

Community Experience Distilled

Intel Galileo Blueprints

Discover the true potential of the Intel Galileo board for building exciting projects in various domains such as home automation and robotics

Marco Schwartz

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PUBLISHING community experience distilled

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BIRMINGHAM - MUMBAI

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First published: June 2015

Production reference: 1230615

Published by Packt Publishing Ltd.
Livery Place
35 Livery Street
Birmingham B3 2PB, UK.

ISBN 978-1-78528-142-6

www.packtpub.com

Credits

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Copy Editor

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About the Author

Marco Schwartz is an electrical engineer, entrepreneur, and blogger. He has a master's degree in electrical engineering and computer science from Supelec in France and a master's degree in micro engineering from EPFL in Switzerland.

Marco has more than 5 years of experience working in the domain of electrical engineering. His interests gravitate around electronics, home automation, the Arduino and Raspberry Pi platforms, open source hardware projects, and 3D printing.

He runs several websites around Arduino, including the Open Home Automation website, which is dedicated to building home automation systems using open source hardware.

He is the author of two other books, namely *Home Automation with Arduino* and *Internet of Things with the Arduino Yun*, both by Packt Publishing.

About the Reviewers

Adam Pasztory has a diverse background, including a BA in history from Duke University and a BS in computer science from San Francisco State University. Besides engineering, Adam has been involved in theater and films, and he enjoys developing software that entertains, informs, and enlightens.

He began his career at LucasArts, where he was involved in testing and localizing many classic games, including *Grim Fandango* and *Jedi Knight*. Later, he played key technical roles in several early-stage start-ups.

I want to thank Cindy for helping me chase all my dreams.

Alan Plotko is a technology enthusiast with experience of developing across the full stack. He was first exposed to programming at the age of nine, when he discovered the "view source code" option in his browser. Coding then quickly turned into a hobby; this led him to take up computer science at university. Alan loves developing applications for the Web and always makes time for attending hackathons, which are typically weekend-long programming competitions where participants build projects from scratch to benefit the community. Alan's experience extends to Python development, various database technologies, including NoSQL, and frameworks for rapid application development. When he's not writing code, he spends his time writing stories; he is an avid writer, having previously self-published a fantasy novel.

Christoph Schultz was born in 1983 in Solingen, Germany.

Since his youth, he has been interested in making electronics projects. He started programming a simple text adventure game in BASIC on his brother's C64 when he was 8 years old. He learned programming in C, Java, and JavaScript all by himself in the following years. In these years, he also had his first contact with building electronic systems, when selecting and setting up the custom-made family PC.

His passion for programming and developing electronic systems finally lead to a diploma (Dipl.-Ing.) in electrical engineering from Ruhr University Bochum in Germany. Since then, Christoph has worked as an RF (Radio-frequency) system engineer in mobile phone transceiver development, first for Infineon Technologies and, since 2011, for the Intel Corporation.

Keeping his hobby alive, he actively participates in the growing maker movement. Though not part of the Galileo development team at Intel, he – like so many other makers working for Intel – was eager to get his hands on the Galileo development board. He, therefore, has used it along with the Intel Edison since day one for personal hobby projects.

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Preface

The Intel Galileo board is an amazing development board for all your DIY electronic projects. The board combines the power of an Intel processor with the simplicity of the Arduino platform. This makes it the perfect board for all sorts of projects, especially projects requiring complex interactions with cloud-based services, making it the ideal platform for Internet of Things applications.

In this book, we will start from simple projects that can be done with most Arduino boards. However, even at this point, we will use the advanced features of the Galileo board.

Later, we will use the Galileo board for more complex applications in fields such as the Internet of Things, home automation, and robotics.

What this book covers

Chapter 1, Setting Up the Galileo Board and the Development Environment, demonstrates how to completely set up the development environment to build and use all the projects that you will find in this book.

Chapter 2, Creating a Weather Measurement and Data Logging Station, covers how to use the inputs of the Intel Galileo board. As an example, we will make a simple weather measurement station that will log data on an SD card.

Chapter 3, Controlling Outputs Using the Galileo Board, covers how to control different devices that can be connected to the Galileo board, such as a servomotor.

Chapter 4, Monitoring Data Remotely, teaches you how to use the Ethernet port of the Galileo board and create a measurement station that can be accessed from your local network.

Chapter 5, Interacting with Web APIs, covers how to connect the Galileo board to the Internet and interact with Web APIs to add more functionalities to the board.

Chapter 6, Internet of Things with Intel Galileo, covers using the Galileo board to create applications in the very exciting field of Internet of Things.

Chapter 7, Controlling Your Galileo Projects from Anywhere, teaches you how to control your Galileo projects from any web browser, wherever you are in the world.

Chapter 8, Displaying the Number of Unread Gmail E-mails on an LCD Screen, lets you use what you learned so far and build an application to display the number of unread e-mails you have in your Gmail inbox on an external LCD screen.

Chapter 9, Automated Remote Gardening with Intel Galileo, covers building another application based on the Galileo board – a complete management system for garden irrigation. You will also be able to monitor it from anywhere in the world.

Chapter 10, Building a Complete Home Automation System, lets you use what you learned so far in this book to build a project in an exciting field – home automation. We will see how to use the Galileo board as the hub of a home automation system.

Chapter 11, Building a Mobile Robot Controlled by the Intel Galileo Board, demonstrates the use of the Galileo board as the "brain" of a mobile robot.

Chapter 12, Controlling the Galileo Board from the Web in Real Time Using MQTT, will let you discover the MQTT protocol that we will use to control the board in real time from a web browser.

What you need for this book

For this entire book, you will need an Intel Galileo board. In the first chapter of this book, you will learn how to install all the required software to configure your board.

You will also need a computer running Windows, OS X, or Linux, as this will be needed to configure your Galileo board.

Who this book is for

This book is intended for those who want to build exciting projects using the Intel Galileo board. For example, it is for people who are already experienced in using more classic Arduino boards, and want to extend their knowledge to the Intel Galileo board.

It is also for people who want to learn about electronics and programming; the Intel Galileo is the perfect platform for this.

Conventions

In this book, you will find a number of text styles 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: "To install this Arduino library, simply place the whole library folder inside the `/libraries` folder of your main Arduino installation folder."


A block of code is set as follows:


```
var pubnub = require("pubnub")({  
  ssl      : true,  // <- enable TLS Tunneling over TCP  
  publish_key  : "your_publish_key",  
  subscribe_key : "your_subscribe_key"  
});
```

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

```
unzip ngrok.zip
```

New terms and **important words** are shown in bold. Words that you see on the screen, for example, in menus or dialog boxes, appear in the text like this: "We will configure our data source here. Select **Dweet.io** and type in the name of your device."

 Warnings or important notes appear in a box like this.

 Tips and tricks appear like this.

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1

Setting Up the Galileo Board and the Development Environment

Intel Galileo Blueprints is for Arduino and electronics hobbyists who want to bring their electronic **Do It Yourself (DIY)** projects to the next level, using an Intel-based Arduino board – the Intel Galileo.

This book will teach you how to develop the Galileo software and how to connect the sensors for the board. It will be your guide on how to integrate the board into an **Internet of Things framework**. Indeed, many of the projects you will find in this book will be about how to connect your Galileo board to web services and monitor it remotely.

It will teach you how to create applications involving mobile robot control, home automation, remote data monitoring, and much more. This book will help you in the first steps of your Galileo projects and it will lead you closer to your mission of making great electronic creations for the world.

In this chapter, you will learn:

- Introduction to Arduino
- The Intel Galileo board
- Setting up the development environment