Augmented Reality is mashing up the virtual and the real in weird and exciting ways. Steve Freeth finds out why our perspective is changing.

“Virtual reality locks you into the artificial, while AR is a real-world experience — and that’s where we spend most of our lives,” says Bruce Thomas from The Wearable Computer Lab at Adelaide University. “Like the internet, though, no one can really predict where AR is going, but its everyday accessibility means it’s got a lot of potential. Obviously it will get a lot of trivial uses too, but as connectivity becomes ubiquitous it also looks like it’s going to be incredibly useful.”

AR’s in hand

It’s something the phone and technology companies were quick to understand. AR-based apps are now the rage with Apple, Nokia and Google’s Android: all bringing out AR-related applications at a cracking pace, with names like Whistle, SREngine, Worksrung, Pocket Universe, SkyMap and Junario, to name only a few. All of these share the ability to blend a phone’s camera with various bits of online data, from subway systems to maps, in real time. The iPhone’s Yelp, for instance, opens up Monocle with a few shakes of the handset to download reviews of nearby restaurants and bars on the street you’re walking down, while TwittARound can show you who’s twittering and from where.

One of the fastest growing, though, is Layer, the so-called ‘reality browser’ (see p44) that superimposes details from a growing army of sites and apps, including Wikipedia, Flickr, Google and YouTube. You can even sort the layers by country, with Australia’s store already holding radar maps from NAB, Red Rooster, the Powerhouse Museum and AusWiki.

But for a glimpse of the future, go no further than Swedish technology designers The Amazing Tribe (TAT for short), which has caused something of a web sensation with its Recognizr prototype. Already being ported to the internet, though, no one can really predict where AR is going, but as connectivity becomes ubiquitous it also looks like it’s going to be incredibly useful.”

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such icon-driven AR is already considered by moving the can or bottle around. But an on-screen 3D image of one of the film’s Zero activated a PC’s webcam to link to of course. Special cans and bottles of Coke behemoth Electric, Hallmark, CNN, Nissan and Nokia… and the list goes on. Everything within an image can be easily located, measured and modelled using simple points, lines, or polygons. No detail is left undocumented, allowing visualisation of everything from overhead power lines and multistorey buildings, to underlyng road and curb features. The technology was originally developed for the wide-angle stereo cameras mounted on NASA’s twin Mars Exploration Rovers (MERs) launched in 2003. The camera technology creates a 3D representation of the local terrain to allow autonomous routing of the MERs through the Martian environment, and it obviously works — the two robot geologists are still out there, having far outlasted their intended 90 days of operation. (‘Opportunity’ is still chugging its way across the planet and returning data to Earth, while ‘Spirit’ went silent in March 2010, hopefully recharging its batteries ready to roam at some future date.) Earthmine’s earthbound use of the technology has extended to the creation of virtual billboards visible only through smartphones, as well as solutions for real estate, engineers and planners, architects and public transport planning.

EARTHMINES MINES MARS

Earthmine calls its technology “reality indexing” — the overlaying of AR data onto detailed 3D panoramic images. While Earthmine has to collect the local terrain details the old-fashioned way (by taking its automated vehicle-based camera arrays down every road, alley and laneway in the area to be mapped), it does so in spectacular quality beyond anything currently possible using Google-based mapping. And that’s thanks to the 3D data generation software and algorithms it has licensed from NASA’s Jet Propulsion Laboratory. Each and every mapped pael contains real-world latitude, longitude, and elevation information, so that everything within an image can be easily

Window shopping

No wonder retailers can see dollar signs and are lining up to incorporate the AR experience both inside and outside shops, or from the other side of the PC. One company that has been fast off the mark is Lego, the international toy company, which has been installing augmented reality kiosks throughout their stores and sales points worldwide. Shoppers simply take the toy box they’re interested in to the kiosk screen to watch it being put together in 3D. It’s an experience the company says is stimulating shoppers to buy. There’s also a push to make mirrors in stores AR-enabled too. Shiseido, the make-up giant, has been rolling out a Digital Cosmetic Mirror in Tokyo malls that can match products to skin type, apply them with AR tools and then print out head shots with the corresponding shopping list — all Shiseido naturally. Plenty of retailers are making use of their windows to grab attention in the same way. In London both Hugo Boss, the global fashion house, and upmarket jewellers Tissot have recently created interactive windows to lure in pedestrians. Tissot’s gamble invokes handing out paper watches to people as they pass by so that they can then see how the company’s ‘real’ watches lock on them. In a sign of just how important AR might be as a retail ‘touchpoint’, Shoplavy from the company Big in Japan lets you scan a bar code with your phone for product reviews, price comparisons and availability, online ordering or to notify a friend. It’s working too — at the end of last year more than three million people were actively using the technology, 91% of them while in a store. In the US there’s an iPhone App called GoodGuide which uses your phone-camera’s image of a barcode to deliver details of the green credentials for some $6,000 high-street products. But why bother schlepping to the store in the first place? Companies like Zugga, Glasses Direct and Ray Ban already let you try on clothes or sunglasses straight to your own face or body via websites using AR and motion sensing.

Press Play

None of the AR possibilities have been lost on the people wanting us to have fun. The gaming industry would love to take the 3D screen experience out into the real world. It’s happening of course — with much R&D under way around the world — but the continuing reliance on the webcam, markers and handheld devices in games like Infinimaze, Pacman, Streetkast, memsAllty or ARthrm/Zombies suggest it’s still just some way to go. The holy grail for the industry will be sleek, wearable computers (like AR goggles and headsets), but even without these, games like Parram’s AR Drone — shown at CES and slated to be released some time this year (see p45) — shows what the potential can be with the right hardware in combination with smart phones. And there’s still a lot out there to keep us — or at least the kids — entertained. The company Topps in the States, for instance, has come out with

Images: NASA/JPL-Caltech/Earthmine
Augmented reality recommendations are made by early adopting conventional, such as Yelp’s system of alerting futuristic-sounding Rocket Racing League WissenMedia is using AR with the 3D book called ArsEdition has an upcoming interactive can gain a little wow with AR. In Germany beginning to explore how their products controller hits the market. to return once the PS3’s ‘Move’ motion trigger all sorts of 3D add-ons, though for run through the PlayStation 3 that is able to of a hit with EyePet, a cute AR construct 3D game, and of course Sony had something more interactive ar…” provide the basis for “geo-tagging and other forms of geospatial markers are already in use, and are expected to provide the basis for more interactive AR…” X Racers competing across skies filled with virtual tracks. Spectators will watch the action on giant screens with virtual overlays of data, or even take virtual part using Apps available on the iPhone held up to the sky. I can see clearly now So far, so sensible that you might be thinking. But AR does have a serious side. In fact AR may hit its deepest pay dirt in industrial and service applications as companies adapt the concepts to help us do real, everyday or complex tasks much more safely and efficiently. It’s still early days for much of this, but there are some exciting ideas out there. Car companies like GM, BMW and Mercedes have been flinging with AR-infused windscreeners for some time, so that information like distance, weather or traffic conditions appear in front of drivers without the distraction of using phones or onboard computers. They’re also hoping AR could be some help under the hood. Metaio, an AR-centric company, has already developed the UrEye Design software that can allow 3D modelling of cars and engines, but which they hope will have much broader industrial applications. It’s an approach that Columbia University has pursued with their Augmented Reality for Maintenance & Repair, a project that hopes to harness wearable hardware and AR for engine visualisation, so that repairs can be done in situ using online expertise and back-up. A BMW research project shows a service engineer donning glasses and being led through procedures using AR overlays on the engine — “remove two screws here… etc.”. The health, education and military sectors are taking interest as well. Siemens, the electronics giant, says it’s exploring how AR could be applied directly in areas like health, while Canadian company Arcane Technologies is taking that route as well, using projected 3D data for behavioural and surgical treatments, as well as training. In fact the company has developed the Mirage System, a wearable device that lets you apply AR to tailored situations; they are putting it to work to help people overcome phobias or in factories for Guided Assembly. Too much information? Not everyone is convinced that AR will be much more than a passing fad once the initial eye-popping thrill has gone. Some of the physical constraints seem a drag for some. For a start it’s still a technology very much attached to handsets and webcams, and that can be both clunky and inconvenient, while GPS is also has limits, though much more precise positioning is at hand once our skies fill up with navigation satellites. Some critics also suggest that we may tire of having too much information in our lives, strapping us into devices and cyberspace at the expense of real-world experiences — think Terminator in the milk bar. Others suggest that apps like Recognizr will open up an ever more to identity theft and online fraud. But many of the same arguments were levelled at the internet. More likely AR will become one element of new applications that seamlessly integrate data with the real world. That’s likely to mean getting through the use of projected AR, or wearable devices like goggles — a process being called Mediated Reality. You can see the seeds of that already beginning to take shape. Another Canadian company, Synap, has a sleek if still not commercially-manufactured AR-based eyepiece it has been pushing for some time, while over at the Massachusetts University of Technology they’ve developed a prototype called Sixth Sense that is light and wearable — if a little under-developed — and projects AR data on to the real world. The virtual seepage into the real world is here, and about to get faster, leading some to call this the beginning of the ‘outernet’. Whatever it’s called, it’s just hope the AR spectacles look a lot better than the 3D ones. Steve Freeth Österreichische Zentralbank in Wien Babette Fefer Praterstra nz. 8, 1030 Vienna tel. +43 1 707 626 Fax +43 1 707 627 Styrian wine and coffee Paris, Austria, Turkey, Sweden February 2010 AR.Drone takes AR into flight Toy helicopters and planes are nothing new — but toys with Wi-Fi control, onboard camera and augmented reality definitely are. The AR.Drone ‘quadcopter’ uses two cameras. The first is under the main structure, connected to an Inertial Measurement Unit which measures speed and allows it to perform stationary flight and automatically compensate for turbulences due to the wind during outside flights. The second camera is at the front of the quadcopter, broadcasting and streaming to an iPhone or iPad, so you see what a pilot would see. You can also fit the AR.Drone with gyroscopic stabilisers. So far, pretty thrilling. But there’s more. You can battle various electronic enemies overlaid onto your live camera feed. Place a marker on a chair and the AR.Drone’s will recognise it and replace it with a fierce robot. Get two AR.Drones and they will recognise each other, so you can blow three shades of hell out of each other and recreate the flying battle scenes of Avatar.