

Raspberry Pi Computer Vision Programming

Discover interesting recipes to help you understand the concepts of object detection, image processing, and facial detection Key Features Explore the latest features and APIs in OpenCV 4 and build computer vision algorithms Develop effective, robust, and fail-safe vision for your applications

Build computer vision algorithms with machine learning capabilities Book Description OpenCV is an image and video processing library used for all types of image and video analysis. Throughout the book, you'll work through recipes that implement a variety of tasks, such as facial recognition and object detection. With easy-to-follow, step-by-step tutorials, this book examines common pain points and best practices for computer vision (CV) developers. Each recipe addresses a specific problem and offers a proven, best-practice solution with insights into how it works, so that you can copy the code and adapt it to your own files and use cases. You'll also learn how to use OpenCV to process images with classes and count pixels with histograms. You'll also learn detecting, describing, and matching interest points. As you advance through the chapters, you'll get to grips with estimating projective relations in images, reconstructing 3D scenes, processing video sequences, and tracking visual motion. In the final chapters, you'll cover deep learning concepts such as face and object detection. By the end of the book, you'll be able to confidently implement a range to computer vision algorithms to meet the technical requirements of your complex CV projects What you will learn Install and create a program using the OpenCV library Segment images into homogenous regions and extract meaningful objects Apply image filters to enhance image content Exploit image geometry to relay different views of a pictured scene Calibrate the camera from different image observations Detect people and objects in images using machine learning techniques Reconstruct a 3D scene from images Explore face detection using deep learning Who this book is for If you're a CV developer or professional who already uses or would like to use OpenCV for building computer vision software, this book is for you. You'll also find this book useful if you're a C++ programmer looking to extend your computer vision skillset by learning OpenCV.

Learn how to program your nifty new \$35 computer to make a web spider, a weather station, a media server, and more. This book explores how to make a variety of fun and even useful projects, from a web bot to search and download files to a toy to drive your pets insane. Even if you're completely new to programming in general, you'll see how easy it is to create a home security system, an underwater photography system, an RC plane with a camera, and even a near-space weather balloon with a camera. You'll learn how to use Pi with Arduino as well as Pi with Gertboard, an expansion board with an onboard Atmega microcontroller. Learn Raspberry Pi Programming with Python has been fully updated in this new edition to cover the features of the new boards. You'll learn how to program in Python on your Raspberry Pi with hands-on examples and fun projects. What you will learn Set up your Raspberry Pi for various projects across a range of interests Program basic functions and processes using Python Who This Book Is For Readers who want to learn Python on a fun platform like the Pi and pick up some electronics skills along the way. No programming or Linux skills required, but a little experience with Linux will be helpful. Readers familiar with the 1st edition will enjoy the updated information in this new edition.

In **Learn Robotics with Raspberry Pi**, you'll learn how to build and code your own robot projects with just the Raspberry Pi microcomputer and a few easy-to-get components - no prior experience necessary! **Learn Robotics with Raspberry Pi** will take you from inexperienced maker to robot builder. You'll start off building a two-wheeled robot powered by a Raspberry Pi microcomputer and then program it using Python, the world's most popular programming language. Gradually, you'll improve your robot by adding increasingly advanced functionality until it can follow lines, avoid obstacles, and even recognize objects of a certain size and color using computer vision. Learn how to: - Control your robot remotely using only a WiI remote - Teach your robot to use sensors to avoid obstacles - Program your robot to follow a line autonomously - Customize your robot with LEDs and speakers to make it light up and play sounds - See what your robot sees with a Pi Camera As you work through the book, you'll learn fundamental electronic skills like how to wire up parts, use resistors and regulators, and determine how much power your robot needs. By the end, you'll have learned the basics of coding in Python and know enough about working with hardware like LEDs, motors, and sensors to expand your creations beyond simple robots.

Machine Learning a branch of Artificial Intelligence is influencing the society, industry and academia at large. The adaptability of Python programming language to Machine Learning has increased its popularity further. Another technology on the horizon is Internet of Things (IoT). The present book tries to address IoT, Python and Machine Learning along with a small introduction to Image Processing. If you are a novice programmer or have just started exploring IoT or Machine Learning with Python, then this book is for you. Features: Raspberry Pi as IoT is described along with the procedure for installation and configuration. A simple introduction to Python Programming Language along with its popular library packages like NumPy, Pandas, SciPy and Matplotlib are dealt in an exhaustive manner along with relevant examples. Machine Learning along with Python Scikit-Learn Library is explained with an emphasis on supervised learning and classification. Image processing on IoT is introduced to the audience who love to apply Machine Learning algorithms to Images The book follows hands-on approach and provide a huge collection of Python programs.

Arduino Computer Vision Programming MPI4Py, NumPy, and SciPy for Enthusiasts Practical Deep Learning for Cloud, Mobile, and Edge OpenCV 4 Computer Vision Application Programming Cookbook Learn to Program on the World's Most Popular Tiny Computer Using Python and OpenCV

Build complex computer vision applications with OpenCV and C++, 4th Edition 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.

Whether you're a software engineer aspiring to enter the world of deep learning, a veteran data scientist, or a hobbyist with a simple dream of making the next viral AI app, you might have wondered where to begin. This step-by-step guide teaches you how to build practical deep learning applications for the cloud, mobile, browsers, and edge devices using a hands-on approach. Rely on 10+ years of industry experience in conducting deep learning research into award-winning applications. Anurudh Ganju, and Meher Kasam guide you through the process of converting an idea into something that people in the real world can use. Train, tune, and deploy computer vision models with Keras, TensorFlow, Core ML, and PyTorch. Learn how to build a Raspberry Pi-based image classification system using TensorFlow Nano, and Google Coral. Explore fun projects, from Silicon Valley's 'No Hotdog app' to 40+ industry case studies Simulate an autonomous car in a video game environment and build a miniature version with reinforcement learning Use transfer learning to train models in minutes Discover 60+ practical tips for maximizing model accuracy and speed, debugging, and scaling to millions of users.

Updated for OpenCV 4 and Python 3, this book covers the latest on deep depth cameras, 3D tracking, augmented reality, and deep neural networks, helping you solve real-world computer vision problems with practical code Key Features Build powerful computer vision applications in concise code with OpenCV 4 and Python 3 Learn the fundamental concepts of image processing, object classification, and 2D and 3D tracking Train, use, and understand machine learning models such as Support Vector Machines (SVMs) and neural networks Book Description Computer vision is a rapidly evolving science, encompassing diverse applications and techniques. This book will not only help those who are getting started with computer vision but also experts in the domain. You'll be able to put theory into practice by building apps with OpenCV 4 and Python 3. You'll start by understanding OpenCV 4 and how to set it up with Python 3 on various platforms. Next, you'll learn how to perform basic operations such as reading, writing, manipulating, and displaying still images, videos, and camera feeds. From taking you through image processing, video analysis, and depth estimation and segmentation, to helping you gain practice by building a GUI app, this book ensures you'll have opportunities for hands-on activities. Next, you'll tackle two popular challenges: face detection and face recognition. You'll also learn about object classification and machine learning concepts, which will enable you to create and use object detectors and classifiers, and even track objects in movies or video camera feed. Later, you'll develop your skills in 3D tracking and augmented reality. Finally, you'll cover ANNs and DNNs, learning how to develop apps for recognizing handwritten digits and classifying a person's gender and age. By the end of this book, you'll have the skills you need to execute real-world computer vision projects. What you will learn Install and familiarize yourself with OpenCV 4's Python 3 bindings Understand image processing and video analysis basics Use a depth camera to distinguish foreground and background regions Detect and identify objects, and track their motion in videos Train and use your own models to match images and classify objects Detect and recognize faces, and classify their gender and age Build an augmented reality application to track an image in 3D Work with machine learning models, including SVMs, artificial neural networks (ANNs), and deep neural networks (DNNs) Who this book is for If you are interested in learning computer vision, machine learning, and OpenCV in the context of practical real-world applications, then this book is for you. This OpenCV book will also be useful for anyone getting started with computer vision as well as experts who want to stay up-to-date with OpenCV 4 and Python 3. Although no prior knowledge of image processing, computer vision or machine learning is required, familiarity with basic Python programming is a must.

Gain a gentle introduction to the world of Artificial Intelligence (AI) using the Raspberry Pi as the computing platform. Most of the major AI topics will be explored, including expert systems, machine learning both shallow and deep, fuzzy logic control, and more! AI in action will be demonstrated using the Python language on the Raspberry Pi. The Prolog language will also be introduced and used to demonstrate fundamental AI concepts. In addition, the Wolfram language will be used as part of the deep machine learning demonstrations. A series of projects will walk you through how to implement AI concepts with the Raspberry Pi. Minimal expense is needed for the projects as only a few sensors and actuators will be required. Beginners and hobbyists can jump right in to creating AI projects with the Raspberry Pi using this book. What You'll Learn What AI is and—as importantly—what it is not Inference and expert systems Machine learning both shallow and deep Fuzzy logic and how to apply to an actual control system When AI might be appropriate to include in a system Constraints and limitations of the Raspberry Pi implementation Who This Book Is For Hobbyists, makers, engineers involved in designing autonomous systems and wanting to gain an education in fundamental AI concepts, and non-technical readers who want to understand what AI is and how it might affect their lives.

Raspberry Pi Cookbook The Official Raspberry Pi Beginner's Guide More Project Ideas with Step-By-Step Configuration Guides and Programming Examples in Python and Node.js Develop Real-Life Examples with Python, Pillow, and SciPy Interfacing to the Real World with Embedded Linux Machine Learning with the Raspberry Pi Machine Learning with TensorFlow Lite on Arduino and Ultra-Low-Power Microcontrollers Raspberry Pi Cookbook for Python Programmers is written in a Cookbook format, presenting examples in the style of recipes. This allows you to go directly to your topic of interest, or follow topics throughout a chapter to gain a thorough in-depth knowledge. The aim of this book is to bring you a broad range of Python 3 examples and practical ideas which you can develop to suit your own requirements. By modifying and combining the examples to create your own projects you learn far more effectively with a much greater understanding. Each chapter is designed to be a foundation for further experimentation and discovery of the topic, providing you with the tools and information to jump right in. Readers are expected to be familiar with programming concepts and Python 3, although beginners should manage with the help of a good Python reference book and background reading. No prior knowledge of the Raspberry Pi or electronics is required; however, the hardware sections you will need some basic electronic components/household tools to build some of the projects. Learn how to build your own computer vision (CV) applications quickly and easily with SimpleCV, an open source framework written in Python. Through examples of real-world applications, this hands-on guide introduces you to basic CV techniques for collecting, processing, and analyzing streaming digital images. You'll then learn how to apply these methods with SimpleCV, using sample Python code. All you need to get started is a Windows, Mac, or Linux system, and a willingness to put CV to work in a variety of ways. Programming experience is optional. Capture images from several sources, including webcams, smartphones, and Kinect. Filter image input so your application processes only necessary information Manipulate images by performing basic arithmetic on pixel values Use feature detection techniques to focus on interesting parts of an image Work with several features in a single image, using the NumPy and SciPy Python libraries Learn about optical flow to identify objects that change between two image frames Use SimpleCV's command line and code editor to run examples and test techniques

If you want a basic understanding of computer vision's underlying theory and algorithms, this hands-on introduction is the ideal place to start. You'll learn techniques for object recognition, 3D reconstruction, stereo imaging, augmented reality, and other computer vision applications as you follow clear examples written in Python. Programming Computer Vision with Python explains computer vision in broad terms that won't bog you down in theory. You get complete code samples with explanations on how to reproduce and build upon each example, along with exercises to help you apply what you've learned. This book is ideal for students, researchers, and enthusiasts with basic programming and standard mathematical skills. Learn techniques used in robot navigation, medical image analysis, and other computer vision applications Work with image mappings and transforms, such as texture warping and panorama creation Compute 3D reconstructions from several images of the same scene Organize images based on similarity or content, using clustering methods Build efficient image retrieval techniques to search for images based on visual content Use algorithms to classify image content and recognize objects Access the popular OpenCV library through a Python interface

OpenVX is the computer vision API adopted by many high-performance processor vendors. It is quickly becoming the preferred way to write fast and power-efficient code on embedded systems. OpenVX Programming Guidebook presents definitive information on OpenVX 1.2 and 1.3, the Neural Network, and other extensions as well as the OpenVX Safety Critical standard. This book gives a high-level overview of the OpenVX standard, its design principles, and overall structure. It covers computer vision functions and the graph API, providing examples of usage for the majority of the functions. It is intended both for the first-time user of OpenVX and as a reference for experienced OpenVX developers. Get to grips with the OpenVX standard and gain insight why various options were chosen Start developing efficient OpenVX code instantly Understand design principles and use them to create robust code Develop consumer and industrial products that use computer vision to understand and interact with the real world Programming Computer Vision with Python

Intelligent algorithms for building image processing apps using OpenCV 4, Python, and scikit-learn, 2nd Edition Learn Raspberry Pi Programming with Python 7 Books in 1-Coding Languages for Beginners: C++, C#, SQL, Python, Data Science for Python, Raspberry Pi and Arduino. Teach Yourself to Code. Learn Faster Image Classification, Object Detection, and Face Recognition in Python Proceedings of the Future Technologies Conference (FTC) 2020, Volume 1

Build creative computer vision projects with the latest version of OpenCV 4 and Python 3, 2nd Edition Start building amazing projects with the Raspberry Pi right out of the box About This Book Explore the vast range of opportunities provided by Raspberry Pi and other hardware components such as a webcam, the Pi camera, and sensors Get hands-on experience with coding, networking, and hardware with the Raspberry Pi platform Learn to design image acquisition systems for a play-by-play account of how to implement Raspberry-Pi-based real-life projects Who This Book Is For What's the best way to learn how to use your Raspberry Pi? By example! If you want something exciting to do whilst getting to grips with what your Pi can offer, this is the book for you. With both simple and complex projects, you'll create a wide variety of cool toys and functions with your Raspberry Pi - all with minimal coding experience necessary. What You Will Learn Set up your Raspberry Pi and get it ready for some interesting real-life projects Work with images, videos, webcams, and the Pi camera and create amazing time-lapse videos Explore the amazing world of Minecraft Pi Get to know how to use PiGlow for GPIO programming Interface your Pi with Grove Sensors and implement IoT applications Build your own cluster with Raspberry Pi Understand the networking and network programming fundamentals In Detail Want to put your Raspberry Pi through its paces right out of the box? This tutorial guide is designed to get you learning all the tricks of the Raspberry Pi through building complete, hands-on hardware projects. Speed through the basics and then dive right in to development! Discover that you can do almost anything with your Raspberry Pi with a taste of almost everything. Get started with Pi Gaming as you learn how to set up Minecraft, and then program your own game with the help of Pygame. Turn the Pi into your own home security system with complete guidance on setting up a webcam spy camera and OpenCV computer vision for image recognition capabilities. Get to grips with GPIO programming to make a Pi-based glowing LED system, build a complete functioning motion tracker, and more. Finally, get ready to tackle projects that push your Pi to its limits. Construct a complete Internet of Things home automation system. Record your YouTube videos via Twitter! Turn your Pi into a super-powered super-linking multiple boards into a cluster and then add in advanced network capabilities for super speedy processing! Style and approach This step-by-step guide to building Raspberry-Pi-based projects is explained in a conversational and easy-to-follow style. Each topic is explained sequentially in the process of creating real-life projects, and detailed explanations of the basic and advanced features of various Python libraries are also included.

Deep learning networks are getting smaller. Much smaller. The Google Assistant team can detect words with a model just 14 kilobytes in size—small enough to run on a microcontroller. With this practical book you'll enter the field of TinyML, where deep learning and embedded systems combine to make astounding things possible with tiny devices. Pete Warden and Daniel Situnayake explain how you can train models small enough to fit into any environment. Ideal for software and hardware developers who want to build embedded systems using machine learning, this guide walks you through creating a series of TinyML projects, step-by-step. No machine learning or microcontroller experience is necessary. Build a speech recognizer, a camera that detects people, and a magic wand that responds to gestures Work with Arduino and ultra-low-power microcontrollers Learn the essentials of ML and how to train your own models Train models to understand audio, images, and accelerometer data Explore TensorFlow Lite, Google's toolkit for TinyML. Debug applications and provide safeguards for privacy and security Optimize latency, energy usage, and model and binary size Learn how to use Raspberry Pi in conjunction with an Arduino to build a basic robot with advanced capabilities Getting started in robotics does not have to be difficult. This book is an insightful and rewarding introduction to robotics and a catalyst for further directed study. You'll be led step by step through the process of building a robot that uses the power of a Linux based computer paired with the simplicity of Arduino. You'll learn why the Raspberry Pi is a great choice for a robotics platform; its strengths as well as its shortcomings; how to overcome these limitations by implementing an Arduino; and the basics of the Python programming language as well as some of the more powerful features. With the Raspberry Pi you can give your project the power of a Linux computer, while Arduino makes interacting with sensors and motors very easy. These two boards are complementary in their functions; where one falters the other performs admirably. The book also includes references to other great works to help further your growth in the exciting, and now accessible, field of smart robotics. As a bonus, the final chapter of the book demonstrates the real power of the Raspberry Pi by implementing a basic vision system. Using OpenCV and a standard USB

web cam, you will build a robot that can chase a ball. What You'll Learn Install Raspbian, the operating system that drives the Raspberry Pi Drive motors through an I2C motor controller Read data through sensors attached to an Arduino Who This Book Is For Hobbyists and students looking for a rapid start in robotics. If you are a non-technical reader, you are guided to pursue the details that interest them in more detail as they learn. Get to grips with traditional computer vision algorithms and deep learning approaches, and build real-world applications with OpenCV and other machine learning frameworks Key Features Understand how to capture high-quality image data, detect and track objects, and process the actions of animals or humans Implement your learning in different areas of computer vision Explore advanced concepts in OpenCV such as machine learning, artificial neural network, and augmented reality Book Description OpenCV is a native cross-platform C++ library for computer vision, machine learning, and image processing. It is increasingly being adopted in Python for development. This book will get you hands-on with a wide range of intermediate to advanced projects using the latest version of the framework and language, OpenCV 4 and Python 3.8, instead of only covering the core concepts of OpenCV in theoretical lessons. This updated second edition will guide you through working on independent hands-on projects that focus on essential OpenCV concepts such as image processing, object detection, image manipulation, object tracking, and 3D scene reconstruction, in addition to statistical learning and neural networks. You'll begin with concepts such as image filters, Kinect depth sensor, and feature matching. As you advance, you'll not only get hands-on with reconstructing and visualizing a scene in 3D but also learn to track visually salient objects. The book will help you further build on your skills by demonstrating how to recognize traffic signs and emotions on faces. Later, you'll understand how to detect and track objects in real-time using neural networks. By the end of this OpenCV Python book, you'll have gained hands-on experience and become proficient at developing advanced computer vision apps according to specific business needs. What you will learn Generate real-time visual effects using filters and image manipulation techniques such as dodging and burning Recognize hand gestures in real-time and perform hand-shape analysis based on the output of a Microsoft Kinect sensor Learn feature extraction and feature matching to track arbitrary objects of interest Reconstruct a 3D real-world scene using 2D camera motion and camera reprojection techniques Detect faces using a cascade classifier and identify emotions in human faces using multilayer perceptrons Classify, localize, and detect objects with deep neural networks Who this book is for This book is for intermediate-level OpenCV users who are looking to enhance their skills by developing advanced applications. Familiarity with OpenCV concepts and Python libraries, and basic knowledge of the Python programming language are assumed.

Build and control autonomous robots using Raspberry Pi 3 and Python Mastering OpenCV 4 with Python Real-World AI & Computer-Vision Projects Using Python, Keras & TensorFlow Introduction to IoT with Machine Learning and Image Processing using Raspberry Pi Raspberry Pi Computer Vision Programming -Second Edition Learn Robotics Programming

Step-by-step tutorials on deep learning neural networks for computer vision in python with Keras. If you want to get started with deep learning, this book is for you! Boasting more than 100 recipes, the basics, this book will walk you through everything from setting up the Pi to building a smart TV. McCarthy begins by introducing the reader to OpenCV, which is the computer vision library used for the projects he describes throughout the book. He then outlines in detail how to program video cameras, how to create a GPS designated photo camera, and even link your Raspberry Pi to your Google Home to bring automation to your smart house. In this book you'll work through a series of projects that outline basic Raspberry Pi programming. The projects in this book include: How to create a face detection app Creating a print server in network accessible How to create a weather app Building your own Smart TV More Perhaps just as important as the projects themselves, McCarthy's book guides the reader on what he or she should already know before starting any of the projects. His "prerequisites" section explains how a basic understanding of Raspberry Pi is important to executing his project and provides resources for the Raspberry Pi programmer-to-be. But this book doesn't just stop with prerequisites! It also includes a "Chapter 0" for very beginners. This chapter takes a step-by-step approach to setting up the Raspberry Pi, connecting devices, and more. Once you set up your Raspberry Pi you'll be off and running! This book explores achievable, functional projects that you can create with your Raspberry Pi, and introduces you to the endless possibilities of Raspberry Pi programming. Whether you're new to the world of Raspberry Pi or simply looking for some new projects to hone your programming skills, this book delivers something useful for any reader. More about Raspberry Pi 3: The Raspberry Pi 3 is a credit-card sized computer that was designed to teach basic computer programming to children. It's an affordable option for schools and families, costing around e20-e40 (\$25-\$35) per unit. This capable computer allows kids to explore the fundamentals of coding in classrooms and at home! The Raspberry Pi 3 also has quite a bit of functionality outside of the classroom. It can be used to improve home automation, as a low-cost energy monitoring system, and more. Programmers are constantly finding more uses for the Raspberry Pi, so now is a great time to learn how to work with that thing! This is the perfect book to enhance your knowledge and train your skills on Python and Node.js programming by developing fun projects. Go your copy now!

Perform a wide variety of computer vision tasks such as image processing and manipulation, feature and object detection, and image restoration to build real-life computer vision applications Key Features Explore the potential of computer vision with Raspberry Pi and Python programming Perform computer vision tasks such as image processing and manipulation using OpenCV and Raspberry Pi Discover easy-to-follow examples and screenshots to implement popular computer vision techniques and applications Book Description Raspberry Pi is one of the popular single-board computers of our generation. All the major image processing and computer vision algorithms and operations can be implemented easily with OpenCV. This book is a practical guide to building real-time image processing and computer vision projects. At the start, you'll learn the basics of Python 3, and the fundamentals of single-board computers and NumPy. Next, you'll discover how to install OpenCV 4 for Python 3 on Raspberry Pi, before covering major techniques and algorithms in image processing, manipulation, and computer vision. By working through the steps in each chapter, you'll understand essential OpenCV features. Later sections will take you through creating graphical user interface (GUI) apps with GPIO and OpenCV. You'll also learn to use the new computer vision library, Mahotas, to perform various image processing operations. Finally, you'll explore the Jupyter Notebook and how to set up a Windows computer and Ubuntu for computer vision. By the end of this book, you'll be able to confidently build and deploy computer vision apps. What you will learn Set up a Raspberry Pi for computer vision applications Perform basic image processing with libraries such as NumPy, Matplotlib, and OpenCV Demonstrate arithmetical, logical, and other operations on images Work with a USB webcam and the Raspberry Pi Camera Module Implement low-pass and high-pass filters and understand their applications in image processing Create advanced techniques such as histogram equalization and morphological transformations Create GUI apps with Python 3 and OpenCV Perform machine learning with K-means clustering and image quantization Who this book is for This book is for beginners as well as experienced Raspberry Pi and Python 3 enthusiasts who are looking to explore the amazing world of computer vision. Working knowledge of the Python 3 programming language is assumed.

Get started with the smallest, cheapest, and highest-utility Pi ever—Raspberry Pi Zero About This Book Get started with Raspberry Pi Zero and put all of its exciting features to use Create fun games and programs with little or no programming experience Learn to use this super-tiny PC to control hardware and software for work, play, and everything else Who This Book Is For This book is for hobbyists and programmers who are taking their first steps toward using Raspberry Pi Zero. No programming experience is required, although some Python programming experience might be useful. What You Will Learn Understand how to initially download the operating system and set up Raspberry Pi Zero Find out how to control the GPIO pins of the Raspberry Pi Zero to control LED circuits Get to grips with adding hardware to the GPIO to control more complex hardware such as motors Add USB control hardware to control a complex robot with 12 servos include speech recognition so that projects can receive commands Enable the robot to communicate with the world around it by adding speech output to the robot from a voice and see how the robot is seeing by adding wireless communication Discover how to build a Robotic hand and a Quadcopter in Detail Raspberry Pi Zero is half the size of Raspberry Pi, only with twice the utility. At just three centimeters wide, it packs in every utility required for full-fledged computing tasks. This practical tutorial will help quickly get you up and running with Raspberry Pi Zero control hardware and software and write simple programs and exciting games with little or no programming experience. We cover all the features of Raspberry Pi Zero as you discover how to configure software and hardware, and control external devices. You will find out how to navigate your way in Raspbian, write simple Python scripts, and create simple DIY programs. Style and approach This is a practical and fun 'getting started' tutorial that will guide you through everything new that the Raspberry Pi has to offer.

Learn Robotics with Raspberry Pi Raspberry Pi Computer Vision Programming Exploring Raspberry Pi OpenVX Programming Guide Design and Implement Computer Vision Applications with Raspberry Pi, OpenCV, and Python 3 Computer Programming Crash Course

Learn Raspberry Pi Programming with Python will show you how to program your nifty new \$35 computer to make a web spider, a weather station, a media server, and more. You'll learn how to program in Python on your Raspberry Pi with hands-on examples and fun projects. Even if you're completely new to programming in general, you'll figure out how to create a home security system, an underwater photography system, an RC plane with a camera, and even a near-space weather balloon with a camera. You'll learn how to make a variety of fun and even useful projects, from a web bot to search and download files to a toy to drive your pets insane. You'll even learn how to use Pi with Arduino as well as Pi with Gertboard, an expansion board with an onboard Atmega microcontroller.

Perform a wide variety of computer vision tasks such as image processing and manipulation, feature and object detection, and image restoration to build real-life computer vision applications Key Features Explore the potential of computer vision with Raspberry Pi and Python programming Perform computer vision tasks such as image processing and manipulation using OpenCV and Raspberry Pi Discover easy-to-follow examples and screenshots to implement popular computer vision techniques and applications Book Description Raspberry Pi is one of the popular single-board computers of our generation. All the major image processing and computer vision algorithms and operations can be implemented easily with OpenCV on Raspberry Pi. This updated second edition is packed with cutting-edge examples and new topics, and covers the latest versions of key technologies such as Python 3, Raspberry Pi, and OpenCV. This book will equip you with the skills required to successfully design and implement your own OpenCV, Raspberry Pi, and Python-based computer vision projects. At the start, you'll learn the basics of Python 3, and the fundamentals of single-board computers and NumPy. Next, you'll discover how to install OpenCV 4 for Python 3 on Raspberry Pi, before covering major techniques and algorithms in image processing, manipulation, and computer vision. By working through the steps in each chapter, you'll understand essential OpenCV features. Later sections will take you through creating graphical user interface (GUI) apps with GPIO and OpenCV. You'll also learn to use the new computer vision library, Mahotas, to perform various image processing operations. Finally, you'll explore the Jupyter Notebook and how to set up a Windows computer and Ubuntu for computer vision. By the end of this book, you'll be able to confidently build and deploy computer vision apps. What you will learn Set up a Raspberry Pi for computer vision applications Perform basic image processing with libraries such as NumPy, Matplotlib, and OpenCV Demonstrate arithmetical, logical, and other operations on images Work with a USB webcam and the Raspberry Pi Camera Module Implement low-pass and high-pass filters and understand their applications in image processing Create advanced techniques such as histogram equalization and morphological transformations Create GUI apps with Python 3 and OpenCV Perform machine learning with K-means clustering and image quantization Who this book is for This book is for This book is for beginners as well as experienced Raspberry Pi and Python 3 enthusiasts who are looking to explore the amazing world of computer vision. Working knowledge of the Python 3 programming language is assumed.

Get started with the smallest, cheapest, and highest-utility Pi ever—Raspberry Pi Zero About This Book Get started with Raspberry Pi Zero and put all of its exciting features to use Create fun games and programs with little or no programming experience Learn to use this super-tiny PC to control hardware and software for work, play, and everything else Who This Book Is For This book is for hobbyists and programmers who are taking their first steps toward using Raspberry Pi Zero. No programming experience is required, although some Python programming experience might be useful. What You Will Learn Understand how to initially download the operating system and set up Raspberry Pi Zero Find out how to control the GPIO pins of the Raspberry Pi Zero to control LED circuits Get to grips with adding hardware to the GPIO to control more complex hardware such as motors Add USB control hardware to control a complex robot with 12 servos include speech recognition so that projects can receive commands Enable the robot to communicate with the world around it by adding speech output to the robot from a voice and see how the robot is seeing by adding wireless communication Discover how to build a Robotic hand and a Quadcopter in Detail Raspberry Pi Zero is half the size of Raspberry Pi, only with twice the utility. At just three centimeters wide, it packs in every utility required for full-fledged computing tasks. This practical tutorial will help quickly get you up and running with Raspberry Pi Zero control hardware and software and write simple programs and exciting games with little or no programming experience. We cover all the features of Raspberry Pi Zero as you discover how to configure software and hardware, and control external devices. You will find out how to navigate your way in Raspbian, write simple Python scripts, and create simple DIY programs. Style and approach This is a practical and fun 'getting started' tutorial that will guide you through everything new that the Raspberry Pi has to offer.

Learn Robotics with Raspberry Pi Raspberry Pi Computer Vision Programming Exploring Raspberry Pi OpenVX Programming Guide Design and Implement Computer Vision Applications with Raspberry Pi, OpenCV, and Python 3 Computer Programming Crash Course

Learn Raspberry Pi Programming with Python will show you how to program your nifty new \$35 computer to make a web spider, a weather station, a media server, and more. You'll learn how to program in Python on your Raspberry Pi with hands-on examples and fun projects. Even if you're completely new to programming in general, you'll figure out how to create a home security system, an underwater photography system, an RC plane with a camera, and even a near-space weather balloon with a camera. You'll learn how to make a variety of fun and even useful projects, from a web bot to search and download files to a toy to drive your pets insane. You'll even learn how to use Pi with Arduino as well as Pi with Gertboard, an expansion board with an onboard Atmega microcontroller.

Perform a wide variety of computer vision tasks such as image processing and manipulation, feature and object detection, and image restoration to build real-life computer vision applications Key Features Explore the potential of computer vision with Raspberry Pi and Python programming Perform computer vision tasks such as image processing and manipulation using OpenCV and Raspberry Pi Discover easy-to-follow examples and screenshots to implement popular computer vision techniques and applications Book Description Raspberry Pi is one of the popular single-board computers of our generation. All the major image processing and computer vision algorithms and operations can be implemented easily with OpenCV on Raspberry Pi. This updated second edition is packed with cutting-edge examples and new topics, and covers the latest versions of key technologies such as Python 3, Raspberry Pi, and OpenCV. This book will equip you with the skills required to successfully design and implement your own OpenCV, Raspberry Pi, and Python-based computer vision projects. At the start, you'll learn the basics of Python 3, and the fundamentals of single-board computers and NumPy. Next, you'll discover how to install OpenCV 4 for Python 3 on Raspberry Pi, before covering major techniques and algorithms in image processing, manipulation, and computer vision. By working through the steps in each chapter, you'll understand essential OpenCV features. Later sections will take you through creating graphical user interface (GUI) apps with GPIO and OpenCV. You'll also learn to use the new computer vision library, Mahotas, to perform various image processing operations. Finally, you'll explore the Jupyter Notebook and how to set up a Windows computer and Ubuntu for computer vision. By the end of this book, you'll be able to confidently build and deploy computer vision apps. What you will learn Set up a Raspberry Pi for computer vision applications Perform basic image processing with libraries such as NumPy, Matplotlib, and OpenCV Demonstrate arithmetical, logical, and other operations on images Work with a USB webcam and the Raspberry Pi Camera Module Implement low-pass and high-pass filters and understand their applications in image processing Create advanced techniques such as histogram equalization and morphological transformations Create GUI apps with Python 3 and OpenCV Perform machine learning with K-means clustering and image quantization Who this book is for This book is for This book is for beginners as well as experienced Raspberry Pi and Python 3 enthusiasts who are looking to explore the amazing world of computer vision. Working knowledge of the Python 3 programming language is assumed.

Get started with the smallest, cheapest, and highest-utility Pi ever—Raspberry Pi Zero About This Book Get started with Raspberry Pi Zero and put all of its exciting features to use Create fun games and programs with little or no programming experience Learn to use this super-tiny PC to control hardware and software for work, play, and everything else Who This Book Is For This book is for hobbyists and programmers who are taking their first steps toward using Raspberry Pi Zero. No programming experience is required, although some Python programming experience might be useful. What You Will Learn Understand how to initially download the operating system and set up Raspberry Pi Zero Find out how to control the GPIO pins of the Raspberry Pi Zero to control LED circuits Get to grips with adding hardware to the GPIO to control more complex hardware such as motors Add USB control hardware to control a complex robot with 12 servos include speech recognition so that projects can receive commands Enable the robot to communicate with the world around it by adding speech output to the robot from a voice and see how the robot is seeing by adding wireless communication Discover how to build a Robotic hand and a Quadcopter in Detail Raspberry Pi Zero is half the size of Raspberry Pi, only with twice the utility. At just three centimeters wide, it packs in every utility required for full-fledged computing tasks. This practical tutorial will help quickly get you up and running with Raspberry Pi Zero control hardware and software and write simple programs and exciting games with little or no programming experience. We cover all the features of Raspberry Pi Zero as you discover how to configure software and hardware, and control external devices. You will find out how to navigate your way in Raspbian, write simple Python scripts, and create simple DIY programs. Style and approach This is a practical and fun 'getting started' tutorial that will guide you through everything new that the Raspberry Pi has to offer.

modern design patterns you should avoid when developing efficient computer vision applications

Book Description OpenCV is considered to be one of the best open source computer vision and machine learning software libraries. It helps developers build complete projects in relation to image processing, motion detection, or image segmentation, among many others. OpenCV for Python enables you to run computer vision algorithms smoothly in real time, combining the best of the OpenCV C++ API and the Python language. In this book, you'll get started by setting up OpenCV and delving into the key concepts of computer vision. You'll then proceed to study more advanced concepts and discover the full potential of OpenCV. The book will also introduce you to the creation of advanced applications using Python and OpenCV, enabling you to develop applications that include facial recognition, target tracking, or augmented reality. Next, you'll learn machine learning techniques and concepts, understand how to apply them in real-world examples, and also explore their benefits, including real-time data production and faster data processing. You'll also discover how to translate the functionality provided by OpenCV into optimized application code projects using Python bindings. Toward the concluding chapters, you'll explore the application of artificial intelligence and deep learning techniques using the popular Python libraries TensorFlow, and Keras. By the end of this book, you'll be able to develop advanced computer vision applications to meet your customers' demands. What you will learn

Handle files and images, and explore various image processing techniques

Explore image transformations, including translation, resizing, and cropping

Gain insights into building histograms

Brush up on contour detection, filtering, and drawing

Work with Augmented Reality to build marker-based and markerless applications

Work with the main machine learning algorithms in OpenCV

Explore the deep learning Python libraries and OpenCV deep learning capabilities

Create computer vision and deep learning web applications

Who this book is for

This book is designed for computer vision developers, engineers, and researchers who want to develop modern computer vision applications. Basic experience of OpenCV and Python programming is a must.

Mastering OpenCV, now in its third edition, targets computer vision engineers taking their first steps toward mastering OpenCV. Keeping the mathematical formulations to a solid but bare minimum, the book delivers complete projects from ideation to running code, targeting current hot topics in computer vision such as face recognition, landmark ...

Build an inexpensive cluster of multiple Raspberry Pi computers and install all the required libraries to write parallel and scientific programs in Python 3. This book covers setting up your Raspberry Pis, installing the necessary software, and making a cluster of multiple Pis. Once the cluster is built, its power has to be exploited by means of programs to run on it. So, Raspberry Pi Supercomputing and Scientific Programming teaches you to code the cluster with the MPI4PY library of Python 3. Along the way, you will learn the concepts of the Message Passing Interface (MPI) standards and will explore the fundamentals of parallel programming on your inexpensive cluster. This will make this book a great starting point for supercomputing enthusiasts who want to get started with parallel programming. The book finishes with details of symbolic mathematics and scientific and numerical programming in Python, using SymPy, SciPy, NumPy, and Matplotlib. You'll see how to process signals and images, carry out calculations using linear algebra, and visualize your results, all using Python code. With the power of a Raspberry Pi supercomputer at your fingertips, data-intensive scientific programming becomes a reality at home. What You Will Learn

Discover the essentials of supercomputing

Build a low-cost cluster of Raspberry Pis at home

Harness the power of parallel programming and the Message Passing Interface (MPI)

Use your Raspberry Pi for symbolic, numerical, and scientific programming

Who This Book Is For

Python 3 developers who seek the knowledge of parallel programming, Raspberry Pi enthusiasts, researchers, and the scientific Python community.

Start building amazing projects with the Raspberry Pi right out of the box

About This Book- Explore the vast range of opportunities provided by Raspberry Pi and other hardware components such as a webcam, the Pi camera, and sensors-

Get hands-on experience with coding, networking, and hardware with the Raspberry Pi platform- Learn through ample screenshots that offer a play-by-play account of how to implement Raspberry-Pi-based real-life projects

Who This Book Is ForWhat's the best way to learn how to use your Raspberry Pi? By example! If you want something exciting to do whilst getting to grips with what your Pi can offer, this is the book for you. With both simple and complex projects, you'll create a wide variety of cool toys and functions with your Raspberry Pi - all with minimal coding experience necessary.

What You Will Learn- Set up your Raspberry Pi and get it ready for some interesting real-life projects-

Work with images, videos, webcams, and the Pi camera and create amazing time-lapse videos-

Explore the amazing world of Minecraft Pi-

Get to know how to use PiGlow for GPIO programming-

Interface your Pi with Grove Sensors and implement IoT applications-

Build your own cluster with Raspberry Pi-

Understand the networking and network programming fundamentals

In Detail

Want to put your Raspberry Pi through its paces right out of the box? This tutorial guide is designed to get you learning all the tricks of the Raspberry Pi through building complete, hands-on hardware projects. Speed through the basics and then dive right in to development!

Discover that you can do almost anything with your Raspberry Pi with a taste of almost everything. Get started with Pi Gaming as you learn how to set up Minecraft, and then program your own game with the help of Pygame. Turn the Pi into your own home security system with complete guidance on setting up a webcam spy camera and OpenCV computer vision for image recognition capabilities. Get to grips with GPIO programming to make a Pi-based glowing LED system, build a complete functioning motion tracker, and more. Finally, get ready to tackle projects that push your Pi to its limits. Construct a complete Internet of Things home automation system with the Raspberry Pi to control your house via Twitter; turn your Pi into a super-computer through linking multiple boards into a cluster and then add in advanced network capabilities for super speedy processing!

Style and approach

This step-by-step guide to building Raspberry-Pi-based projects is explained in a conversational and easy-to-follow style. Each topic is explained sequentially in the process of creating real-life projects, and detailed explanations of the basic and advanced features of various Python libraries are also included.

Deep Learning for Computer Vision

Tools and algorithms for analyzing images

Learning OpenCV 4 Computer Vision with Python 3

How to Use Your New Computer Machine Learning for OpenCV 4

Practical Computer Vision with SimpleCV

This book is intended for novices, as well as seasoned Raspberry Pi and Python enthusiasts, who would like to explore the area of computer vision. Readers with very little programming or coding/scripting experience can create wonderful image processing and computer vision applications with relatively fewer lines of code in Python. Explains how to leverage the revolutionary Raspberry Pi computer in order to learn the versatile Python programming language. Original.

The world of Raspberry Pi is evolving quickly, with many new interface boards and software libraries becoming available all the time. In this cookbook, prolific hacker and author Simon Monk provides more than 200 practical recipes for running this tiny low-cost computer with Linux, programming it with Python, and hooking up sensors, motors, and other hardware—including Arduino. You'll also learn basic principles to help you use new technologies with Raspberry Pi as its ecosystem develops. Python and other code examples from the book are available on GitHub. This cookbook is ideal for programmers and hobbyists familiar with the Pi through resources such as Getting Started with Raspberry Pi (O'Reilly). Set up and manage your Raspberry Pi

Connect the Pi to a network

Work with its Linux-based operating system

Use the Pi's ready-made software

Program Raspberry Pi with Python

Control hardware through the GPIO connector

Use Raspberry Pi to run different types of motors

Work with switches, keypads, and other digital inputs

Hook up sensors for taking various measurements

Attach different displays, such as an LED matrix

Create dynamic projects with Raspberry Pi and Arduino

Make sure to check out 10 of the over 60 video recipes for this book at: <http://razzpisampler.oreilly.com/> You can purchase all recipes at:

With millions of new users and several new models, the Raspberry Pi ecosystem continues to expand—along with a lot of new questions about the Pi's capabilities. The second edition of this popular cookbook provides more than 240 hands-on recipes for running this tiny low-cost computer with Linux, programming it with Python, and hooking up sensors, motors, and other hardware—including Arduino and the Internet of Things. Prolific hacker and author Simon Monk also teaches basic principles to help you use new technologies with Raspberry Pi as its ecosystem continues to develop. This cookbook is ideal for programmers and hobbyists familiar with the Pi through resources, including Getting Started with Raspberry Pi (O'Reilly). Python and other code examples from the book are available on GitHub. Set up your Raspberry Pi and connect to a network

Work with its Linux-based operating system

Program Raspberry Pi with Python

Give your Pi "eyes" with computer vision

Control hardware through the GPIO connector

Use Raspberry Pi to run different types of motors

Work with switches, keypads, and other digital inputs

Use sensors to measure temperature, light, and distance

Connect to IoT devices in various ways

Create dynamic projects with Arduino

Raspberry Pi Computer Vision Programming - Second Edition

Learning Python with Raspberry Pi

Beginning Robotics with Raspberry Pi and Arduino

OpenCV 4 with Python Blueprints

Raspberry Pi by Example

Write your own Digital Image Processing programs with the use of pillow, scipy.ndimage, and matplotlib in Python 3 with Raspberry Pi 3 as the hardware platform. This concise quick-start guide provides working code examples and exercises. Learn how to interface Raspberry Pi with various image sensors. What You'll Learn

- Understand Raspberry Pi concepts and setup
- Understand digital image processing concepts
- Study pillow, the friendly PIL fork
- Explore scipy.ndimage and matplotlib
- Master use of the Pi camera and webcam

Who This Book Is For Raspberry Pi and IoT enthusiasts, digital image processing enthusiasts, Python and Open Source enthusiasts and professionals

A practical guide to understanding the core machine learning and deep learning algorithms, and implementing them to create intelligent image processing systems using OpenCV 4

Key Features Gain insights into machine learning algorithms, and implement them using OpenCV 4 and scikit-learn

Get up to speed with Intel OpenVINO and its integration with OpenCV 4

Implement high-performance machine learning models with helpful tips and best practices

Book Description OpenCV is an open-source library for building computer vision apps. The latest release, OpenCV 4, offers a plethora of features and platform improvements that are covered comprehensively in this up-to-date second edition. You'll start by understanding the new features and setting up OpenCV 4 to build your computer vision applications. You will explore the fundamentals of machine learning and even learn to design different algorithms that can be used for image processing. Gradually, the book will take you through supervised and unsupervised machine learning. You will gain hands-on experience using scikit-learn in Python for a variety of machine learning applications. Later chapters will focus on different machine learning algorithms, such as a decision tree, support vector machines (SVM), and Bayesian learning, and how they can be used for object detection computer vision operations. You will then delve into deep learning and ensemble learning, and discover their real-world applications, such as handwritten digit classification and gesture recognition. Finally, you'll get to grips with the latest Intel OpenVINO for building an image processing system. By the end of this book, you will have developed the skills you need to use machine learning for building intelligent computer vision applications with OpenCV 4. What you will learn

Understand the core machine learning concepts for image processing

Explore the theory behind machine learning and deep learning algorithm design

Discover effective techniques to train your deep learning models

Evaluate machine learning models to improve the performance of your models

Integrate algorithms such as support vector machines and Bayes classifier in your computer vision applications

Use OpenVINO with OpenCV 4 to speed up model inference

Who this book is for

This book is for Computer Vision professionals, machine learning developers, or anyone who wants to learn machine learning algorithms and implement them using OpenCV 4. If you want to build real-world Computer Vision and image processing applications powered by machine learning, then this book is for you. Working knowledge of Python programming is required to get the most out of this book.