

TECH

ISSUE 82



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CRUSHING CORONA

How to keep everyone safe

Symptoms • Infection • Testing • Vaccines

TECH TRUTHS
5G in the time of
COVID-19

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Even before the word COVID was on everyone's lips (alarming wordplay intended!) I had planned to upgrade my internet service. I placed my order. Days later, the president lowered the boom, and the country went into lockdown.

Imagine my shock and surprise when the very next day after the lockdown, two technicians turned up at my house. They were wearing neither masks nor gloves. After lecturing them on the dangers of COVID-19, we masked and gloved them, created a massive air gap between us, and they went to work. An hour later, they left. We disinfected everything they had touched or breathed on.

With two students now taking virtual classes, and my wife and I in video calls and virtual meetings throughout the day (and night, when meeting with Americans) relations between all of us had become a bit strained. The bandwidth upgrade started looking like the responsible thing to do.

But I still needed a new WiFi router to take advantage of my new-found internet speed.

I was doubly surprised when the next day a delivery van pulled up at my house. As I nervously approached the front gate, the delivery guy, wearing both mask and gloves, waved a parcel containing my new router covered with a massive label reading 'Essential Service'. So that was how he (and obviously the technicians, too) got through the blockade of policemen and overzealous neighbourhood-watch vigilantes...

But it rang true. **From the start of SA's lockdown, telecommunication was classified as an essential service**, right up there with water, food and electricity. And that's a sign of the times. In my house, anyway, this bandwidth upgrade seemed to matter more than any food shortages, load shedding or drought.

In this edition, our cool science pages have been devoted to **explaining the ins and outs of the corona pandemic** in plain English. Find out how the virus works, what genuine symptoms to look out for and how the testing works on page 46.

Whether you kept it up after the lockdown, or whether you are now looking to start your own business, we have identified key pieces of hardware and software you need in order to **work efficiently from home** on page 22.

And if you need to lighten the mood around the house, invest in a good smart speaker that plays your tunes on demand, and can respond to your voice commands and even fetch you answers and other useful info from the net. See our top **smart speaker** picks on page 28.

Enjoy the mag.

TECH CHIEF
ed@techmagazine.co.za



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AUDIO

The latest design of this iconic machine offers two RCA audio jacks for external sources, one RCA audio output for connecting to an external amp, and one for an external subwoofer, plus a 3.5 mm preamp audio jack for your headphones.





BELLISSIMA

CLASSIC ITALIAN-STYLE HI-FI REBOOTED WITH MODERN FLAIR

PHOTOGRAPHY: COURTESY IMAGE

Brionvega Radiofonografo RR226 FO-ST

Back in 2016, a 1960s turntable that once belonged to David Bowie was sold at auction for R6 028 873. That turntable was a Brionvega Radiofonografo RR126, created by Italian brothers Achille and Pier Giacomo Castiglioni. Now, to mark the 100th anniversary of Achille's birth, a special edition of that iconic music system has been launched, complete with the original machine's recognisable 'smiley face' (made up of controls for the record player, radio and volume). The Radiofonografo RR226 FO-ST comes in white, orange and red, with only 100 of each colour available for purchase – all will be numbered and made using the original Italian cabinet design. Each will feature a premium Pro-Ject turntable with Ortofon cartridge, an AM/FM radio and modular speakers that can be moved up or down to create unique looks. There's also a headphone jack for when you want to listen privately, but let's be honest, this superb system deserves a bigger audience.

Price from R156 156 (import only)



RESHAAD SHA
CEO of Liquid
Telecom SA

5 telecoms facts in the time of COVID-19

1. Since the original lockdown announcement by President Cyril Ramaphosa at the end of March telecommunications were classified as essential services along with water, power and food distribution. Many cell phone shops stayed open during the first week of lockdown but were subsequently closed down. However, internet services were still provided and repaired, and airtime outlets continued to function.

2. All the top-tier mobile network operators offered low-price data bundles, but you still needed to

shop carefully. Several internet service providers upgraded their customers for free, even doubling their line speed in some cases, although it was made clear that this was strictly for the duration of the lockdown.

3. Vodacom and Discovery Health created a virtual COVID-19 consulting service where any South African can have a free video consultation with a medical professional. A sum of R20 million has been allocated for this, which should pay for around 100 000 consultations.

4. Netflix, ShowMax and other streaming services lowered the quality of their video streams in order to relieve some congestion on SA networks, and ensure quality of service in underserved areas. ShowMax, which has a cut-price mobile-only streaming service also launched a new channel.

5. Globally, laptop sales surged as many more people had to work from home, and learners looked to continue their education through online classes following school closures. After many years in decline, PC sales increased – attributed to the effect of the Coronavirus.

Master CHIEF

RESHAAD SHA BUILT HIS REPUTATION ON PROVIDING EFFECTIVE SOLUTIONS IN THE CONNECTED WORLD AND HE IS STEERING LIQUID TELECOM SOUTH AFRICA INTO ITS INTERESTING FUTURE.

WORDS I. NDSEY SCHUTTERS

UNLIKE THE LOCAL 'BIG TECH' CEOs OF YORE, RESHAAD SHA DOESN'T HAVE A BELLY AND SEEMS TO HAVE A VERY GOOD SENSE OF STYLE. It's the demeanour of a man who has achieved balance in his personal and professional life. This is what is necessary to juggle the evolving challenges of providing data and connectivity services to critical businesses. Future nations are being built on the foundation of a stable internet connection, and Liquid Telecom is proving to be a solid starting point.

What is your core business?

Liquid Telecom is not simple. It's the leading voice and internet provider across East and Southern Africa, and we provide services to wholesale companies such as internet service providers, enterprise customers and the public sector. That's all the way from South Africa to Egypt. We operate in 13 countries where we have a direct presence on our Cape to Cairo network. Primarily, we service the connectivity, internet, voice, cloud services and data centre requirements of our customers.

How will your company affect ordinary South Africans?

My role is to lead Liquid Telecoms South Africa, and as a group our mission is to connect the continent and enable every citizen to have a high-speed network. The vision is to digitise the continent, but in South Africa, the focus is to partner with our enterprise customers on their digitisation journeys to allow them to transform their businesses

and take digital services to their customer base in whatever form that may be, such as a retailer who wants to deliver an enhanced experience to consumers. In the wholesale telco space, we want to be an enabler of the services they offer, using our large infrastructure footprint.

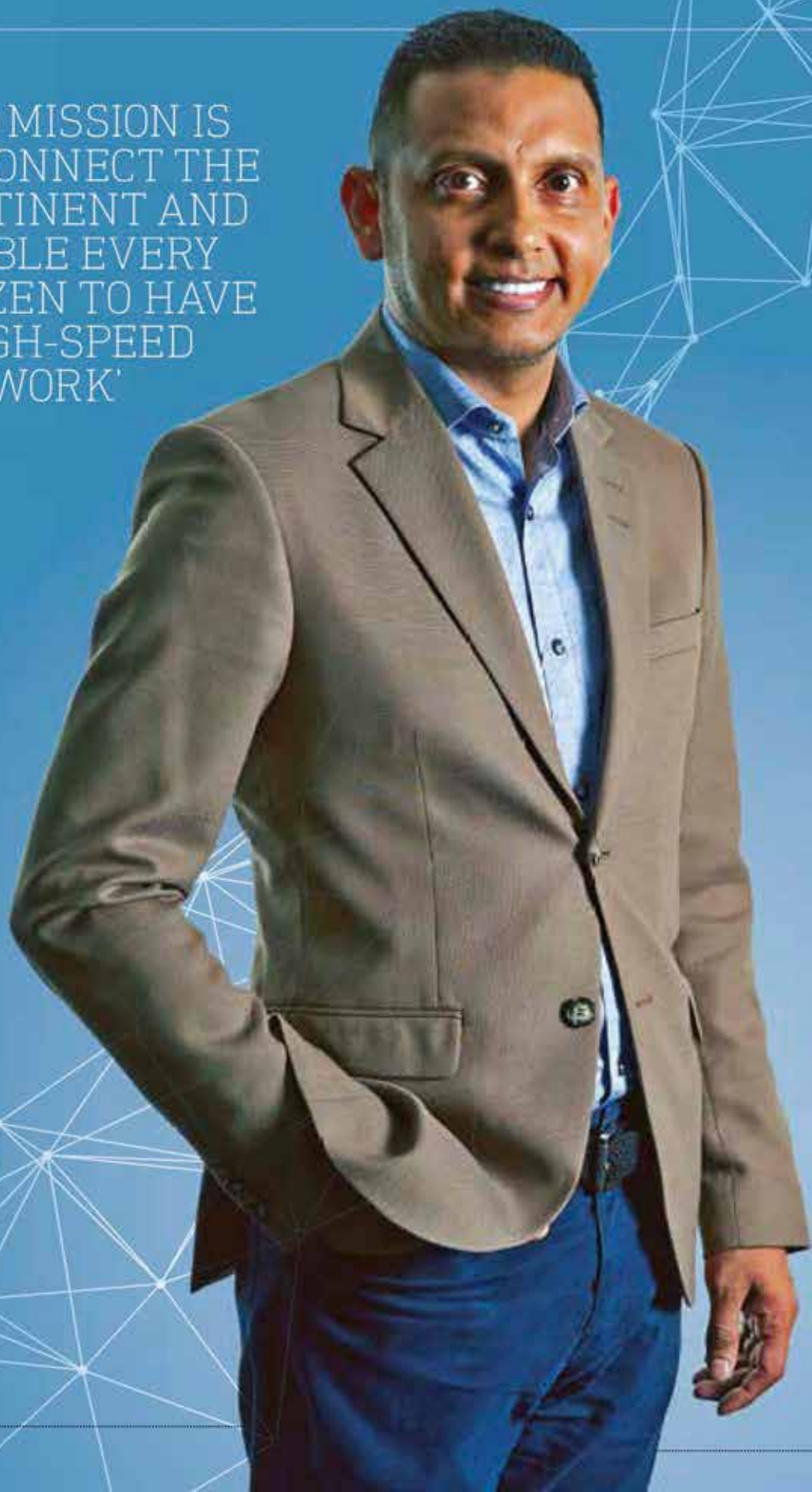
How has the integration of Neotel progressed?

The Neotel business was already delivering services to many customers, and what we wanted to do was to completely transform the network by rebuilding it. We also began to change the engagement model and how our customers experience those services. Then we decided to exit the consumer space, and we have also refocused our efforts in enterprise, public sector and wholesale.

What will the main usage of 5G be?

I don't think there'll be a killer application in the way that LTE allowed us to consume mobile video. The trend with LTE and Fibre was that consumption increased significantly, and I think 5G will allow that consumption to continue on its trajectory, which is an ever-increasing consumption of data. It's also going to enable services that couldn't be run on a 4G network because of latency, which is the response time of the data making a round trip from the device to the server/vehicle and back again. If you think of autonomous vehicles, you need real-time connectivity. It's difficult to do that with LTE with rapid response, especially if you're doing remote management. What 5G does is it allows you to do that in real time. Some argue that 4G was real time. It was close, but 5G gets us

OUR MISSION IS
TO CONNECT THE
CONTINENT AND
ENABLE EVERY
CITIZEN TO HAVE
A HIGH-SPEED
NETWORK'



even closer. The other advantage is that the additional bandwidth is comparable with Fibre. Not the same in terms of the speed you would get, but it gets us closer.

Does the faster Wi-Fi 6 offer more than 5G?

Wi-Fi is a last-mile technology, which means that it's how the end user connects either in a building, office or home. But you still need an internet connection and that will be over 5G or Fibre.

5G in the time of COVID-19

Almost as dangerous as COVID-19 itself is the fake news and misinformation being circulated around its connection to 5G high-speed cellular data networking. In simple medical terms, the radio waves used for carrying data can't create a living organism such as a virus, but that didn't stop several celebrities, including Woody Harrison, John Cusack and others from spreading this baseless and irrational rumour. Cellular towers around the world have subsequently been attacked and destroyed or severely damaged.

Meanwhile in South Africa, the much-anticipated rollout of 5G has received a welcome boost from icasa, the telecommunications regulator. The telecoms industry has long pressed icasa for clarification about when the critical radio wave spectrum needed for 5G will become available, most likely leased to operators through an auction process. Now it seems that, since 5G could speedily bring broadband connectivity to the country's most underserved areas, icasa's hand was forced and temporary licences are being issued.

While there are less than ten 4G operators in SA today, more than 35 companies applied for use of the new radio wave spectrum, which is optimal for building 5G networks and supplying high-end services. icasa said that these temporary permits were being issued only for the duration of the state of disaster in SA so that telecoms companies could continue to provide a reliable service to all South Africans as demand surged during lockdown.

How can your company provide reliable service?

We built a highly robust internet backbone to service our customers. When the two cables went down, which had a significant impact on South Africa, we had zero impact on our network. In fact, we had additional capacity which we could use to assist our customers that were experiencing challenges. And that's what we did behind the scenes.

What part of internet usage do consumers not fully grasp?

I wish more people would adopt more internet services. When you start using the internet, it's likely from an information perspective, such as browsing and maybe some email. But you're not transacting. And as you mature and become more familiar with it, you may migrate towards conducting business. I wish we had a mechanism to get more people on to the internet faster, so that they can start going through that maturity curve faster and start transacting and doing business. Part of our problem in South Africa is that there are many services, but there isn't enough education for the initial user who starts using the internet today. I want to see how we can compress that time so that people's first interaction with the internet is transacting. Then the internet just becomes a ubiquitous thing that you use to conduct whatever you do.

What future tech excites you?

We're already on the journey of delivering a better customer experience. We built an AI-based chatbot to make the experience of how they interact with us a bit more seamless. Importantly, it's also there to service them rapidly. A human being is not the most effective tool to service a wide variety of requirements in one go, whereas AI would be able to do that for a wide variety of general tasks. Then you can narrow down to where the human comes into play to solve a specific issue, creatively. We want our customers to have a frictionless experience with the company, so we're also focusing a lot of energy on proactive solutions. We've advanced to a point where we detect and start repairing a fault before the customer calls in. And we're doing that with artificial intelligence.

What is the future of Liquid Telecoms?

We don't really do fortune telling because the transformation that you see in a two

Reshaad's travel essentials

I would have my two phones, one for a local number and the other for the international SIM – I'll also use that as my hotspot. They're both iPhones (the 11 Pro and the XS Max). Then there's my two sets of noise-cancelling headphones, one wireless (AirPods Pro) and one wired (Bose QC). I have my iPad for media consumption and basic work, and my Macbook Pro. We are a big Microsoft partner, so our company uses a lot of Microsoft services, and my primary cloud storage is OneDrive.



to three-year period is so significant. We do know that it can't just be an internet company. It would be a merger between technology companies, connectivity companies, information technology companies and device companies. Those lines between them are becoming increasingly blurred, and it will continue to blur in the near future. One of the big focuses we have is on cloud- and cyber security, so we'll focus heavily on giving our customers a wide selection of cloud services. We know that not every business will be able to undergo the cyber-security journey on their own, so we'll do it on a large scale and assist our customers to be part of that ecosystem. Connectivity is there as a ubiquitous layer that will continue to improve, and we foresee a significant increase in demand for data-centre capacity. But ultimately, we'll be a digital services provider. **T**

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INSIDE A ROBOT WAREHOUSE

ONLINE RETAILERS SUCH AS OCADO ARE REVOLUTIONISING SHOPPING THANKS TO THE HIVE OF ROBOTS HANDLING THE ORDERS

WORDS LEE CAVENDISH



GONE ARE THE DAYS OF HUMAN INEFFICIENCY, AS OCADO – ONE OF THE TOP ONLINE SUPERMARKETS IN UK – TURNS TO FUTURISTIC CAPABILITIES BY EMBRACING ROBOTICS. This supermarket has a dream like no other: to make online

shopping as efficient as possible by minimising the need for human handling. From the point at which you click the 'Place Order' button, to the moment it arrives at your door, the process will be completed by robots. The emergence of the innovative Ocado Smart Platform (OSP), developed by Ocado

Technology and Cambridge Consultants, has been a huge step into the future.

There are two warehouses – also known as Customer Fulfilment Centres (CFCs) – in the UK that utilise these latest technological feats. These warehouses look like huge mechanical chessboards, with a fleet of robots making their own moves around a grid of three soccer pitches. In each segment of the grid are the products that Ocado offer, offloaded by warehouse staff and placed into the grid. Sitting above them are the robots working together via a localised 4G network.

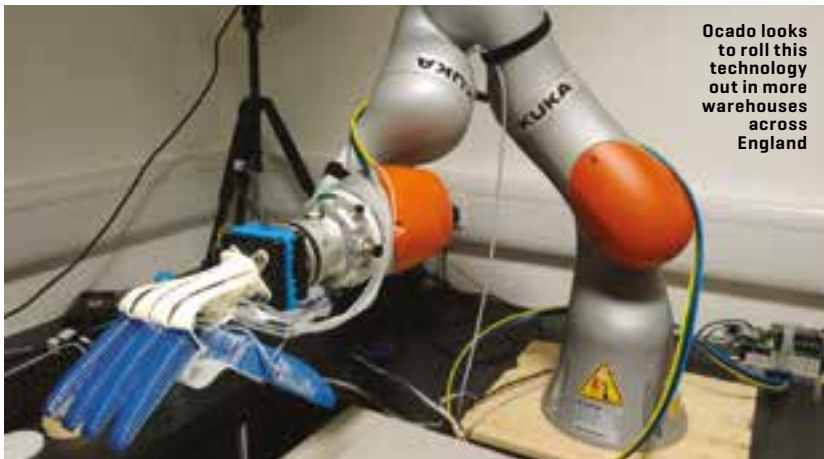
This network allows the robots to communicate with the base station, understand which items they need to collect and which order to do it in using its algorithms. Much like an

air-traffic control system, this process is performed with optimum efficiency, ensuring that no crashes occur. With more than a thousand robots operating at once, the whole system functions at a level that is unachievable by humans, and capable of completing a 50-item order in just five minutes.

The technological advancements Ocado have made in the industry is a trend for the company: Almost two decades ago, the firm introduced automated trolleys that moved along the shelves, and then a few years ago it introduced a conveyor-based system. Combined with the OSP, these two warehouses will revolutionise online shopping, and the technology they have developed could even be sold to other companies. **T**

How do the robots communicate?

A simplified way of putting it is to say the robots communicate via a 4G network. The development team deduced that the wireless communication between robots had to either have a capacity large enough to satisfy the high-speed demands of more than a thousand robots, or they would have to break up the communication into smaller sections. The engineers opted to use something called Orthogonal Frequency-Division Multiple Access (OFDMA), which basically splits up the data into different subsections. The fact that the warehouse is isolated from the outside world means that communication benefits from the reduced signal noise from external sources. However, there is constant radio-frequency interference from the metalwork within the warehouse. This could cause a delay in communications or the robots to miss a piece of vital data, which could lead to a serious problem within this highly efficient environment. To overcome this problem, the system uses sophisticated equaliser and error-correction software.



Ocado looks to roll this technology out in more warehouses across England



Delivering food to the door is the final step of an efficient process utilising sophisticated systems

OLD VS NEW

When compared, the new online-only way is simpler and saves time

1. WAREHOUSE PREPARATION OF THE PAST

The conventional way dictates that the products must be transported to a warehouse, before it can then be distributed to its store nationwide.

2. DELIVERED TO THE STORES

Items are collected either by the customer or a delivery driver, before being brought home.

3. A LONGER WAIT

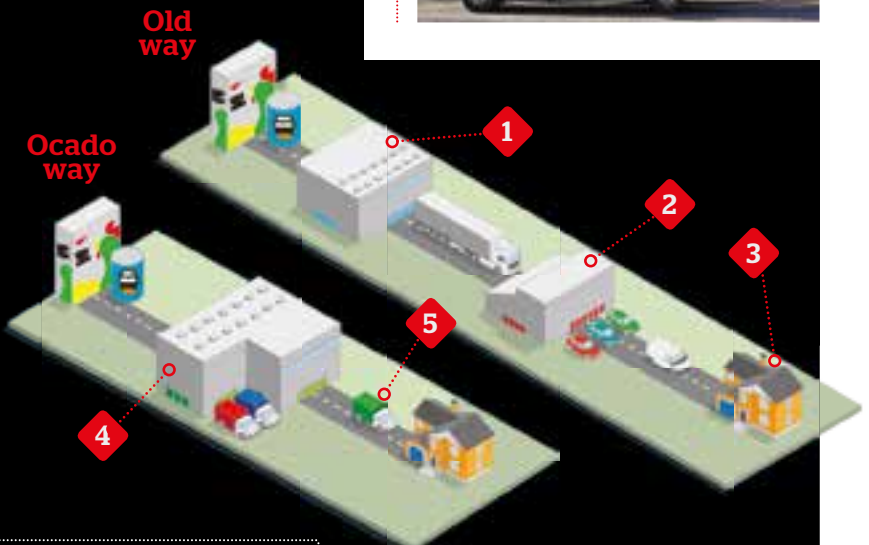
The time and effort involved can sometimes translate into a poorer experience for the customer.

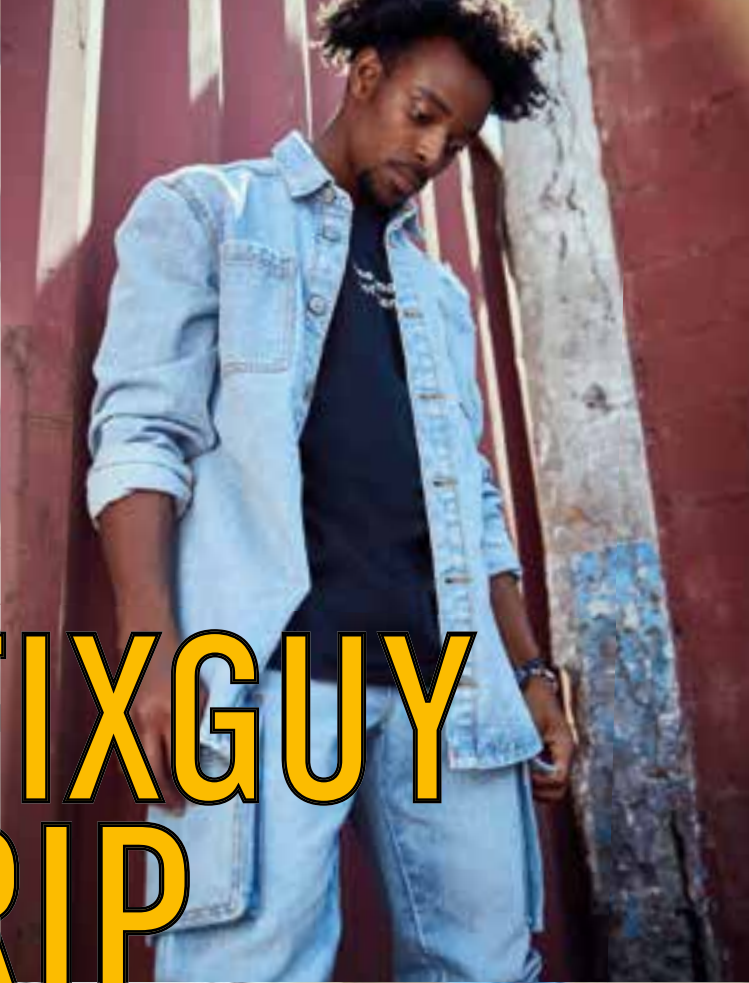
4. THE OCADO WAY

The Ocado way means that goods can be organised in one warehouse, without the need of a store.

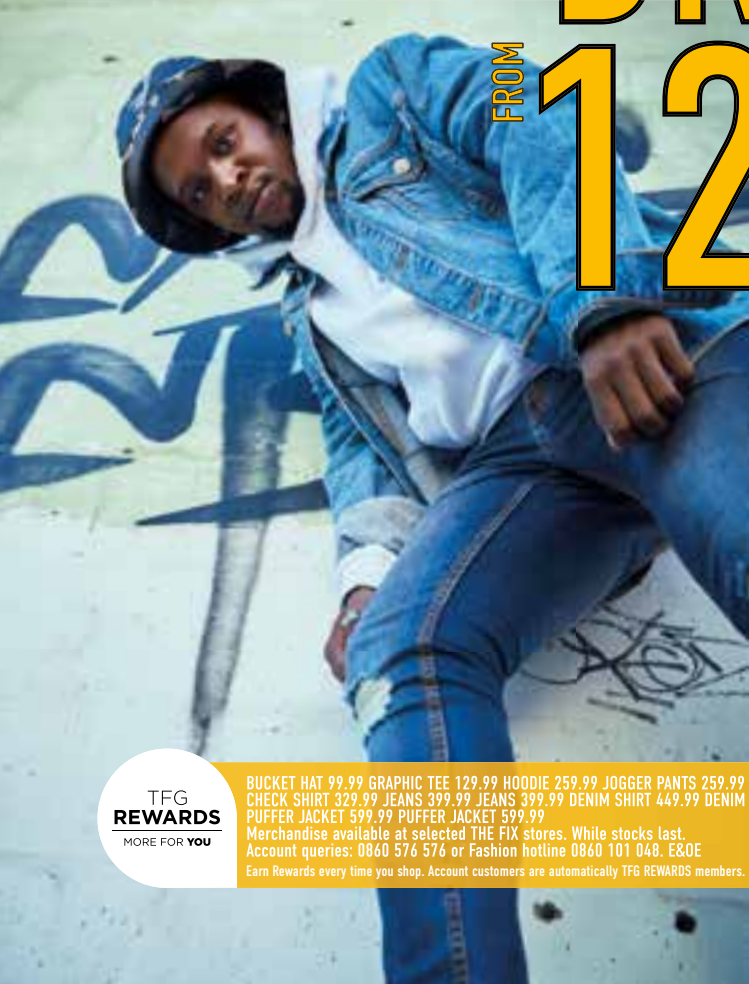
5. SPEEDY DELIVERY

The robot hive's swift and efficient picking should ensure that you get your purchase on time, every time.





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THE INNER WORKINGS OF THE WAREHOUSE

Both humans and the robotics must work together to ensure a fruitful delivery system

Set up in the grid

Once set up, the robots will zip around above the stacks collecting orders in just a matter of minutes.

Plenty of room

The overall grid is the size of three soccer pitches, and in each section the items have been placed there by the use of artificial intelligence.

Delivery time

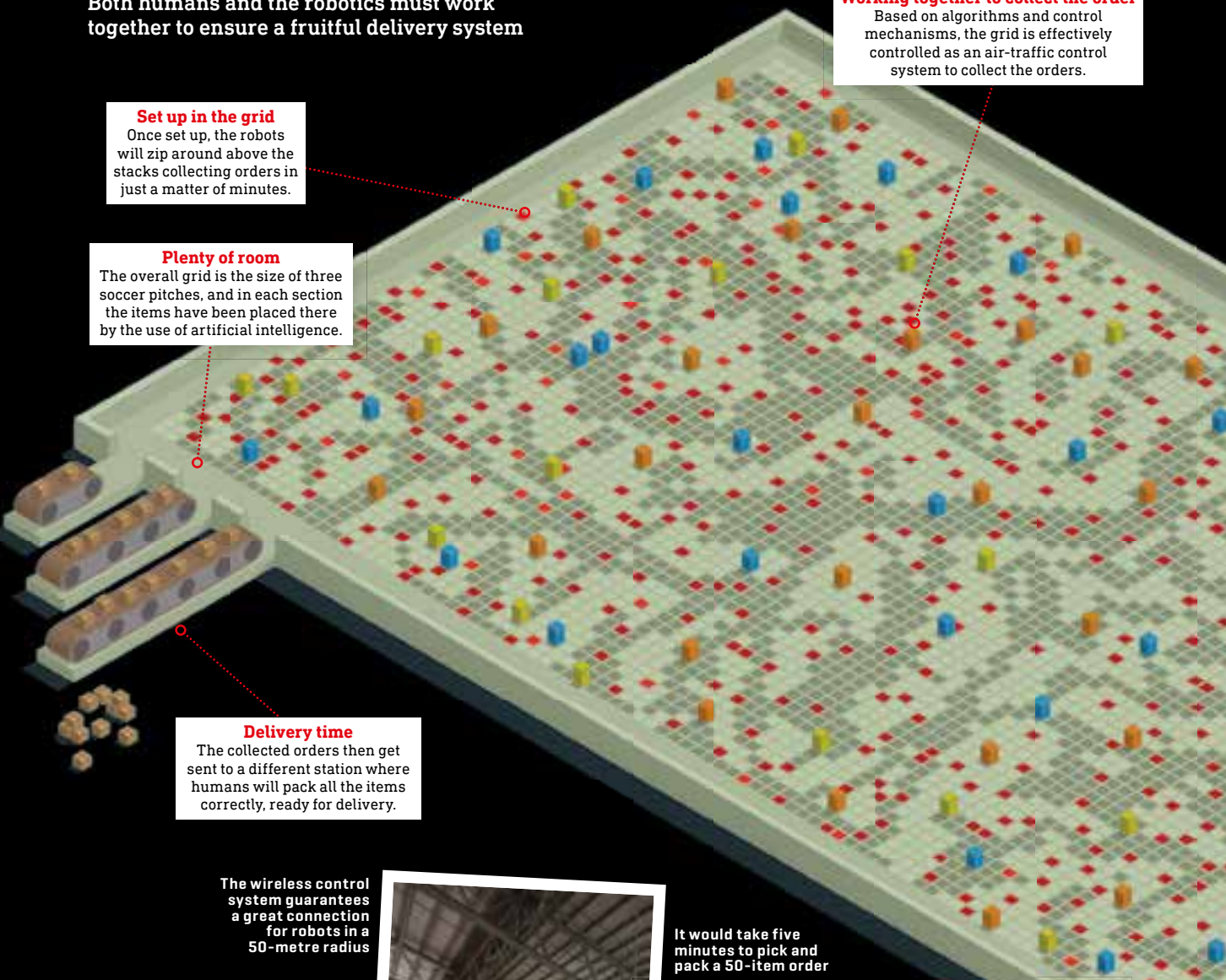
The collected orders then get sent to a different station where humans will pack all the items correctly, ready for delivery.

The wireless control system guarantees a great connection for robots in a 50-metre radius

Warehouse staff place the items into bags then vans once the robots have collected them

Working together to collect the order

Based on algorithms and control mechanisms, the grid is effectively controlled as an air-traffic control system to collect the orders.



PHOTOGRAPHY: COURTESY IMAGES

OPERATING A SMART-PICKING PLATFORM

The latest in warehouse logistics has led to this efficient, innovative and wireless game changer.

Picking up the items

The robots pick the item using an internal claw, similar to an arcade machine, and store it before moving on.

Homogeneous working

If one of the robots breaks down, then there is another to take its place.

Base station

The base station is the hub of the robots, communicating the picking orders through a localised 4G network.

Maximising space

As the robots operate from above the stacks, every inch of the grid can be utilised to accommodate as many items as possible.

Grid adaptability

Depending on the number of orders, the grid can be scaled to different sizes and hold fewer or more robots.

Stacking items

After the delivery has arrived, workers put them into stacks under the robots with their position determined by an algorithm for efficiency.

Ocado's warehouse numbers

1100

The number of robots operating at the warehouse

4G A 4G wireless network is used for communication

112 KM

The length of the track the robots travel on if they were laid in a straight line

250 000

storage locations can be accommodated by the grid

3 MILLION

routing calculations are performed by the system per second

65 000

orders are processed a week

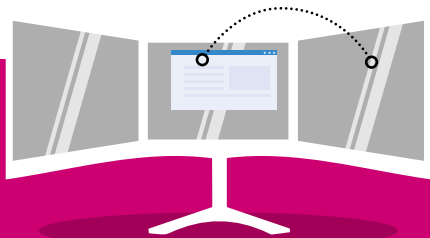
Unloaded from the truck

The items arrive in crates, which are then unpacked and loaded into stacks as high as 17.

THE NETWORK
ALLOWS THE ROBOTS
TO COMMUNICATE

Hack your life

PRACTICAL TRICKS WITH TECH
WORDS MEGAN ELLIS



Move a window across screens

Many people no longer just use one screen for their desktop computer, since multiple screens can provide productivity and multitasking boosts. There's even a gaming benefit if you plug your PC into a large display nearby.

However, getting your windows to the right screen can be quite tricky, especially with full-screen applications. If you're struggling to drag and drop the window to the right screen, Windows has a useful shortcut that moves your selected tab or window to the next display.

Hold Windows + Shift to enable the function, and use your arrow keys to move your window to the next display.

Netflix Party

Bingeing on Netflix series and movies doesn't have to be a solitary affair – with Netflix Party you can enjoy all your favourites with friends or family in different locations.

Netflix Party is a Chrome extension that synchronises content between you and others. Once you have installed and opened the extension, you can share a link so that people can join your session remotely.

The extension even features a chat window to share real-time reactions as you watch.



Makeshift earphone case

Need a container to carry your wired earbuds in a pinch? There are a variety of containers you can use for a quick fix.

One of the easiest is an empty mint or gum container, such as a plastic Tic Tac container or metal mint box.

There are a few other DIY hacks you can use for earphones – everything from old cards to clothing pegs.

Use IFTTT to automate your tasks

Our phones and apps are smarter than ever, allowing us to string together commands and events to automate everyday tasks.

One of the most useful apps for this is IFTTT – which stands for If This Then That. The app allows you to choose from preprogrammed tasks, or you can create your own.

There is a huge variety of tasks to choose from. For example, you can get Google Drive to save any new images from certain albums on your phone. You can also set up syncing between social media apps (such as posting on both Instagram and Twitter at the same time).

IFTTT can even work with smart-home devices to automate tasks based on your location.



Instant image search

If you want to perform an instant reverse image search in Chrome, simply **hold 'S' and right-click** on an image. The browser will open a new tab with the image search results.

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AMAZON

ON THE FUTURE OF

VOICE ASSISTANTS

WHERE WE'LL FIND MORE VOICE OPTIONS IN THE FUTURE, AND THE BIG WAY ALEXA WILL GET SMARTER ABOUT CONVERSATIONS

ERIC KING, GENERAL MANAGER, AMAZON ALEXA EUROPE, HAS BEEN HELPING GROW AMAZON'S VOICE SERVICES SINCE IT FIRST OPENED THE SYSTEM UP TO DEVELOPERS. HE'S LED THE CHARGE FOR GROWING ALEXA'S RANGE OF SKILLS AND HARDWARE PARTNERS FOR AMAZON VOICE SERVICES THAT HAVE DEFINED ALEXA'S RISE TO THE TOP OF THE VOICE-ASSISTANT CHARTS.

ARE THERE AREAS IN THE TECH WORLD THAT YOU THINK VOICE CONTROL WOULD BE SUITED FOR, BUT HASN'T REALLY REACHED YET?

The areas where we see customers adopting voice most aggressively and at the fastest rate is in spaces where, frankly, it makes their lives easier – where they don't have to fumble for their phone in order to do something. We see our next logical advancement to that happening in the car. This is an area where we're investing heavily today, together with companies such as BMW, Toyota, Ford and SEAT. There's a whole set of companies that are interested in these car scenarios where customers are typically doing one of four things that voice [control] would make easier.

They're navigating, they're searching for entertainment, they're communicating with people outside of the car, and they're controlling things within the car – so vocal control. It might be windshield wipers. It might be windows. It might be lights. Another set of scenarios is what I would call 'on the go' scenarios. So Fitbit was one.

It was natural. You've got [the Versa 2] on your wrist. You're running. You want to do a quick check and not be searching through which buttons to press and when – but simply to ask, 'How many calories have I burnt?' It's one of those simple but delightful experiences where we see this taking off. And another 'on the go' scenario would be headphones. Being able to have a set of headphones while you're walking around to ask for directions is a pretty cool feature we haven't heretofore seen in most headphones. In terms of new scenarios beyond that, I really think the sky's the limit. There's an Alexa-enabled bicycle – an electric bike. I wouldn't have predicted that 12 months ago. But here we are.

OUTSIDE OF PRODUCT CONTROL, ARE THERE SOME BROADER LIFE AREAS WHERE YOU THINK VOICE ASSISTANTS COULD BE SO USEFUL AS TO BECOME STANDARD IN THE NEAR FUTURE?

One area, which is at the top of the mind for us, is that kids love Alexa for games. But as a parent myself, I like to use Alexa to help my kids learn multiplication tables. I've just relocated to Luxembourg and my kids have to learn German and French, in addition to English. They're 10- and 12-year-old kids, who are sort of overwhelmed. But there's a number of Alexa skills that are helping them do their regular quizzing, for instance. That's a scenario where we're interested in investing, but it's a scenario where we have already seen a bunch of partners invest. Also, probably once a week, I get an email from someone who's older, somebody who's in an advanced stage of their life, or someone who might not be as

mobile as they used to be, either due to their age or a disability, or something else that has happened, where Alexa is providing not only a utility but, in some cases – I wouldn't use the word 'companionship', I think it might be a loaded term. But whether it's getting an audiobook, or listening to music without having to get off the couch, or simply turning on the back porch light when it's a struggle for you to do it, you have a device to help you, and we see those scenarios happening all the time.

THERE'S AN INTERESTING USER CASE AROUND ALEXA BEING A KIND OF CARE ASSISTANT FOR SOMEONE WHO IS MAYBE SUFFERING FROM DEMENTIA OR A SIMILAR CONDITION, WHERE IT COULD REMIND THEM TO TURN OFF





Amazon recently introduced its first Echo for the car – the Echo Auto, seen here on top of the car’s dashboard

A SMART OVEN IF IT DETECTS THAT IT’S ON.

It’s funny you bring up that exact scenario. We’ve invested recently in a technology called Hunches. Just like you might have a hunch that you may have left the oven on, Alexa can have a hunch that you may have left the oven on, or the door unlocked, or the back porch light on.

That is technology that is live today in the US, and it’s on the road map for releasing it elsewhere. It’s optional – if you elect to have Alexa do this, you can. Or you have a regular routine in which you do certain things with your smart devices – if you break that routine, you can elect to have Alexa remind you about it.

WHAT CHALLENGES DO YOU THINK YOU WILL HAVE TO OVERCOME IN ORDER TO MAKE THE USE OF VOICE CONTROL MORE UNIVERSAL, OUTSIDE OF THE AREAS WHERE IT’S ALREADY POPULAR TODAY?

One area that we are invested in heavily is to make it more conversational. We use a term inside Amazon called ‘conversational AI’, which is really the ability to use whatever dialect, whatever slang, to be able to talk to Alexa more like a trusted friend than a computer. The other thing is just really nailing the scenarios of the user cases where we truly believe it’s going to make a difference. So I mentioned cars before. But there are also elements of local car control – communications, navigation and entertainment – which you might trigger in an environment where you may not always be online. So the question is how

do you handle that scenario if you’re in a tunnel, or if you have turned the car off and still want to use it?

IN THE NEAR FUTURE, YOU COULD MAKE ALEXA’S VOICE EXTREMELY REALISTIC IF YOU WANTED TO. DO YOU THINK YOU’LL HAVE TO EASE PEOPLE INTO THE IDEA OF INTERACTING WITH A COMPUTER THAT CAN RESPOND TO THEM IN A TOTALLY NATURAL WAY?

I think we’re striking a good balance today. The concept of ‘conversational’ doesn’t necessarily equate to ‘realistic’. Really, what we’re trying to do is to make sure that Alexa is responsive, that it understands what you’re saying if you speak with an accent from different parts of London, and that it understands the intent behind what you are asking for. That’s another big area of investment for us. Even if you didn’t ask for it in a robotic, mechanical way, we want to make sure that we understand what was behind the question. We’re doing a lot of work to help understand that, and serve up the right response – whether it’s a response that we’ve developed ourselves and that Alexa understands, or it’s something that a third party has developed.

THE INTENT THING IS INTERESTING BECAUSE CONTEXT WITHIN A CONVERSATION IS SOMETHING WE ARE ONLY JUST STARTING TO SEE APPEAR IN VOICE ASSISTANTS...

It’s a big focus area for us. There’s both context in terms of what you said, and what you haven’t said. The first step of that is to

‘WE’RE INVESTING HEAVILY TO MAKE VOICE CONTROL MORE CONVERSATIONAL.’

make Alexa not necessarily have to restart every time you have a conversation with her. We sometimes call this context-awareness, but that certainly is an area where we’re deeply investing.

VOICE ASSISTANTS HAVE ALWAYS BEEN TIED TO THE CLOUD. IN THE FUTURE, DO YOU SEE THEM BECOMING LESS RELIANT ON BEING ALWAYS ONLINE?

Part of the reason we use the cloud is because of the computing-processing power we have, and the ability to get better at voice because of what we can do there, versus what we are able to do on a wrist, for example. Another reason is that it enables us to get into smaller and smaller form factors. Even an Echo Dot has very little compute in it – almost none. It just sends everything up and back down again. I will say that there are investments we’re making to create local experiences so that you don’t need to be connected to the cloud all the time for it to work, but the vast improvements we’ll continue to make with Alexa will be driven from cloud-based technologies – even if non-cloud connected devices help us to get into more out-of-reach scenarios. **T**

HOMEBOUND

THE TRENDS

THANKS TO THE GLOBAL WORK-FROM-HOME SOCIAL EXPERIMENT COURTESY OF THE COVID-19 PANDEMIC, BEING PRODUCTIVE FROM YOUR COUCH IS THE NEW NORMAL. HERE'S HOW TO DO IT A LITTLE BETTER

WORDS LINDSEY SCHUTTERS



LOCKDOWN WASN'T A PRODUCTIVITY CONTEST, BUT MANY PEOPLE STARTED TO FIGURE OUT THAT YOU CAN GET A LOT DONE WITHOUT HAVING TO GET OUT OF YOUR PYJAMAS – ALTHOUGH IT IS ADVISED TO PUT SOME CLOTHES ON.

Your home WiFi situation may not be as well constructed as it would be in the office, but you're probably not accessing on-site servers as frequently, and don't have to deal with Sharon's blue cheese from last night's leftovers. Life away from the office needn't be a horror show, so here's how to be better at working from home.



Browser:
MICROSOFT EDGE
(THE NEW ONE)

You remember when Internet Explorer was the way you downloaded Firefox or Google Chrome? Microsoft learned a lot from that experience and poured all those lessons into the first generation of the Edge browser that launched on Windows 10, and now on the new Microsoft Edge, which is built on the same mechanics as Chrome. The new Edge browser is fast and light, the opposite of what Chrome has ballooned to, but plays nice with most of Google's services.

If you use a Mac, however, rather stick to Safari for optimal performance. Trust us on the web browser, it can make older machines perform better and greatly improve your productivity.



Video calling:
SKYPE

Yes, Zoom was the real winner during the pandemic, but inherent security flaws make it a poor fit as a trusted tool of your trade. When Microsoft bought Skype in 2011, it tried to give it a new

lick of paint and turn it into an enterprise solution. Thankfully, the software giant didn't touch the underlying bits. Features such as Meet Now bring it on par with consumer-centric apps such as Zoom, and enables users to send or receive a meeting code whether they have accounts or not.

The healthy mix of video features and VoIP functionality make this a solid choice for corporate interactions. Hopefully, Microsoft doesn't kill it off for the collaboration-focused Microsoft Teams. Keep the Zoom app handy for your remote fitness classes, though.



Collaboration:
BASECAMP

If you form part of quite a large organisation, or a small team that shares a lot of content, the R1 791 monthly fee for Basecamp is a good investment. A great set of mobile and desktop apps, 500 GB of cloud storage, generous 2 GB file transfer and unlimited team size are excellent value-adds. Project-management software that combines chat, file transfer and scheduling is an invaluable tool for any business.

We like Basecamp because its easy to catch up if you've been off the project for a while, but Microsoft Teams and Asana are great options if you're on a tight budget or work on Microsoft services anyway.



Keyboard:
LOGITECH K780

This Bluetooth keyboard can connect to three devices and seamlessly switching between them will supercharge your connectivity. There's also an added stand for your mobile devices such as a tablet or smartphone.

Bonus points for being able to connect via USB, but we would've preferred an internal rechargeable battery and not the 2x AAA cells.

Price R1 679

Pro tip:

Use the Zoom host tools to limit people sharing screens. Also, do not publish your Zoom codes on social media, rather circulate through encrypted communication. These tips won't stop the brute force hacking, but it will maintain some level of privacy.



Mouse:
LOGITECH MX ANYWHERE 2S

Much like its keyboard sibling listed here, the MX Anywhere 2S can connect and switch between three devices and it connects via Bluetooth. Then it uses Darkfield tracking technology to work on almost any surface. But the party piece is the three-minute charge that gets you up to eight hours of use.

Price R1 300



Storage:
SYNOLOGY DISKSTATION DS218+

Plug it into your router with an Ethernet cable and you have two hard-drive bays or make a home server. You can also install a wide range of apps on the device to make it smarter than just a drive. Use it as your home media player, or use the Chromecast extension, the options are almost endless.

Price R6 000 T



The Harley-Davidson LiveWire is capable of accelerating to 95 km/h in just three seconds

MOTOR
The Revelation electric motor produces 116 Nm of torque and 78 kW of power.

TORQUE IS NOT CHEAP

THE FIRST E-BIKE FROM THE ICONIC MOTORBIKE BRAND

WORDS MATT BOLTON



DROPPING THE RIGHT WRIST ON THE HARLEY-DAVIDSON LIVEWIRE IS A PERSPECTIVE-SHATTERING EXPERIENCE. The future of motorbikes is suddenly right here, right now in the present, and the feeling it generates as you scream at the horizon is little short of symphonic. And, for me, that horizon lies beyond a twisting mountain road near Antequera, Spain. I've been attending Harley-Davidson's 2020 launch event and, after riding a comprehensive selection of the brand's more traditional bikes, both on the road and off-road, we're finishing the final day with a taste of the future – the all-electric bike that Harley-Davidson has spent nearly 10 years creating. To someone who – truth be told – does not have a strong brand affinity to Harley-Davidson, and whose perspective of the maker was very much rumble and leather, the LiveWire feels almost surreal, as if it isn't supposed to be here and certainly not with a Harley-Davidson badge on it. I think it's fair to say that if you asked 100 people which motorbike brand would produce the first game-changing electric motorbike, then hardly any would plump for the famous American maker.

Which makes the leaning into a now widening bend in the road, tucking in to the LiveWire's sleek naked frame, hitting the exit line into the straight, and then absolutely gunning it even more spectacularly bonkers. I've ridden fast bikes before, and I think it's fair to say that unless you are a track-day fiend with a garage full of 140 kW-plus hyper bikes, then the acceleration the LiveWire delivers (0-97 km/h in three seconds) will leave you breathless.

What a revelation

That impact is without a doubt largely generated by the sheer amount of torque generated by the bike's Revelation electric motor (116 nm), and the fact that torque is all made available at any stage. As the bike has no traditional gearing, there's no having to run up to north of 193 km/h to get near peak torque – you just get it all, instantly. The result of this is that when I first get on the bike and roll the wrist, I fishtail the hell out of the LiveWire, with it begging to put the intense power down under my overzealous, used-to-lesser-torque, unknowing hands. Within minutes, though, I get a feeling for the power this bike has to offer, and can choose when to be dramatic off the line.

And, talking of dramatic, the LiveWire is all sorts of theatrical, both from its lack of sound when stationary and the Tron Light Cycle screaming whine when it moves. Harley-Davidson has spent years, apparently, working on just getting this sound right, since otherwise – with the lack of a noise-making combustion engine beneath you, and instead just the bike’s electric motor connected to a 15.5 kWh Rechargeable Energy Storage System battery – when you engage the bike’s power, you would hear nothing. As someone who’s used to meeting up with friends to go riding, grouping up at biking cafes and accustomed to hearing the tick over of a large number of motorbikes’ engines when stationary, seeing a group of us sit on LiveWires and being able to hear nothing but the wind and ambient noises of rural Spain is markedly odd. Of course, it is how a bike sounds at a speed that is the more important part of the riding experience, and as a fan of both sci-fi and advanced technology, this is where the LiveWire really nails it for me.

HARLEY-DAVIDSON HAS SPENT YEARS WORKING ON JUST GETTING THE SOUND OF THE BIKE RIGHT

Scream for more

As soon as you roll on the accelerator, the LiveWire’s whine begins to build. It’s high-pitched, but seems to carry a more tumultuous whooshing quality (like a jet engine), which, especially at high speed, synchronises perfectly in my mind with what this bike is and the performance experience it delivers. It made me feel

like the pilot of a futuristic piece of military hardware and that, partnered with its outrageous acceleration, immediately placed the LiveWire right at the top of my wish list.

I slide through a series of tight climbing bends, and it is here I realise where big



DASH
A 109 mm colour touchscreen LCD keeps you plugged in to the ride.

BATTERY
A 15.5 kWh Rechargeable Energy Storage System delivers a range of 235 km [city speeds].



speed is not possible and also that the bike actually feels very approachable and manoeuvrable. No one can say this bike is light, and at 230 kg (509 lb) it really isn't; however, at no point did I feel it was heavy or unwieldy, both on and off the bike. I'm 1.8 m, – I am hardly a small chap, so that is something to factor in, but I can honestly say I was surprised at how well the LiveWire handled and how perfectly normal its weight felt. The tight bends end, opening up on to a plateau. After dropping the lid a touch before a blink-and-you-miss-it overtake of three vehicles, the LiveWire screaming in my ears, making me feel like Maverick from *Top Gun* (they should've ditched the Kawasaki for this in the new film!), I pin it again and watch as my peripheral vision melts away into a high-speed blur of scrub and background scenery.

Easy rider

My goodness, this thing is properly fast! With the LiveWire you can firmly kiss goodbye to any lingering image of an electric bike as some gutless scooter. And, the thing is, the LiveWire can deliver this sort of exhilarating, futuristic experience for around 152 kilometres of run time in a combined, stop-and-go situation,

and up to 235 kilometres in a city riding environment. Now, don't get me wrong, if you rode this bike aggressively and made use of its stupendous acceleration and torque in maximum fun mode, you're almost certainly going to get less than that. But, and I don't know about you, I hardly ever travel more than 121 kilometres in one sitting on my bike, let alone 152 or 235.

Power up

And, as Harley-Davidson is keen to point out, the LiveWire recharges to 80% capacity in 40 minutes, and 100% in 60 with DC Fast Charge tech. For me, though, if I were to own a LiveWire, using it for my daily commute of 16 kilometres to work via the school run, and then back again, I am quite confident that I wouldn't even need to rely on Fast Charge to keep me free of range anxiety and the bike always ready to go. Even a trip to my favourite biking store, which is a 56 kilometre round trip from my home, would still leave the LiveWire with three-quarters of its battery left. That is about 20 minutes back to full charge. I think, what I'm trying to say, is that while obviously we all want longer range from electric vehicles, and faster charging times, I feel 95% of riders could easily operate a LiveWire without any issues in terms of range and charging.

So, overall, my experience riding the Harley-Davidson LiveWire in the hills surrounding Antequera was one that I not only thoroughly enjoyed but, as a rider of fast sports bikes, one that really opened my eyes to just how exciting electric motorbikes can be. It also proved to me just how much Harley-Davidson seems to be hell-bent on powering into the future of riding with innovative new machines and technology, which is something I never thought it would've been on the forefront of.

Cash down

The price of the Harley-Davidson LiveWire is clearly going to be a sticking point for many right now, with £28 995 not cheap to anyone but those with very deep pockets. However, we do love top, game-changing technology here, and we can safely say that the LiveWire is just that. So if you can afford it, then it comes wholeheartedly recommended. The Harley-Davidson LiveWire delivers a slice of the future of motorbikes today, and it does so (price aside), in my opinion, with very few real-world caveats. So hats off Harley-Davidson. **T**

Price from R689 760 (import only)

SMART SPEAKERS

THESE SPEAKERS ALL PROMISE GOOD SOUND QUALITY ALONG WITH THEIR VOICE-ASSISTANT SMARTS, BUT WHICH OFFERS THE BEST COMPLETE PACKAGE?

WHEN SMART-HOME ASSISTANTS FIRST STARTED TO APPEAR, MUSIC CONTROL WAS CLEARLY A BIG SELLING POINT FOR PEOPLE. But the original Amazon Echo's speakers were awful, so it's wasn't a great combination overall. But that's all changing. Companies want to make sure you get the most flexible speakers to play music on demand, so they're throwing ingenious sound tech into tiny packages that work perfectly in any room, filling them with lush sound at your command. Far-field mics ensure that the various assistants can hear what you want, and extra wireless connectivity means you can play from devices. Here we put six speakers tuned for sound through their paces.



The biggest limitation of Apple's smart speaker is that artificial intelligence provided by Siri is embarrassingly far behind the market leaders, although the speaker itself sounds great.



Classic rock, modern tech
MARSHALL STANMORE II VOICE

The rock riff that plays when you turn this on tells you what you're in for. This amp-looking speaker includes Alexa, and you can play music over Bluetooth with aptX and WiFi (though the latter only works with Spotify Connect), and has dials on top for volume, bass and treble. Audio-wise, we found it strong, but a little frustrating – it's damn loud and has a pretty open sound that doesn't skimp on detail, but the bass feels flabby and loose. We love the design and build.

R7 900, marshallheadphones.com

RATING /10
 Sound 8
 Features 7
 Price 7

Incredible audio for Apple fans
APPLE HOMEPOD

This is the best-sounding speaker of its size we've heard. Seven tweeters deliver room filling sound with tons of detail, while a mind-blowing woofer delivers immaculately poised bass way beyond what it looks capable of. It's a truly rich, full sound stage in small package. You can also have two in a stereo pair, and there's AirPlay 2 multi-room streaming. However, it only works with Apple devices, and Siri is not the smartest assistant, though its control of HomeKit-compatible smart devices is really strong and flexible.

R7 140, apple.com

RATING /10
 Sound 7
 Features 6
 Price 4



Amazon's Echo started the smart-speaker revolution but it is not officially supported in South Africa yet. Most of Amazon's smart speakers (and many of the best Amazon services) are not available locally.



Sound and smarts to go
UE MEGABLAST

Want to take Alexa anywhere? The Megablast is rated as IP67 dust- and waterproof, so it can withstand getting splashed in the garden or the bathroom, and can survive a few knocks thanks to its rubberised build. Speaker quality is great, pushing 360° sound that's powerful enough to give your next party a big pop. It's a pretty nuanced sound stage too – big and bold, but pleasing across every genre. And because it's rechargeable, you can take it around the house as you listen to your favourite radio station and podcasts.

R6 000, ultimateears.com

RATING /10

Sound 7
Features 7
Price 5

The smart-home supremo
AMAZON ECHO PLUS (2ND GEN)

The new Echo Plus is more of a looker than its predecessor and has the tech to match. This is an Alexa-powered smart speaker with Dolby-tuned audio that's balanced really well and has plenty of punch, but sounds a little more compressed than the more expensive options here. It's also a smart-home hub, controlling devices directly using built-in Zigbee wireless. This means you don't need a base station for compatible gear, which includes smart plugs and Philips Hue bulbs. That's a bit limited now, but it'll grow. Set-up is super easy too

R3 100, amazon.co.uk

RATING /10

Sound 6
Features 6
Price 5

Sonos pioneered multi-room speaker systems and still holds a big lead in this market. However it has fallen out with Google who it claims has stolen its key multi-room audio technologies, and a bitter law suit its now underway.



The surprise package **RIVA CONCERT**

This looks to be gunning straight at the Sonos One: It's about the same size, has Alexa built-in, but even more ways to play, including Bluetooth, plus Apple AirPlay (not AirPlay 2), Spotify Connect and DLNA over WiFi. The audio potency in this thing is really impressive – it has way more bass than the Sonos One (pushing more towards the HomePod's thump), giving a rich, full sound overall. However, when treble gets busy, it feels noticeably a bit crunched and compressed compared to the open detail of the Sonos. This is small, but mighty.

R 4 453, rivaaudio.co.uk

RATING /10

Sound 8
Features 7
Price 8

One speaker to rule them all **SONOS ONE**

This is really aiming to be the high-tech speaker for everyone. Being a Sonos, it works with other Sonos gear as a wireless multi-room set-up or stereo pair, but it can also do Apple AirPlay 2 streaming. AI smarts are handled by Amazon's Alexa, which means it can do a lot, though Google Assistant is promised as an option soon too. The microphone quality is good, though the more expensive HomePod and Marshall hear better over noise. The sound quality is excellent: clear and complete in the mid and top-end, though bass is slightly thinner.

R4 500, sonos.com

RATING /10

Sound 8
Features 7
Price 7

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sportscene

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1896

TOTALSPORTS

Google's home speakers have undergone several evolutions, including being renamed to Nest, originally the brand for its home security cameras. The new Home Hub model includes a 7-inch screen which works great for displaying family pics.



RATING /10

Sound 7
Features 8
Price 8

Arty styling
GOOGLE HOME

While many features stay the same between them, your choice of a smart ecosystem can make a big difference to your day to day. Case in point, Google Assistant – available on the Home and Home Mini, as well as some other speakers coming soon – is the only way to control a Chromecast vocally, and it is much more adept at using natural language than its competitor.

While it had more trouble with our accent than Alexa did (and, on the Home, struggled more to hear its wake word) there's also proper multi-user support built in, with voice recognition for everyone in your family and their personal Google accounts.

The unit itself is small and apes the styling of many of Google's Home devices, with a flat slanted top, a hidden ring of RGB LEDs in said slice, and a cloth grille for its speaker.

Not the sort of thing that's hard to tuck away, but not overly obtrusive either. It throws out a bouncy sound when streaming via Bluetooth or WiFi, although the Home isn't strong enough to replace your proper stereo by any means, particularly as it lacks any form of physical output.

The best way to access Google Assistant in the home right now, but extended support in 2020 could send it packing.

R4 000



The Mini competes with Amazon's Echo Dot which is small and affordable enough so that you can place one in every room of the house. Even better, future versions might be battery powered so you can move it around the room or around the house.

RATING /10
Sound 6
Features 6
Price 8



Compact and affordable
GOOGLE HOME MINI

Aww, isn't it cute? Google's teensy little Home, pitched in both size and price to compete directly with Amazon's Echo Dot, one-ups its puck-shaped competition in the style stakes, and it's got audio built in too. It's like a technologically adept cloth pebble, with a string of four hidden RGB lights in the

top, hidden touch buttons on the edges of the cloth, and a physical switch for deactivating the microphone array.

For its size, the Home Mini belts out some perfectly reasonable and somewhat surprising tones with muscle, and voice recognition is good. Like the larger Google Home, though, this is no replacement for a more competent speaker system, and there's no audio

output, either 3.5 mm or Bluetooth, so if you're looking to connect a stereo to your network, you will also need to invest in a Chromecast Audio. But as a first step into the world of Google Assistant, or a second pair of ears for a new room, it's perfect.

Small it may be, but there's nothing subtle about the Home Mini's sound, and it's an absolute bargain at the price.

R799

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HOW TO FLY A SPACECRAFT

GET YOUR HANDS ON THE CONTROLS AS WE FIND OUT WHAT SPACE FLIGHT IS LIKE

HUMANS HAVE BEEN FLYING INTO SPACE SINCE 1961. Back then, Soviet cosmonaut Yuri Gagarin was launched on a short trip into space lasting just 108 minutes in an automated spacecraft called *Vostok 1*. Unsure how humans would cope with the rigours of space flight, engineers designed the spacecraft to need minimal human input – Gagarin was ejected from the spacecraft before landing. But in the subsequent years, things started to change. Complicated manoeuvres in orbit, such as attempting to dock two spacecraft, required direct human input. Similarly, missions to the moon required real-time input from human pilots to actually land on the surface.

It wasn't until 1981 with the arrival of NASA's Space Shuttle, however, that astronauts would get a real taste of what it's like to pilot a spacecraft fully from post-launch to landing. Space flight is tricky because, in the absence of gravity, there are multiple factors to consider. Aeroplanes rely on three axes: roll (front to back), pitch (side to side) and yaw (the vertical axis). But in space, with no atmosphere or gravity to control the vehicle, pilots must also contend with the rotation and orientation of the spacecraft. They are equipped with thrusters to manoeuvre themselves in space. But once they reach orbit, it's not simply a case of pointing the craft where you want to go and flying

in that direction. Instead, it's all about orbital mechanics; if you want to catch something ahead of you, you actually need to lower the altitude of your orbit. This makes your orbit around Earth smaller, so you catch up. If you went forward, your orbit would increase and you would shoot past the target.

Vehicles such as the Space Shuttle, the last of which was retired in 2011, relied heavily on human input. The cockpit didn't look too different to that of an aircraft, and the pilot used a joystick to manoeuvre the spacecraft in space. Firing different thrusters enabled the orientation of the Shuttle to be changed, letting it perform a number of tasks in orbit such as fixing the Hubble Space Telescope or deploying satellites.

At the end of a mission, the Shuttle would re-enter Earth's atmosphere. Most other spacecraft have handled the end of mission by returning to Earth via parachute, touching down either on land or at sea, but not the Space Shuttle. Designed to fly through Earth's skies like an extremely heavy glider, the Space Shuttle could be piloted – with some difficulty – to a runway landing on the ground, ready for another flight.

There have been many famous astronauts who have piloted different spacecraft. Neil Armstrong, of course, famously piloted the lunar lander of the Apollo 11 mission for its historic touchdown on the moon in July 1969. Running low on fuel and frantically looking for a suitable landing site, he relied on his expertise to bring himself and Buzz Aldrin to a safe landing, with just seconds worth of fuel to spare.

Astronaut Robert Crippen, meanwhile, was entrusted with piloting the first crewed Space Shuttle mission in April 1981, carrying just himself and his commander John Young aboard Space Shuttle *Columbia*. Today, many spacecraft rely on automation rather than human intervention. Russia's Soyuz spacecraft relies on an automated system to dock with the International Space Station (ISS). SpaceX's upcoming Crew Dragon capsule is designed to be fully autonomous, with astronauts on board having little input. Similarly, Boeing's Starliner spacecraft is also dependent on automation, but with the potential for astronauts to take over when needed.

Flying a space passenger jet

Over the years, several attempts have been made to build vehicles that combine the flight of a aeroplane with the spacefaring capabilities of a spacecraft, known as space planes. Today, the only operational space plane capable of reaching space is Virgin Galactic's *SpaceShipTwo*. Carried into the air on a modified Boeing jet, the vehicle is then dropped and activates its rocket engine, soaring upwards.

The vehicle is designed to surpass the official boundary of space at 100 km

(62 miles) above Earth, where it gives its occupants several minutes of weightlessness. It then falls back into the atmosphere, turning its tail upwards using a 'feathering' system to survive the journey back to Earth and then landing on a runway. It is designed to carry up to eight people on board: two crew and six customers who have paid for the experience of going to space, with ticket prices currently about \$250 000 (approximately R4 575 025).



Virgin Galactic's space plane is designed to take paying customers to space

What do you need to be a space pilot?



A degree

You'll need a bachelor's degree in engineering, biological science, physical science, computer science or mathematics to consider being an astronaut.



Flight time

If you want to be a pilot, you'll also need at least 1 000 hours of piloting time on jet aircraft.



Good eyesight

You'll need to have 20/20 vision in both eyes if you want to become an astronaut – but you can use glasses!



Leadership skills

Make sure you can demonstrate key leadership skills, which is an important trait for anyone who wants to be an astronaut.



Team player

And you'll need to be able to work in a team – space flight is all about working with your crew, and if you can't work together, you won't fly.



NASA's newest astronauts after graduation, having completed a two-year training programme



Astronauts train in diving gear, as being underwater mimics weightlessness

IN THE
ABSENCE
OF GRAVITY,
THERE ARE
MULTIPLE
FACTORS TO
CONSIDER



Future missions to Mars may require a large amount of automation



Neil Armstrong and Buzz Aldrin spent more than 21 hours on the lunar surface



STS-1, the first crewed Space Shuttle mission, lifted off on 12 April 1981



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Hands On The Controls

THIS WAS THE CONTROL PANEL USED TO MANOEUVRE THE OLD APOLLO LUNAR MODULES



CONTACT LIGHTS

This told the crew when they were close to the moon's surface so they could switch off the engine.



UTILITY LIGHTS

These switches let the astronauts control the intensity of the light in the spacecraft.



CARBON DIOXIDE GAUGE

Astronauts used this to measure the level of potentially deadly carbon dioxide inside the spacecraft.

ENGINE CIRCUIT BREAKER

This was used to arm the Ascent Propulsion System on the spacecraft to leave the moon's surface.



ATTITUDE CONTROLLERS

This was used to change the angle and orientation of the spacecraft.

INTERFACE

The Display and Keyboard (DSKY) interface was the input system for the spacecraft's computer.



THRUST CONTROLLER

The pilot would use this joystick to control the forwards, backwards and sideways motion of the lander.



ALIGNMENT OPTICAL TELESCOPE (AOT)

This device, like a periscope, was used to make visual sightings on the moon.



5 Facts about space flight

1. One orbit

Yuri Gagarin's first flight to space in 1961 involved just one orbit of our planet before he returned to Earth's surface in his *Vostok 1* spacecraft.

2. Weak at the knees

Prolonged space flight can have detrimental effects on the human body, lowering bone and muscle mass, so astronauts can struggle to stand when they return home.

3. Longest flight

The longest time spent by someone on one mission was Russian Valeri Polyakov, who stayed in space for 437 days on the Mir space station from 1994 to 1995.

4. Highest speed

The highest speed ever reached by humans was by the crew of Apollo 10. Their capsule reached 39 897 km/h on their return from the moon.

5. Farthest from Earth

The Voyager 1 spacecraft is the farthest from Earth. At about 150 times the Earth-Sun distance, it takes more than 40 hours to send a command and get a response.

Q&A Interplanetary missions

ANDREA ACCOMAZZO, HEAD OF THE SOLAR SYSTEM AND EXPLORATION MISSIONS DIVISION AT THE EUROPEAN SPACE AGENCY, TELLS US WHAT IT'S LIKE TO GUIDE UNCREWED SPACECRAFT TO OTHER WORLDS



Timing is everything

When it comes to autonomously landing on or flying to other worlds, the timing of everything in the mission is critical. Spacecraft must be given a series of commands to perform at given times so that they enter orbit around a planet or land on its surface. Sometimes this works, and sometimes it doesn't. An infamous example of this not quite working was in 2016, when the ESA's *Schiaparelli* lander ran into a problem landing on Mars. It incorrectly calculated that it was

below the surface – when it was still high above the ground – and deployed its parachute too early, leading to a crash landing.

But things can go right, too. Perhaps one of the most complex autonomous manoeuvres on another world was NASA's landing of its *Curiosity* rover on Mars in 2012. The rover was dropped on to the surface of Mars by an innovative 'sky crane' system, with a thruster-powered platform using cables to gently lower the rover on to the surface.



NASA's *Curiosity* rover was lowered to the surface of Mars autonomously by a 'sky crane'

WHAT SPACECRAFT HAVE YOU BEEN INVOLVED WITH?

I've done Venus Express, a probe that flew to Venus. More recently I've been involved in an Earth-observation satellite, Sentinel-3A. And now I've been acting as the flight director for the BepiColombo mission to Mercury, and we're launching a probe called Solar Orbiter, which will be orbiting the sun.

WHAT ARE THE MAIN THINGS THAT NEED TO BE CONSIDERED WHEN FLYING TO OTHER WORLDS?

One huge difference is that the orbital mechanics are much more demanding than an Earth-bound mission. The second one is the reaction time; everything on a plane happens much more quickly than on a spacecraft. We collect all the input of what we want to do, we [create] a simulation of what is going to happen, we double-check it, then we generate the telecommands for the spacecraft and we uplink them. They're typically

valid for the next two or three days or the next week, depending on the mission. This is the way you control the spacecraft.

HOW DO MODERN SPACECRAFT COMPARE TO OLDER SPACECRAFT?

Almost every spacecraft now has an autonomous capability to determine which direction it's oriented in space. For Earth-observation spacecraft, we not only have that, but the spacecraft are autonomous in determining where they are positioned around Earth [using GPS]. This is true for spacecraft that are orbiting Earth, but is not the case for interplanetary missions. If I'm approaching Mars, I cannot have a GPS telling me where the spacecraft is with respect to Mars. But I can have a camera that can take pictures of Mars and determines the movement of the spacecraft, and autonomously could determine the relative trajectory of the spacecraft with respect to the body. This is something that might [be used] more and more for spacecraft. **T**

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COCKPIT CRUIS

RAZER ERACING SIMULATOR

We don't reckon you can take this one home with you (and your family probably wouldn't be too pleased if you did) but as a racing-game set-up, it's impressive – motorised seat and harness, all the wheels and pedals you can handle, and an immense 128" screen with a 202° curve.

The Razer Eracing Simulator is packed with really cool features such as a high-performance hydraulic pedal system, a seat-belt G-force tensioner system, magnetic paddles, and even a motion platform that mimics the movements of a real-life race car.

razer.com R105 796 (import only)



The steering wheel is made from carbon fibre, anodised aluminium and finished in leather, which gives you the full grip and a premium experience.

A HYPERREAL MOTOR-RACING SET-UP FOR SPEED FREAKS

A DER

The Razer ERacing Simulator features two full-HD projectors for an epic visual experience.





GOING VIRAL

WHAT YOU NEED TO KNOW ABOUT
INTERNATIONAL HEALTH EMERGENCIES

WORDS JADE TAYLOR COOKE

ON THE LAST DAY OF 2019, THE WORLD HEALTH ORGANIZATION (WHO) OFFICE IN CHINA REPORTED AN UNUSUAL CLUSTER OF CASES OF PNEUMONIA IN WUHAN CITY, IN THE COUNTRY'S HUBEI PROVINCE. On 30 January 2020, the outbreak was declared a Public Health Emergency of International Concern (PHEIC) by the WHO – and it was spreading fast. By 11 February 2020, it received an official name: Covid-19. And we haven't stopped talking about it since...

Panic, hysteria and conspiracy theories abound. At the time of going to print, SA had been in a nation-wide lockdown since 26 March. Drastic but necessary measures to contain the virus. And while many on social media may think they are suddenly a qualified doctor, how much do any of us really know about public health emergencies? Separate the facts from the farce – read on to learn all about the virus.

What is a coronavirus?

'Coronaviruses are a large group of RNA viruses that we have known about for a long time, but have also been circulating among humans and many other species for a very, very long time. You've almost definitely been infected with a coronavirus at some or other point in your life,' says Erin Allmann Updyke, a US epidemiologist, disease ecologist and the co-host of This Podcast Will Kill You. 'However, this coronavirus that's making headlines is a new, individual, specific virus.'

According to Erin, 10–30% of all common colds around the world are caused by one of four rather everyday coronaviruses that colonise the upper respiratory tract (your nose and throat). 'And that's pretty much where they stop,' she says. 'They are not super infectious. They produce very mild upper-respiratory symptoms – a cough, a runny nose. Maybe you get a headache, maybe you spike a fever, but in general, you are not all that sick.' The SARS and MERS outbreaks in 2002 and 2012 respectively were also caused by coronaviruses. What made these different to the coronaviruses that cause the common cold, is that they affect the lower-respiratory system, resulting in serious complications, such as pneumonia.



It's thought that Covid-19 has a similar effect. 'This is such a new virus and an ongoing outbreak, that we don't have all the answers,' says Erin. 'But we can make estimates, based on the fact that we have seen SARS and MERS in the past. This novel coronavirus likely operates very similarly to SARS and MERS.'

How does it spread?

'The way that a coronavirus is transmitted is by respiratory droplets,' says Erin. 'So you cough and sneeze out liquid droplets full of the virus, and that's how the next person gets infected. It's also possible that these droplets can land on surfaces, and the virus can then live on these surfaces, and be transmitted from, say, a doorknob, if you touch that doorknob and then touch your mouth.'

Say what?

RNA: An RNA virus is a virus that has RNA as its genetic material (as opposed to DNA).

SARS: This stands for Severe Acute Respiratory Syndrome. It is a type of coronavirus that infects humans, bats and certain other mammals. Symptoms are influenza-like and include fever, headache, diarrhoea, and shivering.

MERS: This stands for Middle East Respiratory Syndrome. It is a type of coronavirus that infects humans, bats and camels. New to humans, it was first reported in Saudi Arabia in 2012. Symptoms include fever, cough and shortness of breath.

5 Other Pheics This Decade

H1N1 swine flu pandemic (2009-2010)

This was the first PHEIC ever declared, following new international health regulations that came into play in 2007. First identified in Veracruz, Mexico, H1N1 is a subtype of influenza closely related to the Spanish flu of 1918, though far less fatal than its predecessor.

Polio declaration (2014)

After an emergency meeting of the International Health Regulations committee in 2014, it was decided that the international spread of the wild polio virus constituted a PHEIC. 'If unchecked,' stated the WHO, 'this situation could result in failure to eradicate, globally, one of the world's most serious vaccine-preventable diseases'.

Western African Ebola virus epidemic (2014-2016)

According to the WHO, this was 'the largest and most complex Ebola outbreak since the virus was first discovered in 1976, with more cases and deaths than all others combined'.

Zika virus (2015-2016)

Though accompanied by negligible to minor symptoms in infected adults, this mosquito-borne virus causes serious complications during pregnancy. It results in miscarriage or birth defects, including microcephaly [babies born with critically small heads or a partly collapsed skull], brain damage, reduced brain tissue, eye damage, joint problems and neurological disorders such as Guillain-Barré syndrome.

Ongoing Kivu Ebola epidemic (2018-present)

The world's second-largest Ebola epidemic, as of 1 March 2020, 2 264 died of the 3 444 people infected. 'This is about mothers, fathers and children,' said WHO Director-General Dr Tedros Adhanom Ghebreyesus. 'At the heart of this are communities and individual tragedies.'





PHOTOGRAPHY: GALLO/GETTY IMAGES, COURTESY IMAGES



Ask The Expert

Dr Sibongile Walaza
Medical Epidemiologist,
National Institute For
Communicable Diseases
[NICD] of South Africa

Should we expect Covid-19 to continue spreading beyond 2020?

As there's currently no definitive cure for Covid-19 other than symptomatic relief, it can be expected that the virus will keep spreading until a vaccine is available. There are current developments being made towards a possible vaccine, but the expected date of release for public use is unknown. It is unlikely to be available within the year.

What makes Covid-19 different and dangerous compared to other coronaviruses?

Due to Covid-19 being novel, very little is known about the exact mechanism in which it behaves compared to the other coronaviruses. The transmission also appears to be very quick, with

evidence of active local community transmission making it difficult to contain. But we have seen many countries making successful strides with containment of the disease.

How would I know if I'm suffering from Covid-19?

The symptoms include coughing, sore throat, shortness of breath and fever. These are similar to the common cold or influenza, but, consult a doctor if concerned, especially if you have travelled to an area with known transmission.

What precautions should I take to protect myself and help prevent the spread of the virus?

- Wash your hands with soap after contact with ill people or their environment. And avoid touching your face with unclean hands.
 - Avoid contact with people suffering from acute respiratory infections.
 - Take general supportive measures, such as eating a healthy diet and staying adequately hydrated.
 - Anyone with symptoms of respiratory infection should practise good coughing etiquette: Maintain good distance when coughing, cover your coughs and sneezes with either tissues or clothing, and wash your hands thoroughly afterwards.
 - Travellers should self-report if ill.
- Focus on facts, and not fear. **T**

Public Health Emergency of International Concern

For a local or national health crisis to be declared a PHEIC by the WHO Director-General, it needs to meet specific criteria:

1. It has to be an 'extraordinary event', meaning it is serious, unusual or unexpected.
2. It has to constitute a public health risk to countries other than the one in which it originated.
3. It also requires a coordinated international response.

For up-to-date information, go to [nicd.ac.za/diseases-a-z-index/covid-19/](https://www.nicd.ac.za/diseases-a-z-index/covid-19/)

HOW VACCINES SAVE LIVES

THESE INJECTIONS, DROPS AND SPRAYS TRAIN YOUR IMMUNE SYSTEM TO FIGHT DEADLY DISEASES

MADE UP OF MILLIONS OF INDIVIDUAL WHITE BLOOD CELLS, THE IMMUNE SYSTEM PATROLS THE BODY IN SEARCH OF GERMS. When tissues are under threat, it mounts a two-pronged attack. First, the innate immune system gets to work to slow germ growth and prevent spread. Then the adaptive immune system comes in to eliminate the threat. The adaptive immune system has powerful weaponry, but it takes a while to deploy. This is because the cells of the adaptive immune system can each only attack one type of infection. When the body encounters a new germ, it needs to find the right cells and prepare them for battle. This process can take up to one week, and in that time, people can sometimes become very unwell.

This is where vaccines come in. Rather than just wait to encounter a dangerous

disease such as measles in the world, a vaccine gives the immune system a chance to prepare in advance. Vaccines contain weakened or dead germs, or parts of germs, along with something called an adjuvant. This helps to alert the immune system to danger, encouraging it to start mounting an attack. With access to parts of the germ, the immune system can find the right cells and get them ready.

Many of the cells made during a vaccination disappear afterwards, but some stick around as 'memory cells'. They stay in the bloodstream for decades, constantly on the lookout for their matching germ. If the infection then happens for real, these memory cells spring into action straight away. They divide to produce an army of clones that appears in a matter of hours instead of days. This can clear the infection before it takes hold, preventing us from getting sick at all. **T**



The World Health Organization recommends that everyone has ten routine immunisations

Five facts about how vaccines save lives

1 Smallpox

Smallpox used to kill 5 million people every year. Now it kills none. Thanks to a worldwide vaccination campaign, the disease disappeared in 1980 – the only infectious disease to have been eradicated.

2 Diphtheria

The skin and respiratory infection diphtheria would kill 260 000 people every year if it weren't for vaccination. Immunisation prevents at least 86% of infections worldwide.

3 Whooping cough

Without vaccination, there would be nearly 1 million deaths from whooping cough every year. Immunising young babies has reduced that number by two thirds.

4 Measles

Measles can cause blindness, brain swelling and severe lung problems. It takes just two doses of the vaccine to protect children from infection, preventing 2.6 million deaths every year.

5 Neonatal tetanus

Newborn babies are especially vulnerable to tetanus infection. Thanks to vaccination, 700 000 more babies survive every single year.

Is there a vaccine for COVID-19?



Scientists have been working around the clock to develop a vaccine against the COVID-19 virus since February 2020. Unfortunately, they have not developed any vaccine just yet. It has been reported that even when a vaccine has been developed it will take months of testing before vaccines can be distributed to people around the world. The average amount of time estimated would be six to 18 months. The vaccines will be tested in three phases:

Phase 1: This measures the safety of the vaccines and can last up to 6 months.

Phase 2: This trial will measure the immune response from tested patients. This trial could take up to 12 months.

Phase 3: This trial will measure the effectiveness of the vaccines and could take up to 3 years or more.

There has however, been a trial vaccine labelled mRNA-1273 developed by Moderna and NIAID. This trial vaccine has been tested on 45 volunteers who are based in Seattle, US. Phase 1 of the trial officially started on March 1st, 2020 and will run for 6 weeks.

Next-gen vaccines

The science of immunisation is only just beginning. The Human Vaccines Project is bringing the world's top scientists together to unlock the secrets of immune response. To design the vaccines of the future, we need to understand our own immune defences. The Human Immunome Program is mapping the genes that allow the immune system to make custom antibodies to different germs. The Rules of Immunity Program is discovering what rules the immune system uses to build a defence and remember past infection. The more we know about how our immune-system army works, the better we'll get at training it to fight disease.

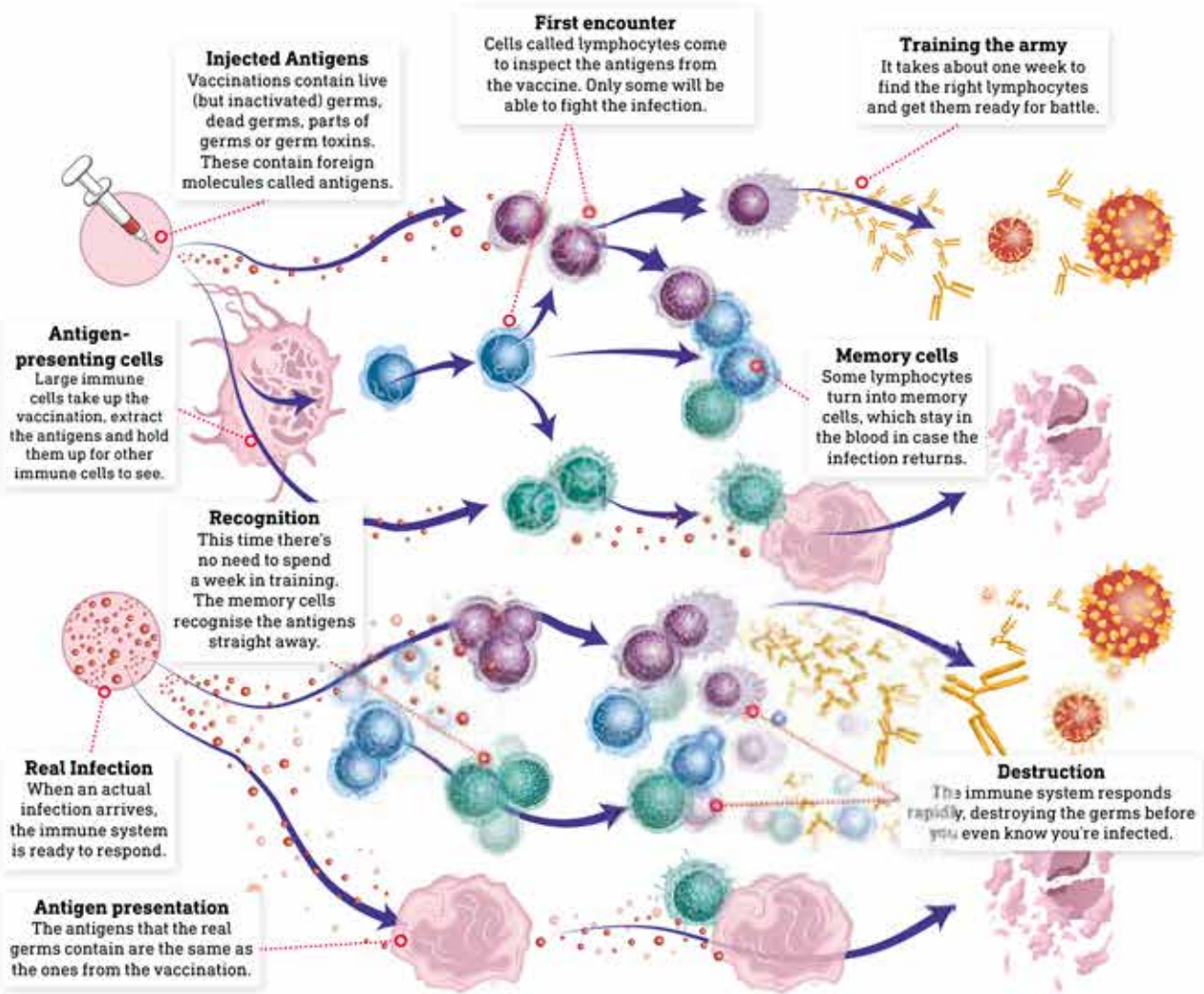
Flu viruses change every year, so we have to change our vaccines to keep up



Before vaccinations, iron lungs helped children to breathe when polio paralysed their muscles

What happens when you're vaccinated?

Vaccinations prepare the immune system to fight infections with speed and precision



Sweet Escape

NINTENDO GIVES THE WORLD EXACTLY WHAT IT NEEDS WITH A CUTE LIFE SIMULATOR THAT OFFERS THE PERFECT ESCAPE

WORDS JONATHAN MEYER



Animal Crossing: New Horizons

NINTENDO SWITCH

I've always held the probably cliché opinion that video games are the purest form of escapism. That may sound a bit 'dad-ish', but I've spent countless hours raiding in *World of Warcraft*, building elaborate houses for my Sims, and staring at Lara Croft in ways I probably shouldn't. Through games, gamers are able to leave the often-harsh realities of the world around them, and pretend to be someone completely different and to have control over something amazing – even if only for a short while. This viewpoint was most certainly put to the test when the world was gripped by the COVID-19 (novel coronavirus) pandemic in early 2020. Millions of people around the world were forced into voluntary or government-mandated quarantine (or lockdown) in an effort to

stop the spread of the virus, with gamers from all walks of life proudly proclaiming that this was the moment for which they had collectively trained. Forced into isolation myself – just as *Animal Crossing: New Horizons* launched on the Nintendo Switch – I thought it the perfect opportunity to give the fifth main title in the popular life-simulator game series a fair try.

You play as a fully customisable character, who moves to a deserted island after purchasing a travel package from Tom Nook, a popular racoon-like character in the series. Under Nook's watchful eye, you explore the island and develop it as you see fit, creating a bustling community of anthropomorphic animals in the process. The game is cute, fun, and filled with a child-like whimsy that will be well known to anyone who has played an *Animal Crossing* game in the past.

Unlike previous iterations, where you arrive at an already thriving community,



in *New Horizons*, you're starting from scratch. This, I think, is where some players might struggle with the game. Everything runs in real-time (syncd with your own clock), so it sometimes takes days, even weeks, to achieve something in the game. Want to build a bridge? No problem, but it will only be ready tomorrow.

This shouldn't be confused with the awful timers and microtransactions seen in most mobile games these days, it's more of a forced soft lock on non-linear progression, based on real-world time, and it does have its advantages. Different things happen at different times of the year, for example, and certain animals are only seen at certain times of the day. If you want to catch a tarantula or see a shooting star in the sky, you'll only be able to find them if you play the game after 7 pm at night. Through the use of real-world time, *New Horizons* nudges you to play at different times, showing you the world you've helped create from a very different perspective.

Animal Crossing is anything but action packed. It's no *DOOM Eternal*, and it most certainly won't get the adrenaline pumping. The focus, instead, is on building, crafting and creating, but all in its own time. Certain parts of the island are off limits until you are able to create the tools you need to get to them: a pole that allows your character to vault over narrow rivers, or a ladder that allows you to climb up sheer cliffs. This may not appeal to everyone, but it was exactly what I needed in the time of uncertainty that was early 2020.



New Horizons is a slow burn, and it isn't perfect. Only one island can be saved per Switch console, for example, meaning that if you want to make a character and an island, then your partner, friend or housemate won't be able to do the same, and will have to play on your island instead. The game does allow four-player co-op, however, and it is fun to explore and build together – the perfect game for couples, perhaps?

I knew *Animal Crossing: New Horizons* would offer me a welcome escape during a trying time in my life, and I truly believe

it will quickly become yet another reason to own a Switch. Nintendo has promised a number of free content updates in the months to come, and I look forward to seasonal events such as Halloween and Christmas making an appearance. If you're looking for a break from the world, and from fast-paced gaming in general, then *Animal Crossing* is exactly what you've been searching for, and something I would gladly take to a deserted island.

ADVENTURE TIME

EXPLORE AND CATALOGUE THE FUNKY
FAUNA AND FLORA OF PLANET ARY-26

WORDS MEGAN ELLIS



Journey To The Savage Planet

PS4, XBOX ONE, PC

What happens when you pair late-stage capitalism and space exploration?

The setting of *Journey To The Savage Planet*, an exploration game that sees disposable adventurers sent off to explore and catalogue potential planets for human habitation. While the dark humour of the game is reminiscent of *The Outer Worlds*, *Journey To The Savage Planet* takes a gleeful approach to space exploration – and all the oddities waiting to be discovered.

Playable either alone or in co-op mode, the story sees you arriving at far-off planet ARY-26 to conduct research for Kindred Aerospace - the fourth best space exploration company in the galaxy!

Every expense is spared by billionaire CEO Martin Tweed, so players will need to harvest resources and 3D-print most of their equipment.

However, very early in the game, your studies find evidence of intelligent life. Of





course, this unexpected twist doesn't stop your adventure and you're tasked with uncovering as much as possible about mysterious towers dotted on the planet's surface.

While a savage planet indeed, ARY-26 is a feast for the eyes. You'll find beautiful and hypnotising biomes all around the world – with a few downright weird and gross sights too.

There's no shortage of things to do as the tasks stack up. After all, most of the upgrades you need in order to venture further must be found by completing puzzles and challenges.

When it comes to enemy bosses and pivotal encounters, the game provides an assortment of oddities to keep things interesting. While most quests involve finding or activating

certain items, the game avoids becoming repetitive.

That said, while *Journey To The Savage Planet's* first-person perspective makes the game immersive, controls could be improved. A slight delay in input and the occasional glitchy action prompt add a bit of inconvenience to certain stages of the game.

Despite this drawback, *Journey To The Savage Planet* provides a delightful and challenging adventure that approaches the concept of space with a beautiful mix of glee and cynicism that will keep you immersed for hours.

.....8.....
1 2 3 4 5 6 7 8 9 10
.....

DOUBLE TROUBLE

HELL'S HORSEMEN NOW WITH A DEADLY MULTIPLE-PERSONALITY DISORDER

WORDS EXCALIBUR



Darksiders Genesis

PS4, XBOX, PC, SWITCH

Darksiders Genesis is the fourth instalment in the highly regarded

Darksiders series of action role-playing games that features the four demonic Horsemen of the Apocalypse as its main characters (one of which identifies as female!).

What differentiates *Genesis* from the previous three titles is the new feature that allows you to play as either War or Strife horsemen, the two protagonists of the new game, and switch between them at will with a single key press.

What this means is that, for the first time in the series, *Genesis* offers players

the choice to focus their character builds on either ranged or melee combat with Strife (using primarily dual pistols) and War (using primarily a broadsword) being better suited to each respectively. Both characters come equipped with a suitably demonic horse, and you can mount and dismount in single key press to gain speed or height, cover distance or escape from a situation.

Unlike the previous *Darksiders* games, *Genesis* looks slightly cartoonish and features a lot of vibrant colour suited to each unique level and location. Although it's a bit Cartoon Network in places, the animation is rather excellent – an enjoyable departure from the hyperreal graphics of many modern games.

Dispatching demons

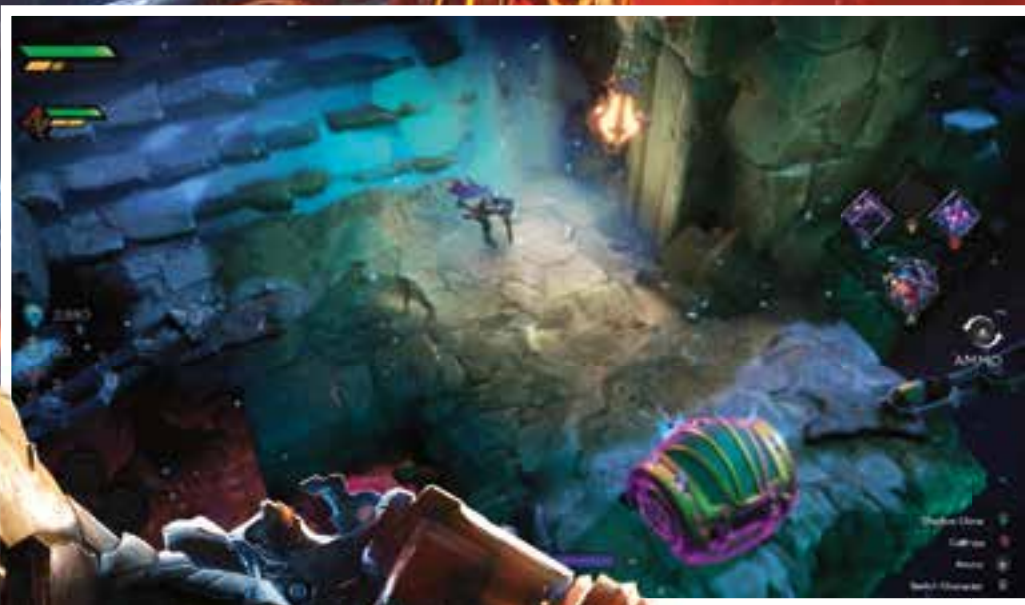
The storyline follows a formula similar to that of previous games: A dark force summons and dispatches you on a quest to kill evil hordes in order to restore balance between good and evil.

Throughout your quest, you will also encounter a series of puzzles that need to be completed to unlock items and progress the story as is traditional for a *Darksiders* game. While not primarily a puzzle game, these challenges in *Genesis* act as a refreshing break from the hacking and slashing that makes up most of the game.

Over the course of the quest, you will encounter the recurring character Vulgrim, a merchant with whom you can trade goods, from all the previous games, but also introduces some new colourful characters such as Dis, a slave to Vulgrim.

Genesis contains all the elements that fans of the franchise have come to expect from a *Darksiders* game with the new dual character mechanics to exploit, a new story, some new characters and a delightfully drawn world to explore.

.....10
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READY, AIM, FIRE!

THIS ACTION-PACKED MOBILE GAME WILL KEEP YOU OCCUPIED FOR HOURS

WORDS ASHEEQAH HOWA

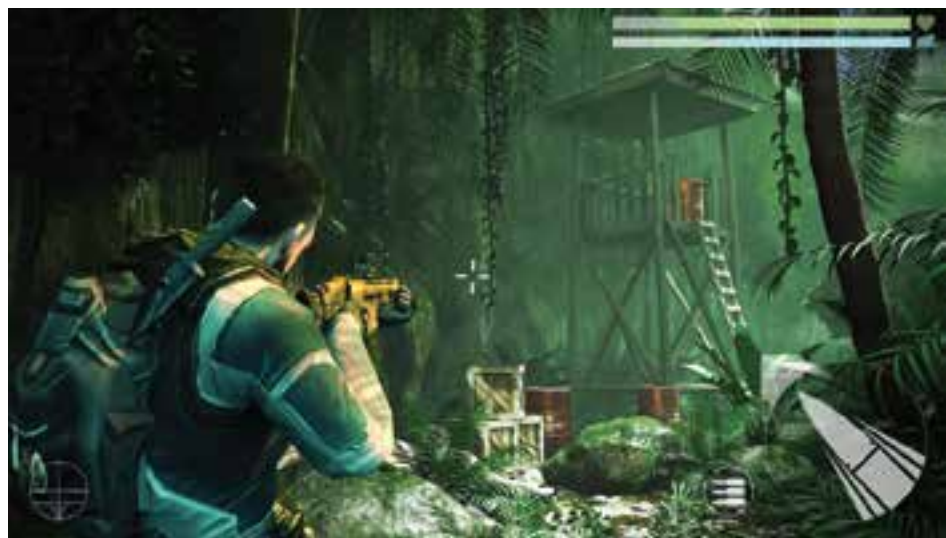


Cover Fire

ANDROID, IOS, FREE

Stop the dreaded Tetracorp from suppressing the planet.

You play as the leader of the resistance aimed at stopping this corporation from taking over, by building up your team with special skills from cards gained from completing missions. *Cover Fire* is very addictive, but having some cash to splurge along the way can make life easier when improving skills and perks to reduce time needed for the upgrade – but if you don't mind watching a few ads to reduce the time, funds won't be a necessity. Side missions that can help you earn more cards, perks or money to upgrade skills include sniper missions and an open-world zombie mode. Sniper missions are time attack missions, where you get extra seconds with every kill you make – they can either be a sniper rifle or drone missions. In the Zombie open world, it's pretty straight forward: kill the zombie hordes. The graphics are crisp and lifelike, and the gaming controls are easy to pick up and understand.



1 2 3 4 5 6 7 8 9 10



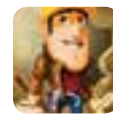
Unsung Heroes

ANDROID, IOS, FREE

Follow the story of three young archaeologist as they uncover the story of Xi Niu, a Chinese girl that lived more than a thousand years ago. Complete tasks to uncover artefacts and treasures to unfold the story of Xi Niu and her quest to discover who killed her family and unravel the secrets of palace life in ancient China. The more golden hearts you get from completing tasks, the faster you gain pieces of artefacts to reassemble and discover how they fit into Xi Niu's life. It's a pretty simplistic gameplay of directing people to do things and assist in fetching items they need around the area. You can also play in both ancient and modern times.



1 2 3 4 5 6 **7** 8 9 10



Diggy's Adventures

ANDROID, IOS, FREE

Join Diggy on a quest to break an ancient Egyptian curse, that his father unleashed. Guide Diggy through mazes and dig your way out of blocks, to help lift the curse. Each character that Diggy meets along the way gives a quest that needs to be completed to help you save the land. Watch your energy bar, and be sure to keep it full. Each obstacle that Diggy faces exerts a certain amount of energy. Graphics are almost childlike with arcade roots, but this game will surely keep you occupied and riveted in its simplicity.

1 2 3 4 5 6 **7** 8 9 10

Upwardly

TOP RATED GEAR FOR GEEKS

Samsung Galaxy S20 Ultra

The Samsung Galaxy S20 Ultra is, technically, the best Android phone on the market today. It is a phone with an impressive, versatile camera system, hyper-premium internal hardware suite, future-proofed, next-gen 5G connectivity and a huge and immersive screen.

How it achieves its dominance, though, is quite basic. These tech weapons are wielded in a rather unrefined way, and in some cases they feel powerful but is a bit rough around the edges and/or complete overkill. The price of this tech is also incredibly high, making it a bit of a niche proposition to our minds. The S20 Ultra's camera system is probably its biggest unique selling point, so we will begin our analysis of the phone here. Samsung speaks about its rear-camera array as a 'signature design element' – something that helps make the phone's overall look and allows it to be easily identified. And, when you flip the phone over, the one thing it does is stand out.

The noticeably pronounced rectangular array (which will have to be protected by a case to avoid scrapes and nicks, in our opinion) houses a seriously powerful quad-camera system, with a 108 MP wide-angle main

Samsung has bet big on the S20 Ultra's cameras; even the front facing snapper can capture sumptuous pictures with a seriously powerful 40 MP sensor.



MOBILE



A gargantuan 5 000 mAh battery means you can run the Ultra's 120 Hz screen for between a day and a day and a half on a single charge.

snapper joined by 48 MP telephoto, 12 MP ultra wide and time-of-flight DepthVision lenses. And, while we are talking about the rear array's selection of lenses, the phone's new Single Take shooting mode makes use of them all. In this mode all the lenses are used when a shot or video is taken and then, post shot, the user is presented with a variety of differing options (10 shots and mini-videos), which sit all under one entry in the phone's image gallery. The S20 Ultra also comes with some pretty impressive zoom functionality. From the furthest out ultra-wide setting to 1x, through 5x, 10x, 30x and up to 100x, you have plenty of range at your disposal when shooting. And fidelity remains decent at most zoom levels aside from 100x, which seems to take on a soft-focus watercolour finish. With a proper tripod, we're sure you could get some half-decent images from it, but we question its everyday usability. Elsewhere, though, the S20 Ultra's camera

system really does flex its muscles. The amount of shooting modes on offer is quite remarkable. As well as a maximum freedom Pro shooting mode, you've got a strong panorama option, as well as dedicated settings for food, night-time and live focus. As you would expect, you can shoot in a variety of aspect ratios, too. In terms of video, you can shoot at a wide variety of resolutions up to 8K, while the Ultra also delivers a Pro video shooting mode, as well as slow-mo, super slow-mo and hyperlapse options. But while the 8K video shooting is a technical achievement, and very nice to have, the vast majority of people will not get to enjoy it, as you'd need an 8K screen to play it back at full fidelity – though creating 4K video from this 8K source looks just excellent. As you would absolutely expect, the S20 Ultra delivers very strong camera images, no matter what you're shooting. Colour balance in particular seems to be a strong point and vibrancy is good, although there is no getting away from the fact that Samsung still seems to



be leaning towards quite heavy post-processing. It's a tad clumsy in our opinion and can lead to sharp edges appearing a little soft. Lastly, in terms of camera system, the Samsung Galaxy S20 Ultra comes with a 40 MP front-facing selfie camera. This bad boy can, if you so wish, capture your lovely mug in 40 MP glory with or – for the brave – without beauty mode activated.

Pick up the Samsung Galaxy S20 Ultra and the first thing that you'll notice is how large its screen is. At 6.9 inches, it is a match for even the gargantuan Samsung Galaxy Note 10+, which comes with a 6.8-inch screen. Side by side, these two phones look essentially the same in terms of size; however, when you pick them up, there is a noticeable weight difference, with the Ultra feeling heavier (221 g) and denser than the king-sized Note (196 g). In terms of design, though, they're very much in the same ballpark.

The main visual difference, at least from the front, is that the Galaxy S20 Ultra has more of the

S-series wider frame curves, giving it a slightly softer look. When it comes to the display, you cannot help but be impressed by the size and clarity of the Dynamic AMOLED screen. It has a refresh rate of 120 Hz, which even outguns the gorgeousness of the OnePlus 7T and OnePlus 7T Pro panels, which have an output of 90 Hz, and that along with HDR10+ and a sharp 3 200 × 1 440 resolution means that anything you display looks stunning. That 120 Hz refresh rate means that scrolling, app switching, UI navigating and all animated elements are liquid-butter smooth, and in partnership with the slickness of Android 10.0 and Samsung's best-in-class One UI 2 skin it truly delivers a top-tier general-usage experience. Overall, the phone looks damn good from the front – even though there is basically no lovely waterfall curve to its screen – and pretty ropey from the back, largely thanks to that bulky rear camera array. In terms of internal hardware, as

RATING/10
Features 9
Build 9
Price 4

you would expect from the range-topping new hotness in a fresh Samsung phone line-up, the Galaxy S20 Ultra is stacked. It comes with Samsung's rapid Exynos 990 CPU (a Snapdragon 865 in the US), an Adreno 650 GPU, a simply incredible 16 GB of RAM (in max spec) and a chunky 512 GB of internal storage space (which can be expanded with a microSD). Despite not being a dedicated gaming phone, it has more than enough power to run even the most graphically demanding Android games without breaking sweat.

Of course, such a ginormous phone needs a large battery, too, and thankfully, Samsung has actually made a decent stab at handling this, as the S20 Ultra comes loaded with a very large 5 000 mAh battery. This is one of the largest battery capacities in a mainstream phone on the market today. So if you use it on its fresh-out-of-the-box settings, which locks the screen at a 60 Hz refresh rate, with medium usage you get a solid day and a half to two days usage out of the phone on a single charge. If you turn on the Ultra's 120 Hz mode, though – and you really will want to – then that battery life is reduced. With 120 Hz on, you're

While outweighing siblings such as the Note – coming in at 221 g to the latter's 196 g – the Ultra has softer lines, having inherited the S-series' frame curves.



THE S20 ULTRA IS A BEZEL-FREE BEAUTY THAT HAS AN EVEN BIGGER SCREEN THAN THE HUGE SAMSUNG GALAXY NOTE 10+. ON TOP OF THIS, ITS 120 HZ DISPLAY IS SMOOTH AS SILK, LEAVING ALL OF ITS RIVALS IN THE DUST.

very much looking at a day to a day and a half usage on a single charge with medium usage. Other tech of note included an in-display fingerprint reader that works just as well as other Samsung units have been doing for the past few phone releases, 5G support (there is no 4G-only version of the Ultra, with the one handset supporting all network connections up to and including 5G) and AKG-tuned stereo loud speakers. And, finally, before we reach the verdict, let's talk OS. The S20 Ultra runs Android 10 and Samsung's own One UI 2.0 skin. The One UI remains the best-in-class Android skin on the market and, as you would expect, when partnered with the super-slick and streamlined Android 10 delivers a superb mobile usage experience.

6.9" OLED screen, 120 Hz, 3 200 × 1 440 HDR10+ resolution, 128 GB/512 GB storage, 5 000 mAh battery, 108 MP, 48 MP, 12 MP cameras, time-of-flight rear camera, 40 MP PDAF front camera
From R27 000, [samsung.com](https://www.samsung.com)

Verdict

We're very impressed with the huge 120 Hz screen, premium hardware and feature-packed camera.



GoPro Max

Hot on the heels of GoPro's fantastic Hero 8 Black comes the dual-lens, 360° Max. But this isn't just about taking spherical video – it also uses its lenses to be the most versatile regular action camera possible, with even more advanced motion stabilisation than the Hero 8 Black. The Max shares a number of design cues with the Hero 8 Black, including the ability to be mounted using two metal fingers that fold out from its base and neatly tuck away when not in use, rather than needing a case. The Max is bigger than most conventional action cameras, and its weight of 154 g feels a tad hefty, though it's lighter than the GoPro Fusion it replaces. Just as the design shares aspects with the Hero 8, the Max's camera uses the same interface. Aside from the additional 360° elements, both offer the same easy-to-use system of taps and swipes via the touchscreen, although the smaller display on the Max makes navigation slightly fiddlier. Both cameras also helpfully respond to

voice commands, which is useful when you don't have a free hand or you're wearing gloves. It's easy to cycle between the Max's three main shooting modes – Video, Photo and Timelapse – by pressing a button on the camera body. An icon on the touchscreen enables you to toggle between shooting with both lenses in 360°, or just one at a time to create conventional footage. You can choose whether to record from the front or rear lens via the touchscreen, which means you can choose to have the screen itself facing in either direction, so you can always see what you're recording, whether you're filming yourself or another. Keep in mind that the touchscreen can't show

RATING/10

Features 9

Build 8

Price 5

you the full picture of what 360° video will look like. For that, you'll need to connect to the app and see it on a larger display. Once you get the idea, you're then better able to picture your footage using just the touchscreen view. The app's other major function is to enable you to view and edit your content – which you can download in full 360° form on to your phone. From there, you can use the in-app software to share your raw 360° footage, or create regular 16:9 video that uses just a portion of the overall 360° video, but you can pan around while the footage is playing to point to wherever the action is taking place. This is fantastic, as it means you can shoot in 360° and guarantee that you'll never miss any action. The ease with which you can do all of this is impressive, and it's really fun. Like all 360° cameras, the image stitching is noticeable as the camera can't see the distance between the two lenses. The image exposure can also vary between each lens, resulting in one view being darker or lighter than the other. And when shooting 16:9 video, its maximum resolution is 1080 p 60 fps, which is far below the 4K 60 fps on the Hero 8 Black as well as many other 4K action cameras on the market. The Max comes equipped with GoPro's superb stabilisation software – HyperSmooth – which massively reduces camera shake and vibration. This is the most advanced version yet, called Max HyperSmooth. It is as smooth as the Boost mode on the Hero 8 Black, but without all the cropping that that mode requires. It also uses the round lenses for clever horizon levelling, keeping everything very watchable.

360° in 6K video resolution, 18 MP photo resolution, 6 mics with noise reduction
R10 734, gopro.com

Verdict

Excellent 360° video; fantastic app support; can use screen on either side; sturdy build.

The Max's screen can face in either direction so you can always see what you're filming

CAT S52

It's not the only brand of rugged phone around, but its the pedigree that's been around the longest. Cat pioneered the market for rough-and-ready phones targeted at people operating in wet, dusty and dirty environments. Many competitors have appeared over time but CAT has kept on innovating both with the design and features of its hardy phones.

The S52 represents a subtle shift away from the strongly functional designs of previous models, which featured noticeably thick body profiles with heavily reinforced edges and corners. This model still has all the hallmarks of the

CAT brand: the water- and dustproof rating (IP68), the tough body shell sports a broad aluminium frame, the hardened glass (Gorilla Glass 6) and tough, non-slip, back panel but it's lighter, looks much more stylish and compact, and it's contoured into a seriously pocket-friendly shape. It feels great in hand.

At R10 000 you are still paying a heavy premium for this go-anywhere model, because the tech specs are more in line with a mid-range phone: decent Mediatek processor, 4 GB RAM, 64 GB storage and 3 100 mAh battery. The screen is slightly smaller than average;

RATING/10
Features 6
Build 8
Price 6

We are delighted that the water- and dust proofing does not require screw-down panels, like on some previous CAT models, or clumsy covers over the ports that need to be removed to use headphones or charge cables.



just 5.65 inches, but we found it bright and clear enough that we didn't feel hard done by.

Thankfully, the ruggedness that the brand is best known for has not been compromised in the new svelte shape. CAT says the S52 has been dropped 1.5 metres on to solid concrete from 30 different angles without breaking. It has also passed the stringent military specification 810G test, which includes extreme temperatures, shocks and repeated vibration.

5.65" screen, 4 GB RAM, 8 MP front/12 MP rear cameras, 64 GB storage, IP68 waterproof, microSD card slot, R 10,000

Verdict

If you need to carry your phone into challenging environments, or if you're just a klutz who keeps cracking their screen, investing in a hardened phone with a long pedigree makes great sense.

This do-it-all dash cam shoots in 2K and offers a wide range of driver safety systems



Thinkware Q800 Pro

Dash cams come in all shapes and sizes, and the Thinkware Q800 Pro is certainly one of the largest on sale today. It doesn't have a display, but makes up for this by offering QHD resolution video, a wide range of driver-safety features, and the option of a secondary rear-facing camera. Video quality is where the Q800 Pro sets itself apart from much of its competition. Unlike most other dash cams, which record video at 1080 p Full-HD, the Q800 offers QHD. It means a resolution of 2 560 × 1 440, which in turn means sharper, higher-quality video with key details such as number plates being easier to see than with an HD camera.

The Q800 Pro has a large footprint compared to most dash cams, but its relatively low profile means it is subtle and neatly out of sight once fitted to the windscreen using the included 3M adhesive. It should fit neatly behind the

rear-view mirror of most cars, but if yours already has a camera there for its own lane-departure warning system, then the dash cam might have to sit in a more prominent position. Despite its lack of display, the Q800 Pro has a wide range of driver-safety and assistance features. These include its Super Night Vision 2.0, which brightens night-time footage without blowing out the highlights. Meanwhile, its integrated GPS antenna means your location and speed can be added to every video recorded, along with the time and date. The camera can also warn you about red lights and speed cameras, as well as alerting you if you drift out of your lane, or if it thinks you are going to run into the vehicle ahead. Ultimately, it depends on what you want from your dash cam. If all you want is a way to record

video in the event of a collision, there are many cheaper, smaller and simpler options. But if you want all of the driver assistance and safety features offered by the Thinkware Q800 Pro, then few others that fit the bill so well.

From R5 580
thinkware.com

Verdict
The Thinkware Q800 Pro is packed full of features. It records at 2K resolution and can be used with a second rear-facing camera. But the high price and huge feature set might put some buyers off.

RATING /10
Features 8
Build 8
Price 5

81/1000
CHILDREN BORN
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2/3 DEATHS ARE PREVENTABLE : **1/3** OF DEATHS ARE IN THE NEONATAL PERIOD 

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Phones

**Huawei Y9 Prime**

Honestly, we struggled to fault this phone, from the massive 6.6" screen supported by the large 4 000 mAh battery and the smart triple-camera system, to the masses of RAM to keep things buttery smooth and fast – and all at a great price too.

R5 400**Samsung Galaxy A51**

With an excellent four-camera system featuring a 48 MP main sensor, and backed up by a large, sharp 6.5" screen, Samsung's latest mid-range phone is setting the bar high. There's plenty of processing power too, and the sleek and glossy finish also makes it stand out from the crowd. **R7 000**

**Huawei Y7**

This mid-range phone has a generous 6.26" screen for the heavy multimedia consumer, which is backed with a large 4 000 mAh battery and useful 3 GB of RAM. We particularly liked that it offers both a fingerprint sensor and facial unlocking, which worked well. **R4 000**

**Nokia 3.2**

A big part of the Finnish company's comeback road map, the 3.2 offers a marvellous 6.2" screen, runs fast, and feels fantastic in hand. Quite simply, it's the most phone you can get for less than R3 000, and only its limited 16 GB storage kept it from placing higher on our list. **R2 400**

**Vivo Y91C**

With solid, but basic, specs this handset handled all our daily phone needs admirably. But it makes this Top 5 list for some purely cosmetic reasons. The glossy two-tone back panel is striking, it's extremely slender and beautifully shaped, and the overall build quality is excellent. **R1 900**

Headphones

**Sony WH-1000XM3**

The technoverse agrees with us that these are the best noise-cancelling headphones on the market, but they wouldn't top our list if they didn't sound absolutely brilliant too. They adapt their sound to your environment, are light for travelling and fold into a small, compact shape. **R6 000**

**1More E1020BT Spearhead VR**

With a unique high-tech dual driver system, these produced an exciting and detailed, yet balanced, sound. The buds were supremely comfortable, as was the soft-touch neckband, and we found the controls positioned just right for easy operation.

R1 200**Skullcandy Ink'd 2 Wireless**

The flexible plastic collar makes these easy to wear, and they also roll up into a pocketable size. The sound punches well above its weight for entry-level buds, and the large buttons have good tactile feedback.

R600**Sennheiser HD 300**

These lightweight, over-ear 'phones are fantastically comfortable, with well-padded cups and headband. The trademark sound is perfectly balanced, but still exciting. We especially like the compact, pocket-size shape they fold down into. These are simply exceptional value for money. **R850**

**Samsung Galaxy Buds**

With a light and comfy fit, reliable touch controls and all-round superb sound these buds topped our rankings. The charging case was also the perfect pocketable shape and the phone app added loads of cool features such as ambient noise control.

R2 800



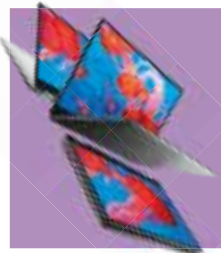
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Laptops



Dell XPS 13 2-in-1

The XPS brand defines reliability in executive business computing. This sleek, all-metal model is fully loaded, features a delightful keyboard and screen, and will give you at least seven hours of battery.

i7, 13" screen, 8 GB RAM, 1.24 kg

R28 500



Acer Swift 3

There's plenty of processing power in this lightweight, all-metal model, which includes a large 500 GB SSD drive to keep things zippy. It weighs just 1.6 kg but has a decent set of four USB ports for adding peripherals.

i5, 14" screen, 8 GB RAM, 512 GB SSD

R11 000



Asus TUF FX505

Save on this gaming rig and still outgun your mates. The all-plastic body shell isn't great, but it's what's under the hood that counts: a fast and sharp full-HD screen and blazing Nvidia GTX 1660 Ti graphics.

AMD Ryzen 7, Nvidia GTX 1660,

15.6" screen, 8 GB RAM **R18 000**



Asus VivoBook 15 X512FA

Weighing just 1.4 kg, you won't mind lugging this laptop around with you. It handles the daily grind without a hitch, thanks to 8 GB RAM and a 256 GB SSD drive, plus it has a decent-sized screen and keyboard.

i5, 15.6" screen, 8 GB RAM, 1.4 kg

R10 000



Asus Transformer Book

The T101HA is a solid tablet-and-keyboard combination. It weighs around 1 kg and is less than 2 cm thick. It's also covered in tough aluminium, runs Windows 10 and has a full-sized USB port.

Intel X CPU, 10" screen, 2 GB RAM, 1.1 kg

R4 670

Accessories



TP Link TD-W9970 router

This is the best router we could find for less than R1 000, and it can do 100 MB speeds uploading and downloading, so it can even handle a fibre connection.

It also has a USB port to plug in all the printers and hard drives you want to share on the network. Superb value from a trusted brand. **R850**



Sun King Home 120

This weatherproof solar-charged lighting set is ideal for a small home, holiday cottage or any outdoor area. The battery will support three lamps of up to 200 lumen for several hours, and you can plug in for USB charging too. **R1 800**



Yale All-In-One Camera

In a market of almost identical products, this one manages to stand out by offering two features we haven't seen before: an LED floodlight and an alarm siren. It uses WiFi, of course, so you can monitor your home from anywhere, and it's also weatherproof.

R2 700



DJI Mavic Mini

DJI is the clear leader in the drone business, and now casual pilots can afford one too. You're not getting 4K video (although the HD footage is pin-sharp) and you're forfeiting the collision protection for which DJI is famous, but it's a strong flyer for its pocketable size.

R7 000



Rocketbook Everlast notebook

This slim A5 notebook uploads your handwritten notes and doodles to your PC using email, or to your favourite note-taking app using the cloud. Write decently and it will even make your notes word-searchable. When your notebook is full, just wipe the pages clean and reuse. **R625**



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DUNCAN BELL..

IS PAST IMPERFECT



THREE INTERACTIONS WITH RETRO TECH MAKE IT CLEAR THAT THE PAST AIN'T WHAT IT USED TO BE

USUALLY IN THIS COLUMN – AND MY DAY-TO-DAY LIFE – I COVER A DIVERSE RANGE OF TOPICS. There's moaning about modern technology and about how tech things ain't like they used to be. Well, this time round, I am completely 'flipping the script', as we say in the hip-hop community, to moan about old tech.

As anyone who's ever been to a school reunion or watched the TV channel Dave will know, nothing destroys nostalgia quite so quickly as actually encountering the thing you are nostalgic about. This month, I have had no fewer than three interactions with the kind of 'classic' tech that people like to coo about in bad online lists. And let me tell you, people: If that was the golden past, give me the Coronavirus-ridden present any day.

Actually, as a side note, this virus – although it's been terrible for those affected – has also had some minor positive effects. Fears about travelling and congregating in large numbers in one place have put a temporary halt to two of my most disliked tech things: trade shows and launches where a series of executive nerds in dad jeans read about a new phone off an autocue. Everyone loves retro gaming, I am told. So when I was clearing out my spare room and discovered a PlayStation 3 and a pile of games, I assumed a glittering road to riches lay before me. Mint condition, 320 GB hard drive, an array of 25 fine titles from *GTA IV* to *Metal Gear Solid: Guns of the Patriots*; who could resist that?

Imagine my disappointment then, when I looked up online what I could expect to earn from them. Some of them were listed as being worth one penny. As if to taunt me, some of them still had the price labels showing what I paid for them, and it was generally in the region of R460 to R920 – and I usually bought second hand!



IF THAT WAS THE GOLDEN PAST, GIVE ME THE CORONAVIRUS-RIDDEN PRESENT ANY DAY

Red hot CEX

I popped into the local branch of a well-known buyer of 'pre-loved' gaming tech and asked if they'd be interested in my mint condition, 320 GB PS3... and the woman laughed. Sure, she looked away, but I could see she was chortling. To be fair, when I set up the PS3 and tried to play a few of those games, I could see why. I think the fact that PS4 is not backwards compatible and because many of those games are part of franchises that put out a slightly better version of the same thing has also completely killed their second-hand value. But mainly it's the fact that the graphics are a bit crap, and the gameplay kind of ponderous. In a completely unrelated development, I recently acquired a VHS player. And when I say 'acquired' I mean 'stole from my elderly grandmother'. Well, where else are you going to get a VCR from? Bizarrely, I'd recently bought a film that, for various reasons, was only available on VHS.

This is where the cold, harsh reality of retro technology became really apparent.

If you bought a phone now for R1 150 that shot video that looked like VHS, it would be laughed off the face of the planet. Although admittedly, millennials might enjoy a VHS filter that made their videos look amazingly awful, in a deliciously ironic fashion.

I put on my long-sought VHS purchase with great excitement. I loved watching videos cassettes when I was a kid. But after watching the colours all blow out or mute, while tracking interference caused backgrounds to become a nightmarishly strobing hellscape, with a soundtrack that compressed into a storm of hissing treble, I resolved never to do that again. Even that paled into minor inconvenience when compared to setting up a record player the following week. No wonder the 'vinyl revival' is largely led by kids who buy records to stick on their walls, or rich, old guys who pay someone else to set it up. Give me Tidal any day. My conclusion? The past is over. And it ain't coming back. Not in my house, anyways. **T**

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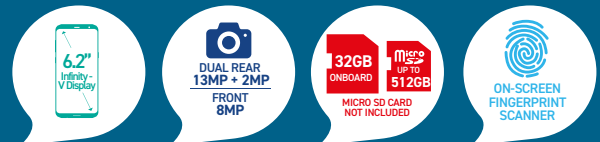
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