



# BeagleBone Essentials

*Rodolfo Giometti*

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**Harness the power of the BeagleBone Black to manage external environments using C, Bash, and Python/PHP programming**

## About This Book

- Learn the fundamentals of Beaglebone Black via a detailed tutorial that provides practical examples, from initial board setup to device driver management
- Access external peripherals to monitor and control an electronic device
- Monitor and control several electronic devices with one of the best embedded computers

## Who This Book Is For

If you are a developer with some hardware or electrical engineering experience who wants to learn how to use embedded machine-learning capabilities and get access to a GNU/Linux device driver to collect data from a peripheral or to control a device, this is the book for you.

## What You Will Learn

- Set up and install a Debian operating system for your BeagleBone Black
- Get access to the serial console to manage the BeagleBone Black's bootloader and kernel
- Discover the pros and cons of native versus cross-compiling C applications
- Compile the Linux kernel from scratch and add custom device drivers
- Ascertain how a system daemon works and how high-level languages can interact with it
- Work with electronic components to build a small circuit
- Develop applications that interact with your circuits connected with the system's GPIOs, serial/USB ports, and I<sup>2</sup>C/SPI/1-Wire busses
- Use RFID LF readers, temperature sensors, barcode readers, ADC/DAC, and other peripherals to monitor and control your surroundings

## In Detail

The BeagleBone Black is an embedded system that is able to run complete GNU/Linux distributions such as Debian or Ubuntu. Having powerful distribution capabilities, and packed with an easily expandable embedded board, the BeagleBone Black is a device that will allow users to build powerful and versatile monitoring and controlling systems.

You start off by learning how to set up the board from scratch; you will be introduced to the concepts of compilation and cross-compilation of user-space and kernel-space applications with some basic debugging techniques. Next, you will move on to high-level programming by using scripting languages; you'll then learn how to get access to different kinds of peripherals such as serial ports, USB devices, I<sup>2</sup>C/SPI, and 1-Wire. Finally, you will discover how to use or develop system daemons in several programming languages, collect peripheral data, and control a device. Accessing all peripherals and writing good monitoring and

controlling programs can be a complex task; it's all too easy to make mistakes early in development that lead to serious problems in production. This guide is an invaluable tutorial if you are planning to use a BeagleBone Black to control or monitor projects.

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