

## 30 Beaglebone Black Projects For The Evil Genius

Program your own MicroPython projects with ease—no prior programming experience necessary! This DIY guide provides a practical introduction to microcontroller programming with MicroPython. Written by an experienced electronics hobbyist, *Python for Microcontrollers: Getting Started with MicroPython* features eight start-to-finish projects with clear, easy-to-follow instructions for each. You will learn how to use sensors, store data, control motors and other devices, and work with expansion boards. From there, you'll discover how to design, build, and program all kinds of entertaining and practical projects of your own.

- Learn MicroPython and object-oriented programming basics
- Interface with a PC and load files, programs, and modules
- Work with the LEDs, timers, and converters
- Control external devices using serial interfaces and PWM
- Build and program a ball detector using the three-axis accelerometer
- Install and program LCD and touch-sensor expansion boards
- Record and play sounds using the AMP audio board

If you are a programmer, scientist, or someone interested in modern computer technology that goes beyond the typical PC, then this book will show you the outstanding possibilities of cluster computing with modern embedded systems based on ARM architecture. Whether you need a high-speed or low-cost scalable cluster for simulations or want to try something new, this book is the right guide for you.

Jump into the world of Near Field Communications (NFC), the fast-growing technology that lets devices in close proximity exchange data, using radio signals. With lots of examples, sample code, exercises, and step-by-step projects, this hands-on guide shows you how to build NFC applications for Android, the Arduino microcontroller, and embedded Linux devices. You'll learn how to write apps using the NFC Data Exchange Format (NDEF) in PhoneGap, Arduino, and node.js that help devices read messages from passive NFC tags and exchange data with other NFC-enabled devices. If you know HTML and JavaScript, you're ready to start with NFC. Dig into NFC's architecture, and learn how it's related to RFID. Write sample apps for Android with PhoneGap and its NFC plugin. Dive into NDEF: examine existing tag-writer apps and build your own. Listen for and filter NDEF messages, using PhoneGap event listeners. Build a full Android app to control lights and music in your home. Create a hotel registration app with Arduino, from check-in to door lock. Write peer-to-peer NFC messages between two Android devices. Explore embedded Linux applications, using examples on Raspberry Pi and BeagleBone.

The Yocto Project produces tools and processes that enable the creation of Linux distributions for embedded software, independent of the architecture. BeagleBone Black is a platform that allows users to perform installation and customizations to their liking, quickly and easily. Starting with a basic introduction to Yocto Project's build system, this book will take you through the setup and deployment steps for Yocto Project. You will develop an understanding of BitBake, learn how to create a basic recipe, and explore the different types of Yocto Project recipe elements. Moving on, you will be able to customize existing recipes in layers and create a home surveillance solution using your webcam, as well as creating other advanced projects using BeagleBone Black and Yocto Project. By the end of the book, you will have all the necessary skills, exposure, and experience to complete projects based on Yocto Project and BeagleBone Black.

A dozen fiendishly fun projects for the Raspberry Pi! This wickedly inventive guide shows you how to create all kinds of entertaining and practical projects with Raspberry Pi operating system and programming environment. In *Raspberry Pi Projects for the Evil Genius*, you'll learn how to build a Bluetooth-controlled robot, a weather station, home automation and security controllers, a universal remote, and even a minimalist website. You'll also find out how to establish communication between Android devices and the RasPi. Each fun, inexpensive Evil Genius project includes a detailed list of materials, sources for parts, schematics, and lots of clear, well-illustrated instructions for easy assembly. The larger workbook-style layout makes following the step-by-step instructions a breeze. Build these and other devious devices: LED blinker MP3 player Camera controller Bluetooth robot Earthquake detector Home automation controller Weather station Home security controller RFID door latch Remote power controller Radon detector. Make Great Stuff! TAB, an imprint of McGraw-Hill Professional, is a leading publisher of DIY technology books for makers, hackers, and electronics hobbyists.

*Arduino Projects to Save the World* shows that it takes little more than a few tools, a few wires and sensors, an Arduino board, and a bit of gumption to build devices that lower energy bills, help you grow our own food, monitor pollution in the air and in the ground, even warn you about earth tremors. *Arduino Projects to Save the World* introduces the types of sensors needed to collect environmental data—from temperature sensors to motion sensors. You'll see projects that deal with energy sources—from building your own power strip to running your Arduino board on solar panels so you can actually proceed to build systems that help, for example, to lower your energy bills. Once you have some data, it's time to put it to good use by publishing it online as you collect it; this book shows you how. The core of this book deals with the Arduino projects themselves: Account for heat loss using a heat loss temperature sensor array that sends probes into every corner of your house for maximum measurement. Monitor local seismic activity with your own seismic monitor. Keep your Arduino devices alive in the field with a solar powered device that uses a smart, power-saving design. Monitor your data and devices with a wireless radio device; place your sensors where you like without worrying about wires. Keep an eye on your power consumption with a sophisticated power monitor that records its data wherever you like. *Arduino Projects to Save the World* teaches the aspiring green systems expert to build environmentally-sound, home-based Arduino devices. Saving the world, one Arduino at a time. Please note: the print version of this title is black & white; the eBook is full color.

In-depth instruction and practical techniques for building with the BeagleBone embedded Linux platform. *Exploring BeagleBone* is a hands-on guide to bringing gadgets, gizmos, and robots to life using the popular BeagleBone embedded

Linux platform. Comprehensive content and deep detail provide more than just a BeagleBone instruction manual—you'll also learn the underlying engineering techniques that will allow you to create your own projects. The book begins with a foundational primer on essential skills, and then gradually moves into communication, control, and advanced applications using C/C++, allowing you to learn at your own pace. In addition, the book's companion website features instructional videos, source code, discussion forums, and more, to ensure that you have everything you need. The BeagleBone's small size, high performance, low cost, and extreme adaptability have made it a favorite development platform, and the Linux software base allows for complex yet flexible functionality. The BeagleBone has applications in smart buildings, robot control, environmental sensing, to name a few; and, expansion boards and peripherals dramatically increase the possibilities. Exploring BeagleBone provides a reader-friendly guide to the device, including a crash course in computer engineering. While following step by step, you can:

- Get up to speed on embedded Linux, electronics, and programming
- Master interfacing electronic circuits, buses and modules, with practical examples
- Explore the Internet-connected BeagleBone and the BeagleBone with a display
- Apply the BeagleBone to sensing applications, including video and sound
- Explore the BeagleBone's Programmable Real-Time Controllers

Hands-on learning helps ensure that your new skills stay with you, allowing you to design with electronics, modules, or peripherals even beyond the BeagleBone. Insightful guidance and online peer support help you transition from beginner to expert as you master the techniques presented in Exploring BeagleBone, the practical handbook for the popular computing platform.

BeagleBone is an inexpensive web server, Linux desktop, and electronics hub that includes all the tools you need to create your own projects—whether it's robotics, gaming, drones, or software-defined radio. If you're new to BeagleBone Black, or want to explore more of its capabilities, this cookbook provides scores of recipes for connecting and talking to the physical world with this credit-card-sized computer. All you need is minimal familiarity with computer programming and electronics. Each recipe includes clear and simple wiring diagrams and example code to get you started. If you don't know what BeagleBone Black is, you might decide to get one after scanning these recipes. Learn how to use BeagleBone to interact with the physical world

- Connect force, light, and distance sensors
- Spin servo motors, stepper motors, and DC motors
- Flash single LEDs, strings of LEDs, and matrices of LEDs
- Manage real-time input/output (I/O)

Work at the Linux I/O level with shell commands, Python, and C

- Compile and install Linux kernels
- Work at a high level with JavaScript and the BoneScript library
- Expand BeagleBone's functionality by adding capes
- Explore the Internet of Things

Expand Raspberry Pi capabilities with fundamental engineering principles

Exploring Raspberry Pi is the innovators guide to bringing Raspberry Pi to life. This book favors engineering principles over a 'recipe' approach to give you the skills you need to design and build your own projects. You'll understand the fundamental principles in a way that transfers to any type of electronics, electronic modules, or external peripherals, using a "learning by doing" approach that caters to both beginners and experts. The book begins with basic Linux and programming skills, and helps you stock your inventory with common parts and supplies. Next, you'll learn how to make parts work together to achieve the goals of your project, no matter what type of components you use. The companion website provides a full repository that structures all of the code and scripts, along with links to video tutorials and supplementary content that takes you deeper into your project. The Raspberry Pi's most famous feature is its adaptability. It can be used for thousands of electronic applications, and using the Linux OS expands the functionality even more. This book helps you get the most from your Raspberry Pi, but it also gives you the fundamental engineering skills you need to incorporate any electronics into any project. Develop the Linux and programming skills you need to build basic applications

- Build your inventory of parts so you can always "make it work"
- Understand interfacing, controlling, and communicating with almost any component
- Explore advanced applications with video, audio, real-world interactions, and more

Be free to adapt and create with Exploring Raspberry Pi.

- Explore the Internet of Things and build useful, functioning Photon projects
- Quickly learn to construct your own electronics devices and control them over the Internet with help from this DIY guide.

Programming the Photon: Getting Started with the Internet of Things features clear explanations and step-by-step examples that use inexpensive, easy-to-find components. Discover how to connect to Wi-Fi networks, attach hardware to I/O ports, write custom programs, and work from the cloud. You will learn how to troubleshoot and tweak your Photon creations—even interface with social media sites!

- Set up your Photon board and connect to the Particle cloud
- Start constructing and programming custom IoT projects
- Learn the syntax of both the C and Arduino languages
- Incorporate switches, sensors, and other input devices
- Control hardware through the Photon's outputs
- Control your creations through the Internet
- Add functions with Particle shields and add-on boards
- Link real-time data to your board via the IFTTT Web Service
- Integrate with websites—Facebook, Twitter, Gmail, and more!

Plans, diagrams, schematics, and lists of parts and tools for model rocket projects.

Learn how to build physical computing systems using BeagleBone Black and Python

About This Book

- Get to grips with the fundamentals of BeagleBone
- Leverage Python scripts to program BeagleBone for your requirements
- Build four exciting projects, from home automation to a tele-controlled robot

Who This Book Is For

This book is intended for hobbyists and consumers who wish to create impressive projects using BeagleBone. You must be familiar with Python programming.

What You Will Learn

- Program on BeagleBone Black using Python
- Interface sensors and actuators to BeagleBone Black
- Build your own real-time physical computing systems
- Connect physical computing systems to cloud servers
- Build your own home automation and home security system
- Build your own tele-controlled robot with real-time video streaming

In Detail

BeagleBone is a low cost, community-supported development platform to develop a variety of electronic projects. This book will introduce you to BeagleBone and get you building fun, cool, and innovative projects with it. Start with the specifications of BeagleBone Black and its operating systems, then get to grips with the GPIOs available in BeagleBone Black. Work through four types of exciting projects: building real-time physical computing systems, home automation, image processing for a security system, and building your own tele-controlled robot and learn the fundamentals of a variety of projects in a single book. By the end of this book, you will be able to write code for BeagleBone in order to operate hardware and impart decision-making capabilities with the help of efficient coding in Python. Style

and approach This book is a step by step guide that will walk you through the fundamentals of building different projects using BeagleBone Black.

An annotated guide to program and develop GNU/Linux Embedded systems quickly About This Book Rapidly design and build powerful prototypes for GNU/Linux Embedded systems Become familiar with the workings of GNU/Linux Embedded systems and how to manage its peripherals Write, monitor, and configure applications quickly and effectively, manage an external micro-controller, and use it as co-processor for real-time tasks Who This Book Is For This book targets Embedded System developers and GNU/Linux programmers who would like to program Embedded Systems and perform Embedded development. The book focuses on quick and efficient prototype building. Some experience with hardware and Embedded Systems is assumed, as is having done some previous work on GNU/Linux systems. Knowledge of scripting on GNU/Linux is expected as well. What You Will Learn Use embedded systems to implement your projects Access and manage peripherals for embedded systems Program embedded systems using languages such as C, Python, Bash, and PHP Use a complete distribution, such as Debian or Ubuntu, or an embedded one, such as OpenWrt or Yocto Harness device driver capabilities to optimize device communications Access data through several kinds of devices such as GPIO's, serial ports, PWM, ADC, Ethernet, WiFi, audio, video, I2C, SPI, One Wire, USB and CAN Practical example usage of several devices such as RFID readers, Smart card readers, barcode readers, z-Wave devices, GSM/GPRS modems Usage of several sensors such as light, pressure, moisture, temperature, infrared, power, motion In Detail Embedded computers have become very complex in the last few years and developers need to easily manage them by focusing on how to solve a problem without wasting time in finding supported peripherals or learning how to manage them. The main challenge with experienced embedded programmers and engineers is really how long it takes to turn an idea into reality, and we show you exactly how to do it. This book shows how to interact with external environments through specific peripherals used in the industry. We will use the latest Linux kernel release 4.4.x and Debian/Ubuntu distributions (with embedded distributions like OpenWrt and Yocto). The book will present popular boards in the industry that are user-friendly to base the rest of the projects on - BeagleBone Black, SAMA5D3 Xplained, Wandboard and system-on-chip manufacturers. Readers will be able to take their first steps in programming the embedded platforms, using C, Bash, and Python/PHP languages in order to get access to the external peripherals. More about using and programming device driver and accessing the peripherals will be covered to lay a strong foundation. The readers will learn how to read/write data from/to the external environment by using both C programs or a scripting language (Bash/PHP/Python) and how to configure a device driver for a specific hardware. After finishing this book, the readers will be able to gain a good knowledge level and understanding of writing, configuring, and managing drivers, controlling and monitoring applications with the help of efficient/quick programming and will be able to apply these skills into real-world projects. Style and approach This practical tutorial will get you quickly prototyping embedded systems on GNU/Linux. This book uses a variety of hardware to program the peripherals and build simple prototypes.

Incorporate the "tube sound" into your home audio system Learn how to work with vacuum tubes and construct high-quality audio amplifiers on your workbench with help from this hands-on, do-it-yourself resource. The TAB Guide to Vacuum Tube Audio: Understanding and Building Tube Amps explains tube theory and construction practices for the hobbyist. Seven ready-to-build projects feature step-by-step instructions, detailed schematics, and layout tips. You'll also find out how to tweak the projects, each based on a classic RCA design, for your own custom-built amps. Coverage includes: Principles and operational theory behind vacuum tubes Tube nomenclature, applications, and specifications Circuit layout, connections, and physical construction Finding and selecting the right components for the project Power supplies for vacuum tube circuits Preamplifier and power amplifier circuits Performance measurement Safety, maintenance, and troubleshooting techniques Tips on building your own tube-based system—and having fun in the process This book is intended for hobbyists interested in adding the tube sound to any audio system. (Readers looking for high-performance audiophile books are urged to consider the McGraw-Hill books by Morgan Jones.) Learn more at [www.vacuumtubeaudio.info](http://www.vacuumtubeaudio.info) Make Great Stuff! TAB, an imprint of McGraw-Hill Professional, is a leading publisher of DIY technology books for makers, hackers, and electronics hobbyists.

What can you do with the Raspberry Pi, a \$35 computer the size of a credit card? All sorts of things! If you're learning how to program, or looking to build new electronic projects, this hands-on guide will show you just how valuable this flexible little platform can be. This book takes you step-by-step through many fun and educational possibilities. Take advantage of several preloaded programming languages. Use the Raspberry Pi with Arduino. Create Internet-connected projects. Play with multimedia. With Raspberry Pi, you can do all of this and more. Get acquainted with hardware features on the Pi's board Learn enough Linux to move around the operating system Pick up the basics of Python and Scratch—and start programming Draw graphics, play sounds, and handle mouse events with the Pygame framework Use the Pi's input and output pins to do some hardware hacking Discover how Arduino and the Raspberry Pi complement each other Integrate USB webcams and other peripherals into your projects Create your own Pi-based web server with Python

Build and program projects that tap into the Internet of Things (IoT) using Arduino, Raspberry Pi, and BeagleBone Black! This innovative guide gets you started right away working with the most popular processing platforms, wireless communication technologies, the Cloud, and a variety of sensors. You'll learn how to take advantage of the utility and versatility of the IoT and connect devices and systems to the Internet using sensors. Each project features a list of the tools and components, how-to explanations with photos and illustrations, and complete programming code. All projects can be modified and expanded, so you can build on your skills. The Internet of Things: DIY Projects with Arduino, Raspberry Pi, and BeagleBone Black Covers the basics of Java, C#, Python, JavaScript, and other programming languages used in the projects Shows you how to use IBM's Net Beans IDE and the Eclipse IDE Explains how to set up small-scale networks to connect the projects to the Internet Includes essential tips for setting up and using a MySQL database. The fun, DIY projects in the book include: Raspberry Pi home temperature measurements Raspberry Pi surveillance webcams Raspberry Pi home weather station Arduino garage door controller Arduino irrigation controller Arduino outdoor lighting controller Beaglebone message panel Beaglebone remote control SDR Machine-to-machine demonstration project

This comprehensive book provides detailed materials for both novice and experienced programmers using all BeagleBone variants which host a powerful 32-bit, super-scalar TI Sitara ARM Cortex A8 processor. Authored by Steven F. Barrett and Jason Kridner, a seasoned ECE educator along with the founder of Beagleboard.org, respectively, the work may be used in a wide variety of projects from science fair projects to university courses and senior design projects to first prototypes of very complex systems. Beginners may access the power of the "Bone" through the user-friendly Bonescript examples. Seasoned users may take full

advantage of the Bone's power using the underlying Linux-based operating system, a host of feature extension boards (Capes) and a wide variety of Linux community open source libraries. The book contains background theory on system operation coupled with many well-documented, illustrative examples. Examples for novice users are centered on motivational, fun robot projects while advanced projects follow the theme of assistive technology and image processing applications. Key Features: - Provides detailed examples for all BeagleBone variants, including the newest "next generation" BeagleBone Black - BeagleBone is a low cost, open hardware, expandable computer first introduced in november 2011 by beagleboard - BeagleBone variants, including the original BeagleBone and the new beaglebone black, hosts a powerful 32-bit, super-scalar arM Cortex A8 processor - BeagleBone is small enough to fit in a small mint tin box - "Bone" may be used in a wide variety of projects from middle school science fair projects to university courses and senior design projects to first prototypes of very complex systems - Novice users may access the power of the bone through the user-friendly bonescript environment - Seasoned users may take full advantage of the Bone's power using the underlying Linux-based operating system - A host of feature extension boards (Capes) and a wide variety of Linux community open source libraries are available - The book provides an introduction to this powerful computer and has been designed for a wide variety of users - The book contains background theory on system operation coupled with many well-documented, illustrative examples - Examples for novice users are centered on motivational, fun robot projects - Advanced projects follow the theme of assistive technology and image processing applications

Fiendishly Fun Ways to Use the BeagleBone Black! This wickedly inventive guide shows you how to program and build fun and fascinating projects with the BeagleBone Black. You'll learn how to connect the BeagleBone Black to your computer and program it, quickly mastering BoneScript and other programming tools so you can get started right away. 30 BeagleBone Black Projects for the Evil Genius is filled with a wide variety of do-it-yourself LED, sensor, robotics, display, audio, and spy gadgets. You'll also get tips and techniques that will help you design your own ingenious devices. Features step-by-step instructions and helpful illustrations Provides full schematic and breadboard layout diagrams for the projects Includes detailed programming code Removes the frustration factor—all required parts are listed along with sources Build these and other clever creations: High-powered LED Morse code sender RGB LED fader GPS tracker Temperature sensor Light level indicator Web-controlled rover Plant hydration system Sentinel turret 7-segment clock Display for sensor information Internet radio Imperial march indicator Intruder alert using Twitter API Lie detector Auto dog barker

This book features a selection of articles from The 2019 International Conference on Information Technology & Systems (ICITS'19), held at the Universidad de Las Fuerzas Armadas, in Quito, Ecuador, on 6th to 8th February 2019. ICIST is a global forum for researchers and practitioners to present and discuss recent findings and innovations, current trends, professional experiences and challenges of modern information technology and systems research, together with their technological development and applications. The main topics covered are: information and knowledge management; organizational models and information systems; software and systems modeling; software systems, architectures, applications and tools; multimedia systems and applications; computer networks, mobility and pervasive systems; intelligent and decision support systems; big data analytics and applications; human-computer interaction; ethics, computers & security; health informatics; information technologies in education; cybersecurity and cyber-defense; electromagnetics, sensors and antennas for security.

This book is for musical makers and artists who want to gain knowledge and inspiration for your own amazing creations. "Grumpy Mike" Cook, co-author of several books on the Raspberry Pi and frequent answerer of questions of the Arduino forums, brings you a fun and instructive mix and simple and complex projects to help you understand how the Arduino can work with the MIDI system to create musical instruments and manipulate sound. In Part I you'll find a set of projects to show you the possibilities of MIDI plus Arduino, covering both the hardware and software aspects of creating musical instruments. In Part II, you learn how to directly synthesize a wave form to create your own sounds with Arduino and concludes with another instrument project: the SpoonDuino. Finally, in Part III, you'll learn about signal processing with the Arduino Uno and the Due — how to create effects like delay, echo, pitch changes, and realtime backwards audio output. /divIf you want to learn more about how to create music, instruments, and sound effects with Arduino, then get on board for Grumpy Mike's grand tour with Arduino Music and Sound Projects.

Many people think of Linux as a computer operating system, running on users' desktops and powering servers. But Linux can also be found inside many consumer electronics devices. Whether they're the brains of a cell phone, cable box, or exercise bike, embedded Linux systems blur the distinction between computer and device. Many makers love microcontroller platforms such as Arduino, but as the complexity increases in their projects, they need more power for applications, such as computer vision. The BeagleBone is an embedded Linux board for makers. It's got built-in networking, many inputs and outputs, and a fast processor to handle demanding tasks. This book introduces you to both the original BeagleBone and the new BeagleBone Black and gets you started with projects that take advantage of the board's processing power and its ability to interface with the outside world.

If you are an Android app developer who wants to experiment with the hardware capabilities of the BeagleBone Black platform, then this book is ideal for you. You are expected to have basic knowledge of developing Android apps but no prior hardware experience is required.

This do-it-yourself guide shows you how to program and build projects with the Arduino Uno and Leonardo boards and the Arduino 1.0 development environment. It gets you started right away with the simplified C programming you need to know and demonstrateshow to take advantage of the latest Arduino capabilities. You'll learn how to attach an Arduino board to your computer, program it, and connect electronics to it to create your own devices. A bonus chapter uses the special USB keyboard/mouse-impersonation feature exclusive to the Arduino Leonardo--

This book is targeted towards beginners and intermediate designers of mechatronic systems and embedded system design. Some familiarity with the Raspberry Pi and Python programming is preferred but not required.

Despite the increasing population (the Food and Agriculture Organization of the United Nations estimates 70% more food

will be needed in 2050 than was produced in 2006), issues related to food production have yet to be completely addressed. In recent years, Internet of Things technology has begun to be used to address different industrial and technical challenges to meet this growing need. These Agro-IoT tools boost productivity and minimize the pitfalls of traditional farming, which is the backbone of the world's economy. Aided by the IoT, continuous monitoring of fields provides useful and critical information to farmers, ushering in a new era in farming. The IoT can be used as a tool to combat climate change through greenhouse automation; monitor and manage water, soil and crops; increase productivity; control insecticides/pesticides; detect plant diseases; increase the rate of crop sales; cattle monitoring etc. Agricultural Informatics: Automation Using the IoT and Machine Learning focuses on all these topics, including a few case studies, and they give a clear indication as to why these techniques should now be widely adopted by the agriculture and farming industries.

If you want a simple guide to building complex robots, then this book is for you. You'll need some programming knowledge and experience working with mechanical systems.

The BeagleBone Black Primer Master BeagleBone Black: Today's most powerful low-cost embedded development platform! You can do amazing things with BeagleBone Black. Get started in just five minutes: all you need is a USB cable and this easy, hands-on primer! Brian McLaughlin teaches you enough to be seriously dangerous. Start with the simplest embedded programming concepts. Explore BeagleBone Black's capabilities, and learn all the essentials, from controlling I/O to establishing network connections. Then, step by step, master increasingly advanced techniques with the Cloud9 IDE and BoneScript...Integrate external hardware...Install Linux or Android...Use Cape expansion boards to do even more. Don't just learn it: do it. This guide is packed with projects, from weather stations, to car computers, to a "capstone" project using Software Defined Radio to capture signals from local airspace and orbiting satellites! You won't just put BeagleBone Black to work: you'll start imagining great projects of your own. And then you'll build them. Discover how BeagleBone Black works, and what it can do Get your BeagleBone Black—and get it working, fast Link your BeagleBone Black to the world, and link yourself to the global BeagleBone community Learn to read schematics and use them to connect hardware Prototype your projects with breadboards Extend BeagleBone Black with Capes Add sensors to capture and use data from the environment Use actuators to make things happen in the real world Make your BeagleBone Black recognize your face Learn from mistakes, and go beyond what you've already learned Brian McLaughlin is an engineer by profession and by hobby. Building on a solid foundation in software, he was first exposed to advanced hardware topics while working on the Hubble Space Telescope. After working for Lockheed Martin, he joined NASA, where he's supported many of NASA's most exciting missions. He holds a B.S. in computer science (North Carolina State University) and an M.S. in systems engineering (University of Maryland). He's also written for GeekDad and is a member of the growing Maker community.

Learn to build amazing robotic projects using the powerful BeagleBone Black. About This Book Push your creativity to the limit through complex, diverse, and fascinating projects Develop applications with the BeagleBone Black and open source Linux software Sharpen your expertise in making sophisticated electronic devices Who This Book Is For This Learning Path is aimed at hobbyists who want to do creative projects that make their life easier and also push the boundaries of what can be done with the BeagleBone Black. This Learning Path's projects are for the aspiring maker, casual programmer, and budding engineer or tinkerer. You'll need some programming knowledge, and experience of working with mechanical systems to get the complete experience from this Learning Path. What You Will Learn Set up and run the BeagleBone Black for the first time Get to know the basics of microcomputing and Linux using the command line and easy kernel mods Develop a simple web interface with a LAMP platform Prepare complex web interfaces in JavaScript and get to know how to stream video data from a webcam Find out how to use a GPS to determine where your sailboat is, and then get the bearing and distance to a new waypoint Use a wind sensor to sail your boat effectively both with and against the wind Build an underwater ROV to explore the underwater world See how to build an autonomous Quadcopter In Detail BeagleBone is a microboard PC that runs Linux. It can connect to the Internet and run OSes such as Android and Ubuntu. You can transform this tiny device into a brain for an embedded application or an endless variety of electronic inventions and prototypes. This Learning Path starts off by teaching you how to program the BeagleBone. You will create introductory projects to get yourselves acquainted with all the nitty gritty. Then we'll focus on a series of projects that are aimed at hobbyists like you and encompass the areas of home automation and robotics. With each project, we'll teach you how to connect several sensors and an actuator to the BeagleBone Black. We'll also create robots for land, sea, and water. Yes, really! The books used in this Learning Path are: BeagleBone Black Cookbook BeagleBone Home Automation Blueprints Mastering BeagleBone Robotics Style and approach This practical guide transforms complex and confusing pieces of technology to become accessible with easy- to-succeed instructions. Through clear, concise examples, you will quickly get to grips with the core concepts needed to develop home automation applications with the BeagleBone Black.

TEAM ARDUINO UP WITH ANDROID FOR SOME MISCHIEVOUS FUN! Filled with practical, do-it-yourself gadgets, Arduino + Android Projects for the Evil Genius shows you how to create Arduino devices and control them with Android smartphones and tablets. Easy-to-find equipment and components are used for all the projects in the book. This wickedly inventive guide covers the Android Open Application Development Kit (ADK) and USB interface and explains how to use them with the basic Arduino platform. Methods of communication between Android and Arduino that don't require the ADK--including sound, Bluetooth, and WiFi/Ethernet are also discussed. An Arduino ADK programming tutorial helps you get started right away. Arduino + Android Projects for the Evil Genius: Contains step-by-step instructions and helpful illustrations Provides tips for customizing the projects Covers the underlying principles behind the projects Removes the frustration factor--all required parts are listed Provides all source code on the book's website Build these and other

devious devices: Bluetooth robot Android Geiger counter Android-controlled light show TV remote Temperature logger Ultrasonic range finder Home automation controller Remote power and lighting control Smart thermostat RFID door lock Signaling flags Delay timer

Write powerful programs for your Intel® Galileo—no experience required! This hands-on guide offers a step-by-step introduction to programming the Intel® Galileo using Arduino™ software. Written by an experienced electronics hobbyist, *Programming the Intel® Galileo: Getting Started with the Arduino™-Compatible Development Board* shows how to set up your board, configure the software, and quickly start writing sketches. You will discover how to work with the Galileo's inputs and outputs, use libraries, interface with the Web, and control external hardware. From there, you will learn to engineer and program your own useful and fun Galileo gadgets.

- Explore the features and capabilities of the Intel® Galileo
- Power up your board and install the Arduino IDE
- Learn C programming basics and start writing sketches
- Control LEDs, LCD, and servo motors
- Process input from temperature and light sensors
- Connect to the Internet through Ethernet and WiFi
- Share sensor readings and other data via the cloud
- Go further and design, build, and test your own projects

Find out everything you need to know to build powerful robots with the most up-to-date ROS About This Book This comprehensive, yet easy-to-follow guide will help you find your way through the ROS framework Successfully design and simulate your 3D robot model and use powerful robotics algorithms and tools to program and set up your robots with an unparalleled experience by using the exciting new features from Robot Kinetic Use the latest version of gazebo simulator, OpenCV 3.0, and C++11 standard for your own algorithms Who This Book Is For This book is suitable for an ROS beginner as well as an experienced ROS roboticist or ROS user or developer who is curious to learn ROS Kinetic and its features to make an autonomous Robot. The book is also suitable for those who want to integrate sensors and embedded systems with other software and tools using ROS as a framework. What You Will Learn Understand the concepts of ROS, the command-line tools, visualization GUIs, and how to debug ROS Connect robot sensors and actuators to ROS Obtain and analyze data from cameras and 3D sensors Use Gazebo for robot/sensor and environment simulation Design a robot and see how to make it map the environment, navigate autonomously, and manipulate objects in the environment using MoveIt! Add vision capabilities to the robot using OpenCV 3.0 Add 3D perception capabilities to the robot using the latest version of PCL In Detail Building and programming a robot can be cumbersome and time-consuming, but not when you have the right collection of tools, libraries, and more importantly expert collaboration. ROS enables collaborative software development and offers an unmatched simulated environment that simplifies the entire robot building process. This book is packed with hands-on examples that will help you program your robot and give you complete solutions using open source ROS libraries and tools. It also shows you how to use virtual machines and Docker containers to simplify the installation of Ubuntu and the ROS framework, so you can start working in an isolated and control environment without changing your regular computer setup. It starts with the installation and basic concepts, then continues with more complex modules available in ROS such as sensors and actuators integration (drivers), navigation and mapping (so you can create an autonomous mobile robot), manipulation, Computer Vision, perception in 3D with PCL, and more. By the end of the book, you'll be able to leverage all the ROS Kinetic features to build a fully fledged robot for all your needs. Style and approach This book is packed with hands-on examples that will help you program your robot and give you complete solutions using ROS open source libraries and tools. All the robotics concepts and modules are explained and multiple examples are provided so that you can understand them easily.

The First Maker-Friendly Guide to Electric Motors! Makers can do amazing things with motors. Yes, they're more complicated than some other circuit elements, but with this book, you can completely master them. Once you do, incredible new projects become possible. Unlike other books, *Motors for Makers* is 100% focused on what you can do. Not theory. Making. First, Matthew Scarpino explains how electric motors work and what you need to know about each major type: stepper, servo, induction, and linear motors. Next, he presents detailed instructions and working code for interfacing with and controlling servomotors with Arduino Mega, Raspberry Pi, and BeagleBone Black. All source code and design files are available for you to download from [motorsformakers.com](http://motorsformakers.com). From start to finish, you'll learn through practical examples, crystal-clear explanations, and photos. If you've ever dreamed of what you could do with electric motors, stop dreaming...and start making! Understand why electric motors are so versatile and how they work Choose the right motor for any project Build the circuits needed to control each type of motor Program motor control with Arduino Mega, Raspberry Pi, or BeagleBone Black Use gearmotors to get the right amount of torque Use linear motors to improve speed and precision Design a fully functional electronic speed control (ESC) circuit Design your own quadcopter Discover how electric motors work in modern electric vehicles--with a fascinating inside look at Tesla's patents for motor design and control!

Master the techniques needed to build great, efficient embedded devices on Linux About This Book Discover how to build and configure reliable embedded Linux devices This book has been updated to include Linux 4.9 and Yocto Project 2.2 (Morty) This comprehensive guide covers the remote update of devices in the field and power management Who This Book Is For If you are an engineer who wishes to understand and use Linux in embedded devices, this book is for you. It is also for Linux developers and system programmers who are familiar with embedded systems and want to learn and program the best in class devices. It is appropriate for students studying embedded techniques, for developers implementing embedded Linux devices, and engineers supporting existing Linux devices. What You Will Learn Evaluate the Board Support Packages offered by most manufacturers of a system on chip or embedded module Use Buildroot and the Yocto Project to create embedded Linux systems quickly and efficiently Update IoT devices in the field without compromising security Reduce the power budget of devices to make batteries last longer Interact with the hardware without having to write kernel device drivers Debug devices remotely using GDB, and see how to measure the

performance of the systems using powerful tools such as `perf`, `ftrace`, and `valgrind`. Find out how to configure Linux as a real-time operating system. In Detail Embedded Linux runs many of the devices we use every day, from smart TVs to WiFi routers, test equipment to industrial controllers - all of them have Linux at their heart. Linux is a core technology in the implementation of the inter-connected world of the Internet of Things. The comprehensive guide shows you the technologies and techniques required to build Linux into embedded systems. You will begin by learning about the fundamental elements that underpin all embedded Linux projects: the toolchain, the bootloader, the kernel, and the root filesystem. You'll see how to create each of these elements from scratch, and how to automate the process using Buildroot and the Yocto Project. Moving on, you'll find out how to implement an effective storage strategy for flash memory chips, and how to install updates to the device remotely once it is deployed. You'll also get to know the key aspects of writing code for embedded Linux, such as how to access hardware from applications, the implications of writing multi-threaded code, and techniques to manage memory in an efficient way. The final chapters show you how to debug your code, both in applications and in the Linux kernel, and how to profile the system so that you can look out for performance bottlenecks. By the end of the book, you will have a complete overview of the steps required to create a successful embedded Linux system. Style and approach This book is an easy-to-follow and pragmatic guide with in-depth analysis of the implementation of embedded devices. It follows the life cycle of a project from inception through to completion, at each stage giving both the theory that underlies the topic and practical step-by-step walkthroughs of an example implementation.

Build exciting robotics projects such as mobile manipulators, self-driving cars, and industrial robots powered by ROS, machine learning, and virtual reality. Key Features Create and program cool robotic projects using powerful ROS libraries. Build industrial robots like mobile manipulators to handle complex tasks. Learn how reinforcement learning and deep learning are used with ROS. Book Description Nowadays, heavy industrial robots placed in workcells are being replaced by new age robots called cobots, which don't need workcells. They are used in manufacturing, retail, banks, energy, and healthcare, among other domains. One of the major reasons for this rapid growth in the robotics market is the introduction of an open source robotics framework called the Robot Operating System (ROS). This book covers projects in the latest ROS distribution, ROS Melodic Morenia with Ubuntu Bionic (18.04). Starting with the fundamentals, this updated edition of ROS Robotics Projects introduces you to ROS-2 and helps you understand how it is different from ROS-1. You'll be able to model and build an industrial mobile manipulator in ROS and simulate it in Gazebo 9. You'll then gain insights into handling complex robot applications using state machines and working with multiple robots at a time. This ROS book also introduces you to new and popular hardware such as Nvidia's Jetson Nano, Asus Tinker Board, and Beaglebone Black, and allows you to explore interfacing with ROS. You'll learn as you build interesting ROS projects such as self-driving cars, making use of deep learning, reinforcement learning, and other key AI concepts. By the end of the book, you'll have gained the confidence to build interesting and intricate projects with ROS. What you will learn Grasp the basics of ROS and understand ROS applications. Uncover how ROS-2 is different from ROS-1. Handle complex robot tasks using state machines. Communicate with multiple robots and collaborate to build apps with them. Explore ROS capabilities with the latest embedded boards such as Tinker Board S and Jetson Nano. Discover how machine learning and deep learning techniques are used with ROS. Build a self-driving car powered by ROS. Teleoperate your robot using Leap Motion and a VR headset. Who this book is for If you're a student, hobbyist, professional, or anyone with a passion for learning robotics and interested in learning about algorithms, motion control, and perception capabilities from scratch, this book is for you. This book is also ideal for anyone who wants to build a new product and for researchers to make the most of what's already available to create something new and innovative in the field of robotics.

Develop practical example projects with detailed explanations; combine the projects in a vast number of ways to create different robot designs, or work through them in sequence to discover the full capability of the BeagleBone Black. This book is for anyone who is curious about using new, low-cost hardware to create robotic projects that have previously been the domain of research labs, major universities or Defence departments. Some programming experience would be useful, but if you know how to use a personal computer, you can use this book to construct far more complex systems than you would have thought possible.

BeagleBone Black is a low-cost, open hardware computer uniquely suited to interact with sensors and actuators directly and over the Web. Introduced in April 2013 by BeagleBoard.org, a community of developers first established in early 2008, BeagleBone Black is used frequently to build vision-enabled robots, home automation systems, artistic lighting systems, and countless other do-it-yourself and professional projects. BeagleBone variants include the original BeagleBone and the newer BeagleBone Black, both hosting a powerful 32-bit, super-scalar ARM Cortex A8 processor capable of running numerous mobile and desktop-capable operating systems, typically variants of Linux including Debian, Android, and Ubuntu. Yet, BeagleBone is small enough to fit in a small mint tin box. The "Bone" may be used in a wide variety of projects from middle school science fair projects to senior design projects to first prototypes of very complex systems. Novice users may access the power of the Bone through the user-friendly BoneScript software, experienced through a Web browser in most major operating systems, including Microsoft Windows, Apple Mac OS X, or the Linux operating systems. Seasoned users may take full advantage of the Bone's power using the underlying Linux-based operating system, a host of feature extension boards (Capes) and a wide variety of Linux community open source libraries. This book provides an introduction to this powerful computer and has been designed for a wide variety of users including the first time novice through the seasoned embedded system design professional. The book contains background theory on system operation coupled with many well-documented, illustrative examples. Examples for novice users are centered on motivational, fun robot projects while advanced projects follow the theme of assistive technology and image-processing applications.

Join the Raspberry revolution with these fun and easy Pi projects The Raspberry Pi has opened up a whole new world of innovation for everyone from hardware hackers and programmers to students, hobbyists, engineers, and beyond. Featuring a variety of hands-on projects, this easy-to-understand guide walks you through every step of the design process and will have you creating like a Raspberry Pi pro in no time. You'll learn how to prepare your workspace, assemble the necessary tools, work with test equipment, and find your way around the Raspberry Pi before moving on to a series of fun, lively projects that brings some power to your plain ol' Pi. Introduces Raspberry Pi basics and gives you a solid understanding of all the essentials you'll need to take on your first project Includes an array of fun and useful projects that show you how to do everything from creating a magic light wand to enhancing your designs with Lego sensors, installing and writing games for the RISC OS, building a transistor tester, and more Provides an easy, hands-on approach to learning more about electronics, programming, and interaction design for Makers and innovators of all ages Bring the power of Pi to your next cool creation with Raspberry Pi Projects For Dummies! Design, build, and pilot custom drones?no prior experience necessary! This fun guide shows, step-by-step, how to construct powerful drones from inexpensive parts, add personalized features, and become a full-fledged pilot. DIY Drones for the Evil Genius: Design, Build, and Customize Your Own Drones not only covers safety, mechanics, drone design, and assembly, but also teaches the basics of Aerospace Engineering. You will discover how to add video transmitters, GPS, first-person view, and virtual reality goggles to your creations. The book walks you through the FAA licensing process and takes a look at advanced concepts, such as artificial intelligence and autonomous flight. • Learn about aircraft parts, control mechanics, and safety practices • Become an expert pilot—even handle flips and high-speed maneuvers • Pick the perfect parts for your high-performance drone • Find out how to solder and start assembling your drone • Program the aircraft, calibrate the motors, and start flying! • Add LED lights, GoPro mounts, and self-balancing camera gimbals • Explore the world of first-person-view (FPV) drones and high-speed racing • See how artificial intelligence can be put to use in the drone industry

UNLEASH YOUR INNER MAD SCIENTIST! "Wonderful. I learned a lot reading the detailed but easy to understand instructions."--BoingBoing This wickedly inventive guide explains how to design and build 15 fiendishly fun electronics projects. Filled with photos and illustrations, 15 Dangerously Mad Projects for the Evil Genius includes step-by-step directions, as well as a construction primer for those who are new to electronics projects. Using easy-to-find components and equipment, this do-it-yourself book shows you how to create a variety of mischievous gadgets, such as a remote-controlled laser, motorized multicolored LEDs that write in the air, and a surveillance robot. You'll also learn to use the highly popular Arduino microcontroller board with three of the projects. 15 Dangerously Mad Projects for the Evil Genius: Features step-by-step instructions and helpful illustrations Covers essential safety measures Reveals the scientific principles behind the projects Removes the frustration factor--all required parts are listed, along with sources Build these devious devices to amaze your friends and confound your enemies! Coil gun Trebuchet Ping pong ball minigun Mini laser turret Balloon-popping laser gun Touch-activated laser sight Laser-grid intruder alarm Persistence-of-vision display Covert radio bug Laser voice transmitter Flash bomb High-brightness LED strobe Levitation machine Snailbot Surveillance robot Each fun, inexpensive Evil Genius project includes a detailed list of materials, sources for parts, schematics, and lots of clear, well-illustrated instructions for easy assembly. The larger workbook-style layout and convenient two-column format make following the step-by-step instructions a breeze. VIDEOS, PHOTOS, AND SOURCE CODE ARE AVAILABLE AT WWW.DANGEROUSLYMAD.COM Make Great Stuff! TAB, an imprint of McGraw-Hill Professional, is a leading publisher of DIY technology books for makers, hackers, and electronics hobbyists.

Exciting new capabilities to enable even easier DIY robotics with BeagleBone Blue About This Book Build powerful robots with the all new BeagleBone Blue Communicate with your robot and teach it to detect and respond to its environment Control walking, rolling, swimming, and flying robots with your iOS and Android mobile devices Who This Book Is For This book is for anyone who is curious about using new, low-cost hardware to create robotic projects and have previously been the domain of research labs, major universities, or defence departments. Some programming experience would be useful, but if you know how to use a personal computer, you can use this book to construct far more complex systems than you would have thought possible. What You Will Learn Power on and configure the BeagleBone Blue Get to know Simple programming techniques to enable the unique hardware capabilities of the BeagleBone Blue. Connect standard hardware to enable your projects to see, speak, hear, and move Build advanced capabilities into your projects, such as GPS and sonar sensors Build complex projects that can fly, or go under or on the water In Detail BeagleBone Blue is effectively a small, light, cheap computer in a similar vein to Raspberry Pi and Arduino. It has all of the extensibility of today's desktop machines, but without the bulk, expense, or noise. This project guide provides step-by-step instructions that enable anyone to use this new, low-cost platform in some fascinating robotics projects. By the time you are finished, your projects will be able to see, speak, listen, detect their surroundings, and move in a variety of amazing ways. The book begins with unpacking and powering up the components. This includes guidance on what to purchase and how to connect it all successfully, and a primer on programming the BeagleBone Blue. You will add additional software functionality available from the open source community, including making the system see using a webcam, hear using a microphone, and speak using a speaker. You will then learn to use the new hardware capability of the BeagleBone Blue to make your robots move, as well as discover how to add sonar sensors to avoid or find objects. Later, you will learn to remotely control your robot through iOS and Android devices. At the end of this book, you will see how to integrate all of these functionalities to work together, before developing the most impressive robotics projects: Drone and Submarine. Style and approach Develop practical example projects with detailed explanations, combine the projects in a vast number of ways to create different robot designs, or work through them in sequence to discover the full capability of the BeagleBone Blue.

30 BeagleBone Black Projects for the Evil Genius McGraw Hill Professional

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