Intelligent by design

Autonomous cars

BMW may have been in talks with Apple about autonomous cars for much longer than the two companies have admitted. It would not be surprising as both have a history of engineering design and innovation

Of the many millions of robotics enthusiasts in the world, there are some thousands who are putting in their time and effort to actually make robots and build a business around them. For these new startups, dreaming of being the next big thing would not only be natural, it might be well advised. This type of aspirational thinking is important for long-term motivational reasons and setting high standards, provided it's balanced by realistic expectations based on resources and skills.

Apple, though it may be one of the world's biggest companies now, did not enjoy a straightforward meteoric rise to the top. Its difficult journey story is well documented. Now, it can be used as an example of how good design principles can lead to success. If Apple made robots, they'd probably be among the best designed robots in the world. The company is reported to be preparing to launch a robotic car, an autonomous road vehicle to rival the Google driverless car, and other companies that are gearing up for launch.

Apple has made decisions in the past weeks that indicate that an iCar, or whatever it ends up being called, is being revved up for the roads. If the company's other phenomenally successful products are anything to go by, the Apple car will be wildly successful around the world, from smooth autobahns to bumpy dirt tracks.

Last week it emerged that Apple had hired former Fiat Chrysler VP Doug Betts. Prior to that, it had hired a number of other former senior executives from leading, traditional auto makers for what is called "Project Titan", according to a report in the Wall Street Journal, via Mashable.

Apple fans have been uploading their own visions of what the car will look like. It's difficult to say if any of them are based on inside information from Apple, but the company whatever its eventual form, the Apple car is unlikely to veer too far away from the design principles that founders Steve Jobs and Steve Wozniak established from the beginning.

Discussions about design between two talented and opinionated people such as Jobs and Wozniak are rarely a straightforward conversation, and conflicts inevitably arose. But Wozniak is credited with the design of the early Apple computers, and was celebrated for his engineering skill.

Wozniak was said to have a gift for arranging components in small spaces and getting better performance out of the hardware that anyone else could.

While Jobs has become known for launching aesthetically pleasing devices such as the iMac, iPod, and iPhone, the design principle at Apple flows from the same original principles and initial engineering achievements by Wozniak – albeit with added Unix-based source code, developed through Jobs' time with NeXTSTEP.

Apple has also been reported as being in talks with BMW. The German car giant has a reputation for innovative design and world-class engineering. Its electric cars, the i3 and i8, are of interest to Apple, in particular the i3, according to TechSpot.com, translating from Manager-Magazin.de.

Apple has some similarities with BMW. The car company's advertising slogan for many years has been "The ultimate driving machine", implying that it's all about how the car works, rather than how it looks. Which is just as well, because some might say its appearance is quite ugly – or ruggedly handsome, if you want to be complimentary.

Aesthetically pleasing or not, BMW cars have an image of being well engineered, well built and well maintained. That image isn't based on looks alone. It's based on the widely held opinion that it drives well. So say the countless people who have bought or driven them down the generations.

Jobs was known for using the phrase "It just works" frequently when describing an Apple product. It's a simple statement, but contains a powerful message.

At a time when computers were beginning to be widely used in business and at home, many people were experiencing technical difficulties. Most computers crashed at one time or another. In the early days of YouTube, some of the most popular videos were of office workers attacking their computers because they found them so frustrating to use.

That type of thing doesn't happen so much now, with all the advances in computers. But the design principle of simplicity, ease of use, is still one of the most important factors in a successful product. It must work, and work well. You can get use to how something looks, but it's more difficult to feel comfortable with it if it keeps breaking down.

It could be argued that Apple computers worked well mostly because of the operating system, the software. But software is a crucial element of the design of a computer, arguably the most important element.

The principles of good design holds true for robots too

In the robotics world, aesthetics were never a priority, mainly because industrial robotic arms – the overwhelmingly dominant species of robot – were shut away in factories, performing their tasks within cages, in case of accidents involving humans.

But as they become increasingly collaborative – meaning that they are released from their cages and are deemed safe for humans to work with – it's noticeable that they have started to become more aesthetically pleasing.

In this regard, the two companies that come to mind are Rethink Robotics and ABB, both of which make collaborative robots – Rethink has Sawyer and Baxter, and ABB has launched YuMi.

While each country has its safety standards and regulatory bodies to uphold them, robotics is a global business, so the International Standards Organisation is the essential authority on the subject.

At the moment, with collaborative robots being relatively new to the market, the ISO's development of regulations on the subject are ongoing. Some safety standards have been published, and the organisation has published numerous additional standards on a wide range of specific areas of detail, such as performance criteria, and vocabulary.

Needless to say, for any robotics company, a well designed robot means a robot that is safe to use. Beyond safety, customers would want ease of use, accuracy of performance and so on.

Aesthetic considerations would be lower down the list of requirements for industrial applications, if they're on there at all – some people might not value it at all.

Easier on the eye than the average industrial robot though they may be, Sawyer, Baxter and YuMi would not be regarded highly at all unless they were safe and functioned well. Customers might appreciate their looks but none of them would pay premium prices for anything that doesn't work properly.

Industrial robots may adhere to higher standards of safety, but the rest of the criteria would apply to any robot, whether it's for commercial or personal use. And the closer a robot gets to the customer's home, the more likely it is that aesthetics would be prioritised.

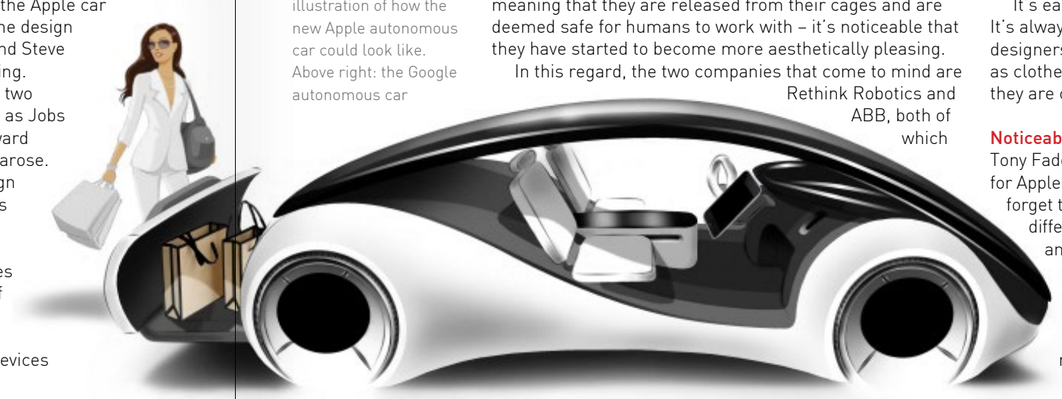
When planning any product, it's advisable to think of the end user's demands first, and then work backwards towards the point of production. The more you can understand about the end user's demands or needs, right down to psychological and emotional interactions with the product, the more likely it is that you will make a better product. Although it does depend on how accurately you understand the end user and being able to interpret that knowledge into features of the product.

It's easy to find advice about design on the internet. It's always worth taking a look at some of those. Product designers are not generally as famous or well celebrated as clothes designers, for example, but within the industry they are certainly highly regarded.

Noticeably better design

Tony Fadell, currently the CEO of Nest Labs, used to work for Apple and helped design the iPod. It's probably easy to forget that before the iPod, MP3 players came in many different shapes and sizes. All of them looked clunky and loosely to put together in comparison to the iPod.

In a speech on TED, Fadell says the first secret of design is "noticing the problems that are all around us". He says comedians are good at noticing little details that are not quite right, and making humorous sketches out of them.



Main picture: the BMW electric cars, the i8 (left) and i3. Below: an artist's illustration of how the new Apple autonomous car could look like. Above right: the Google autonomous car

"But designers, innovators and entrepreneurs, it's our job to not just notice those things, but to go one step further and try to fix them," says Fadden.

He accepts that noticing too much detail too much of the time can lead to mental exhaustion, but when designing a product it's important to identify as many problems as possible. "It's easy to solve a problem that almost everyone sees. But it's hard to solve a problem that almost no one sees," he says.

And it's not always about how something looks or even functions. It can be something as simple as pre-installing batteries into an electronics product.

Fadden says Jobs noticed how many electronic products back in the old days used to be sold without batteries. So, not only did Apple help change that culture, it now pre-charges its phone batteries so the customer can use it immediately out of the box. "It just works," as Jobs may have said.

Aesthetically, too, it's possible that Jobs was deliberately going for simplicity. Whereas many mobile phones of the day had lots of buttons and edges at different angles, hinges and other visible signs of its construction, the iPhone dispensed with as much of that as it possibly could.

One hallmark of a design classic is when you don't have to radically change it for many years. The first iMac, with its bright colours, was a playful way to introduce Apple computers to consumers who had never thought of having a desktop computer at home. Now the iMac has matured into a more serious looking product, and because of advances in flat-scene technology, looks sleek and stylish. The iPhone hasn't changed much at all since its launch.

Minimalism is probably the word to use. The world is a hectic, frenetic place. It can be overstimulating. Too many bells and whistles with your chips. Why not make things simple? Simple to look at, and simple to use.

Both Rethink and ABB do a good job of simplicity with their collaborative robots. So too do iRobot and Dyson, with their home vacuum cleaning robots. 3D Robotics' drone is one of the more attractive consumer drones on the market. But many of the others are not bad either.

What might now be called "modern" design principles are well understood and widely applied. This makes it even more difficult for new robotics companies to make their products stand out in the market. What becomes crucial, what remains as the essence of competition, the differentiator, is details. Or, as Fadell might put it, how many problems you can notice and solve.

The emphasis on details is not new, but it still works. What's important is to know what details are important, and what is not.

Cracking the da Vinci code

Someone who goes to the kitchen and is looking to make a salad or cook a meal would probably need a knife at some point. If they did, they would probably reach for the best one. The best knife in this context would be a traditional kitchen knife, a cook's knife, or something like that. Whatever it is, it's almost certainly not going to be the Swiss army knife.

However, if that same someone were to go camping for few days, the Swiss army knife would probably be very useful in that context.

Trying to do too many things with one product may be a bad idea. Having said that, the first iPhone did a whole lot more than the phones around at the time, and set a standard for other phones to follow.

Apple put a lot of time and money into creating an apps ecosystem, a concept which did not really exist before. Not many companies can do that. And not many companies can make deals with AT&T that almost guarantees reliable internet connection – which really was the "killer app" that made the iPhone sell as well as it did.

Until then, there were many phones that claimed to offer internet connection. But too many of them were expensive, didn't work well, were unreliable, and generally so frustrating to use that many people just didn't want to face going through the agony and just waited until they were next at a computer to go online.

So, while robotics startups may not have anything like the resources that Apple had, even before it launched the iPhone, they can certainly identify what their own killer app is. That shouldn't cost too much money, it's probably mostly a question of noticing, of thinking, of identifying what it is that people are having a big problem with in their market, and how the robotics startup can solve it.

Art is probably not a good place to find design templates. Great artists rarely think of the audience or market when they are creating their work, preferring to look within themselves at their deepest interpretations of what they have experienced of the world and share those with the viewers, or the market as such, through their art.

So maybe it wouldn't directly give you design ideas, but it might give you an insight into the human psyche. Just trying to thinking of those things might help to exercise that part of your brain that is used for insightful thinking. This may be helpful in the context of design and development of many kinds. If not, you just end up having seen some art. And that's no loss.

Almost all designers and thinkers would probably start expressing their ideas using a pencil and paper. Sketches by Pablo Picasso and Leonardo da Vinci may not be directly helpful, but no harm in looking at them. Piet Mondrian is probably a good go-to artist for the modern designer.

None of these are particularly original suggestions, but the general objective remains to exercise the part of your mind that is used to think about what problems people, what they think about, have and how to solve those problems, or at least engage them in metaphorical or symbolic conversation.

Abstract sculpture would also be a good place to go for ideas and insights if you're in development mode. Unless you're developing human-like humanoid robot, or an android, in which case just looking at humans would seem to be an obvious place to start.

Cinema has shown many robots down the generations. Among the most well known are C3PO and R2D2 from the Star Wars films. Having been way ahead of their time, they still wouldn't look totally out of place in today's world.

The Starship Enterprise from Star Trek hasn't changed much. Its overall structure has stayed more or less the same. Get it right or as close to right as possible first time, and you don't have to change anything. Just refine.

If there's one thing that seems to work, it is this: simplification. Make things simple for people to use and look at. That seems to be the key that unlocked the world for Apple. Maybe it can do the same for other companies. ●

Dress designed in the 1960s by Yves Saint Laurent, based on art by Piet Mondrian. Art may or may not be a good place to find design ideas, if not templates