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Hacking the Kinect is the technogeek's guide to developing software and creating projects involving the groundbreaking volumetric sensor known as the Microsoft Kinect. Microsoft's release of the Kinect in the fall of 2010 startled the technology world by providing a low-cost sensor that can detect and track body movement in three-dimensional space. The Kinect set new records for the fastest-selling gadget of all time. It has been adopted worldwide by hobbyists, robotics enthusiasts, artists, and even some entrepreneurs hoping to build business around the technology. Hacking the Kinect introduces you to programming for the Kinect. You'll learn to set up a software environment, stream data from the Kinect, and write code to interpret that data. The progression of hands-on projects in the book leads you even deeper into an understanding of how the device functions and how you can apply it to create fun and educational projects. Who knows? You might even come up with a business idea. Provides an excellent source of fun and educational projects for a tech-savvy parent to pursue with a son or daughter Leads you progressively from making your very first connection to the Kinect through mastery of its full feature set Shows how to interpret the Kinect data stream in order to drive your own software and hardware applications, including robotics applications

Using a project-based approach, you will be able to learn the coolest aspects of working with Processing. Each project contains step-by-step explanations, diagrams, screenshots, and downloadable material to make learning Processing even easier. This book targets Processing developers, visual artists, creative professionals, and students who want to move to the next level of learning Processing for gaining inspiration, work, or just for fun. The book assumes a basic understanding of programming. However, this book is also recommended to non-artistic readers, looking to expand their graphics and develop their creativity.

This book gathers select contributions from the 32nd International Congress and Exhibition on Condition Monitoring and Diagnostic Engineering Management (COMADEM 2019), held at the University of Huddersfield, UK in September 2019, and jointly organized by the University of Huddersfield and COMADEM International. The aim of the Congress was to promote awareness of the rapidly emerging interdisciplinary areas of condition monitoring and diagnostic engineering management. The contents discuss the latest tools and techniques in the multidisciplinary field of performance monitoring, root cause failure modes analysis, failure diagnosis, prognosis, and proactive management of industrial systems. There is a special focus on digitally enabled asset management and covers several topics such as condition monitoring, maintenance, structural health monitoring, non-destructive testing and other allied areas. Bringing together expert contributions from academia and industry, this book will be a valuable resource for those interested in latest condition monitoring and asset management techniques.

Expand your knowledge of computer vision by building amazing projects with OpenCV 3 About This Book Build computer vision projects to capture high-quality image data, detect and track objects, process the actions of humans or animals, and much more Discover practical and interesting innovations in computer vision while building atop a mature open-source library, OpenCV 3 Familiarize yourself with multiple approaches and theories wherever critical decisions need to be made Who This Book Is For This book is ideal for you if you aspire to build computer vision systems that are smarter, faster, more complex, and more practical than the competition. This is an advanced book intended for those who already have some experience in setting up an OpenCV development environment and building applications with OpenCV. You should be comfortable with computer vision concepts, object-oriented programming, graphics programming, IDEs, and the command line. What You Will Learn Select and configure camera systems to see invisible light, fast motion, and distant objects Build a "camera trap", as used by nature photographers, and process photos to create beautiful effects Develop a facial expression recognition system with various feature extraction techniques and machine learning methods Build a panorama Android application using the OpenCV stitching module in C++ with NDK support Optimize your object detection model, make it rotation invariant, and apply scene-specific constraints to make it faster and more robust Create a person identification and registration system based on biometric properties of that person, such as their fingerprint, iris, and face Fuse data from videos and gyroscopes to stabilize videos shot from your mobile phone and create hyperlapse style videos In Detail Computer vision is becoming accessible to a large audience of software developers who can leverage mature libraries such as OpenCV. However, as they move beyond their first experiments in computer vision, developers may struggle to ensure that their solutions are sufficiently well optimized, well trained, robust, and adaptive in real-world conditions. With sufficient knowledge of OpenCV, these developers will have enough confidence to go about creating projects in the field of computer vision. This book will help you tackle increasingly challenging computer vision problems that you may face in your careers. It makes use of OpenCV 3 to work around some interesting projects. Inside these pages, you will find practical and innovative approaches that are battle-tested in the authors' industry experience and research. Each chapter covers the theory and practice of multiple complementary approaches so that you will be able to choose wisely in your future projects. You will also gain insights into the architecture and algorithms that underpin OpenCV's functionality. We begin by taking a critical look at inputs in order to decide which kinds of light, cameras, lenses, and image formats are best suited to a given purpose. We proceed to consider the finer aspects of computational photography as we build an automated camera to assist nature photographers. You will gain a deep understanding of some of the most widely applicable and reliable techniques in object detection, feature selection, tracking, and even biometric recognition. We will also build Android projects in which we explore the complexities of camera motion: first in panoramic image stitching and then in video stabilization. By the end of the book, you will have a much richer understanding of imaging, motion, machine learning, and the architecture of computer vision libraries and applications! Style and approach This book covers a combination of theory and practice. We examine blueprints for specific projects and discuss the principles behind these blueprints, in detail.

Innovative Developments in Virtual and Physical Prototyping presents essential research in the area of Virtual and Rapid Prototyping. The volume contains reviewed papers presented at the 5th International Conference on Advanced Research in Virtual and Rapid Prototyping, hosted by the Centre for Rapid and Sustainable Product Development of the Polytechnic Institute of Leiria, Portugal, from September 28 to October 1, 2011. A wide range of topics is covered, such as CAD and 3D Data Acquisition Technologies, Additive and Nano Manufacturing Technologies, Rapid Tooling & Manufacturing, Biomanufacturing, Materials for Advanced Manufacturing Processes, Virtual Environments and Simulation, Applications of Virtual and Physical Prototyping Technologies. Innovative Developments in Virtual and Physical Prototyping is intended for engineers, designers and manufacturers who are active in the areas of mechanical, industrial and biomedical engineering.

The seven-volume set comprising LNCS volumes 7572-7578 constitutes the refereed proceedings of the 12th European

Conference on Computer Vision, ECCV 2012, held in Florence, Italy, in October 2012. The 408 revised papers presented were carefully reviewed and selected from 1437 submissions. The papers are organized in topical sections on geometry, 2D and 3D shapes, 3D reconstruction, visual recognition and classification, visual features and image matching, visual monitoring: action and activities, models, optimisation, learning, visual tracking and image registration, photometry: lighting and colour, and image segmentation.

Program Kinect to do awesome things using a unique selection of open source software! The Kinect motion-sensing device for the Xbox 360 and Windows became the world's fastest-selling consumer electronics device when it was released (8 million sold in its first 60 days) and won prestigious awards, such as "Gaming Gadget of the Year." Now Kinect Open Source Programming Secrets lets YOU harness the Kinect's powerful sensing capabilities for gaming, science, multimedia projects, and a mind-boggling array of other applications on platforms running Windows, Mac OS, and Linux. Dr. Andrew Davison, a user interface programming expert, delivers exclusive coverage of how to program the Kinect sensor with the Java wrappers for OpenNI and NITE, which are APIs created by PrimeSense, the primary developers of the Kinect's technology. Beginning with the basics--depth imaging, 3D point clouds, skeletal tracking, and hand gestures--the book examines many other topics, including Kinect gaming, FFAST-style gestures that aren't part of standard NITE, motion detection using OpenCV, how to create gesture-driven GUIs, accessing the Kinect's motor and accelerometer, and other tips and techniques. Inside: Free open source APIs to let you develop amazing Kinect hacks for commercial or private use Full coverage of depth detection, camera, and infrared imaging point clouds; Kinect gaming; 3D programming; gesture-based GUIs, and more Online access to detailed code examples on the author's web site, plus bonus chapters on speech recognition, beamforming, and other exotica From the Author Why Buy This Book? I can suggest four reasons for buying this book: It offers a unique choice of Kinect programming tools. It explains the official Java wrappers for those tools. It covers topics not found elsewhere. It provides depth, but with brevity. Unique Programming Tools This is the only book on programming the Kinect using the OpenNI library, NITE, and Java (as of April 2012, when this book went to press). Official Java Wrappers This is the only book that explains the official Java wrappers for OpenNI and NITE (again, as of April 2012). By "official," I mean that these bindings were developed by PrimeSense. Obvious advantages of Java include object-orientation, cross-platform support, availability for free, and many people (including you, probably) knowing how to program with it. Most important, programming in Java gives you access to a massive number of libraries—for graphics, networking, and beyond—that can be linked to the Kinect without much effort. For example, I'll demonstrate how to use the Java 3D graphics library and the Java binding for the OpenCV computer vision package. The main drawback of using the PrimeSense Java wrappers is their lack of documentation. As I explain in Chapter 1, I had to decompile the libraries' JAR files, and work out the correspondences between the Java source and the somewhat better documented C++ OpenNI/NITE APIs. (This is why including Secrets in the book's title isn't too excessive.) A Wide Range of Topics This book covers programming topics not found elsewhere. I start off with the basics, of course, with chapters on depth, infrared, and RGB imaging, point clouds, skeletal user tracking, hand tracking, and gesture support. Moving beyond that, I cover several novel and unusual features, including the following: Kinect gaming based around a version of the classic Breakout video game. Controls for the Kinect motor, LED, and accelerometer, which are not part of the standard OpenNI API. In fact, their absence is often held up as a serious drawback of the API. It's actually quite easy to add these capabilities using a custom-built USB driver. 3D graphics programming in the point cloud and skeletal tracking examples, using Java 3D. A computer vision example that demonstrates how to link the Kinect to the popular (and powerful) OpenCV library. The creation of new body gestures (inspired by the FFAST system), which are not part of the limited NITE repertoire. A new type of GUI component controlled by hand gesturing, illustrated with three examples: a button, dial, and slider. These components are controlled without the help of mouse or keyboard. Depth with Brevity This book describes a lot of complicated code but, unlike some rather hefty programming tomes, you won't find all the code tediously printed on these pages. Instead, you can download it from the book's website. In addition, I've been adding supplementary chapters to the website, including ones discussing speech recognition and the Kinect microphone array.

The two-volume set LNCS 7382 and 7383 constitutes the refereed proceedings of the 13th International Conference on Computers Helping People with Special Needs, ICCHP 2012, held in Linz, Austria, in July 2012. The 147 revised full papers and 42 short papers were carefully reviewed and selected from 364 submissions. The papers included in the second volume are organized in the following topical sections: portable and mobile systems in assistive technology; assistive technology, HCI and rehabilitation; sign 2.0: ICT for sign language users: information sharing, interoperability, user-centered design and collaboration; computer-assisted augmentative and alternative communication; easy to Web between science of education, information design and speech technology; smart and assistive environments: ambient assisted living; text entry for accessible computing; tactile graphics and models for blind people and recognition of shapes by touch; mobility for blind and partially sighted people; and human-computer interaction for blind and partially sighted people.

Unleash the power of computer vision with Python using OpenCV About This Book Create impressive applications with OpenCV and Python Familiarize yourself with advanced machine learning concepts Harness the power of computer vision with this easy-to-follow guide Who This Book Is For Intended for novices to the world of OpenCV and computer vision, as well as OpenCV veterans that want to learn about what's new in OpenCV 3, this book is useful as a reference for experts and a training manual for beginners, or for anybody who wants to familiarize themselves with the concepts of object classification and detection in simple and understandable terms. Basic knowledge about Python and programming concepts is required, although the book has an easy learning curve both from a theoretical and coding point of view. What You Will Learn Install and familiarize yourself with OpenCV 3's Python API Grasp the basics of image processing and video analysis Identify and recognize objects in images and videos Detect and recognize faces using OpenCV Train and use your own object classifiers Learn about machine learning concepts in a computer vision context Work with artificial neural networks using OpenCV Develop your own computer vision real-life application In Detail OpenCV 3 is a state-of-the-art computer vision library that allows a great variety of image and video processing operations. Some of the more spectacular and futuristic features such as face recognition or object tracking are easily achievable with OpenCV 3. Learning the basic concepts behind computer vision algorithms, models, and OpenCV's API will enable the development of all sorts of real-world applications, including security and surveillance. Starting with basic image processing operations,

the book will take you through to advanced computer vision concepts. Computer vision is a rapidly evolving science whose applications in the real world are exploding, so this book will appeal to computer vision novices as well as experts of the subject wanting to learn the brand new OpenCV 3.0.0. You will build a theoretical foundation of image processing and video analysis, and progress to the concepts of classification through machine learning, acquiring the technical know-how that will allow you to create and use object detectors and classifiers, and even track objects in movies or video camera feeds. Finally, the journey will end in the world of artificial neural networks, along with the development of a hand-written digits recognition application. Style and approach This book is a comprehensive guide to the brand new OpenCV 3 with Python to develop real-life computer vision applications.

OpenNI CookbookPackt Publishing Ltd

Program Kinect to do awesome things using a unique selection of open source software! The Kinect motion-sensing device for the Xbox 360 and Windows became the world's fastest-selling consumer electronics device when it was released (8 million sold in its first 60 days) and won prestigious awards, such as "Gaming Gadget of the Year." Now Kinect Open Source Programming Secrets lets YOU harness the Kinect's powerful sensing capabilities for gaming, science, multimedia projects, and a mind-boggling array of other applications on platforms running Windows, Mac OS, and Linux. Dr. Andrew Davison, a user interface programming expert, delivers exclusive coverage of how to program the Kinect sensor with the Java wrappers for OpenNI and NITE, which are APIs created by PrimeSense, the primary developers of the Kinect's technology. Beginning with the basics--depth imaging, 3D point clouds, skeletal tracking, and hand gestures--the book examines many other topics, including Kinect gaming, FAAST-style gestures that aren't part of standard NITE, motion detection using OpenCV, how to create gesture-driven GUIs, accessing the Kinect's motor and accelerometer, and other tips and techniques. Inside: Free open source APIs to let you develop amazing Kinect hacks for commercial or private use Full coverage of depth detection, camera, and infrared imaging point clouds; Kinect gaming; 3D programming; gesture-based GUIs, and more Online access to detailed code examples on the author's web site, plus bonus chapters on speech recognition, beamforming, and other exotica

There is a tremendous interest among researchers for the development of virtual, augmented reality and games technologies due to their widespread applications in medicine and healthcare. To date the major applications of these technologies include medical simulation, telemedicine, medical and healthcare training, pain control, visualisation aid for surgery, rehabilitation in cases such as stroke, phobia and trauma therapies. Many recent studies have identified the benefits of using Virtual Reality, Augmented Reality or serious games in a variety of medical applications. This research volume on Virtual, Augmented Reality and Serious Games for Healthcare 1 offers an insightful introduction to the theories, development and applications of virtual, augmented reality and digital games technologies in medical and clinical settings and healthcare in general. It is divided into six sections: section one presents a selection of applications in medical education and healthcare management; Section two relates to the nursing training, health literacy and healthy behaviour; Section three presents the applications of Virtual Reality in neuropsychology; Section four includes a number of applications in motor rehabilitation; Section five aimed at therapeutic games for various diseases; and the final section presents the applications of Virtual Reality in healing and restoration. This book is directed to the healthcare professionals, scientists, researchers, professors and the students who wish to explore the applications of virtual, augmented reality and serious games in healthcare further.

Design, simulate, and program interactive robots Key Features Design, simulate, build, and program an interactive autonomous mobile robot Leverage the power of ROS, Gazebo, and Python to enhance your robotic skills A hands-on guide to creating an autonomous mobile robot with the help of ROS and Python Book Description Robot Operating System (ROS) is one of the most popular robotics software frameworks in research and industry. It has various features for implementing different capabilities in a robot without implementing them from scratch. This book starts by showing you the fundamentals of ROS so you understand the basics of differential robots. Then, you'll learn about robot modeling and how to design and simulate it using ROS. Moving on, we'll design robot hardware and interfacing actuators. Then, you'll learn to configure and program depth sensors and LIDARs using ROS. Finally, you'll create a GUI for your robot using the Qt framework. By the end of this tutorial, you'll have a clear idea of how to integrate and assemble everything into a robot and how to bundle the software package. What you will learn Design a differential robot from scratch Model a differential robot using ROS and URDF Simulate a differential robot using ROS and Gazebo Design robot hardware electronics Interface robot actuators with embedded boards Explore the interfacing of different 3D depth cameras in ROS Implement autonomous navigation in ChefBot Create a GUI for robot control Who this book is for This book is for those who are conducting research in mobile robotics and autonomous navigation. As well as the robotics research domain, this book is also for the robot hobbyist community. You're expected to have a basic understanding of Linux commands and Python.

This book constitutes the proceedings of the 4th International Conference on Intelligent Technologies for Interactive Entertainment (INTETAIN 11). The 20 full papers, 3 posters, 10 demos and 4 workshops presented were carefully selected from numerous submissions. The conference aims enhancing the understanding of recent and anticipated advances in interactive technologies, and their applications to entertainment, education, culture, and the arts. Interaction technologies are having relevant changes in the last years, and will influence the way users consume and interact with the media and applications, both locally and over the Internet. The explosion of natural, multimodal, and touch based interfaces, and their access to the general public, has made new interaction paradigms a reality.

This book constitutes the refereed proceedings of the 5th International Workshop on Motion in Games, held in Rennes, France, in November 2012. The 23 revised full papers presented together with 9 posters and 5 extended abstracts were carefully reviewed and selected from numerous submissions. The papers are organized in topical sections on planning,

This book constitutes the refereed proceedings of the 6th International Conference on Social Robotics, ICSR 2014, held in Sydney, NSW, Australia, in October 2014. The 41 revised full papers presented in this book were carefully reviewed and selected from numerous submissions. Amongst others, topics covered are such as interaction and collaboration among robots, humans, and environments; robots to assist the elderly and persons with disabilities; socially assistive robots to improve quality of life; affective and cognitive sciences for socially interactive robots; personal robots for the home; social acceptance and impact in the society; robot ethics in human society and legal implications; context awareness, expectation, and intention understanding; control architectures for social robotics; socially appealing design methodologies; safety in robots working in human spaces; human augmentation, rehabilitation, and medical robots; robot applications in education, entertainment, and gaming; knowledge representation and reasoning frameworks for robot social intelligence; cognitive architectures that support social intelligence for robots; robots in the workplace; human-robot interaction; creative and entertaining robots.

Over 35 hands-on recipes to create impressive, stunning visuals for a wide range of real-time, interactive applications using OpenGL About This Book Get acquainted with a set of fundamental OpenGL primitives and concepts that enable users to create stunning visuals of arbitrarily complex 2D and 3D datasets for many common applications Explore interactive, real-time visualization of large 2D and 3D datasets or models, including the use of more advanced techniques such as stereoscopic 3D rendering. Create stunning visuals on the latest platforms including mobile phones and state-of-the-art wearable computing devices Who This Book Is For This book is aimed at anyone interested in creating impressive data visualization tools using modern graphics hardware. Whether you are a developer, engineer, or scientist, if you are interested in exploring the power of OpenGL for data visualization, this book is for you. While familiarity with C/C++ is recommended, no previous experience with OpenGL is assumed. What You Will Learn Install, compile, and integrate the OpenGL pipeline into your own project Create interactive applications using GLFW to handle user inputs and the Android Sensor framework to detect gestures and motions on mobile devices Use OpenGL primitives to plot 2-D datasets such as time series dynamically Render complex 3D volumetric datasets with techniques such as data slicers and multiple viewpoint projection Render images, videos, and point cloud data from 3D range-sensing cameras using the OpenGL Shading Language (GLSL) Develop video see-through augmented reality applications on mobile devices with OpenGL ES 3.0 and OpenCV Visualize 3D models with meshes and surfaces using stereoscopic 3D technology In Detail OpenGL is a great multi-platform, cross-language, and hardware-accelerated graphics interface for visualizing large 2D and 3D datasets. Data visualization has become increasingly challenging using conventional approaches as datasets become larger and larger, especially with the Big Data evolution. From a mobile device to a sophisticated high-performance computing cluster, OpenGL libraries provide developers with an easy-to-use interface to create stunning visuals in 3D in real time for a wide range of interactive applications. This book provides a series of easy-to-follow, hands-on tutorials to create appealing OpenGL-based visualization tools with minimal development time. We will first illustrate how to quickly set up the development environment in Windows, Mac OS X, and Linux. Next, we will demonstrate how to visualize data for a wide range of applications using OpenGL, starting from simple 2D datasets to increasingly complex 3D datasets with more advanced techniques. Each chapter addresses different visualization problems encountered in real life and introduces the relevant OpenGL features and libraries in a modular fashion. By the end of this book, you will be equipped with the essential skills to develop a wide range of impressive OpenGL-based applications for your unique data visualization needs, on platforms ranging from conventional computers to the latest mobile/wearable devices. Style and approach This is an easy-to-follow, comprehensive Cookbook showing readers how to create an application with real-time, interactive data visualization in stereoscopic 3D. Each topic is explained in a step-by-step format. A range of hot topics is included, including data visualization on mobile and wearable platforms.

Manufacturing and Engineering Technology brings together around 200 peer-reviewed papers presented at the 2014 International Conference on Manufacturing and Engineering Technology, held in San-ya, China, October 17-19, 2014. The main objective of these proceedings is to take the Manufacturing and Engineering Technology discussion a step further. Contributions cover Manufacture, Mechanical, Materials Science, Industrial Engineering, Control, Information and Computer Engineering. Furthermore, these proceedings provide a platform for researchers, engineers, academics as well as industrial professionals from all over the world to present their research results and development activities in Manufacturing Science and Engineering Technology.

This book is for programmers who want to expand their skills by building fun, smart, and useful systems with OpenCV. The projects are ideal in helping you to think creatively about the uses of computer vision, natural user interfaces, and ubiquitous computers (in your home, car, and hand).

This book includes the thoroughly refereed post-conference proceedings of the 16th Annual RoboCup International Symposium, held in Mexico City, Mexico, in June 2012. The 24 revised papers presented together with nine champion team papers and one best paper award were carefully reviewed and selected from 64 submissions. The papers present current research and educational activities within the fields of Robotics and Artificial Intelligence with a special focus to robot hardware and software, perception and action, robotic cognition and learning, multi-robot systems, human-robot interaction, education and edutainment, and applications.

Musical Performance covers many aspects like Musical Acoustics, Music Psychology, or motor and prosodic actions. It deals with basic concepts of the origin of music and its evolution, ranges over neurocognitive foundations, and covers computational, technological, or simulation solutions. This volume gives an overview about current research in the foundation of musical performance studies on all these levels. Recent concepts of synchronized systems, evolutionary concepts, basic understanding of performance as Gestalt patterns, theories of chill as performance goals or historical aspects are covered. The neurocognitive basis of motor action in terms of music, musical syntax, as well as therapeutic aspects are discussed. State-of-the-art applications in performance realizations, like virtual room acoustics, virtual musicians, new concepts of real-time physical modeling using complex performance data as input or sensor and gesture studies with soft- and hardware solutions are presented. So although the field is still much larger, this volume presents current trends in terms of understanding, implementing, and perceiving performance.

This book presents in a systematic manner the advanced technologies used for various modern robot applications. By bringing fresh ideas, new concepts, novel methods and tools into robot control, robot vision, human robot interaction, teleoperation of robot and multiple robots system, we are to provide a state-of-the-art and comprehensive treatment of the advanced technologies for a wide range of robotic applications. Particularly, we focus on the topics of advanced control and obstacle avoidance techniques for robot to deal with unknown perturbations, of visual servoing techniques which enable robot to autonomously operate in a dynamic environment, and of advanced techniques involved in human robot interaction. The book is primarily intended for researchers and engineers in the robotic and control community. It can also serve as complementary reading for robotics at the both graduate and undergraduate levels.

Embodied conversational agents (ECA) and speech-based human-machine interfaces can together represent more advanced and more natural human-machine interaction. Fusion of both topics is a challenging agenda in research and production spheres. The important goal of human-machine interfaces is to provide content or functionality in the form of a dialog resembling face-to-face conversations. All natural interfaces strive to exploit and use different communication strategies that provide additional meaning to the content, whether they are human-machine interfaces for controlling an application or different ECA-based human-machine interfaces directly simulating face-to-face conversation. *Coverbal Synchrony in Human-Machine Interaction* presents state-of-the-art concepts of advanced environment-independent multimodal human-machine interfaces that can be used in different contexts, ranging from simple multimodal web-browsers (for example, multimodal content reader) to more complex multimodal human-machine interfaces for ambient intelligent environments (such as supportive environments for elderly and agent-guided household environments). They can also be used in different computing environments—from pervasive computing to desktop environments. Within these concepts, the contributors discuss several communication strategies, used to provide different aspects of human-machine interaction.

This is a Cookbook with plenty of practical recipes enriched with explained code and relevant screenshots to ease your learning curve. If you are a beginner or a professional in NIUI and want to write serious applications or games, then this book is for you. Even OpenNI 1 and OpenNI 1.x programmers who want to move to new versions of OpenNI can use this book as a starting point. This book uses C++ as the primary language but there are some examples in C# and Java too, so you need to have about a basic working knowledge of C or C++ for most cases.

Discover best practices and troubleshooting solutions when working on ROS Key Features Develop complex robotic applications using ROS to interface robot manipulators and mobile robots Gain insight into autonomous navigation in mobile robots and motion planning in robot manipulators Discover best practices and troubleshooting solutions Book Description In this day and age, robotics has been gaining a lot of traction in various industries where consistency and perfection matter. Automation is achieved via robotic applications and various platforms that support robotics. The Robot Operating System (ROS) is a modular software platform to develop generic robotic applications. This book focuses on the most stable release of ROS (Kinetic Kame), discusses advanced concepts, and effectively teaches you programming using ROS. We begin with an informative overview of the ROS framework, which will give you a clear idea of how ROS works. During the course of this book, you'll learn to build models of complex robots, and simulate and interface the robot using the ROS MoveIt! motion planning library and ROS navigation stacks. Learn to leverage several ROS packages to embrace your robot models. After covering robot manipulation and navigation, you'll get to grips with the interfacing I/O boards, sensors, and actuators of ROS. Vision sensors are a key component of robots, and an entire chapter is dedicated to the vision sensor and image elaboration, its interface in ROS and programming. You'll also understand the hardware interface and simulation of complex robots to ROS and ROS Industrial. At the end of this book, you'll discover the best practices to follow when programming using ROS. What you will learn Create a robot model with a seven-DOF robotic arm and a differential wheeled mobile robot Work with Gazebo and V-REP robotic simulator Implement autonomous navigation in differential drive robots using SLAM and AMCL packages Explore the ROS Pluginlib, ROS nodelets, and Gazebo plugins Interface I/O boards such as Arduino, robot sensors, and high-end actuators Simulate and motion plan an ABB and universal arm using ROS Industrial Explore the latest version of the ROS framework Work with the motion planning of a seven-DOF arm using MoveIt! Who this book is for If you are a robotics enthusiast or researcher who want to learn more about building robot applications using ROS, this book is for you. In order to learn from this book, you should have a basic knowledge of ROS, GNU/Linux, and C++ programming concepts. The book is also excellent for programmers who want to explore the advanced features of ROS.

This volume presents the proceedings of Medicon 2016, held in Paphos, Cyprus. Medicon 2016 is the XIV in the series of regional meetings of the International Federation of Medical and Biological Engineering (IFMBE) in the Mediterranean. The goal of Medicon 2016 is to provide updated information on the state of the art on Medical and Biological Engineering and Computing under the main theme "Systems Medicine for the Delivery of Better Healthcare Services". Medical and Biological Engineering and Computing cover complementary disciplines that hold great promise for the advancement of research and development in complex medical and biological systems. Research and development in these areas are impacting the science and technology by advancing fundamental concepts in translational medicine, by helping us understand human physiology and function at multiple levels, by improving tools and techniques for the detection, prevention and treatment of disease. Medicon 2016 provides a common platform for the cross fertilization of ideas, and to help shape knowledge and scientific achievements by bridging complementary disciplines into an interactive and attractive forum under the special theme of the conference that is Systems Medicine for the Delivery of Better Healthcare Services. The programme consists of some 290 invited and submitted papers on new developments around the Conference theme, presented in 3 plenary sessions, 29 parallel scientific sessions and 12 special sessions.

The six-volume set LNCS 8579-8584 constitutes the refereed proceedings of the 14th International Conference on Computational Science and Its Applications, ICCSA 2014, held in Guimarães, Portugal, in June/July 2014. The 347 revised papers presented in 30 workshops and a special track were carefully reviewed and selected from 1167. The 289 papers presented in the workshops cover various areas in computational science ranging from computational science technologies to specific areas of computational science such as computational geometry and security.

The 3 volume-set LNCS 11566, 11567 + 11568 constitutes the refereed proceedings of the Human Computer Interaction thematic area of the 21st International Conference on Human-Computer Interaction, HCII 2019, which took place in Orlando, Florida, USA, in July 2019. A total of 1274 papers and 209 posters have been accepted for publication in the HCII 2019 proceedings from a total of 5029 submissions. The 125 papers included in this HCI 2019 proceedings were organized in topical sections as follows: Part I: design and evaluation methods and tools; redefining the human in HCI; emotional design, Kansei and aesthetics in HCI; and narrative, storytelling, discourse and dialogue. Part II: mobile interaction; facial expressions and emotions recognition; eye-gaze, gesture and motion-based interaction; and interaction in virtual and augmented reality. Part III: design for social challenges; design for culture and entertainment; design for intelligent urban environments; and design and evaluation case studies.

Get savvy with OpenCV and actualize cool computer vision applications About This Book Use OpenCV's Python bindings to capture video, manipulate images, and track objects Learn about the different functions of OpenCV and their actual implementations. Develop a series of intermediate to advanced projects using OpenCV and Python Who This Book Is For This learning path is for someone who has a working knowledge of Python and wants to try out OpenCV. This Learning Path will take you from a beginner to an expert in computer vision applications using OpenCV. OpenCV's application are humongous and this Learning Path is the best resource to get yourself acquainted thoroughly with OpenCV. What You Will Learn Install OpenCV and related software such as Python, NumPy, SciPy, OpenNI, and

SensorKinect - all on Windows, Mac or Ubuntu Apply "curves" and other color transformations to simulate the look of old photos, movies, or video games Apply geometric transformations to images, perform image filtering, and convert an image into a cartoon-like image Recognize hand gestures in real time and perform hand-shape analysis based on the output of a Microsoft Kinect sensor Reconstruct a 3D real-world scene from 2D camera motion and common camera reprojection techniques Detect and recognize street signs using a cascade classifier and support vector machines (SVMs) Identify emotional expressions in human faces using convolutional neural networks (CNNs) and SVMs Strengthen your OpenCV2 skills and learn how to use new OpenCV3 features In Detail OpenCV is a state-of-art computer vision library that allows a great variety of image and video processing operations. OpenCV for Python enables us to run computer vision algorithms in real time. This learning path proposes to teach the following topics. First, we will learn how to get started with OpenCV and OpenCV3's Python API, and develop a computer vision application that tracks body parts. Then, we will build amazing intermediate-level computer vision applications such as making an object disappear from an image, identifying different shapes, reconstructing a 3D map from images , and building an augmented reality application, Finally, we'll move to more advanced projects such as hand gesture recognition, tracking visually salient objects, as well as recognizing traffic signs and emotions on faces using support vector machines and multi-layer perceptrons respectively. This Learning Path combines some of the best that Packt has to offer in one complete, curated package. It includes content from the following Packt products: OpenCV Computer Vision with Python by Joseph Howse OpenCV with Python By Example by Prateek Joshi OpenCV with Python Blueprints by Michael Beyeler Style and approach This course aims to create a smooth learning path that will teach you how to get started with will learn how to get started with OpenCV and OpenCV 3's Python API, and develop superb computer vision applications. Through this comprehensive course, you'll learn to create computer vision applications from scratch to finish and more!. Conference proceedings of the U.S. Tcl conference of 2012

The objective of this book is to provide the reader with a comprehensive coverage on the Robot Operating Systems (ROS) and latest related systems, which is currently considered as the main development framework for robotics applications. The book includes twenty-seven chapters organized into eight parts. Part 1 presents the basics and foundations of ROS. In Part 2, four chapters deal with navigation, motion and planning. Part 3 provides four examples of service and experimental robots. Part 4 deals with real-world deployment of applications. Part 5 presents signal-processing tools for perception and sensing. Part 6 provides software engineering methodologies to design complex software with ROS. Simulations frameworks are presented in Part 7. Finally, Part 8 presents advanced tools and frameworks for ROS including multi-master extension, network introspection, controllers and cognitive systems. This book will be a valuable companion for ROS users and developers to learn more ROS capabilities and features.

OpenCV 3.0 Computer Vision with Java is a practical tutorial guide that explains fundamental tasks from computer vision while focusing on Java development. This book will teach you how to set up OpenCV for Java and handle matrices using the basic operations of image processing such as filtering and image transforms. It will also help you learn how to use Haar cascades for tracking faces and to detect foreground and background regions with the help of a Kinect device. It will even give you insights into server-side OpenCV. Each chapter is presented with several projects that are ready to use. The functionality of these projects is found in many classes that allow developers to understand computer vision principles and rapidly extend or customize the projects for their needs.

This book reports on the latest technological and clinical advances in the field of neurorehabilitation. It is, however, much more than a conventional survey of the state-of-the-art in neurorehabilitation technologies and therapies. It was formed on the basis of a week of lively discussions between curious PhD students and leading research experts during the summer school on neurorehabilitation (SSNR2012), September 16-21 in Nuévalos, Zaragoza (Spain). Its unconventional format makes it a perfect guide for all PhD students, researchers and professionals interested in gaining a multidisciplinary perspective on current and future neurorehabilitation scenarios. The book covers various aspects of neurorehabilitation research and practice, organized into different parts. The first part discusses a selection of common impairments affecting brain function, such as stroke, cerebral palsy and Parkinson's disease; the second deals with both spinal cord and brain plasticity. The third part covers the most recent rehabilitation and diagnostics technologies, including robotics, neuroprostheses, brain-machine interfaces and electromyography systems. Practical examples and case studies related to the application of some of the latest techniques in realistic clinical scenarios are covered in the fourth part.

If you've done some Arduino tinkering and wondered how you could incorporate the Kinect—or the other way around—then this book is for you. The authors of Arduino and Kinect Projects will show you how to create 10 amazing, creative projects, from simple to complex. You'll also find out how to incorporate Processing in your project design—a language very similar to the Arduino language. The ten projects are carefully designed to build on your skills at every step. Starting with the Arduino and Kinect equivalent of "Hello, World," the authors will take you through a diverse range of projects that showcase the huge range of possibilities that open up when Kinect and Arduino are combined. Gesture-based Remote Control. Control devices and home appliances with hand gestures. Kinect-networked Puppet. Play with a physical puppet remotely using your whole body. Mood Lamps. Build your own set of responsive, gesture controllable LED lamps. Drawing Robot. Control a drawing robot using a Kinect-based tangible table. Remote-controlled Vehicle. Use your body gestures to control a smart vehicle. Biometric Station. Use the Kinect for biometric recognition and checking Body Mass Indexes. 3D Modeling Interface. Learn how to use the Arduino LilyPad to build a wearable 3D modelling interface. 360o Scanner. Build a turntable scanner and scan any object 360o using only one Kinect. Delta Robot. Build and control your own fast and accurate parallel robot.

Meet the Kinect introduces the exciting world of volumetric computing using the Microsoft Kinect. You'll learn to write scripts and software enabling the use of the Kinect as an input device. Interact directly with your computer through physical motion. The Kinect will read and track body movements, and is the bridge between the physical reality in which you exist and the virtual world created by your software. Microsoft's Kinect was released in fall 2010 to become the fastest-selling electronic device ever. For the first time, we have an inexpensive, three-dimensional sensor enabling direct interaction between human and computer, between the physical world and the virtual. The Kinect has been enthusiastically adopted by a growing culture of enthusiasts, who put it to work in creating technology-based art projects, three-dimensional scanners, adaptive devices for sight-impaired individuals, new ways of interacting with PCs, and even profitable business opportunities. Meet the Kinect is the resource to get you started in mastering the Kinect and the exciting possibilities it brings. You'll learn about the Kinect hardware and what it can do. You'll install drivers and learn to download and run the growing amount of Kinect software freely available on the Internet. From there, you'll move into writing code using some of the more popular frameworks and APIs, including the official Microsoft API and the language known as Processing that is popular in the art and creative world. Along the way, you'll learn principles and terminology. Volumetric computing didn't begin with the Kinect. The field is decades old—if you've ever had an MRI, for example, you have benefitted from volumetric computing technology. Meet the Kinect goes beyond just the one device to impart the principles and terminology underlying the exciting field of volumetric computing that is now wide-open and accessible to the average person.

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