

The latest tech to prevent bike thefts, 3D scan yourself, skate effortlessly, document your travels, replace flame with plasma and make the most of your vinyl.

Gadgets

by Caramel Quin

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3*



WEBLINK

For full reviews of this issue's gadgets, visit our web page at bit.ly/eanndt-gadgets1605



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Technics SL-1200GAE

£2,799

A 50th anniversary limited edition iconic DJ turntable, redesigned to reduce vibrations and improve control to reproduce the sound of your vinyl.

Elementium Plazmatic X Dual Beam Lighter

\$59.95

Need an electric lighter that uses plasma instead of a flame? Of course! Weatherproof and ridiculously hot at 370°C.

Fortified Invincible

From \$499

Puncture-resistant tyres, rust-proof frame and zinc-coated, corrosion-resistant chain, security bolts and lock make this bike low maintenance and so secure.

Suunto Kailash

£785

An outdoor GPS sports watch with extra bragging rights. Its bespoke logbook displays a summary of your adventures, such as how many countries you've visited.

XYZprinting Handheld 3D Scanner

£149

Use freehand to scan an object up to 30x60x60cm. It's the perfect companion to a 3D printer. Could 3D selfies be the next big thing?

Acton RocketSkates

£700

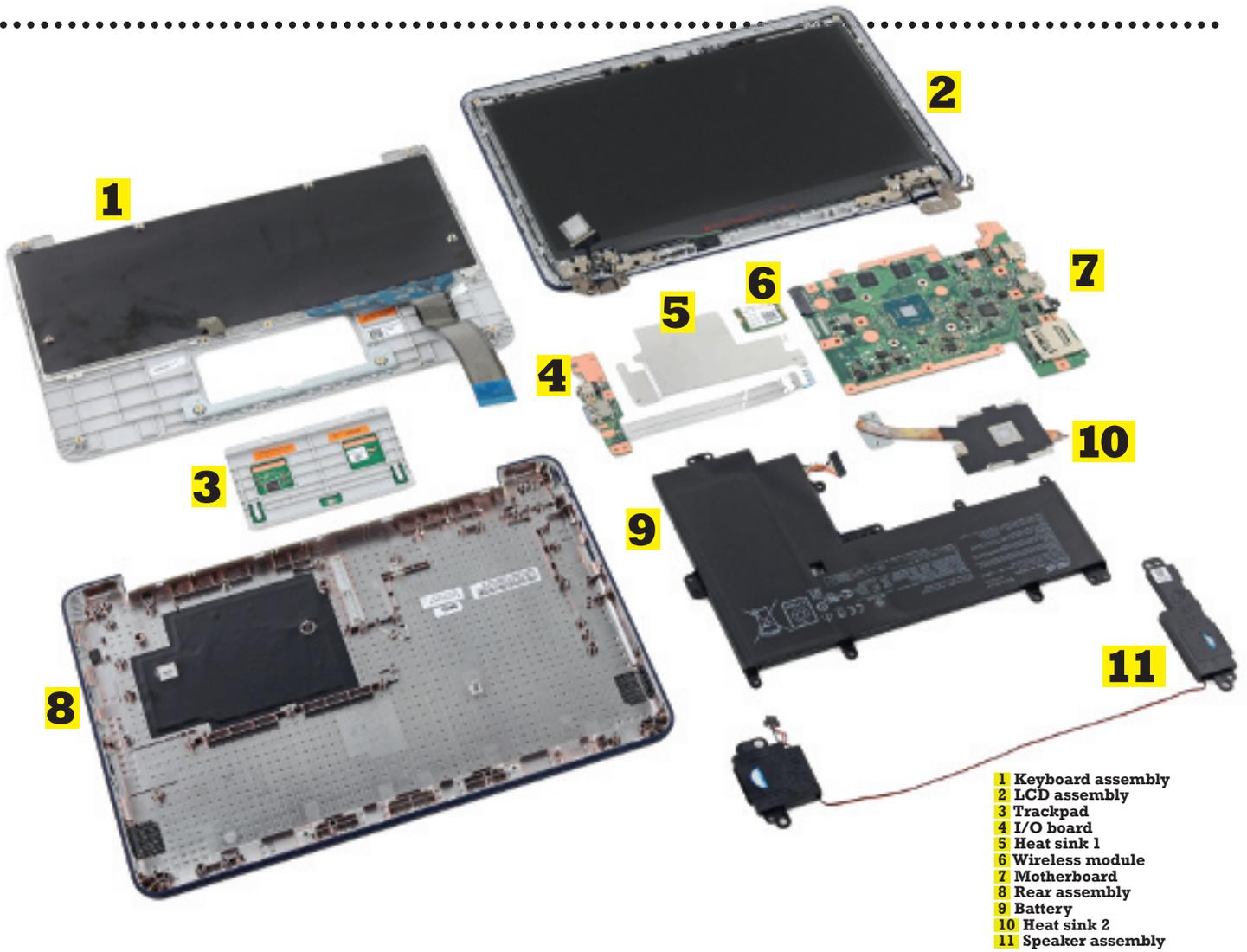
Strap these rechargeable skates over your shoes to travel at up to 12mph. Set the speed via an app and control it by moving your heels.

Asus is targeting the schools market with a laptop that's robust and easy to repair.

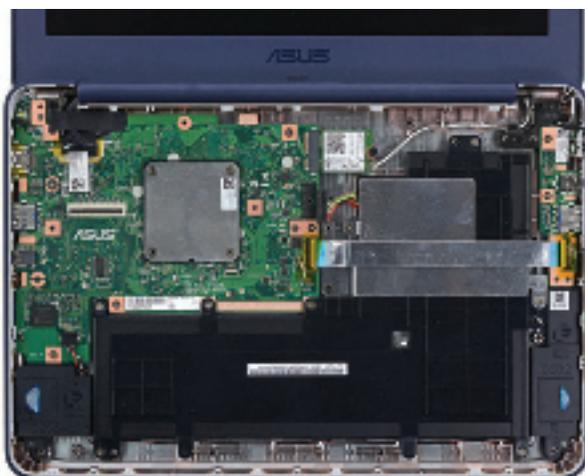
By **Paul Dempsey**

The Teardown

Asus Chromebook C202



- 1 Keyboard assembly
- 2 LCD assembly
- 3 Trackpad
- 4 I/O board
- 5 Heat sink 1
- 6 Wireless module
- 7 Motherboard
- 8 Rear assembly
- 9 Battery
- 10 Heat sink 2
- 11 Speaker assembly



The C202 comprises modular layers installed with those most susceptible to failure at the top



The 11.6in LCD display assembly also features parts that are easy to access and replace

IFIXIT/ASUS

WHAT HAPPENS when a company develops a product that is designed to withstand some harsh treatment and yet still be easy to open up and repair?

The Asus Chromebook C202 laptop was unveiled earlier this year at the Consumer Electronics Show. It is specifically intended for use in schools, bidding for a market where Apple is already looking to make significant inroads with the iPad.

So, the 12in computer boasts a ruggedised exterior with features that include “a tough wraparound rubber bumper with reinforced corners, a spill-resistant keyboard, a scratch-resistant finish and shock-proof solid-state storage”.

Kids being kids, the Taiwanese company has also subjected the C202 to “military-grade reliability tests” and claims that the laptop is “best in its class for drop-test survival”.

At the same time, though, Asus acknowledges that typical schools must operate within very tight IT budgets. To that end, the C202 has been made as easy to repair as the company thinks is viable.

Take apart with ease

“For unrivaled serviceability, Chromebook C202 features the industry’s first modular design that allows easy removal or repair of key components such as the keyboard, power socket and battery,” Asus’ promo blurb declares. “Full dismantling of the device is possible in a few easy steps using only simple tools,” it continues.

Those are fighting words, and to prove that it is quite happy to be taken up on them, Asus recently sent a production model to the iFixit teardown team. Its experts have given the C202 a very high nine-out-of-ten mark for reparability.

Before going into how the C202 is assembled, let’s first review what it contains. The objective has not been to push the envelope in terms of performance, but to deliver something that will meet most educational needs at an appropriate price point – estimated in the US at between



Asus has designed the Chromebook C202 to be robust, affordable and repairable

\$220 and \$230 (£155-£162) per laptop for the 4GB RAM edition.

The CPU is a dual-core, 1.6GHz Intel Celeron N3060 processor with burst speeds up to 2.48GHz. It also has integrated Intel HD Graphics 400. There’s just 16GB of on-board storage, with versions available offering both 2GB and 4GB of RAM. There are then HDMI, SD storage card and USB3.0 ports.

The implementation of the open-source Chrome OS (the C202 is also part of a partnership project between Google and Asus) is very much belt-and-braces. The display is a mid-range unit with 1366×768px resolution.

Battery life is one of the more highly specified features at a very healthy 10 hours thanks to a 38Wh lithium-ion unit. This again recognises that the C202 may need to be moved from one classroom to another throughout the school day (and how many schools have power connections at every desk, anyway?).

Opening up the C202, it becomes obvious that Asus has, true to its word, applied the same pragmatism to the design as it has to the components. Getting inside is easy: remove some rubber screw covers and all the screws themselves are either Philips #1 or #00. The plastic clips are also easily popped apart and, by iFixit’s measure, are sufficiently robust to withstand multiple repairs.

Looking at the main part of

the laptop below the keyboard, you can quickly see that the design comprises a series of standard modules. These have been layered in a linear fashion and have to be removed in order. iFixit says this could make repair of some of the deeper-lying elements slightly more complicated. However, the order of the layers gives priority to those parts most prone to failure, such as the battery and various ports, by placing them at or close to the top.

The biggest ‘issue’ is arguably replacement of the LCD. This does require that the repairer takes out modules as far down as both the motherboard and the

I/O board before the display can be detached. However, once that is done, replacement of the display, camera, microphone, antenna and other modules in the C202’s top half is, iFixit says, relatively straightforward.

Asus has also gone to the trouble of labelling some of the cables within the laptop to further simplify replacement and/or reassembly – for example, the main interconnect cable has self-explanatory ‘IO’ and ‘MB’ markings at either end.

The one significant element iFixit thought was missing from its C202 was sufficiently detailed service documentation. However, even here Asus says it will now work with the repair specialists to develop a more comprehensive guide to the laptop.

In short, the C202’s design delivers on its promises.

One final point, though. That we have got this far without any nasty surprises may not make for the most exciting teardown ever. But it does make for a rather significant one. To the extent that Asus has made design decisions based on the demands of an extremely cost-sensitive market does nevertheless raise one very obvious question: since even top of the range laptops more or less share the same basic contents as this one, why can’t they also be made as easy to repair? *

KEY COMPONENTS

ASUS CHROMEBOOK C202

Part	Supplier	Comments
Processor	Intel	Celeron N3060, 1.6GHz (2.48GHz ‘burst’), dual-core, integrated Intel HD Graphics 400
Wireless module	Intel	Dual-band, 802.11ac, Bluetooth 4.1
Memory (DRAM)	Samsung	4GB, LPDDR3
Memory (Flash)	SanDisk	16GB, eMMC, NAND
Memory (Flash)	Winbond	Serial
Keyboard and embedded controller	SMSC/Microchip	ARM Cortex M4-based
Security	Infineon Technologies	SLB9655TT1.2 Trusted Platform Module
Audio CODEC	Realtek	ALC5650

Note: the components listed here are not exhaustive but restricted to key parts whose suppliers and function could be identified.

Source: iFixit

Making our cities smarter is more than just infrastructure. It's also about getting real benefits to residents, not just to administrators, and that's where mobile apps could help. By **Bryan Betts**

Software Reviews

Apps for the smart city

FOOD HYGIENE THE POCKET FOOD-TASTER

Mobile technology is a key part of the smart city. It's smartphones that allow citizens to participate in smart travel infrastructures and engage with the local council's digital services, for instance, and in return mobile devices let city managers track footfall, communicate news and even boost economic development.

There are philosophical questions here, of course: is it smart for the people, or smart for the managers? Will it empower us and make our lives more agreeable, or will it simply make us do more of the work that we currently pay others to do for us? Fundamentally though, if an app doesn't provide value to the user, it will not get used.

That value may be as simple as using geolocation to access a resource more accurately – a database of currently-available parking spaces to make parking your car easier and quicker, say. The infrastructure is still institutionalised, with the app merely mediating our access to it in a new way, but if our usage informs the evolution of the city infrastructure, that's smart.

A major spur to the development of smart city apps has been the open data phenomenon. Led by the US, where tax-funded data is regarded as the property of the tax-paying citizenry rather than as something to be sold off for private profit, cities and countries around the world have opened up their databases for app developers to work with.

One of the most popular UK datasets for developers is the hygiene ratings at the Food Standards Agency (FSA). These rank half a million food service establishments from 0 to 5 for cleanliness and management, and while many places post their score on the door, it is not mandatory, so an app that lets you quickly find the cleanest places around is clearly a boon.

Of the several food hygiene apps available, we liked Scores on the Doors best, partly because it is available free on Android (with ads), Apple and the web, but also because it pulls in information from a variety of other sources too, notably social networks (though the Apple version lacked this). This can be a big

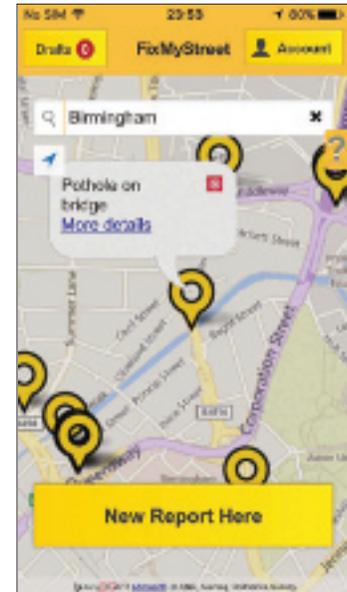
Name	Distance	Type	Rating
The Spon Gate	(<0.1 m)		5
Croft Road CV1 3AZ			
JJ's	(<0.1 m)		5
Croft Road CV1 3AZ			
Ikea	(<0.1 m)		5
2 Croft Road CV1 3AZ			
Rileys	(<0.1 m)		4
Hertford Place CV1 3JZ			
Sky Dome Arena	(<0.1 m)		2
Croft Road CV1 3LE			
Carters	(<0.1 m)		5
Croft Road CV1 3AZ			
Genting Casino	(0.11 m)		5
Croft Road CV1 3LE			
Harvester	(0.11 m)		5
Croft Road CV1 3AZ			

Food hygiene – Where to eat, where to avoid

help in refining your decision of where to go.

You can search for a specific place or simply list what's around you, ranked by score or name, or filtered by the type of establishment. Scores on the Doors also provides a map showing the venues around you and an augmented reality 'radar' view, which superimposes the venues and ratings on the phone's camera view.

The one caveat is that although the app updates itself regularly from the FSA database, local authorities upload new ratings rather less often. So even if a venue has its 4 or 5 rating restored after being issued a zero during kitchen refurbishment (to take a real example), there can be a lag of two to four weeks before this feeds through to an app or the FSA website.



FixMyStreet – Report faults and problems on the go

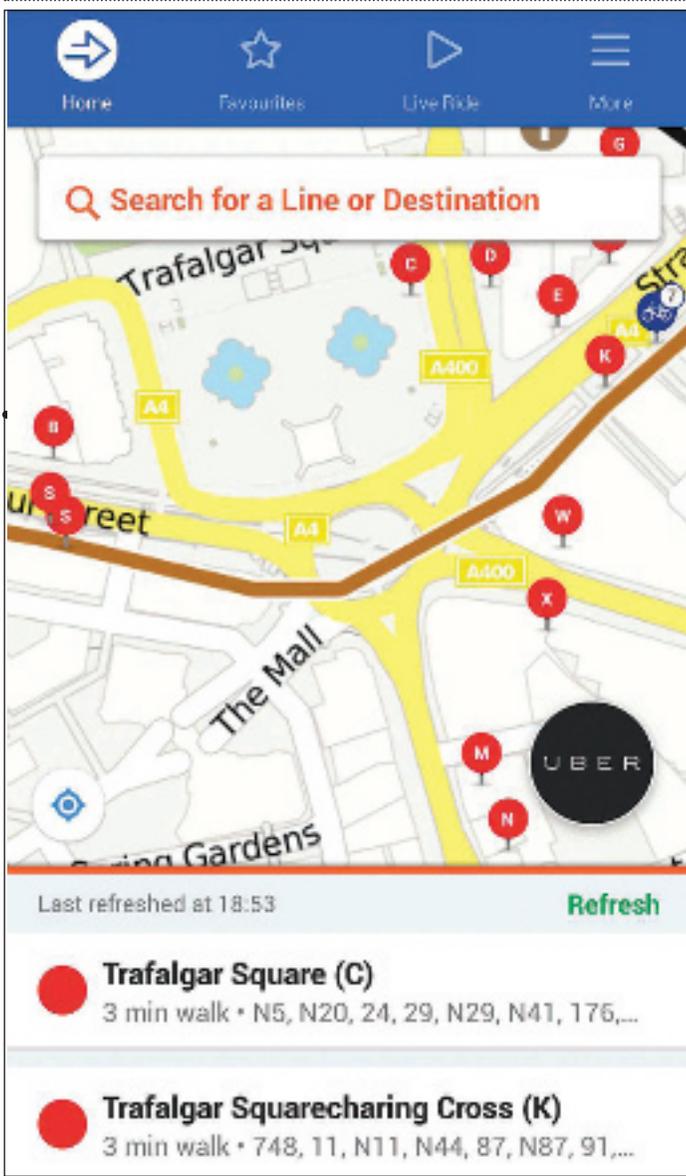
MYSOCIETY FIXMYSTREET FREE ON ANDROID, APPLE

WHETHER IT'S a pothole, flytipping or overgrown foliage, being able to report problems in your local area, and know they will be addressed, is an important part of building a sense of community. But do you know which council it's covered by, which department and how to get in touch?

This is where FixMyStreet comes in, as an independent app and service designed to make reporting easy and consistent (and run, incidentally, by a registered charity). Simply start the app, let it use your location, add a photo and some comments, and send the report. A few minutes later it should be with the relevant authority, who can respond and provide an update. You can also subscribe to local alerts and add updates.

Funding comes from the councils who pay to subscribe. In return they share a service that they would otherwise have to build themselves.

FixMyStreet's users are mainly in the UK, although it is also implemented in Zurich. Other apps are popular in other countries though, for example developer SmartAppCity has



Moovit – Making public transport safer and easier to use

A nice route can make city walks a joy

except for Uber. It claims to be usable in 60 countries. As well as Android and Apple, a slightly older version is available for Windows Phone.

WORLDSENSING

FASTPRK
FREE ON ANDROID, APPLE

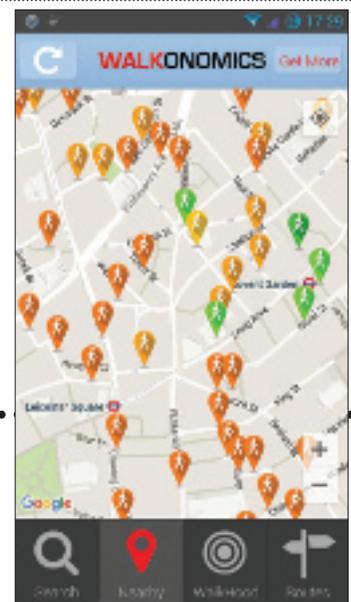
A smart city wouldn't make people drive around for ages simply to find a parking place. It might let them know when it would be better to take the bus, because there is no parking. This is where Fastprk comes in, linking to the municipal infrastructure to show which parking spaces are available, and allowing you to pay for parking.

The one caveat is that it relies on the council installing the necessary infrastructure: a wireless sensor in each parking bay, a wireless gateway for each square kilometre or so, and display panels in the street for drivers without the app. When a vehicle parks over one of the sensors, which are rugged modules embedded in the road and with a four-year battery life, its presence is noted.

Linked to a payment system, it allows tablet-equipped wardens to monitor tickets efficiently, and the company claims that by making spaces easier to find, it



Fastprk – No more driving around looking for a space



increases both occupancy and ticket sales. So far there are no Fastprk deployments in the UK, but travellers can find them in Norway, Italy, Singapore and other countries.

WALKONOMICS
WALKONOMICS
FREE ON ANDROID, APPLE

Something that could make future cities more liveable is more people walking, and something that makes walking more popular is having nice routes to walk. That's the theory behind Walkonomics, a free routing app for Android and Apple that prioritises pedestrian-friendly streets.

In particular it likes tree-lined streets and parks, but it also uses an automated tool that interprets open data (where available) for key indicators such as road safety, hilliness, popularity and tidiness. Users can feed back their own reports or reviews too – for example if a street feels cool and relaxing, or grimy and threatening – and the system blends these in. You also can view what it thinks of the streets around you (green, amber, red).

The routes it comes up with are occasionally extremely odd, especially if you leave the app's beauty versus speed slider set to maximise the former. We found that setting the route option in the middle produced routes that were more interesting than simply choosing the shortest route, and not all that much longer. The app also seemed to recognise footpaths, unlike some navigator apps which are more oriented towards in-vehicle use.

One drawback is it only contains data for a few cities, and for certain areas within them; elsewhere you just get the fastest route. But if you're in one the areas it covers, which include central London, Paris, New York and Hamburg, it could take you somewhere new and pleasant.

Spanish, Indian and Chilean municipalities using its customisable app. As well as the basics of incident reporting, SmartAppCity can also offer a wide range of community and tourist information – museums, concerts, shopping, pharmacy opening hours and so on. You can even view local fuel prices.

TRANZMATE
MOOVIT
FREE ON ANDROID,
APPLE, WINDOWS

If you want to deal with congestion, public transport has a big role to play, and if you want more people to use public transport, it needs to be reliable. Increasingly, this means operators providing up-to-date information at stations and bus stops, on buses and trains, and online. The problem is that different parts of the transport puzzle may be run by different companies or public operators, and the information a traveller needs will be scattered across multiple sites and pages.

Moovit aims to collate all this and add it to user-generated information – travellers can add

reports about their experience, such as station cleanliness, bus congestion and so on. A 'live ride' mode allows it to track you, thereby validating the schedule information, and notify you when to get off. It is also easy to change your plans en route.

You can search by address or station/stop, or find out what stops are nearby, then drill down to see what routes serve each station, etc. You can also get service alerts and view maps and timetables – it automatically detects where you are and adjusts to list only the local services. This means it can only route within the current region, and can't handle long distance travel.

Usefully for blind users, it now supports the screenreaders built into both Apple (VoiceOver) and Android (Google TalkBack) devices. Accessibility is important for the smart city.

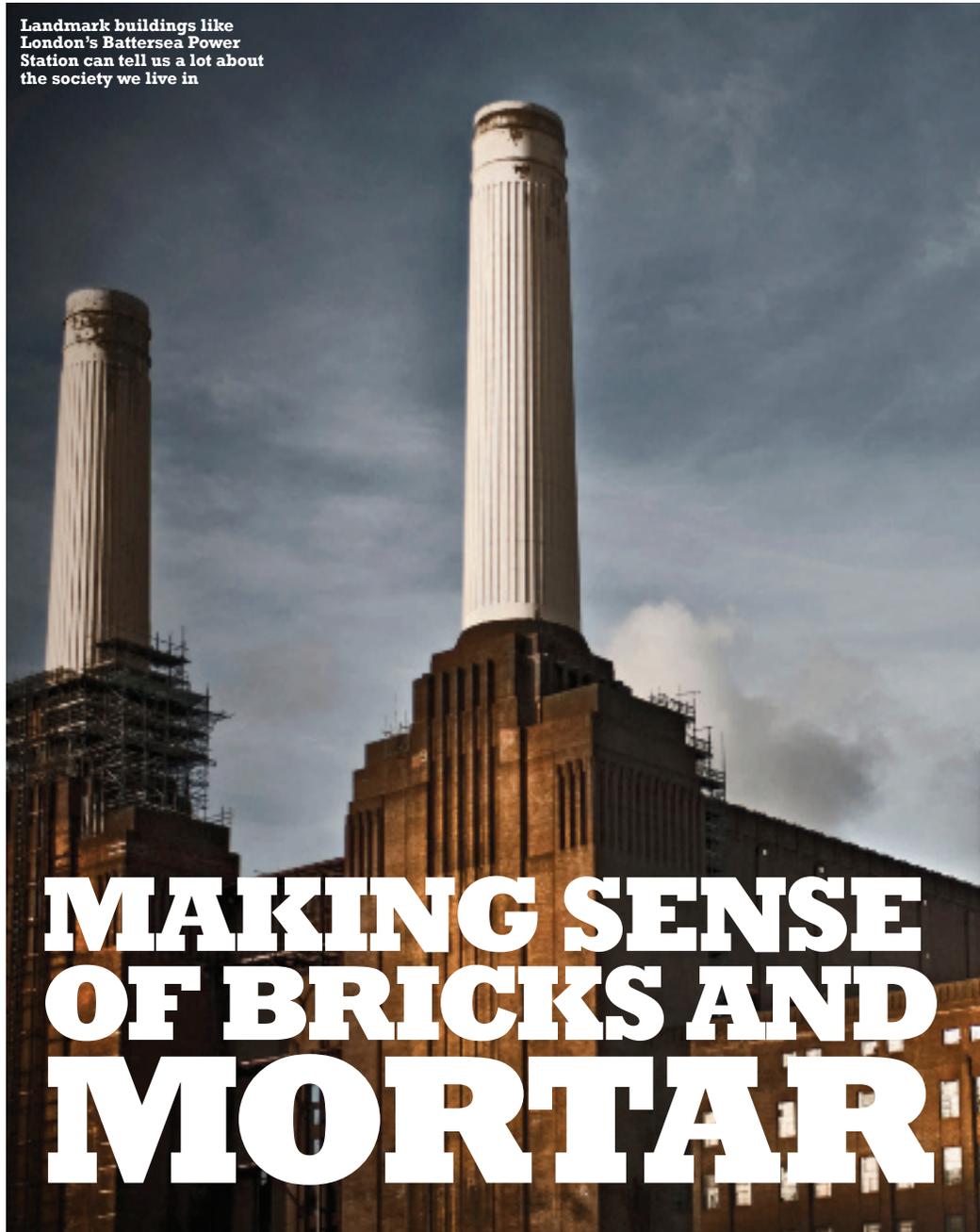
As well as buses, trains and trams, Moovit will suggest walking if that is the fastest route, and also offers Uber cars as an option. Although it shows city-bike rental locations, cycling isn't a routing option, nor is there any fare information,

Modern architecture can be seen as a huge book that describes the state of society, its concerns, wealth and technology. Author Will Jones explains how to read between the lines of an extremely complex set of concepts.

Book Interview

By Nick Smith

Landmark buildings like London's Battersea Power Station can tell us a lot about the society we live in



MAKING SENSE OF BRICKS AND MORTAR

"ANYONE CAN come up with a crazily shaped building. But getting it to stand up is a different matter." And while Will Jones admits that there are many considerations equally as important as structural integrity, the author of 'How to Read Modern Buildings' is keen to stress that he thinks engineering and technology go hand-in-hand

with the development of new architecture. "While the art of architecture is important, the science and engineering is critical to making it happen. As such, today, as much as in the past, engineering breakthroughs push forward architectural development as often as the creative musings of visionaries such as Zaha Hadid." He

gives as an example of such a breakthrough the transition from mortar and stone to riveted steel joints.

The biggest problem facing the novice attempting to decode modern architecture is that of the bewildering array of genre terms. If you can't tell Art Deco from Bauhaus, Avant-Garde from Beaux Arts, or even Art Nouveau

from Post Modernism, you'll soon find yourself up a certain creek without an instrument of propulsion. This terminology is really what Jones has set out to disentangle, despite being aware that attempting to separate architectural movements and styles is something of a foolhardy enterprise.

"While each style has its own particular ideals and icons, most meld in some way with one another, just as different aspects of art, poetry and sciences feed off of, and grow out of, their predecessors." And yet, he goes on to say, when writing a book with a title such as his, there is a certain obligation to make differentiations. This Jones did by choosing buildings that are "a good example of a particular style, while selecting prominent features and standout elements that characterise a style".

One of the key messages of Jones's book is that there is simply so much to be learned from modern buildings. "Architecture is an indicator of its time, and as such we can gauge societal, technological and financial trends from when a building was built. However, architecture is also often an aspirational ideal, and while all around there may be trouble and strife, in the eye of the designer there is a brave new world."

He cites as a perfect example New York's Empire State Building, which was erected at a time of great financial depression in the USA. "With this in mind, architecture is a difficult discipline to pin down. Buildings can be thoroughly indicative of their time – social housing projects – or can be divorced from reality like the Sagrada Familia in Barcelona. This is why it is such an interesting and exciting aspect of our lives."

According to Jones, the best architects are "the ones who fully understand the engineering challenges behind the designs". But the relationship between architecture and engineering has changed with time. Historically, the master builder was both architect and engineer on all

'Most iconic structures in modern times require ever more groundbreaking engineering in order to make the architectural ideas possible' Will Jones



major structures such as medieval cathedrals. But as we move into the modern era, "the disciplines of architecture and engineering seem to have drifted apart. This phenomenon has seen architects rise to star status while engineers have been sidelined. If the truth were to be told, most iconic structures in modern times require ever more groundbreaking engineering in order to make the architects' ideas possible".

A good example of the engineer bringing the concept to reality is the Flat Iron Building in New York, which the author thinks of as one as the most recognisable and transitional buildings in his book. "Externally, its design is classical. The decorative facades are designed in three sections to mirror the base, shaft and capital of a Greek or Roman column. However, internally, the building is supported on the steel frame; in fact, it was one of the first buildings in New York to be designed in such a modern manner."

Jones, who is a carpenter by trade, grew up in a family that has always been associated with the construction industry. He took this interest with him to university where he graduated with a degree in construction management. But finding few opportunities in his industry, he switched to writing about buildings and is the author of several books, including 'Modern Architecture in New York', 'Unbuilt Masterworks of the 21st Century' and 'Architects' Sketchbooks'.

His fascination with architecture has given him "the chance to visit amazing buildings and talk with the visionaries who design and build them". One of his key conclusions is that modern architecture is not, as many suppose, a genre restricted to white-walled concrete houses and glass-clad offices reminiscent of the 1950s and 1960s.

"This is perhaps the most important thing that the reader will take away from my book. Modern architecture spans over

WE READ IT FOR YOU

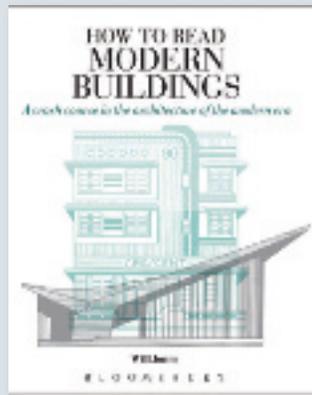
'HOW TO READ MODERN BUILDINGS'

Modern buildings are about much more than white walls, flat roofs and glass-clad skyscrapers. In architectural terms, the modern era spans many styles and nuances and encompasses the entire 20th century. It takes in possibly the widest variety of styles of any architectural era, from the Renaissance Revival to the glamour of Art Deco, the severity of Brutalism and the quirkiness of Avant-Garde. The buildings tell us about much more than simply the personality of the architect. They tell us about the society we live in, and none more so than the iconic industrial buildings that turn into landmarks.

From central London's Battersea Power Station to the

century of design, material technology and engineering endeavour. It moves sinuously through multiple styles, often combining them, to fill our towns and cities with a plethora of interesting and often unique structures. Don't be fooled into thinking that modern architecture means Modernist architecture because it encompasses a whole lot more besides."

Even the most inexperienced of readers of architecture can't fail to notice that great cities such as London, New York and Barcelona have radically different architectural personalities. Jones thinks that there are many reasons that can contribute to such differentiation, but he thinks probably the most important one is history. "While older cities such as London and Paris have grown almost organically – hence their winding roads and easily identifiable viable hearts – new urban conurbations, such as New York's Manhattan Island and the grid patterning of Barcelona's Eixample district, were planned as a whole and built in a more methodical



Coca-Cola building in Los Angeles, from Tate Modern on Bankside to the Evian building in France, industrial architecture can tell us as much about the world we live in as cathedrals and art galleries.

manner. With regards to the architecture itself: history, art, geography and stylistic trends all influence the buildings within cities. While the English have always tended towards more restrained design, the Spanish enjoy flamboyancy, and the Americans... well, if it ain't big then it ain't important."

The bottom line for Jones is that architecture is the product of architects. "While there are many who follow trends, there are always a few who look to push boundaries and take the next step." We may not build cathedrals out of stone anymore, or industrial monoliths such as the Battersea Power Station out of brick, but that doesn't mean we've run out of big ideas.

"Today we see architects and engineers again pushing the boundaries of what they can achieve with steel, concrete and glass. Pioneers are already looking at composite materials, self-perpetuating construction techniques and other 22nd century ideas." *

'How to Read Modern Buildings' by Will Jones is published by Bloomsbury, £9.99

EXTRACT

FACTORY FINISHED

Factories were often built with little or no architectural imagination. They were traditionally no more than large boxes in which to house a manufacturing or research process. When forward-thinking company owners employed architects to create something a little more interesting, the results were often outstanding.

Modern-era architects jumped at the chance to not only design massive structures, but also to give them personality. Additionally, Modernists excelled at engineering buildings to suit the processes to be engaged within. They took their 'form follows function' mantra and ran with it to create buildings as machines.

These considerations continue to be influential, although architects are less rigid in their Modernist philosophies and they tend to 'design in' additional levels of comfort and relaxation. Work buildings offer the designer a chance to embrace massive scale and to design something monumental. In the 1980s and 1990s architects such as Norman Foster, Nicholas Grimshaw and Renzo Piano took their high-tech style to its logical conclusion, with factories and headquarters bristling with steel and wire, while more advanced industry types have clamoured for those who use state-of-the-art techniques to accentuate the groundbreaking work being carried out inside.

The work building could be the poor relation of such structures as cathedrals and skyscrapers, but it is an exciting chance for architects to stretch their design wings and create an icon.

Edited extract from 'How to Read Modern Buildings' by Will Jones, reproduced with permission

From the serious business of tackling terrorism to improving your golf through science, via a look back at a landmark personal computer

BookReviews

Engineers of Jihad, Now the Chips are Down, Golf –

PRINCETON UNIVERSITY PRESS

ENGINEERS OF JIHAD: THE CURIOUS CONNECTION BETWEEN VIOLENT EXTREMISM AND EDUCATION

BY DIEGO GAMBETTA AND STEFFEN HERTOG, £19.95, ISBN 9780691145174

Diego Gambetta and Steffen Hertog are social scientists specialising, respectively, in the academic disciplines of social theory and politics. In this intriguing book they consider in a very scientific way the question that sometimes arises when analysing the backgrounds of individual members of a group. Why does engineering appear to be so vastly overrepresented in the ranks of some types of violent extremist organisations?

When the authors first highlighted the phenomenon in an article published on the website of US magazine *IEEE Spectrum* in 2008, they attracted a predictable volley of criticism from those who saw it as some kind of veiled attack on a supposed mindset that predisposed those with an aptitude for science and maths to being more easily recruited to a cause, and once they were, more fanatical about supporting it.

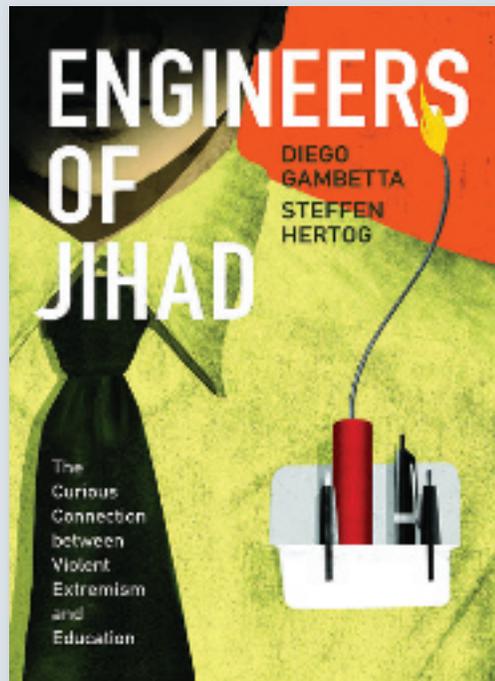
Since then, they've been analysing data from a range of sources to see whether a link exists, and if it does, why. The starting point involves identifying the level and type of education of nearly 500 known members of violent Islamist groups active since the 1970s. Spanning three continents and three decades, it reveals some remarkable statistics. Of the 207 who attended university and whose degree subject is known, 93 (45 per cent) were engineers.

Gambetta and Hertog stress that the question isn't why so many engineers are terrorists, but why so many terrorists of a certain type are engineers. Graduates are a small proportion of members of extremist organisations of any political or religious persuasion and, in comparison, the numbers are similar for those with a background in humanities and social sciences who appear to be overrepresented in other types of extremist groups.

Their methodology is a particularly robust way of questioning what motivates ideology, they claim. Level of education and subject studied are verifiable facts that can usually be found in the public domain and which reflect actual behaviour and not just reported attitudes.

Not everyone will be convinced, but they're confident enough to claim they've established a correlation that's "beyond a reasonable doubt" and that degree choice is a close enough reflection of underlying character traits for it to be a way of identifying which part of the political spectrum someone predisposed to extremism will probably ally themselves with.

"The 'love affair' between engineers and extremism, while particularly marked in the Islamist case, is not peculiar to it," they add. "By knowing that someone is a university graduate,

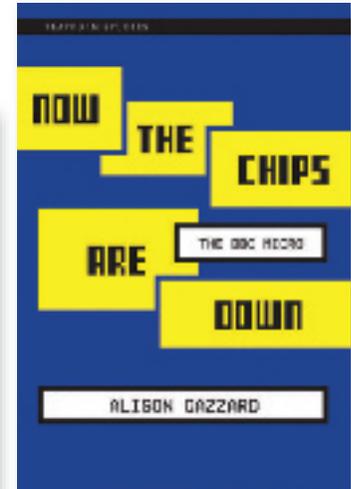


one cannot guess what kind of an extremist one could become, but by knowing the type of graduate, one can guess, with near perfect accuracy in the case of some disciplines, which type of extremism a graduate is attracted to or repulsed by."

Why the link between engineering and Islamic extremism? The narrative here moves away from a historic one in which poverty breeds terrorism to that of 'relative deprivation' or frustrated expectations. When economic development in many Arab countries ground to a halt in the late 1970s and early 1980s, demand for engineers plummeted and people who had completed a demanding education expecting a lucrative and prestigious career were left disappointed. The theory is given credence by the absence of the effect in Saudi Arabia, whose continuing wealth and investment in infrastructure maintain demand for engineers.

However carefully assembled, the conclusion will be controversial, even if the final argument is that the strong presence of graduates in general, and engineers in particular in Muslim-world militants is largely attributable to economic, not psychological, factors. Whatever your opinion, there's a clear need to try and understand the motivation for this breed of terrorism that Gambetta and Hertog address in a thorough way that avoids alarmism.

Dominic Lenton



THE MIT PRESS

NOW THE CHIPS ARE DOWN: THE BBC MICRO

BY ALISON GAZZARD, £26.95, ISBN 9780262034036

There's an illustration, usually attributed to pioneering low-budget punk music magazine *Sniffin' Glue*, although it probably appeared elsewhere, that's credited with capturing the spirit which in the late 1970s saw thousands of young people with no musical experience picking up instruments in the belief that they didn't have to spend years breaking into an established industry to record something worthwhile.

Crude drawings of three simple guitar chord shapes are captioned: "this is a chord, this is another, this is a third. Now form a band". Many did, and it embodies perfectly the spirit that was built on by the advent of cheap electronics and home recording equipment.

By the time punk had run out of its initial burst of frenetic enthusiasm in the early 1980s, the establishment figure of the BBC was doing the same thing with its more highbrow but no less influential Computer Literacy Project.

Intended "to introduce interested adults to the world of computers and computing" the campaign embraced television programmes, courses, books and software, but had as its cornerstone the BBC Microcomputer developed with

The Science of the Perfect Swing

Acorn Computers. To stretch the punk metaphor, the BBC Micro was the cheap guitar that you could have a go on at school and, if you were lucky, persuade your parents to buy for home.

In 'Now the Chips are Down', Alison Gazzard, a lecturer in media arts and education at University College London's Institute of Education, examines the early capabilities of multi-platform content generation and consumption that the project made possible, not only in programming and software creation, but also in accessing information across a range of media, and in 'DIY' computing.

The book shares its title with a 1978 Horizon TV programme that's often cited as having started a wider debate about the integration of the microcomputer into British society and the need for increased computer literacy. Proving that current fears of humans being displaced by machines are nothing new though, it warned of low-skilled workers losing their jobs and even word-processing software taking jobs from typists.

Rather than trying to write a comprehensive, nostalgic history of the BBC Micro, Gazzard focuses on components unique to its design and role within the microcomputer explosion that took place in 1980s Britain. As well as programmes like Granny's Garden and seminal space-trading game Elite which gave many youngsters their first taste of computing, she considers the shift in focus from hardware to peripherals, describing the Teletext Adapter as an early model for software distribution and the hypermedia-like Domesday Project which combined texts, video and still photographs.

By the end of 1981 200,000 households in the UK had computers; two years later that number had risen to 2 million and Britain had the highest number of home computers per capita of any nation in the world. At the turn of the century, less than 20 years after the BBC Micro had played its part in a home

computing boom that gave UK computing a new lease of life, numbers applying for university courses were on the way down, probably due to schools focusing on 'ICT' skills that had little to do with computing and more to do with using popular software packages.

The dilemma, not covered in this book, is that in 2016 we're seeing a return of the BBC to the IT sector with the launch of the micro:bit device, which aims to get 11 and 12 year olds interested in coding by convincing them that it's about the same kind of hands-on problem-solving that the BBC Micro tried to promote.

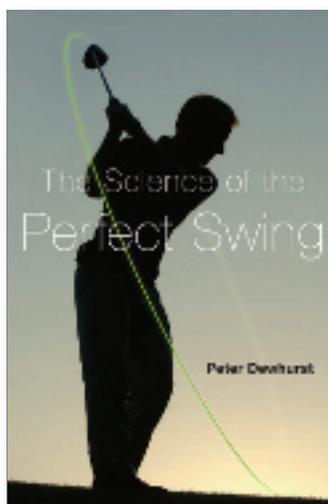
Gazzard's account shows the BBC Micro not only as a vehicle for various literacies but also as a user-oriented machine that pushed the boundaries of what could be achieved in order to produce something totally new.
Dominic Lenton

OXFORD UNIVERSITY PRESS
THE SCIENCE OF THE PERFECT SWING
BY PETER DEWHURST, £22.99, ISBN 9780199382194

Golf makes its return to the summer Olympics this year in the unlikely setting of Rio de Janeiro after a hiatus of more than a hundred years. However impenetrable the rules and etiquette of the game may appear to a newcomer, the underlying principle is simple. As it says on the back cover of the official rule book: play the ball as it lies, play the course as you find it, and if you cannot do either, do what is fair. That informality extends to the playing area; golf is one of the few ball games where the playing area isn't standardised.

The relaxed attitude to rules doesn't extend to equipment. Like so many other sports, the tiny differences that can mean the difference between victory and defeat at the highest level of competition depend on adopting the very latest technology. Rules have to change to keep pace, and where the professionals lead, amateurs with deep pockets are bound to follow.

Even the most casual golfer will be familiar with the alleged



advantages of a particular type of club or ball, a preoccupation that's evidence of how much the game is in part an applied science. Just striking a ball invokes a wide range of principles such as energy transfer, kinetics, launch angles, spin and momentum.

Step forward Peter Dewhurst, who recently gave up university teaching and research to write about golf and design equipment but remains Professor Emeritus in Theoretical and Applied Mechanics and Industrial Engineering at the University of Rhode Island. 'The Science of the Perfect Swing' is based on three decades of experience in the physics of golf, and claims to be the first book to go into depth about how you can use a knowledge of physics to improve your game rather than signing a cheque for yet another gadget or the latest model of club.

From the interaction between club face and ball to aspects of trajectory and impact and even the mechanics of putting, Dewhurst uses a range of illustrations, graphs and charts that resemble a text book more than a 'how to improve your game' manual. As well as explaining the science, each chapter includes a 'findings and consequences' section full of recommendations on how to put it to practical use.

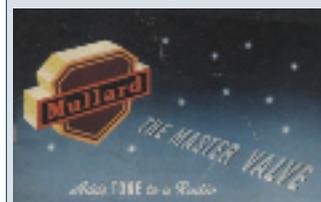
A perfect gift for the golf-playing scientist at any level.
Dominic Lenton

HISTORY FROM THE IET ARCHIVES

MULLARD ORAL HISTORIES

IET archivists recently came across an envelope containing six cassette tapes with recordings of interviews undertaken in June 1999. The interviews, which have now been digitised, were with former staff of Mullard Research Laboratories who worked at the MRL site in Redhill, Surrey at various times between the 1940s and 1980s and included three former directors of research.

Mullard, a manufacturer of electronic components and



domestic appliances, was founded in London in 1920, but by 1927 its entire shareholding was in the hands of the Dutch firm Philips. For some reason the purchase by Philips was kept secret until shortly before the Second World War.

In November 1946 Philips set up a UK laboratory, the Mullard Electronic Research Laboratory, in Redhill, under Dr Christopher Bareford.

Philips then moved an existing Mullard laboratory, called the Vacuum Physics Laboratory, to the Redhill site in 1948. The two facilities operated under a joint management structure comprising Bareford and VPL's George Knott, but were run separately until 1955, when the VPL effectively came to an end and what remained was incorporated into MERL, now renamed the Mullard Research Laboratories. It became the Philips Research Laboratories in June 1977, while Norman Goddard was director.

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