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# Intel Galileo Essentials

Leverage the power of Intel Galileo to construct amazingly simple, yet impressive projects

**Richard Grimmiett**

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PUBLISHING community experience distilled

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**Richard Grimmett**



BIRMINGHAM - MUMBAI

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I would certainly like to thank my wife, Jeanne, and family for providing me with a wonderful, supportive environment that encourages me to take on projects like this. I would also like to thank my students; they show me that amazing things can be accomplished by those who are unaware of the barriers.

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Jason would like to thank his family and friends for their continued love and support.

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# Preface

Over the last few years, a number of important technological tools have been introduced that have enabled the migration of complex electronics projects from the University or Government Lab to almost anyone's project desk. The Galileo, an inexpensive processor system by Intel, is an example of one of these toolkits. This small, inexpensive, but powerful board can be used in a wide range of projects.

But just as important as the hardware is the community of developers who not only provide help in the area of software development, but also provide hardware add-ons for the processor board itself. Still, it can be a bit intimidating to start using Galileo to build your very own projects.

This book is designed to help anyone, even those with no programming background or experience, to be successful in building both simple but also quite complex projects. It will lead you through the process step by step so that your project designs can come to life. Hopefully, this book will inspire those with the imagination and creative spirit to build those wildly inventive designs that will revolutionize the world!

## What this book covers

*Chapter 1, Getting Started with the Galileo*, begins with a discussion of how to connect power and ends with a full system, configured and ready to begin connecting amazing devices and SW capabilities to fulfill almost any project.

*Chapter 2, Accessing the GPIO Pins*, shows you to how to access these pins, both input and output, so you can do all sorts of amazing things. One of the capabilities you'll need to complete your projects is a basic knowledge of how to access the GPIO pins so that you can access all sorts of additional hardware capabilities.

*Chapter 3, Adding Display Functionality*, shows you how the Galileo can be connected to a display so that you can both see output and also get input from a touchscreen. One of the first things you might want to do is to connect a display up to the Galileo.

*Chapter 4, Controlling DC Motors*, details how to control a DC motor so that the unit can drive wheels or tracks.

*Chapter 5, Adding Sensors*, shows you how to add IR, Sonar, and even a compass to your project.

*Chapter 6, Remote Control*, covers how to communicate wirelessly with your Galileo projects, as you may want to access your projects without connecting wires.

*Chapter 7, Going Further with Galileo*, introduces you to the Linux capabilities of the Galileo using the example of constructing a quadruped robot.

*Chapter 8, Speech Output*, covers how to make your project talk as an example of how to use free, open source software to add complex functionality to your projects. One of the amazing features of today's computer systems is the ability to provide output without a screen or keyboard.

## What you need for this book

The most important piece of software required for the first six chapters of the book is the Galileo IDE, which is available at <https://communities.intel.com/docs/DOC-22226>. The only other software that will be required for these chapters is the software drivers associated with the hardware that you might add to your project; these will be detailed in the individual chapters themselves.

For *Chapter 7, Going Further with Galileo*, you'll need to download a version of Debian Linux available at <https://communities.intel.com/message/231688>. To burn the image to an SD card, you'll need Win32DiskImage available at <http://sourceforge.net/projects/win32diskimager/>. You'll also need a terminal emulator program; PuTTY is one such program, available at <http://www.chiark.greenend.org.uk/~sgtatham/putty/>. Finally, you'll need a control program for servos, available at [www.pololu.com/docs/0J40/3.b](http://www.pololu.com/docs/0J40/3.b).

For *Chapter 8, Speech Output*, you'll need a free, open source software package called Espeak that is available by using the command `sudo apt-get install espeak`.

## Who this book is for

This book is for anyone with a little programming skill, a bit of imagination, and the desire to create their own dazzling projects. The book is designed to start by teaching beginners the basics of Galileo and how to program it. You'll tackle more and more challenging projects until you have the know-how to build your own amazing projects.

## Conventions

In this book, you will find a number of styles of text that distinguish between different kinds of information. Here are some examples of these styles, and an explanation of their meaning.

Code words in text, database table names, folder names, filenames, file extensions, pathnames, dummy URLs, user input, and Twitter handles are shown as follows:

"This will un-archive a set of files and directories under the `arduino-1.5.3-Intel.1.0.3` directory structure."

A block of code is set as follows:


```
qData = false; // Initialize on reset
gSerialStdPtr->begin(9600); // Receiver
gSerialTwoPtr->begin(9600); // Sender
waitForUser(5); // Give usr time to open serial terminal
gSerialStdPtr->println("XBee-Receiver-setup");
pinMode(led, OUTPUT);
```


Any command-line input or output is written as follows:

```
mv maestro-linux-100507.tar.gz\?file_id=0J315 maestrolinux-100507.tar.gz
```

**New terms** and **important words** are shown in bold. Words that you see on the screen, in menus or dialog boxes for example, appear in the text like this:

"Select the **Start** | **Control Panel** | **Device Manager** inside Windows."

 Warnings or important notes appear in a box like this.

 Tips and tricks appear like this.

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