they knew they could trust. There's some variation globally though: UK respondents were the most reluctant to pay more, with 45 percent saying any price premium would put them off. In China, meanwhile, only 13 percent felt this way.

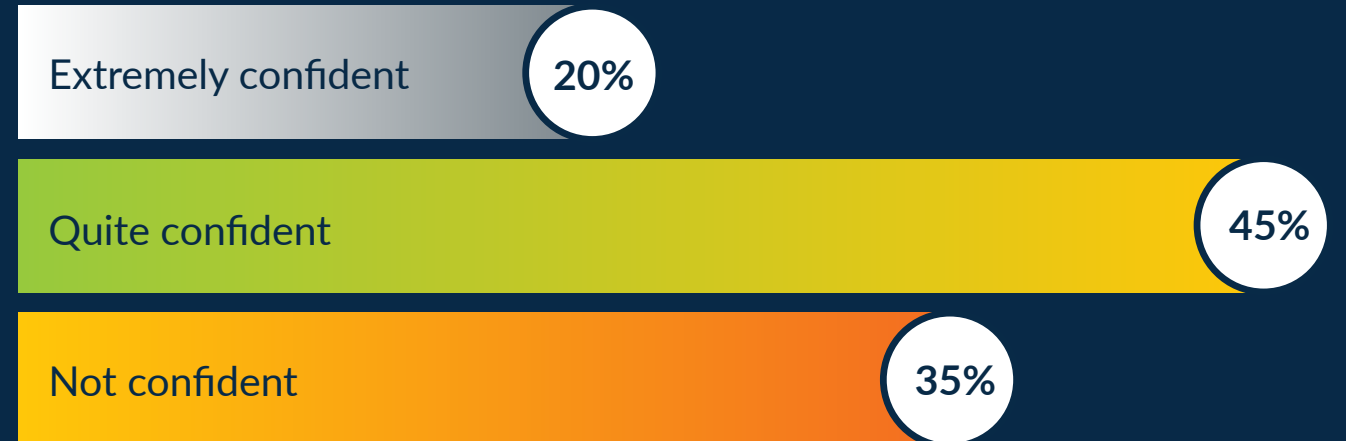
While 1 in 5 respondents felt extremely confident they knew how to identify whether a device was secure, we think good security determination remains a tough ask for most consumers. As such, the technology industry must keep doing its utmost to uphold the digital social contract governing trust between technology makers and technology buyers.

### Points of View

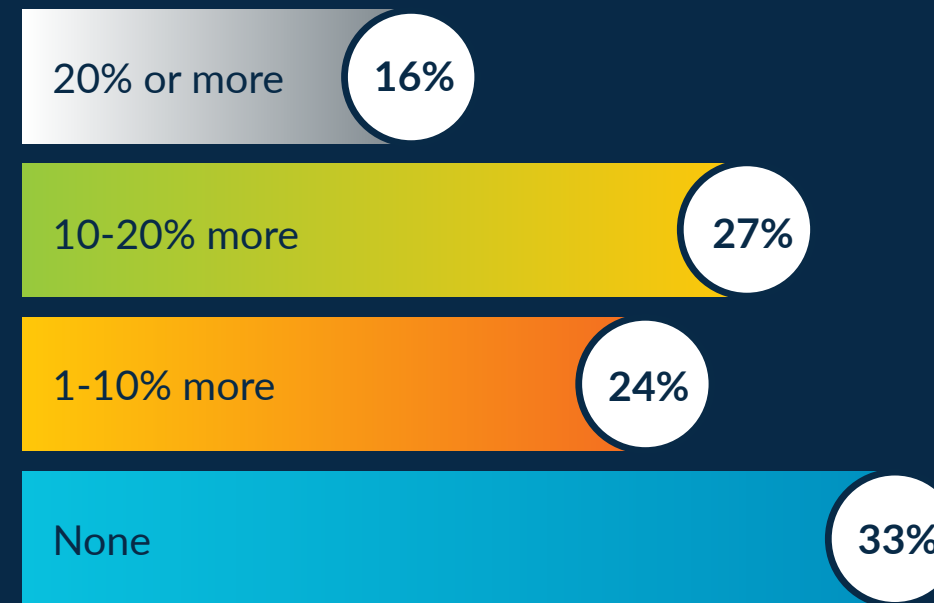
#### Tech Giants Must Focus on Keeping End Users Safe

*"The plethora of cyber-attacks and data breaches shows me that, whilst the tech giants are completely focused on 'brave new worlds', they are not putting as much effort into ensuring their technologies are secure from abuse and keeping end users safe." — Female, 60-70 years, UK*

## Confidence in Identifying Whether a Device is Secure



## Premium Paid for a Truly Secure Device





## Companies Failing to Assure Concerned Public of Security Commitments

More than ever, tech companies must reassure customers that the devices and services they offer are secured against privacy and security risk. A significant majority of respondents (76 percent)—even more so than last year—want to see companies doubling down on device security.

There's also a perceived correlation between the amount of technology and privacy risk with more than two-thirds of respondents concerned that the more technology they use, the greater the risk that their private data might be compromised.

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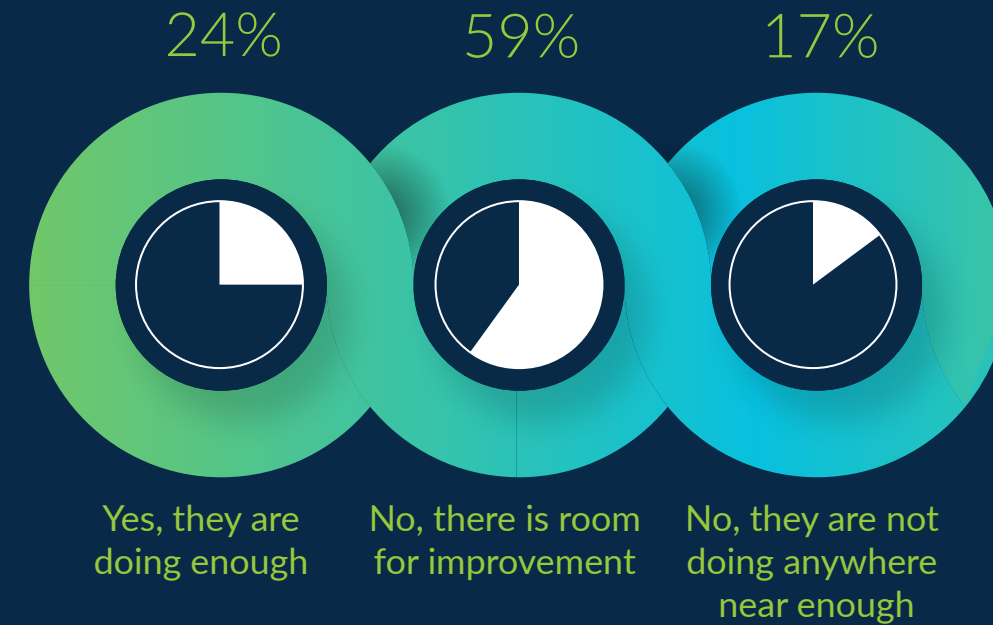
Security, Privacy & Trust

### Arm Predicts

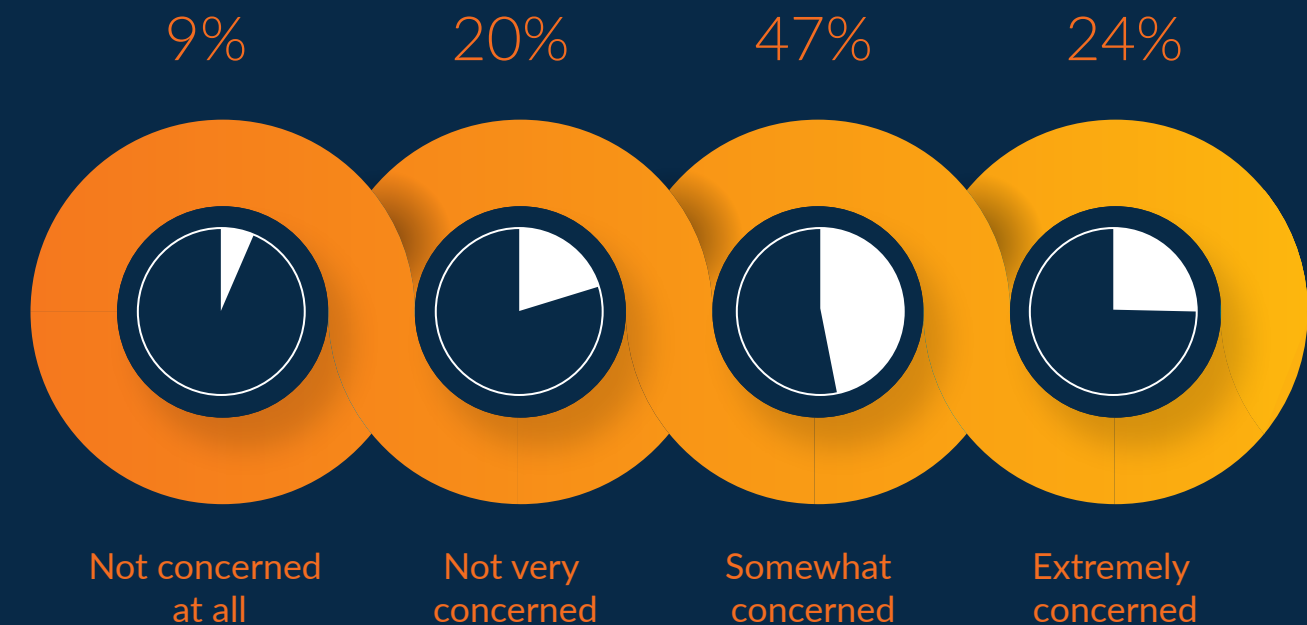
#### Device Makers Go on Charm Offensive over Security

Responding to increased regulation and public scrutiny in 2020, responsible device-makers will find clear ways to tell customers what they're doing to ensure their connected products are being born secure. Underpinning this will be developers focusing on how to provide easy device updates and how to embed lifecycle management capabilities into their designs so devices can be retired securely. Software will increasingly be written with security and privacy principles at the forefront.

## Are Tech Companies Doing Enough to Ensure Devices Are Secure?



## How Concerned Are You That More Technology Exposes You to Greater Privacy Risk?



## AI Specialist Seen as Respectable Future Career – Bitcoin Miner Less So

Shifting global economies and the spread of AI throughout the global workforce will lead to some job roles disappearing, others changing, and new roles being created.

We were interested to explore which of the new roles AI technology might make possible (as well as some other potential future career options) would be most palatable to our respondents as jobs they'd like to see a family member pursue.

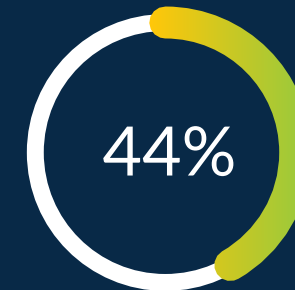
An AI and machine learning (ML) specialist was seen to be the most acceptable vocation (44 percent), while 90 percent felt a job mining bitcoins was no career at all. There were some interesting geographical variances, too: 35 percent of UK respondents were happy to see their children become professional video gamers, while only 7 percent of respondents in Germany shared this sentiment.

### Arm Predicts

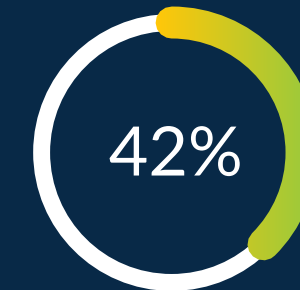
#### AI and VR Slash University Fees

In the future, universities will become hubs for social engagement and life experiences rather than institutions predominantly tasked with imparting knowledge. Learning may become more self-directed, using AI and VR. As a result, it's likely that the cost of higher education will fall to a level that's affordable to many more people.

## Which of These Jobs Would You Be Happy for a Family Member to Pursue as a Career?



Artificial intelligence (AI) and machine learning specialist



Data scientist



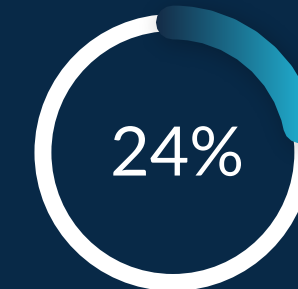
Smart city planner



Augmented/virtual reality architect



I would be happy for my child to pursue any of the above



Drone / autonomous vehicle dispatcher



Professional video gamer / esports player (e.g. Fortnite)



Bitcoin miner

The Next Big Thing

## Robots and Autonomous Vehicles Most Eagerly Awaited Future Tech

Finally, we asked respondents to think ahead to the future and imagine the 'next big thing' in technology—be it a gadget, smart device, service, new method of communication or mode of transport.

Answers ranged from the unlikely (personal jetpacks and invisibility cloaks) to the profound—we've listed a few of the most interesting examples below. We also wanted to see which answers came up most often and were surprised to discover quite how ubiquitous AI-powered robots are within the public's vision of the future. Almost 1 in 5 respondents predicted intelligent robotics would be the next big thing—far more than autonomous cars.

It was also interesting to note how many people took an evolutionary, rather than revolutionary, approach by predicting the next big thing would be a new smartphone. Not such a huge thought gamble but certainly a safe bet!

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The Future

**Points of View:**

What Will Be the 'Next Big Thing' in Technology?

*"Trips to the moon that are cheap enough for the common man"*  
Male, 40-49 years, France

*"A robot that can perform basic tasks such as taking blood pressure to make up for lack of hospital staff"*  
Female, 30-39 years, Germany

*"A new tool replacing the smartphone, being much smaller and using a virtual screen"*  
Male, 40-49 years, France

*"Wearable technology built into clothing"*  
Male, 18-29 years, USA

*"An AI health wearable that learns your body's natural rhythm and alerts family and practitioners to any changes"*  
Male, 60-70 years, UK

## The 'Next Big Thing'

