The Google ADK: Making Money Because of Something

By Andrew Back, Co-founder, SolderPad

Open Source

A year ago the question, "Why would Google be interested in a microcontroller platform?" would have been met with blank expressions. Yet in the keynote speech at the Google I/O conference in May 2011, the company unveiled the Arduino-based Accessory Development Kit for Android. Why is Google supporting microcontroller development and why choose Arduino? In this article we take a closer look at the ADK and consider the wider opportunity for Open Source Hardware.

An enabler for Android accessory development

The Google Accessory Development Kit (ADK) was designed to support the prototyping of USB attached accessories for Android devices. It serves as both a development platform for low power microcontroller-based accessories, and as a reference implementation of the protocol used in communications between an Android device and accessory.

The ADK comprises two major parts: hardware that connects to the Android device via USB, and supporting software. The hardware consists of an Arduino Mega 2560 that has been extended to integrate a USB host controller, and a custom Arduino shield. USB host capability is required as the vast majority of Android devices do not support it. The Arduino shield plugs into the ADK mainboard and provides various basic inputs and outputs, including a joystick, LEDs and temperature and light sensors.

Communication between the device and ADK board is facilitated by the Android Accessory Protocol. A library for this, along with a USB host driver, are provided for the ADK and simply drop into the Arduino development environment. Support in Android itself appeared in version 3.1 of the platform and has also been back-ported to version 2.3.4. Software development is then split across the Android application via its Software Development Kit (SDK) – built using, for example, the Eclipse Integrated Development Environment (IDE) – and the Arduino IDE for the ADK board firmware.

> **"organise the world's information and make it universally accessible and useful"**
>
> **Google's stated mission**

The Arduino advantage

The answer to the question, "why Arduino?" is simple: cost, community, generativity [1] and ecosystem. The Arduino technology is low cost and boasts a large, enthusiastic and inventive community. While the platform and its approach to licensing can be considered to be generative, it has given birth to an ever growing ecosystem of derivative and compatible hardware and software. There are no licensing, partnership or non-disclosure agreements to be signed, or fees to be paid, and a strong culture of sharing exists.

In selecting Arduino, Google was able to make use of legally unencumbered technology with a low barrier to entry and an expansive ecosystem of complementary hardware and software.

Accelerated adoption

The ADK hardware that Google launched was available at a cost of around £240 and was, by Arduino standards, expensive. However, given that Google provided all the design materials for the hardware and published these under a liberal licence, it didn't take long for a compatible clone to appear. In fact it took around a month, dispensed with the custom Arduino shield, and came in at a cost of close to £50. In the months that followed and in what could be considered completion of the Open Source Hardware (OSHW) cycle, the originators of the Arduino platform in-turn released their own ADK product.

It would be reasonable to assume that this is precisely what Google had hoped for, as the cloned and derivative boards are also compatible with the ADK firmware and thus Android. Would there be such a rapid proliferation of ADK compatible products were the technology licensed under more restrictive terms? Unlikely.

It's all about information

Let's be clear: Google is not a hardware company. It may run its services on custom data centre technology and Google branded consumer devices exist, but the volume of hardware that the company ships is relatively small and will only account for a tiny fraction of its overall revenue. Google's stated mission is to, "organise the world's information and make it universally accessible and useful." In order to achieve this, Google needs to do everything it can to drive the use of its services and data through itself. Thus the Android platform is not about generating revenue from device sales, it exists simply to extend the reach of Google's online services business. The ADK further strengthens the Android proposition and paves the way for the future Android @ Home framework, which will add home automation capabilities to the platform.

Devices and device platforms are a means to an end: generating value by underpinning a strategy to collect information, organise it and make it available.
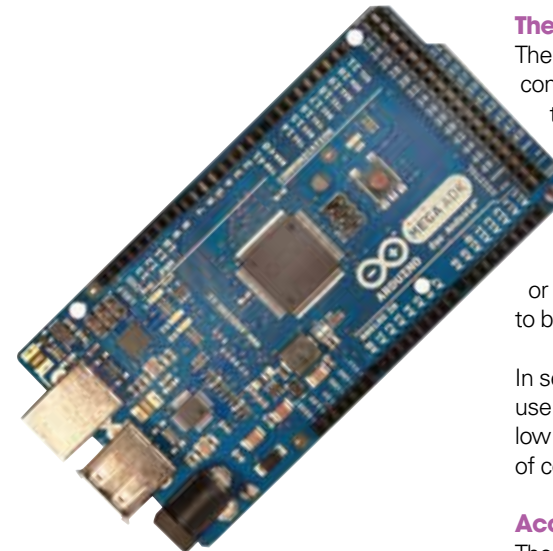
A multi-faceted opportunity

Google's motivations for employing Arduino in the creation of the ADK are clear. However, it's important to recognise that the OSHW opportunity is not limited to development kits or as an adjunct to online services.

A key lesson from Free/Open Source Software (F/OSS) has been that business opportunities are multi-faceted and may not be obvious. For example, open source can be used to create a market for services, drive implementation-led standards or empower customers with the ability to innovate. Perhaps uniquely, it can be used to greatly reduce the cost associated with establishing a new technology platform, securing market share and disrupting incumbents.
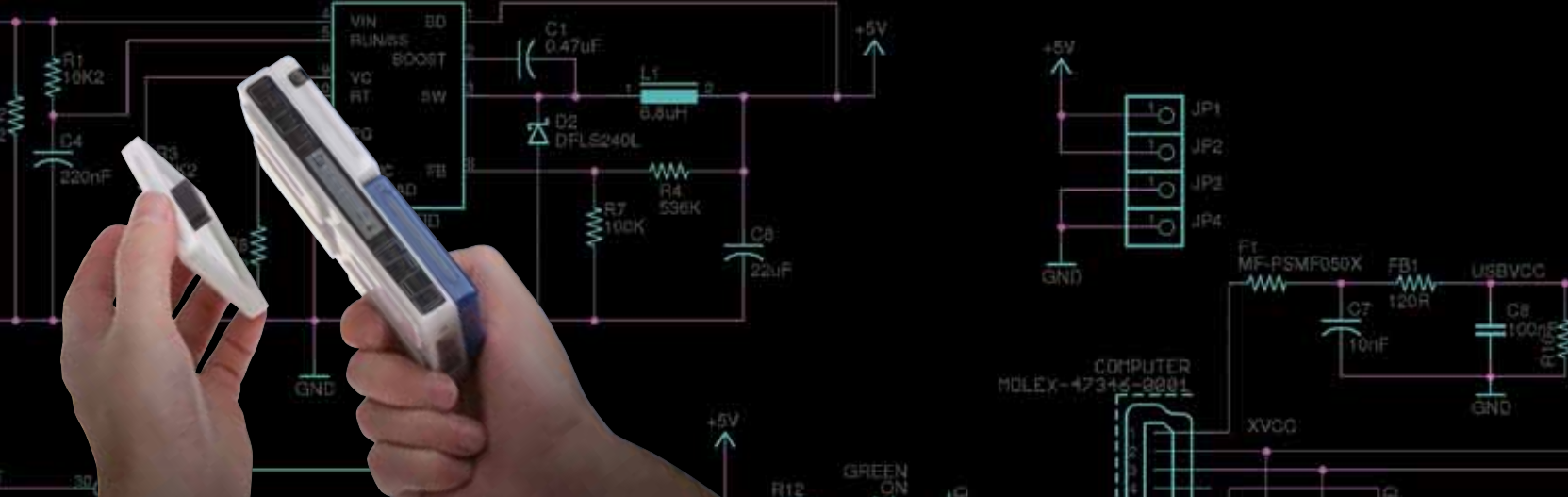
With the advent of open business models it's no longer as simple as making something, selling it at a profit and protecting the associated intellectual property. This traditional model still works, clearly, but a greater number of options now exist and some of these may be used to gain an advantage over competitors that have taken a simpler approach.

Open for the consumer

Google was not the first to recognise the opportunity for the application of OSHW technology in the consumer space. Initiated in 2009, Homesense was a "research project that looked at how we might design smart homes from the bottom up."

Working with selected households across Europe, the project provided them with a kit of Arduino-compatible electronic building blocks, a manual and access to a local technical expert.

In 2008 Bug Labs launched The Bug System, described as a "modular, open source system for building devices". At the heart of the system is the Bugbase – a small ARM powered computer that runs Linux, can be extended via a range of hardware modules, and supports the Java Open Services Gateway initiative (OSGi) framework and Eclipse IDE for software development.

The Bug System has been put to use by businesses such as Accenture and Orange in prototyping mobile technology, and in September 2011 Bug Labs and Ford jointly announced they would be developing and distributing tools to, "advance in-car connectivity innovation". This new platform, named OpenXC, is based on the Bug system and according to Ford is "about creating a platform that is totally accessible to the developer community and quickly incorporates local market needs to offer innovative solutions at an affordable price point". The idea being that the car becomes a docking station for interchangeable plug-and-play hardware and software, thereby enabling a high degree of customisation of in-car connectivity features and services.

Conclusion

In 2011 we saw companies such as Google with the ADK, Facebook with Open Compute and Ford in its use of The Bug System, bet on OSHW, and one thing became very clear: this is no longer a niche phenomenon. The biggest mistake that can be made in attempting to understand such moves is to assume they are simply acts of altruism or a high risk gamble, from organisations with deep pockets.

While there are clear societal benefits associated with OSHW this is by no means where the story ends. Significant business opportunities are present in what author and research fellow Doc Searls has dubbed the 'because effect', which he neatly describes as, "what happens when you make more money because of something than with something". It's vital to think beyond the notion of giving something away and to consider the opportunity in the round. This is something that Google was quick to recognise – first with online search – and it has clearly paid off. ○

Footnotes
[1] "Generativity is a system's capacity to produce unanticipated change through unfiltered contributions from broad and varied audiences." — J.Zittrain, The Future of The Internet and How to Stop It, pp. 70.

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