NEW TECHNOLOGY

If you've just about caught up with DVD recorders and 3G mobile phones, ready yourself for the next onslaught of new products. Over the next six pages, we check out how home entertainment, mobile devices and motoring are set to change under the influence of technology

NEED TO KNOW

A conventional TV picture is made up of 576 lines. This limits the amount of detail it can show and means that big screens have noticeably worse picture quality.

High-definition (HD) TVs show more lines than a conventional TV, so the picture is sharper. You'll need a compatible TV and a special receiver.

There will be two types of HDTV signal.

FOR DETAIL

The 1080i system has 1,080 lines, which adds detail and lets you watch on massive screens. But, as with normal TV, only half the lines are shown at once, with the other half shown a fiftieth of a second later. This 'interlacing' is usually fine but can produce jitter on fast-moving pictures or jagged edges on diagonals.

FOR FAST ACTION

The 720p system has – you guessed it – 720 lines and all the lines are shown at the same time. This 'progressive scanning' removes jitter so it's better for fast-moving pictures. But it's best for screens with a diagonal size of less than 50 inches – above that, you need 1,080 lines.

An HD-ready set will handle both types of picture.

HIGH-DEFINITION TELEVISION

Television is about to change in a big way. With today's trend towards larger TV screens, the picture is starting to look a bit ropey, and that's where high-definition (HD) screens come in. (See p53 for tests of some of the first HD-ready TVs.)

Take films such as the *Lord of the Rings* trilogy. Modern film makers can squeeze incredible detail into their epic scenes but it's lost when you watch the films on a conventional TV, even if you're watching a DVD. Not so with an HD picture.

Sky's Director of New Products, Brian Sullivan, reckons it will be a major change: 'People want an experience that's as near to cinema as they can get. HD will provide that.'

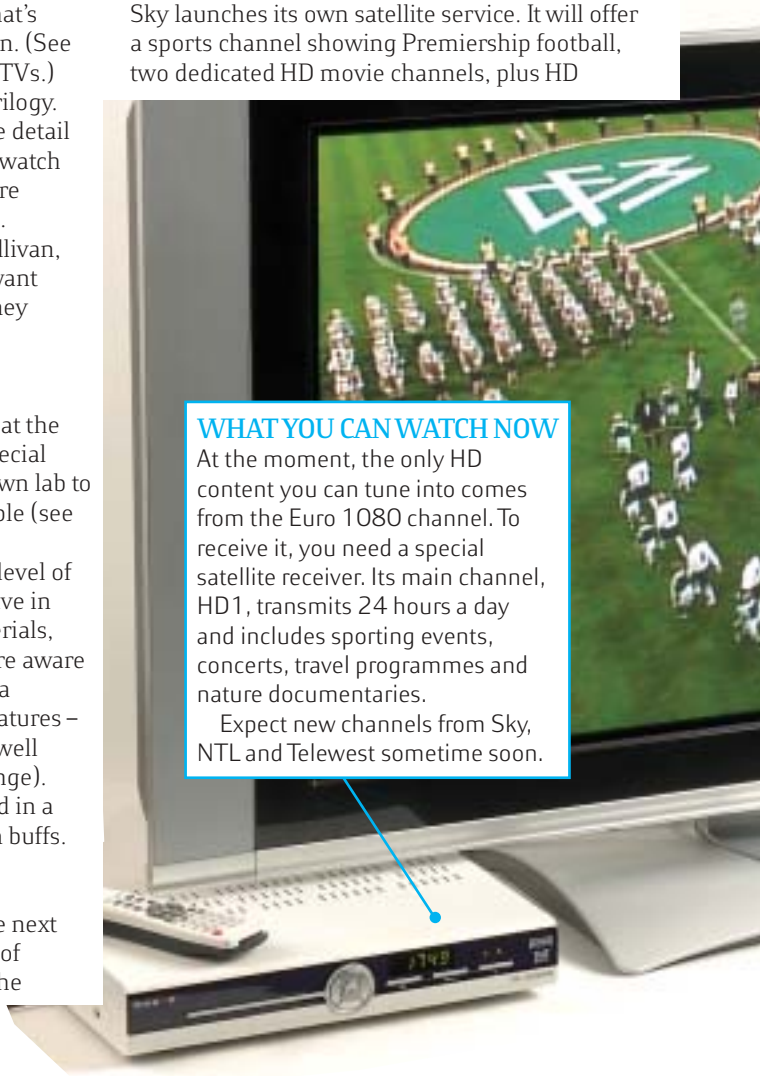
IT'S VERY, VERY GOOD

We've seen demonstrations of HD pictures at the BBC's laboratories. And we've installed a special satellite receiver and HD-ready set in our own lab to tune into the only channel currently available (see 'What you can watch now', right).

We love what we've seen. There's a finer level of detail visible, which is particularly impressive in scenic views. The textures of different materials, such as brickwork, stand out. You're far more aware of the background, which gives the picture a distinct sense of depth and reality. Facial features – warts and all – suddenly become visible as well (which could give make-up artists a challenge). The picture simply seems far more real, and in a way that everyone will notice – not just film buffs.

You can already buy HD-ready TVs and projectors, and it won't be too long before there's plenty of stuff to watch on them. The next big event for HD screens will be the launch of Microsoft's HD-compatible X-Box 360 at the start of next month. There's much excitement about this among gamers, with lots of potential for spectacular graphics.

For the rest of us, TV isn't that far behind and we'll soon be able to buy receivers for mainstream broadcasts. The first will come in 2006, when Sky launches its own satellite service. It will offer a sports channel showing Premiership football, two dedicated HD movie channels, plus HD



WHAT YOU CAN WATCH NOW

At the moment, the only HD content you can tune into comes from the Euro 1080 channel. To receive it, you need a special satellite receiver. Its main channel, HD1, transmits 24 hours a day and includes sporting events, concerts, travel programmes and nature documentaries.

Expect new channels from Sky, NTL and Telewest sometime soon.

PHOTOGRAPHY JOHN TRENHOLM, STEVE GARFORTH, ALAMY, CREATIVE CLUB, AQUARIUS COLLECTION, CORBIS

versions of Sky One and ArtsWorld. The channels will also come with cinema-like surround sound, though you'll need the right audio kit to take advantage of this (see 'Home cinema', September 2005, p34). There are no details of cost and subscription packages yet.

Cable TV companies Telewest and NTL also plan to launch HDTV soon, though the BBC is more

Sky's channels will come with cinema-like surround sound

reticent – high-definition pictures are unlikely on its Freeview service because the signal doesn't have spare capacity to carry all the extra data.

However, there is the possibility of Freeview HDTV once the government has switched off analogue TV signals over the next few years; this will free up capacity on the airwaves. And the BBC is future-proofing some programmes. It told us: 'We're committed to moving to HDTV production by 2010. Currently, we're producing about six HDTV series a year.'

So HDTV is on its way – it won't be long before we can all sit back and enjoy a new TV experience.

WHAT YOU CAN BUY ALREADY

The 'HD ready' logo (below) is used to show which TV sets are suitable for displaying HD pictures.

They're mainly the new flat-panel sets, which use LCD and plasma displays. Some projectors are also HD ready. See our article on TVs on p53 for a list of HD-ready models.

In addition, you'll need a box to decode the signal. Sky's HD box, out next year, will include a hard disk for recording.

To watch Euro 1080, you need a card for access until 2010, a box and a dish. All this costs around £400.

Coming soon: high-definition DVD recorders

Blue lasers mean better pictures

High definition isn't restricted to TV sets. You'll need something to record HD programmes on to when you aren't around to watch. HD personal video recorders that record to hard disk will be with us soon – SkyDigital will launch one next year – and manufacturers are already demonstrating HD DVD recorders at industry shows (though they're not yet available to buy in the shops).

Conventional DVD recorders aren't up to the job because an HD picture uses, typically, four times as much data as a conventional picture. It therefore fills up discs four times as quickly.

But an HD recorder uses new discs that hold six times as much data as today's DVD discs. They do this by reading and writing to the disc with a laser that emits blue light, rather than the red light used by today's recorders. The shorter wavelength of blue light means that it can cope with much smaller spots, or 'pits', in the disc, so you can cram more of them in.

FORMAT WAR

However, DVD boffins have invented two different HD formats, called Blu-Ray and HD-DVD. Because these two formats are incompatible with each other, a format war is in the offing.

Fingers crossed that all this will be resolved before the first products appear on the shelves, which we expect to be in 2007 in the UK. Expect to pay high prices at first – the first conventional DVD recorders went for around £1,000.

In the pipeline

Other new technology that could appear in your home in the future includes know-it-all fridges

3D TV

It looks as if real three-dimensional television, without the need to wear daft-looking special glasses, could be with us by 2010.

Toshiba plans to introduce 3D displays to video-games arcades next year. It hopes to move on to home gaming in 2008, mobile phones in 2009 and finally television in 2010.

The 3D displays have tiny lenses in front of each pixel that project slightly different images to each eye, in the same way that light bouncing off a real object would hit your eyes differently – images appear to stand out several centimetres from the display.

SMART HOMES

In a 'smart home', washing machines could select their own wash cycle. And we might no longer 'own' a washing machine at all – just have one installed and pay by the wash.

The fridge would keep track of use-by dates, suggest menus and order new stock from the supermarket. Robot vacs would monitor dust levels. Appliances would predict their own breakdowns and call an engineer. The house would even recognise people and decide whether to let them in.

It all sounds a bit like the Jetsons but it's a real project with EU backing – and not just for luxury homes. It could particularly benefit disabled and elderly people.

There'll be no need for 3D specs

NEED TO KNOW

Pocket-sized MP3 players that store hundreds of songs are common these days – see p38 for the latest models.

MP4 players take this concept a step further – they also store video and they come with built-in screens so you can watch a movie on the move.

The MP4 format massively reduces the amount of digital information needed to store a film. Squeezing all this data does affect video quality, but on a small screen it's still acceptable.

ADDING FILMS

You can put video on to an MP4 player in several ways.

First, you can record directly from a set-top box, VCR or TV with a video output. It will take as long to record as it takes to watch the film.

Second, you can download it from the internet, using sites such as www.divx. com (mainly music videos and movie trailers). This is quicker but there's not much legally available material.

Third, you can quickly copy a film from a DVD using your computer. The DVD will let you copy it once (for your own use) but anti-piracy software kicks in if you try to make copies of the copy.

PORTABLE VIDEO

Archos has launched the AV480 (£450), which is designed to combine two recent technological developments in one tiny package. It attempts to marry MP4 video with the intelligent TV recording of personal video recorders (PVRs).

It comes with a docking station that you leave connected to your set-top box. The docking station stays at home while you detach the portable unit so you can take it with you wherever you go. When you get home, pop the AV480 in its dock and it will automatically record whatever programmes you've set it to.

You can set it to record programmes up to a month in advance. And, unlike a normal MP4 player, there's a little infra-red transmitter that talks to your set-top box so you can set it to record from more than one channel.

So far, so good. But we came across a hitch when we tried to use the PVR recording feature. The idea is that you select programmes from Yahoo's internet TV guide and save your selections to the Archos; it should then record them at the appropriate time. Sadly, we can't get this feature to work, despite many attempts and much time spent talking to Archos' advice line. The only way to make recordings is to program the timer manually.

RECORDING QUALITY

The hard disk on to which the Archos records has an 80GB capacity. In reality, only 74GB is available for recording – but that's still a phenomenal 60 to 120 hours, depending on the quality setting. (If you choose to make a low-resolution recording, it won't look as good but it will take up less memory.)

It can record a phenomenal 60 to 120 hours of video, depending on the quality setting you choose

The battery will give you four and a half hours of video viewing when fully charged or 16 hours of listening if you use it just as an MP3 player.

On its own 3.8-inch screen, picture quality is reasonable. You can also connect it to your TV but the picture's worse on a bigger screen – you'll still need a VCR, PVR or DVD recorder.

Sound quality through the supplied headphones is fine, although it improves noticeably if you add Best Buy headphones (see p38). What isn't fine is the built-in loudspeaker, which sounds awful.

Connecting it all up is fairly involved; there are lots of cables to hook up and sort out. But the beauty of the docking station is that, once done, it's done. The remote control works well and thumbnail pictures of the videos make it easy to find the one you're after.

Overall, we like this product; it takes MP4 a stage further and throws in some other handy features. But it doesn't really live up to its full promise: until we see an improvement in how it deals with the Yahoo schedule, we won't recommend it.

DELETING ADVERTS

Once you've recorded your programme on to the Archos you can do some basic editing.

One of the most appealing features is the ability to cut and splice films – so you can remove adverts. All you have to do is select the video you want to edit, mark the start and end points of the section you want to remove, and hit delete.

You can save your edited versions separately, just in case you want to revert to the original.

Calm down, dear; you'll be able to edit out the most irritating adverts

Coming soon: TV on your mobile

A user trial currently under way in Oxford looks set to revolutionise the way we think about our mobile phones. O2, Nokia and Arqiva are broadcasting 16 TV channels to modified Nokia handsets.

Four hundred Oxford residents are trying out the handsets for six months. And this service could be available to everyone in three or four years.

Companies can already send a TV programme to third-generation (3G) video phones through mobile phone masts. But no more than five or six people in the same area can view it at once. And so far we've been less than enamoured with what we've seen.

By contrast, O2's system broadcasts directly from a transmitter to an unlimited number of handsets.

Hopes for the system are high. Mark Selby of Nokia predicts 'three billion users of mobile TV worldwide by 2010'.

We're impressed by early demonstrations. Picture quality was OK, with enough resolution to let you read a 'news ticker', and reception in the test area was solid. You occasionally get some blockiness in the picture but it's very watchable for short periods. Nokia says you get about three hours' viewing time from a handset.

Cost is critical, says O2's Dave Williams: 'We're seeing how much cheaper we can do it than 3G.' Studies suggest the price will be around £7 to £10 a month.

TV to your mobile is on trial now

ON THE MOVE

This Archos lets you bookmark your favourite scenes or episodes, so that you can quickly find them again.

And the resume function is extremely useful. If you have to stop playing a video, you can easily pick up again from where you left off – handy if you don't have a feature-length commute.

In the pipeline

In your pocket in a few years' time, you might find some hi-tech innovations that you can fold up and take with you. Others may follow you around

ELECTRONIC PAPER

Paper has been around for a long time and it hasn't been bettered yet. You can download a newspaper or book to your personal digital organiser – or even your phone – but it's hardly enjoyable to read. Electronic paper could change all that.

Described by Lord Broers in this year's Reith Lectures as likely to be 'one of the most significant developments of the next few decades', electronic paper will have all the advantages of conventional print: high contrast; readable in strong or dim light; flexible and light enough to fold up and stick in your pocket. But it will have one more advantage – once you've read it, you'll be able to change instantly what's on the same piece of paper.

Prototype flexible screens that can bend and roll up into a narrow tube have already been developed. And electronic 'ink' has been invented too. It consists of sheets of tiny capsules of black and white pigment. They act like pixels on a TV screen and they're sensitive to electronic charge. Apply a negative charge and the white stuff moves to the capsule's surface; apply a positive charge and the black stuff moves up to form words.

Just think of the possibilities your morning paper – or your copy of *Which?* – could offer if it were connected to a small power supply and the mobile internet.

LOCATION DETECTOR

You may use GPS in your car just to help wend your way through the nether regions of Milton Keynes – but it can be seen as pretty dangerous technology. In fact, the US has the right to deny parts of the world access to it in times of conflict.

Partly in response to that fact, Europe is to launch its own system, Galileo. The accuracy of GPS is 10m to 20m but Galileo will find your location to within about 1m. The first test satellite launches on a Russian Soyuz rocket in December this year – and accuracy will be even greater by 2008, when there'll be a constellation of 30 satellites in orbit around the Earth.

There are many potential applications. Mobile phones with built-in Galileo receivers could offer local information on shops and services and guide you right to their door. It could even be used to make sure you don't crash into another Galileo-equipped car.

Galileo satellites will find your location to an accuracy of around 1m. Magnifico!

NEED TO KNOW

Petrol is such a part of everyday life that it's easy to forget the problems it causes. Exhaust emissions contain pollutants known to damage health and they contribute to climate change.

FUEL OPTIONS

There are already a few cars designed to be less damaging to the environment.

Some are hybrid cars, such as the Toyota Prius, Honda Insight, and the hybrid version of the Honda Civic. These use a combination of a petrol engine and an electric motor to make fuel savings of around 30 per cent.

Others use liquefied petroleum gas (LPG), made from by-products of oil refining and natural gas production. There are lots of cars available in LPG-compatible versions.

However, neither of these options is an alternative to fossil fuels – they still have many of the same problems.

Vehicles that use electricity or hydrogen fuel cells go a step further, though they're not yet widely available. And remember that unless the electricity to power the cars or make the hydrogen comes from sources such as wind or nuclear power, you'll still be pumping out greenhouse gases.

TECHNOLOGY FOR COMMUTERS

Two new environmentally-friendly vehicles will offer interesting alternatives for commuters

The tiny G-Wiz recharges with household electric sockets

The G-Wiz is a cute, if slightly odd-looking, hatchback, taller than it is wide. But the remarkable thing about it is that it's a completely electric-powered car. It plugs into a normal 240-volt socket, just like any household appliance, and goes from flat to fully charged in about six hours – which costs just over 50p at on-peak times. You can then drive 40 miles before the battery's flat.

On the road, it's as quiet as a milk float, and surprisingly nippy acceleration keeps you up with the taxis and buses. The suspension's a little harsh – it certainly notices potholes and raised drain covers – but it's OK for short runs.

The limited range, along with a maximum speed of 40mph, means it's essentially for townies. And it's well suited to coping with the stops and starts of city traffic. When you slow down, the brakes use some of the energy that conventional cars disperse as heat to generate electricity for the batteries.

Joe Byars of GoinGreen, which makes the car, told us: 'I drive it across the city to work, charge it while I'm there and then drive it home again.'

Indeed, commuting electric-style does seem a good idea – the G-Wiz is exempt from road tax and from London's congestion charge. And several local authorities offer free parking spaces for electric cars.

Apart from its engine, the technology isn't exactly state of the art – the cabin, for example, is fairly sparse. It fits two in the front and, at a squeeze, a couple of toddlers on the tiny rear seat. There's a small boot at the front and room for a couple more bags if you fold the rear seat down.

The G-Wiz is already available to buy, with prices from £7,700. If you live within the M25, annual servicing costs £349 a year, and GoinGreen will come to your house. Outside the M25, you have to take the car to it and servicing is £53 an hour.

It won't suit everybody but, for city slickers with green leanings, this little runabout offers cheap travel without clogging up the local atmosphere.

HYDROGEN-POWERED BIKE

The ENV motorbike isn't on sale yet but soon will be. ENV stands for 'Emission Neutral Vehicle' and the bike is powered by a hydrogen fuel cell that drives an electric engine – the only waste products are water and heat.

Andy Egglestone from Intelligent Energy, which makes the ENV, says it's due on the market in 2007: 'It's still a proof-of-concept vehicle at this stage, not the finished article. But not much more needs to be done to it before it gets approval for British road use.'

The fuel cell itself is a briefcase-sized unit weighing about 20kg that takes a few minutes to fill with hydrogen. But where you fill it is a problem – there are currently no hydrogen pumps in garages. That said, Intelligent Energy is developing devices that produce hydrogen from bio-diesel fuels (which are made from vegetable oils). These will sell for around £1,000; with one at home, the lack of hydrogen filling stations needn't be a problem for commuters.

The bike feels light when you clamber on (it weighs 80kg) but you sit quite high up. Push the 'on' button, twist the throttle and you're away. A display near the buttons shows your power consumption and speed; top speed is 50mph and you'll get about 100 miles on a full fuel cell.

The acceleration can't compare to a traditional motorbike but it's acceptable. And the electric motor is particularly responsive at slow speeds; it's easy to handle, with a good turning circle – it feels a bit like learning to ride again on a beginner's 125cc bike.

It's extremely quiet on the move. You're far more aware of wind noise, even at low speeds, and it feels a bit like freewheeling down a hill.

Unusually, there's no foot brake. Both front and rear brakes are mounted on the handlebars – in the same way as they are on a push-bike – so there's nothing for the feet to do. Intelligent Energy is considering adding brakes which use the energy normally lost as heat to recharge the batteries, as on the G-Wiz.

In general, we're rather impressed by the ENV. It's obviously not a finished product, yet it is fun to ride. And it has the feel of a bike that will work well on the road. Watch out for it when it hits the shops – it'll cost around £3,000.


The ENV motorbike produces only water and heat as waste

Coming soon: new safety technology

New ideas are appearing thick and fast in car safety, as manufacturers compete to produce the safest cars.

SLEEP DETECTOR

Volvo has developed a system that warns drivers when they are becoming drowsy or are not paying enough attention to the road ahead.

Called Facelab, it uses two dash-mounted cameras to monitor the driver's facial features and track their eyes.

By measuring how elliptical drivers' irises appear from the camera's angle of view, it calculates whether their gaze has fallen from the road.

Drivers who are about to drop off also show characteristic blinking patterns, and Facelab detects fatigue by tracking how often you blink.

Set-up takes only five minutes. It involves using software to select the points on your face which the system will track. It needs five snapshots of the head, with a number of reference locations from parts of your face.

The first commercial applications are likely to appear on Volvo trucks and cars in the next few years.

AUTO BRAKES

Mercedes-Benz has developed a new radar system which it claims will reduce front-impact accidents by up to 26 per cent.

The system is called Brake Assist Plus and has just appeared in the flagship S-class.

It senses when the brakes are being applied and uses radar to detect how near the vehicle in front is. In an emergency, it warns the driver, calculates the most effective pressure needed to stop the car safely, and then applies the brakes automatically.

Another Mercedes system, Pre-Safe, uses similar electronics to detect an imminent collision and maximise the safety of occupants – it pre-tensions seat belts, adjusts seat positions and closes the sunroof.

KEEPING IN LANE

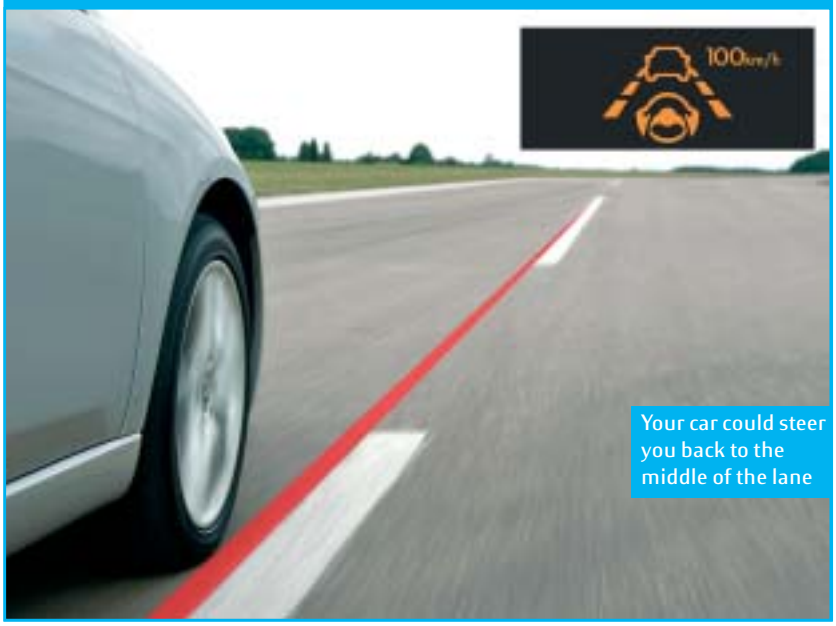
In January, Honda is launching a Lane Keeping Assist System on its top-spec Accords.

This uses a windscreen-mounted camera that lines the car up in its lane. It makes small adjustments to the power steering to keep it in the centre.

It will warn you if you wander out of lane and gently try to steer you back (although you still have full control).

NEAR SCHOOLS

Toyota has a new system that will override the driver's control of speed if the navigation system finds a school nearby.



Your car could steer you back to the middle of the lane

In the pipeline

Cars of the future could skip across water or head to the skies to avoid the ever-growing levels of road congestion

Prototype flying cars could be with us by next year

A CAR THAT'S A JET BOAT

The idea of an amphibious car has been around for a while – the first was based on a Triumph Herald and developed in Germany in the 1960s. You can even buy a couple of modern versions, based on the Ford Fiesta, from a British company called Dutton.

But those models were effectively just floating cars; there's a much more exciting development on the way in the shape of the Gibbs Aquada.

Powered by a 2.5-litre V6 engine, it will notch up 100mph on land but can also manage 30mph on water, jet-boat style. Company founder Alan Gibbs reckons it will 'revolutionise everything from leisure to commuting'.

Simply drive the car into the water, push a button and, James-Bond-style, the wheels fold up and the car becomes a boat. To get back on dry land, motor to the bank, push the button again and the wheels come back down so you can just drive out. It conforms to all road and marine regulations, and it's suitable for use on rivers and sheltered bays.

However, there's only a prototype around for now; you can't buy it yet. Gibbs tells us that's still at least two years away.

THE FLYING TAXI

Another interesting idea for getting around inner-city congestion is the Avcen Jetpod. A proof-of-concept model is about to be built and Avcen expects to make its maiden flight next year.

It's essentially a flying taxi based on a new type of aircraft that has very quiet take-offs and landings and needs only short runways. Such taxis would use park-and-fly sites, ferrying passengers to inner-city landing strips. The airstrips could be built alongside rivers and roads.