MOI GLOBAL

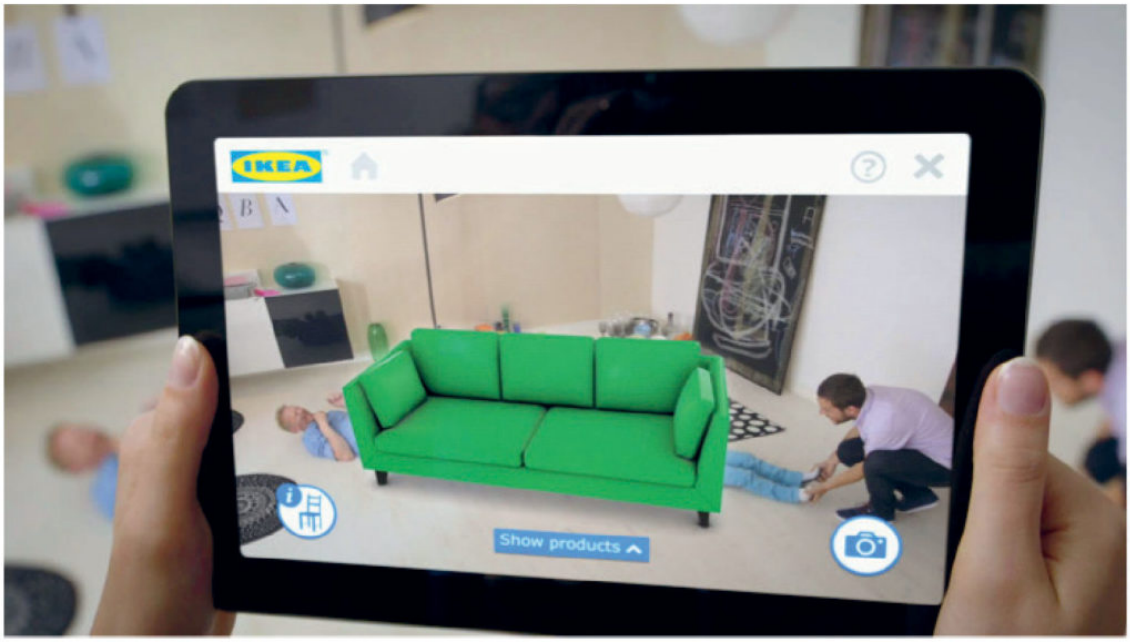
Making Sense of 3D Sensing

This post has been excerpted from an article by Stuart Mitchell of S.W. Mitchell Capital. Stuart is an instructor at European Investing Summit 2017.

The potential for 3D sensing technologies in the next generation of mobile phones – technologies which will fundamentally alter the phone's user interface – is an undiscovered opportunity.

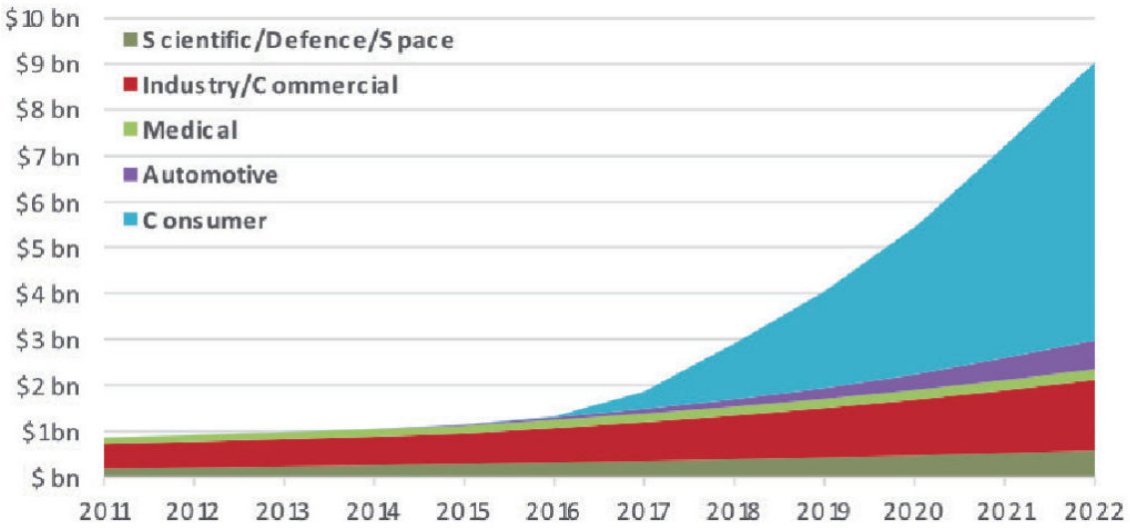
Over the last few years, global smartphone adoption has surged to more than 2.5 billion users, and is on a clear path to double again. However, the pace of radical innovation appears to have stalled: Apple has only introduced marginal improvements to its iPhone 6 design over the last three years. This suggests one of two things: either that this beacon of innovation has run out of ideas; or maybe that it is working on something truly revolutionary. We believe it is the latter, and that Augmented Reality (AR), enabled by 3D sensing, will be the blockbuster new feature that will be introduced this Autumn as part of the iPhone 8, to mark the tenth anniversary of
Apple's original iPhone.

Augmented Reality, which essentially lets viewers superimpose graphics and data onto footage of the physical world on their phone screens, has already become a mainstream hit, even in its currently limited form, following the success of *Pokémon GO* and *Snapchat*. However, the current smartphone AR experience is still rather rudimentary because it relies on a simple 2D camera. **The obvious missing link is a 3D sensor**. Simply put, you cannot superimpose a layer of augmented content on the real world unless your phone can detect the location and depth of objects around it. A 3D camera works much like the human eye and opens up incredible opportunities way beyond today's selfie filters, because by simply pointing your phone at any object or space, you will be able to accurately scan it. Facial and gesture recognition are just some of the first-use examples of this technology, but in the not-so-distant future, before buying new furniture from Ikea, you will be able to see what it will look like in your living room by simply holding up your phone. Or to scan the tie of the person next you, and order it with one click from *Amazon*.



3D sensing and imaging is already a significant industry with many applications in the medical, automation and robotics industries, but the explosive growth will come from the adoption of this technology in smartphones. The technology consultant *Yole Développement* believes that the 3D consumer industries should grow from close to nothing today to $6bn by 2022, and we think that the French electronics and semiconductor manufacturer, *STMicroelectronics (STM)*, is one of the companies that will be able to benefit from this significant growth.

3D sensing market size



Source: *Yole Développement*

Based on our extensive research, including patent application reviews and conversations with industry experts, we believe that STM, with its unique technological edge, will be supplying at least one of the 3D sensors in the new iPhone. Without going into too much technical detail, currently the two leading technological approaches to 3D sensing are known as “Time-of-Flight” and “Structured Light.” The former measures distances by determining the time it takes for a light pulse to travel to an object and back, whereas the latter illuminates an object with a regular pattern of multiple light beams and calculates distances based on the deformation of the reflected light pattern. In both cases, the 3D sensing module consists of three key components: a vertical cavity laser light source (VCSEL), an optical system, and an optical sensor. Although Apple has not revealed anything about its design plans (as usual), one of the reasons we feel confident about the inclusion of 3D sensing in the new iPhone is that recent earnings calls of the leading global laser supplier confirm the receipt of very large scale orders, and on a timeline which fits perfectly with Apple’s expected release date.

Why do we believe that STMicroelectronics can be a leader in 3D sensing? The key development is that STM has revolutionized Time-of-Flight technology by using single photon avalanche diodes (SPAD), which are able to capture individual photons with very high time-of-arrival resolution, unlike the classic photodiodes used by their competitors. These cameras are able to handle both depth and motion, and experts believe that after ten years of development, STM is now the only company that has been able to scale it down to smartphone requirements, and has managed to package a solution that is two to three times cheaper than camera modules currently available.

We believe that the secrecy around Apple’s plans and the technical complexity of 3D sensing has kept STM’s incredible opportunity under the radar. However, as soon as the phone is launched, we expect the market to start recognizing the company’s unique edge and leadership in this emerging $6bn industry. We think that from 3D sensing alone STM should be able to generate an additional $1bn in revenues in 2018, significantly more than what most analysts are forecasting. Additionally, beyond the smartphone market, STM also appears to be very well positioned to benefit from the rapid development of the internet of things, autonomous vehicles and the emergence of smart homes.

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