The background is a teal color with various icons and patterns. There are several gears in red, black, and teal. There are also white clouds of different sizes. In the center, there are two large red circles. Surrounding these are several concentric light blue circles with arrows pointing clockwise. There are also some smaller light blue circles scattered around.

# GUI Guidelines for IoT Devices



## 8 GUI Guidelines for IoT Devices

In a previous eBook, “[Interfacing with the Internet of Things](#),” we discussed the reasons why IoT devices need a GUI. We talked about the wide variety of devices that participate in the Internet of Things – and how roughly 40% of them are going to need some sort of user interface. Having a compelling UI on low cost hardware is necessary to increase device adoption rates of this intimidating technology – and to make the devices much more useful.



**UI Design from the Audience Perspective**

<http://www.altia.com/blog/2015/01/19/ui-design-audience-perspective/>



## What is different about IoT devices?

So given that at least some of these devices need a GUI, let's explore the consistent mistakes found in IoT devices since they have some unique characteristics that most manufacturers do not account for in their product designs.

First, because of the need to cut costs and handle low power in a wide range of environmental conditions, there are a very wide variety of hardware and microprocessor options available. Likewise there are a wide variety of OS and RTOS platforms that have very unique specialties. Third, reliability is critical – physical devices are out there by the billions, and they usually can't be dynamically upgraded to fix bugs. Unlike smart phones and tablets, these products have to be fool proof. Finally, the price point must be pretty aggressive to appeal to a cost-conscious market, so the hardware will likely have limited performance and memory.

### These characteristics drive developers to make some common mistakes.

- Hardware Diversity
- OS Diversity
- Reliability
- Fool proof
- Under \$100

What are those common mistakes? Let's discuss those now...



### Common GUI Design Pitfalls to Avoid

<http://www.altia.com/blog/2015/01/29/gui-design-pitfalls-to-avoid/>



## 3 Common IoT GUI Mistakes

### 1. Too Complex

The first and most common mistake is that the GUIs in these devices are just too complex. There are several root causes, but let's touch on two.

First, designers have a tendency to treat every device with a touchscreen like it's an iPhone. Remember, the iPhone UI is very successful because it is appropriately designed to be a flexible and dynamically updated multi-app device. It needs an OS and complex GUI with gestures but that's okay, because it is a device to which you can give your full attention. Most embedded devices are **single purpose, time critical, urgent devices** for users that have no tolerance for distraction. These devices are NOT iPhones and, therefore, should not have a UI that mimics the iPhone.

The second reason we make device GUIs overly complex is what we call the "Pile-On Effect." Many of these devices – a washing machine, for example – previously had no user interface display or touchscreen. Now all of the sudden you have a potentially unlimited landscape of UI and your engineering, marketing and executive teams all want to pile on their favorite "must-have" feature – which often creates a rather large mess. That is a big mistake that will destroy your chances for market success and user satisfaction.



Mastering the Art of Simplicity in UI Design

<http://www.altia.com/blog/2015/05/11/simplicity-in-ui-design/>



## 3 Common IoT GUI Mistakes

### 2. Reliance on remote control

The next mistake was an early one made during the maturation of the Internet of Things. In the beginning it was quite cool to control your oven, bathroom scale, door locks, portable respirator, window blinds and stereo with your phone. Truthfully, that feature can still be rather cool.

In the early days the question was: “Why do I ever need a screen on my device if I can use my phone?” Pretty quickly, reality sets in. The need for instant, reliable, stress-free access to our Things trumps the novelty of smart phone-only interaction with that device. By the time you find your phone, find the app, navigate to the appropriate screen and, possibly, fix your flaky Wi-Fi connection, the urgent need to turn down your stereo volume or defibrillate a patient has long past.

On the other hand, if you are truly remote – in your car or another city, then yes, the phone is a great solution – but as a *secondary UI*. The primary user interface still needs to be located on the device.



5 Epic UI Fails Tech Giants Wish You'd Forget

<http://www.altia.com/blog/2015/04/08/5-epic-ui-fails/>



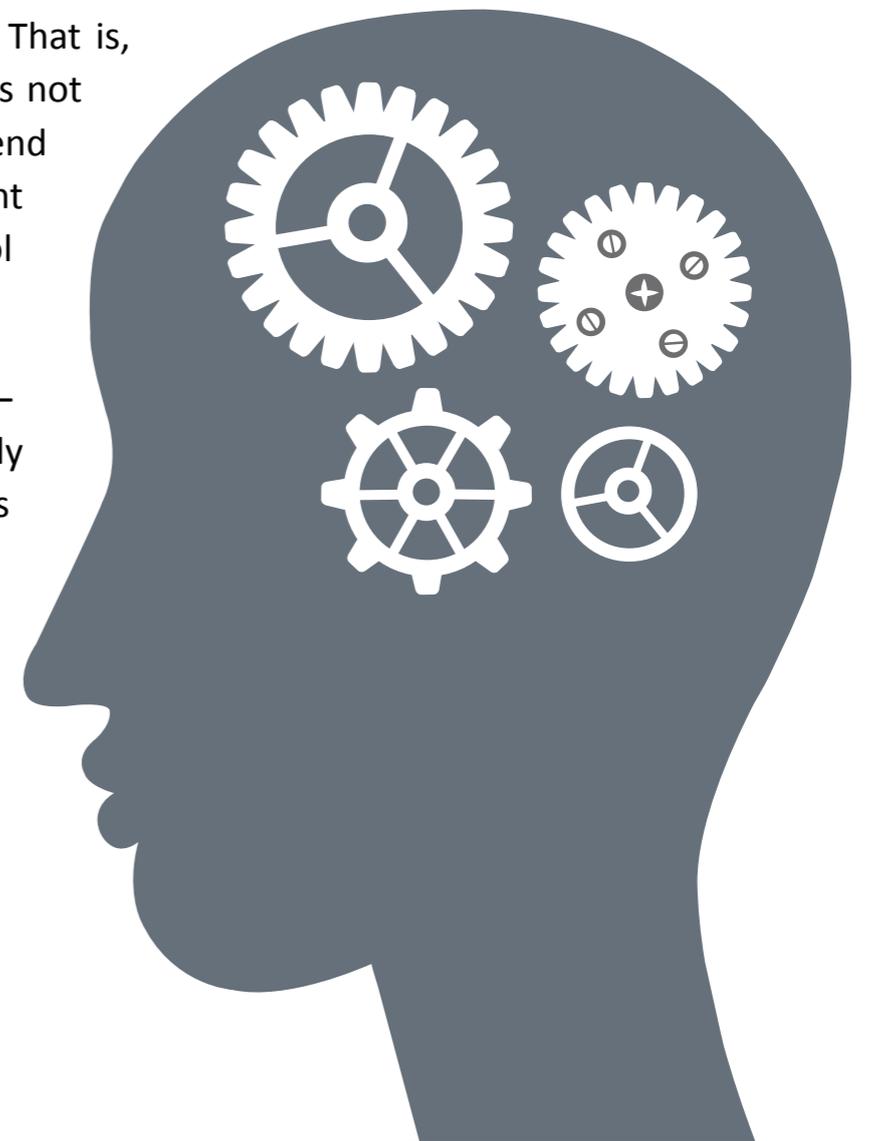
## 3 Common IoT GUI Mistakes

### 3. Underestimate effort to build

The last and often most critical mistake is one that is still common today. That is, underestimating the effort to build a GUI and do it right. Deploying a GUI is not as simple as adding a couple of web programmers and a few weeks to the end of your development cycle. This requires a serious software development team with usability analysis, professional testing and diligent change control management.

Add to this the reality that many of the micros and GPUs are new to the game – and you must be on top of all of this technology. Start your development early and choose your micros and tools wisely. We've seen many great products miss delivery dates by not only months, but years because of the underestimated effort to build a GUI.

**Now let's discuss some guidelines for developing the best GUI for the IoT...**



**Five Techniques to Improve User Testing**

<http://www.altia.com/blog/2015/03/31/five-techniques-to-improve-user-testing/>



# 5 Guidelines for IoT GUI Success

## 1. One Second Boot Time

For an IoT device that is out in the field doing real work solving urgent needs, boot time is critical. Many times these devices have to start in the “off” or a power saving mode. If your user has to wait for the device to boot up, they will eventually stop using it. OSs and RTOSs are very useful things in many cases, but – for these types of devices especially – if you don’t need one, don’t use it. Why? Because an OS or an RTOS will stretch out your boot time. You can build very compelling, beautiful GUIs without an RTOS, so don’t put one in just to get access to a GUI toolkit.

## 2. First Screen, Only Screen

Second, after your device boots, make sure the first screen is a useful one. Don’t force your user suffer through a long-winded start up screen or a complex menu or launch screen. If it’s a critical care monitor, boot into the EKG plot screen. If it’s a car, boot into the speedometer and tachometer screen.

## 3. Three Second Perfection

Next, shoot for a three second boot time. This is a magic numbers that people can remember and wrap their heads around. It is not always possible, but start with that goal in mind. Unlike phones and TVs, IoT devices need urgent access and response.



What is Lean UX and How Does it Help UI/GUI Developers Reach Their Design Goals?

<http://www.altia.com/blog/2015/02/09/what-is-lean-ux/>



## 5 Guidelines for IoT GUI Success

### 4. One Touch Results

Design your screens so that one touch makes something very useful happen. The door opens, the coffee brews, the wash cycle starts. Minimize navigation through menus and carousels to empower your device user. Minimize complicated gestures and commands. Hand waving and complex animations make for great action movie scenes, but those of us who aren't superheroes, find the histrionics required to turn on kitchen lights just too annoying.

### 5. Fool Proof Stimulus

Finally make sure every touch is fool proof. No hesitation. No missed intentions. No lag time. You could have the most amazing product in the world, but if it is not reactive to the user, they will simply throw it away.

The best way to make IoT devices better – especially for development teams that are new to embedded GUIs – is to learn from the experience of other teams who have tried and failed.

By avoiding the common mistakes that others have made and following these guidelines when developing IoT device GUIs, development teams can deliver successful products that will delight and empower their users.



### 5 Guidelines for Prototyping Your GUI

<http://www.altia.com/blog/2015/05/18/5-guidelines-for-prototyping-your-gui/>



# Altia's Contribution

It's tough to build a solid embedded system that stands the test of time – and there aren't enough talented embedded systems programmers in the world.

Altia's mission is to help designers get a great GUI from to the lowest cost hardware in the shortest amount of time. We've spent thousands of hours optimizing and testing our graphics code generators for every new embedded micro out there, so developers can focus on building the Smarts driving the Things that are doing the real work of the IoT.

1



## DEVELOP CONCEPT

PhotoProto + FlowProto

2



## BUILD GUI

Altia Design

3



## GENERATE CODE

DeepScreen



Altia Design 11.1 ... Take Another Look at What's New

<http://www.altia.com/blog/2014/04/22/altia-design-11-1-take-another-look-at-whats-new/>

# Want to learn more about how we do this? Get in touch.

A new GUI is an entirely new way to engage customers. A well-executed, intuitive GUI can deliver the kind of experience that converts customers for the long haul.

Designing a GUI isn't simple ... but with a clear focus on your user, great design and product performance, you and your team are on the right track.

How do you fast track your GUI – and your company – to market leadership? [Contact Altia.](#)

Companies in the automotive, medical, home appliance, consumer device and industrial industries all over the world have used Altia's GUI development tools and services to get first rate user interfaces into production embedded devices. Contact our team of user interface experts to discuss the goals for your next product user interface and learn how Altia can help.

Your next great GUI is waiting!

Altia, Inc.  
[info@altia.com](mailto:info@altia.com)  
**Tel: +1 719-598-4299**  
[www.altia.com](http://www.altia.com)

