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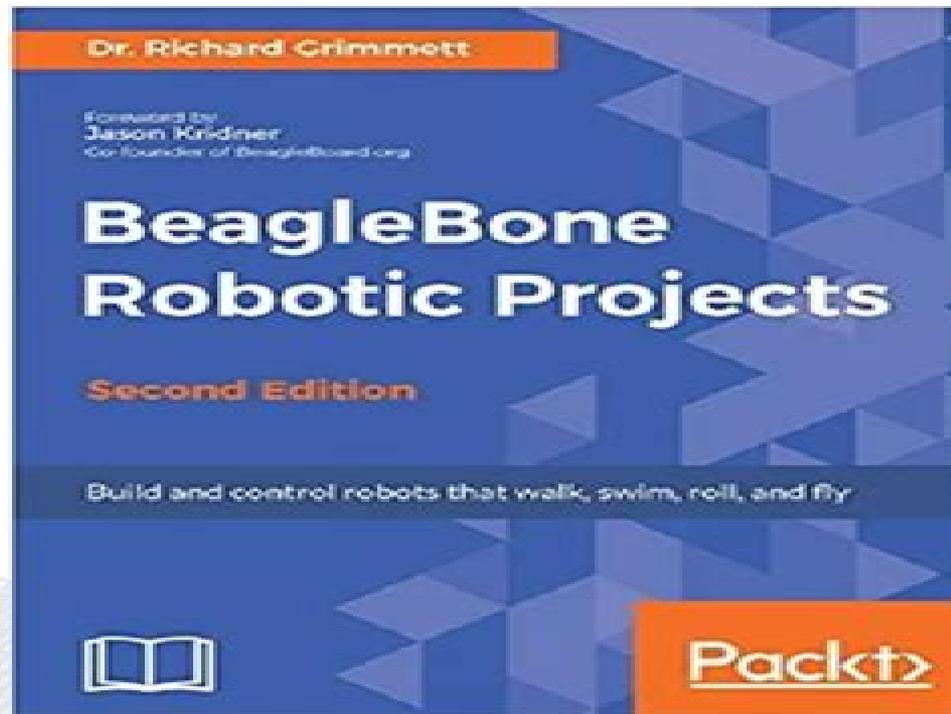
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Foreword by
Jason Kridner
Co-founder of BeagleBoard.org

BeagleBone Robotic Projects

Second Edition

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Beaglebone Robotic Projects

Julia Schneider

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 BeagleBone Robotic Projects Richard Grimmett,2013-12-26 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 Robotic Projects* Richard Grimmett,2017-06-13 Exciting new capabilities to enable even easier DIY robotics with BeagleBone Blue Key Features 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 Book DescriptionBeagleBone 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 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 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   *BeagleBone: Creative Projects for Hobbyists* Charles Hamilton,Rodolfo Giometti,Richard Grimmett,2017-07-20 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   **BeagleBone: Creative Projects for Hobbyists** Charles Hamilton,2017   **Mastering BeagleBone Robotics** Richard Grimmett,2014-12-22 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   **Raspberry Pi Robotic Projects** Richard Grimmett,2016-10-17 Work through a mix of amazing robotic projects using the Raspberry Pi Zero or the Raspberry Pi 3 Key Features Easy to follow instructions yet the ones that help you build powerful robots and exclusive coverage of mobile robots with the Pi Zero Build robots that can run swim and fly and the cutting edge dimension of robotics that is possible with the Raspberry Pi Zero and Pi 3 Interact with your projects wirelessly and make sci fi possible right in your home Book DescriptionThis book will allow you to take full advantage of Raspberry Pi Zero and Raspberry Pi 3 by building both simple and complex robotic projects The book takes a mission critical approach to show you how to build amazing robots and helps you decide which board to use for which type of robot The book puts a special emphasis on designing mobile or movable robots using the Raspberry Pi Zero

The projects will show inexpensive yet powerful ways to take full advantage It will teach you how to program Raspberry Pi control the movement of your robot and add features to your robots What you will learn Control a variety of different DC motors Add a USB webcam to see what your robot can see Attach a projector to project information Insert USB control hardware to control a complex robot with two legs Include speech recognition so that your projects can receive commands Add speech output to that the robot can communicate with the world around it Include wireless communication so that you can see what the robot is seeing and control the robot from a distance Who this book is for This book is for hobbyists and programmers who are excited about using the Raspberry Pi 3 and Raspberry Pi Zero It is for those who are taking their first steps towards using these devices to control hardware and software and write simple programs that enable amazing projects No programming experience is required Just a little computer and mechanical aptitude and the desire to build some interesting projects   Learning Robotics Using Python Lentin Joseph,2015-05-27 If you are an engineer a researcher or a hobbyist and you are interested in robotics and want to build your own robot this book is for you Readers are assumed to be new to robotics but should have experience with Python   Arduino Robotic Projects Richard Grimmett,2014-08-14 This book is for anyone who has been curious about using Arduino to create robotic projects that were previously the domain of research labs of major universities or defense departments Some programming background is useful but if you know how to use a PC you can with the aid of the step by step instructions in this book construct complex robotic projects that can roll walk swim or fly   Arduino Robotic Projects Richard Grimmett,2014-08-14 This book is for anyone who has been curious about using Arduino to create robotic projects that were previously the domain of research labs of major universities or defense departments Some programming background is useful but if you know how to use a PC you can with the aid of the step by step instructions in this book construct complex robotic projects that can roll walk swim or fly   *30 BeagleBone Black Projects for the Evil Genius* Christopher Rush,2014-09-26 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   **Python Programming for Arduino** Pratik Desai,2015-02-27 This is the book for you if

you are a student hobbyist developer or designer with little or no programming and hardware prototyping experience and you want to develop IoT applications If you are a software developer or a hardware designer and want to create connected devices applications then this book will help you get started **Bad to the Bone** Steven Barrett,Jason Kridner,2022-06-01 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 throughthe 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 **Human-Computer Interaction: Concepts, Methodologies, Tools, and Applications** Management Association, Information Resources,2015-10-02 As modern technologies continue to develop and evolve the ability of users to interface with new systems becomes a paramount concern Research into new ways for humans to make use of advanced computers and other such technologies is necessary to fully realize the potential of 21st century tools Human Computer Interaction Concepts Methodologies Tools and Applications gathers research on user interfaces for advanced technologies and how these interfaces can facilitate new developments in the fields of robotics assistive technologies and computational intelligence This four volume reference contains cutting edge research for computer scientists faculty and students of robotics digital science and networked communications and clinicians invested in assistive technologies This seminal reference work includes chapters on topics pertaining to system usability interactive design mobile interfaces virtual worlds and more **BeagleBone By Example** Jayakarthigeyan Prabakar,2016-08-31 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   *Bad to the Bone* Steven Frank Barrett,Jason Kridner,2015 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   **Raspberry Pi Robotics Essentials** Richard Grimmett,2015-06-19 The Raspberry Pi B2 is an inexpensive embedded processor that provides a high performance Linux

development environment This book is a fast paced guide that will show you how to use Raspberry Pi technology to build a biped robot that can interact with its environment We start off by explaining the basics of getting your Raspberry Pi up and running ready to be mounted on your biped platform After this you will be introduced to the art of constructing a mechanism for the biped platform You will then learn to develop a vision system for your robot as well as a means by which you can control and monitor it At the end of this book you will have learned enough to build a complex biped robot that can walk turn find its way and see its environment *Industrial and Service Robotics* Mikuláš Hajduk,Lucia Koukolová,2014-08-11 Selected peer reviewed papers from the 13th International Conference on Industrial Service and Humanoid Robotics ROBTEP 2014 May 15 17 2014 High Tatras Slovakia **Embedded Linux Systems with the Yocto Project** Rudolf J. Streif,2016-04-18 Build Complete Embedded Linux Systems Quickly and Reliably Developers are increasingly integrating Linux into their embedded systems It supports virtually all hardware architectures and many peripherals scales well offers full source code and requires no royalties The Yocto Project makes it much easier to customize Linux for embedded systems If you re a developer with working knowledge of Linux Embedded Linux Systems with the Yocto ProjectTM will help you make the most of it An indispensable companion to the official documentation this guide starts by offering a solid grounding in the embedded Linux landscape and the challenges of creating custom distributions for embedded systems You ll master the Yocto Project s toolbox hands on by working through the entire development lifecycle with a variety of real life examples that you can incorporate into your own projects Author Rudolf Streif offers deep insight into Yocto Project s build system and engine and addresses advanced topics ranging from board support to compliance management You ll learn how to Overcome key challenges of creating custom embedded distributions Jumpstart and iterate OS stack builds with the OpenEmbedded Build System Master build workflow architecture and the BitBake Build Engine Quickly troubleshoot build problems Customize new distros with built in blueprints or from scratch Use BitBake recipes to create new software packages Build kernels set configurations and apply patches Support diverse CPU architectures and systems Create Board Support Packages BSP for hardware specific adaptations Provide Application Development Toolkits ADT for round trip development Remotely run and debug applications on actual hardware targets Ensure open source license compliance Scale team based projects with Toaster Build History Source Mirrors and Autobuilder **Raspberry Pi Robotic Projects - Third Edition** Richard Grimmett,2016-10-11 Work through a mix of amazing robotic projects using the Raspberry Pi Zero or the Raspberry Pi 3About This Book Easy to follow instructions yet the ones that help you build powerful robots and exclusive coverage of mobile robots with the Pi Zero Build robots that can run swim and fly and the cutting edge dimension of robotics that is possible with the Raspberry Pi Zero and Pi 3 Interact with your projects wirelessly and make sci fi possible right in your homeWho This Book Is ForThis book is for hobbyists and programmers who are excited about using the Raspberry Pi 3 and Raspberry Pi Zero It is for those who are taking their first steps towards using these devices to control hardware and

software and write simple programs that enable amazing projects No programming experience is required Just a little computer and mechanical aptitude and the desire to build some interesting projects What You Will Learn Control a variety of different DC motors Add a USB webcam to see what your robot can see Attach a projector to project information Insert USB control hardware to control a complex robot with two legs Include speech recognition so that your projects can receive commands Add speech output to that the robot can communicate with the world around it Include wireless communication so that you can see what the robot is seeing and control the robot from a distanceIn DetailThis book will allow you to take full advantage of Raspberry Pi Zero and Raspberry Pi 3 by building both simple and complex robotic projects The book takes a mission critical approach to show you how to build amazing robots and helps you decide which board to use for which type of robot The book puts a special emphasis on designing mobile or movable robots using the Raspberry Pi Zero The projects will show inexpensive yet powerful ways to take full advantage It will teach you how to program Raspberry Pi control the movement of your robot and add features to your robots Style and approachThis fun and practical tutorial contain step by step instructions to get you hands on building inexpensive projects It contains mission critical chapters and everything you need to know to get started   The Internet of Things: Do-It-Yourself at Home Projects for Arduino, Raspberry Pi and BeagleBone Black Donald Norris,2015-01-30 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

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