# DESIGNING FOR THE INTERNET OF THINGS

**Emerging devices are making the Internet more useful and exciting, but at the same time, these devices are also making the internet more complicated. From live-feed traffic cams to fitness trackers to smart watches, the family of Internet-based devices is growing more diverse every day, and integrating obscure gadgets that go far beyond the computers and servers that the Internet was initially built for.**

Refining the design and integration of these devices will prove to be one of the primary technical challenges of the next 10 to 15 years. But if we do it right and don't lose sight of our goals, the Internet will continue to be the single biggest development that makes this the most dynamic time to be alive in the history of mankind.

It is estimated that by the year 2020, somewhere between 50 and 100 billion devices will be connected to the "Internet of Things"—the phrase used to collectively describe all of the noncomputer devices actively linked to the Internet. In order to maximize this potential, we need to take it upon ourselves to ease the introduction of these devices into the digital infrastructure. For a designer, the most important way to ensure that you are doing your part is to constantly remind yourself who you are designing for: the Individual, the Business, or the System (government agencies). With that, there are three overarching rules to remember:

1. All Internet users are dedicated to saving or generating money by increasing their access to information. Strive to create devices that do this while saving the user time in convenient ways.

2. Identify the specific needs of the Individual, Business, and System individually, and anticipate their evolving needs in the future. Ask yourself this question: where do the needs of these groups intersect currently, and where will they diverge or intersect in the future?

3. Devise ways to isolate the specific interests of the target group that you are designing for. Prioritize the interests of that group over the pressuring interests of other groups.

## DESIGNING FOR THE INDIVIDUAL

While the Internet might have been developed as a government network, it is really the Individual who made it a versatile tool for work and play. When you are designing an Internet-based device for the Individual, it is imperative to capitalize on his or her creativity:

- Create objects that are compatible with a broad range of lifestyles and technical aptitudes.

- Don't add features that you think some people might use, or might learn to use in time.

- If you're torn because you want to add a feature that you know is complicated, leave it on the back burner for a future iteration, optional downloadable content, or a future "deluxe" model.

Any first release model needs to be basic so that the Individual can master it quickly and know that he or she is in complete control. Few people want or need 100 percent control of any given device, but they do want the ability to change proprietary settings and close unnecessary programs. The Individual is more comfortable with technology when he or she knows what a device is doing and has control over it. To this end,

- design devices that offer a clean slate of content so that the Individual can be creative and make it his or her own;

- start simple and give the user the ability to customize a device in a way that conforms to his or her unique lifestyle;

- do not overwhelm the user with a list of things that you think are good for him or her.

Your device will be more successful if it has fewer features than if it has too many, because the Individual will know what he or she is getting and what he or she will need to learn at the time of purchase. Remember, it is not the Individual's job to learn how to use a device, and he or she will stop using it (or refrain from buying it altogether) if he or she thinks the learning curve is too steep. To help make your device a success, consider these factors:

- Design logical devices that are easy to operate and demonstrate very obvious potential for reward.

- The Individual must see the device as an upgrade over something already owned, or improvement to his or her quality of life without adding any hassle. The value add must be real and marketable.

- The device must be compatible with the most disparate set of networked devices possible. If the device is too proprietary and doesn't work well with others in an ecosystem, it's likely to gain a bad reputation quickly.

## DESIGNING FOR THE BUSINESS

When designing an Internet-based device intended to be used by a Business, you need to maintain a business mindset and prioritize efficiency as the main benefit. Remember that the Business makes money when it does two things: meets its sales targets, and manages clients and employees effectively. As a product designer, you want to focus on the latter. If you can create a product that helps a company manage people, you are also helping that company make sales; it doesn't necessarily work the other way around.

Imagine that you are designing a barcode scanner for logging product inventory. To do the job properly, you will need to weigh out your critical variables for your design so that your product will make the business more efficient from the inside out. Ask yourself questions like these:

Is ease of use more important than security protocol? A small business shouldn't have to sacrifice speed and battery life because your wireless scanner uses a government-strength security protocol (because you wanted to be able to market your product to the largest possible buyer group of businesses).



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Will it ultimately be worth training people to use the device, or should it have fewer features and be intuitive to use out of the box? In certain cases, training employees to use a new technology is a worthy investment—if the features will save time and money in the long run. But ask yourself: will this technology be outdated by the time employees are fully competent in using it, and how much will the company have to lose while adapting to the device?

A smart strategy for designing any product for the Business is to create a clear set of goals based upon those of the companies that you are marketing to, and design your product accordingly. One approach is to ask for a copy of a business model from a company that would consider buying your product—this will help you to tailor your design strategy to target your corporate buyer's needs. Having knowledge of the internal departments and external stakeholders that will need to deal with data sent and received from your device can help you decide which design variables are most important. When trying to gauge the importance of your design priorities, consider the following:

- Devise a simple set of core design principles that are faithful to the goals of the Business itself. If your device complements the mission of the Business, then it will be valuable.

- Remember that the Business thrives on obtaining a maximum amount of information from the Individual and its employees, and it generally suffers when divulging information to the System. Your product should protect the interest of the Business and help it manage information, without releasing information to competitors and prying eyes.

- Aiming for longevity and upgradability are priorities—planned obsolescence is never a good thing, especially in bulk sales situations.

- Every variable in compatibility adds another layer to the complexity of devices coordinating within the Internet of Things. Remember that poor compatibility adds time. Every second counts to the Business.

## DESIGNING FOR THE SYSTEM

Designing Internet-based devices for the government has less to do with the allure of the Internet, and more to do with the immediate capabilities of devices that happen to use it. The System has no interest in enabling remote climate control in military tanks if an army cadet tweets "#Hot" during desert training. The System's major interests are clear and utilitarian: protect the Individual, oversee the Business, and invent ways to earn profit. If you are designing for the System, then you must remember that you are working to solve a challenge; it is need-based design that probably won't make your brand a household name.

The System strives to operate at the top of the food chain, so designing Internet-based devices for it generally grants less creative freedom due to a well-defined set of goals. Strong designers can spin this to their advantage—remember that sometimes having fewer variables and a clear mission can allow you to make a profound impact with a unique and unconventional solution. If you can think outside of the box and conceive a profound solution after having started with the odds against you, you have turned a thankless task into an appreciated gesture.

Designing something like a network of stress sensors to monitor expansion and contraction in a bridge would be a very deliberate task, and probably one that would be assigned to a designer on a commission-based agreement. If you were to take on this job, it would not be like designing for the Business or the Individual, where the appeal (and sometimes the novelty factor) of a design can sell the product. The product has already been sold and it is simply your job to make it work.



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Whether you are designing for space agencies or transportation departments, chances are that you're working according to predetermined specifications with very exact intentions. Jobs like this require designers who can take a list of restricting factors and use them as hints to point toward a solution—essentially, designers who are brought in to bridge the gap between the hard science of engineering and the real world. If you are designing for the System, then you must be that bridge and consider the following:

- Designing Internet-based devices for the System is about stating your credentials and capabilities, and living up to the challenge presented to you. Your future product pitch is how well you prove yourself on your first assignment.

- If the product that you design is not perfect for your government buyer, there is no sympathy for you as the designer. It is a pass/fail exam, and if your design looks better than it functions, you won't get hired again.

The creativity that you inject into your project will be most appreciated with regard to how it is applied to the efficiency of the device. From the lifespan of the capacitors to the degradation of the chipsets and the practicality of the software coding, your mission is to maximize the potential for your device vis-à-vis current government-standard Internet specs. When it is outdated, it will probably be replaced—not updated. If you can use foresight to figure out a way to design your product for future updates without making sacrifices to its functionality in the present, you win.

The best approach that you can take is to ask all questions up front and make no assumptions, prioritize the details logically, and apply design intuition accordingly.

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