sagentia

Apps and add-ons

"Download the app" is such a fact of modern life that it is totally unremarkable. The idea of the smartphone as the main platform for consumer software engagement is mainstream, yesteryear.

But what if in addition to accessing train and bus information, playing angry birds, posting on Instagram and stumbling through the city on Google maps you could use your smartphone to perform not just useful tasks (we'll ignore Angry Birds) but potentially life-changing processes?

The last few years have started to see the growth in hardware add-ons designed to work on a smartphone device that perform specialist functions. And these specialist functions are in fundamental parts of our lives - like healthcare. To give you an example, the Portable Eye Examination Kit (PEEK) has a new add-on, Peek Retina, engineered at the University of Strathclyde and NHS Greater Glasgow and Clyde. The add-on clips over a smartphone's camera and enables a healthworker to see inside the eye, save photos and then send them to experts for diagnosis. This means that individuals in remote locations with potential conditions (such as diabetes or high blood pressure) can have a local image produced of their eye and have this communicated back to specialists working in a specialist diagnostic or treatment centre.

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¬ Why develop like this?

The smart bit about the development of these hardware add-ons is that they are just that – add-ons which use the smartphone as a platform providing them a lot of software functionality and hardware delivery components. Let's examine this more closely: the smartphone user can both download and upload information through their device. The smartphone has a well understood user interface with integrated keyboard and screen (with all the language facilities etc pre-developed). The smartphone has built in connectivity – it has 3/4G, wifi and Bluetooth meaning that near and far communication is easily achieved. It has GPS – it can tell you where your patient is. The smartphone has an integral camera – useful for any sort of imaging requirement.

What this means is that product development companies – such as healthcare technology developers – can focus their efforts and their budgets on developing the bit of the product that is unique. They are not replicating pre-existing devices or software functionality they are just developing the clever bit.

In healthcare, one of the "clever bits" is implants. Implantables – components which are placed into the body surgically or by other means – can be used to monitor aspects of health or to dispense treatment. The first instance of these uses some sort of sensor to monitor an aspect of health (heart rate, blood levels etc) and the second might be something like a neuro-stimulator – activating the body in some way. Both

forms of implant need to be able to communicate back outside the body. One of the common standards for this communication is Medical Implant Communication Service (MICS). MICS allows two-way communication between the implant and the external transceiver. The advantages of MICS are that it is that its transmission power is very low and so it doesn't interfere with other devices using the same bandwidth (it uses a part of the spectrum dedicated to medical implants) and secondly it can communicate to an external transceiver which is relatively remote – ie not touching the skin.

Clearly the ability for a medical implant to be able to talk directly to a smartphone would be hugely advantageous and currently to achieve this, the MICS protocol needs to be able to talk to Bluetooth. This is an area that we at Sagentia have been working on. We have created a relay device which acts as an intermediate between MICS-enabled implantables and smartphone Bluetooth Low Energy (BLE) wireless protocols. This means that the implantable talks to the relay device by MICS and the relay device talks to the smartphone by BLE. This gives full 2 way communication from implant to smartphone allowing the user to view and monitor what the implant is sensing and ultimately to communicate that information onward. Ultimately the user will also be able to change the settings on the implant directly (if desirable) which for the active implants (as opposed to monitoring, sensor implants) such as the neurostimulator, could be critical.

We see this is an area which is ripe for further development. There could come a point when the implant can talk directly to the smartphone through bluetooth. For this to occur the implant would need to contain a bluetooth chip. Currently the ability for bluetooth to communicate through skin and fat gives it a range less than existing bluetooth and MICS but this could be improved. Traditionally, MICS has also inhabited a separate part of the spectrum from bluetooth and wifi ensuring lack of interference. Increasingly, however, bluetooth is co-existing well with other wireless protocols operating in the same part of the spectrum and we suspect this will become less of an issue going forward.

As it stands though, there are hundreds of thousands of people worldwide wearing implants which currently communicate using MICS. The Sagentia adapter will allow these to connect to smartphones.

¬ Go to market

In addition to the relatively frugal approach to technology development permitted by reuse of the smartphone platform, the process for taking the add-ons to market becomes relatively templated. There are certain key device and o/s manufacturers which have huge market share and the ability to tap into this market with well targeted and priced add-ons provides a standard way for taking add-ons to market. Obviously that distribution might happen directly to the consumer or via interested parties such as healthcare providers.

¬ Challenges

The reality of specialist devices is that they tend to need to work in controlled environments and a smartphone isn't necessarily controlled. If the latest version of android or i/os automatically downloaded by the keen user disrupts a critical add-on which the user has come to rely on for medical or other important reasons, then clearly the add-ons won't be sustainable.

¬ What might the future hold?

If our observation does indeed prove to be a trend, not a fad, then the way in which smartphones are perceived may change. We see that there will be base models which contain the standard hardware/ software device components (connectivity, interface, camera etc) and then there will be additional hardware modules which can be bought to connect to the base model. The concept of a modular smartphone is evident in Google's Project Ara. Ara will allow users to construct and swap different modules of their smartphone such as processor, camera or battery and it is quite easy to see how this concept could be extended to more specialist modules . Some may physically connect to the handheld device as in the Peek Retina others might Bluetooth to it such as the implantable devices described above. The cost-effective nature of the development should mean that more add-ons come to market. In this world, "get the add-on here" will become the new refrain.