

IoT Devices: The Make vs Buy Decision

One of the key decisions to be made during an IoT project is determining how to execute the technology building blocks. Should you design and build a device for your IoT solution in-house? Or should you buy an off-the-shelf (OTS) device? F3 Wireless designs and develops custom wireless electronics products. Through this work, we identified numerous key considerations to help decide between OTS hardware or making a custom device.

The electronics market presents a wide variety of OTS hardware that a design team can use to quickly develop a product. Common examples include Arduino and Raspberry Pi. However, OTS hardware is not always the most cost effective way to bring a new product to market. While it can work for small volumes, larger volumes benefit most from custom hardware.



Making a product allows the device to be tailored exactly to your use case, resulting in the most efficient solution possible.

Buying a Product

When choosing an OTS product that you didn't develop, the obvious benefits include faster lead time and lower up-front investment. In this scenario, you are choosing to partner with a vendor. The more specialized the product, the greater the likelihood you can only get it from a select number of vendors, decreasing the pool of partner options and future support.

The downside of going with OTS hardware is that you sacrifice product development control; including lead time, costs, hardware revisions, size of components and ultimately ensuring the product does exactly what your use case demands. While your initial OTS hardware order is based on availability, the lead time and revision updates of future orders will be out of your control. This potentially adds significant business risk. Surprise revision changes may result in the need for product redesign, reconfiguration, and recertification. The OTS hardware may be discontinued, meaning time must be spent finding a replacement, adding engineering costs and effort. When you buy a product, you are not in control of the destiny of that product.

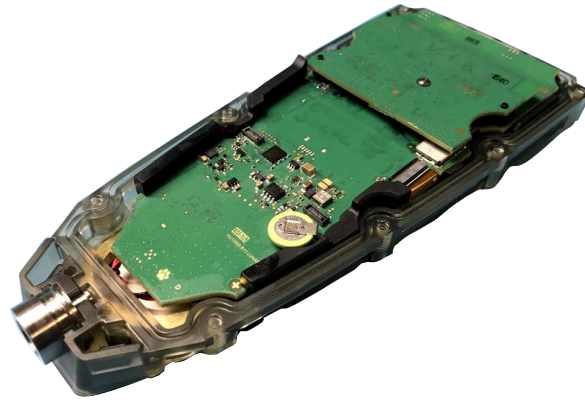
The biggest trade off is typically time and schedule. Off the shelf products provide a quick solution since they're available and ready to be shipped. Unit cost will be higher, which is the price you pay for not investing in your own product development and certification.

Making a Product

Anytime you have to do something, add something, or change something to your device in order to use it, this is a "make" scenario. When you make a product, it does exactly what you need, the way you need, and it doesn't do anything you don't need. OTS hardware tends to be feature-rich, which means it may have a larger hardware footprint than you need or want, including unnecessary components and functionality. These can add to the unit cost of your product while adding no value to your use case.

Making a product allows the device to be tailored exactly to your use case, resulting in the most efficient solution possible. It also means that you own the intellectual property and are not relying on a vendor whose product may change or become obsolete.

The benefits of customer hardware include meeting exact requirements (including parts costs, size, and mechanical requirements), and ultimately a lower unit cost for your product.



EXAMPLE OF A CUSTOM WIRELESS DEVICE

CHOOSING MAKE VS BUY

The smaller and more embedded your thing is, the greater the likelihood that making exactly what you need is a bigger deal. The downsides are increased time and upfront dollar investment. Custom product development is not quick or inexpensive. When you design and manufacture a completely custom electronic wireless product, however, your unit cost will be lowest in this scenario. Something that may cost more than \$200 per unit off the shelf may only cost \$50 per unit once you have it designed.

The volume potential is an important consideration when deciding on make vs buy. OTS hardware is beneficial for getting small volume products ready for sale quickly. This is usually not the best way to develop a product that will be used in market vs a prototype. Custom hardware design can be beneficial for small, medium, and large volumes. For small volume production, a cost-benefit analysis must be made regarding the level of engineering effort required vs the benefits. The benefits of custom hardware include meeting exact requirements, including parts costs, size, mechanical requirements, and ultimately a lower unit cost for a product that differentiates you from the competition.

Average development time for an end-to-end custom device is six to nine months. One of the factors that drives the timeline is the tooling for the enclosure, which is typically three months. In addition, some of the specialized electronics parts may have two to three month lead times. Working with an expert like F3 can reduce that time by employing parallel planning and leveraging the blocks of intellectual property (IP) that we license. This can speed things up and potentially remove a few months. But with custom product development, the total time will always be months and not weeks.



If you build a custom thing you will have a competitive advantage over anyone who purchased off the shelf.

Cost vs Benefits Analysis

If you are going to make or buy something, you must have a written requirements document of what that thing is supposed to do. In the buy scenario, it may be tempting to use raspberry pi or another OTS hardware. It's important to ensure you aren't buying something that is significantly overpowered or more expensive than it needs to be for your product. In the make scenario, you are building a custom product that does exactly what the product is required to do for your business case.

Developing a custom product includes risks with finding things you didn't anticipate. For example your software language may use more memory than you originally thought. Every project development is unique, and F3 can help you identify and prevent those landmines.

A major benefit of customer product development is ownership of that IP and design. You can choose where that product is manufactured and control the production. IP leads to increased company value, since you now have something tangible that your competitors do not (vs if you and your competition both purchase the same OTS product). If you build a custom thing you will have a competitive advantage over anyone who purchased off the shelf.

Conclusion

First, understanding your business case is paramount. Your business case is what drives everything that determines what your product needs to do. Next, those written requirements are the essential and the most important aspect of customer product development success. After the written requirements are documented, you can decide on make vs buy. Oftentimes, the right business decision is based on company strategy. For example an aggressive growth strategy most likely means a custom product, since it provides competitive differentiation.

F3 can work with you to examine all available options for the various stages of product development, helping you assess what is best suited for your specific needs. We can help you make the right design decisions for your product, assist with initial proof of concept to deployment, or help transition your OTS-based design to fully custom solutions. Our goal is to help position customers for long-term sustainability and success.

About F3 Wireless

F3 Wireless is a custom wireless electronics device organization based in Minneapolis that offers consulting, engineering, design, certification, and manufacturing for the "things" in the IoT. F3's core competency is wireless in all of its variations, and providing best in class device cost and time to volume.

For more information, visit www.f3wireless.com.

