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KEY=REVERSE - CAROLYN BRENDAN

REVERSE ENGINEERING

TECHNOLOGY OF REINVENTION

CRC Press The process of reverse engineering has proven infinitely useful for analyzing Original Equipment Manufacturer (OEM) components to duplicate or repair them, or simply improve on their design. A guidebook to the rapid-fire changes in this area, Reverse Engineering: Technology of Reinvention introduces the fundamental principles, advanced methodologies, and other essential aspects of reverse engineering. The book's primary objective is twofold: to advance the technology of reinvention through reverse engineering and to improve the competitiveness of commercial parts in the aftermarket. Assembling and synergizing material from several different fields, this book prepares readers with the skills, knowledge, and abilities required to successfully apply reverse engineering in diverse fields ranging from aerospace, automotive, and medical device industries to academic research, accident investigation, and legal and forensic analyses. With this mission of preparation in mind, the author offers real-world examples to: Enrich readers' understanding of reverse engineering processes, empowering them with alternative options regarding part production Explain the latest technologies, practices, specifications, and regulations in reverse engineering Enable readers to judge if a "duplicated or repaired" part will meet the design functionality of the OEM part This book sets itself apart by covering seven key subjects: geometric measurement, part evaluation, materials identification, manufacturing process verification, data analysis, system compatibility, and intelligent property protection. Helpful in making new, compatible products that are cheaper than others on the market, the author provides the tools to uncover or clarify features of commercial products that were either previously unknown, misunderstood, or not used in the most effective way.

REVERSE ENGINEERING

McGraw-Hill Professional Publishing Discover the Powerfully Economical Engineering Method That. . . The process od siassembling one or more problem hardware components to determine its design, reverse engineering (RE) is one of the most economical (and legal) ways to maintain or upgrade a troubled manufacturing system without paying to fully revamp it. Now for the first time Kathryn A. Ingle's Reverse Engineering takes you through every step in the process of targeting and correcting component problems--showing you how to implement a sophisticated RE program from start to finish. It's packed with dozens of real-world examples plus guidelines for using RE to calculate return on investment.

A METHODOLOGY FOR DESIGNING PRODUCT COMPONENTS WITH BUILT-IN BARRIERS TO REVERSE ENGINEERING

Reverse engineering, defined as extracting information about a product from the product itself, is a common industry practice for gaining insight into innovative products. Both the original designer and those reverse engineering the original design can benefit from estimating the time and barrier to reverse engineer a product. This thesis presents a set of metrics and parameters that can be used to calculate the barrier to reverse engineer any product as well as the time required to do so. To the original designer, these numerical representations of the barrier and time can be used to strategically identify and improve product characteristics so as to increase the difficulty and time to reverse engineer them. One method for increasing the time and barrier to reverse engineer a product -- presented in this thesis -- is to treat material microstructures (crystallographic grain size, orientation, and distribution) as continuous design variables that can be manipulated to identify unusual material properties and to design devices with unexpected mechanical performance. A practical approach, carefully tied to proven manufacturing strategies, is used to tailor material microstructures by strategically orienting and laminating thin anisotropic metallic sheets. This approach, coupled with numerical optimization, manipulates material microstructures to obtain desired material properties at designer-specified locations (heterogeneously) or across the entire part (homogeneously). As the metrics and parameters characterizing the reverse engineering time and barrier are also quantitative in nature, they can also be used in conjunction with numerical optimization techniques, thereby enabling products to be developed with a maximum reverse engineering barrier and time -- at a minimum development cost. On the other hand, these quantitative measures enable competitors who reverse engineer original designs to focus their efforts on products that will result in the greatest return on investment. While many products were analyzed in an empirical study demonstrating that the characterization of the time to reverse engineer a product has an average error of 12.2%, we present the results of three different products. Two additional examples are also presented showing how microstructure manipulation leads to product hardware with unexpected mechanical performance effectively increasing reverse engineering time and barrier.

THE GHIDRA BOOK

THE DEFINITIVE GUIDE

No Starch Press A guide to using the Ghidra software reverse engineering tool suite. The result of more than a decade of research and development within the NSA, the Ghidra platform was developed to address some of the agency's most challenging reverse-engineering problems. With the open-source release of this formerly restricted tool suite, one of the world's most capable disassemblers and intuitive decompilers is now in the hands of cybersecurity defenders everywhere -- and The Ghidra Book is the one and only guide you need to master it. In addition to discussing RE techniques useful in analyzing software and malware of all kinds, the book thoroughly introduces Ghidra's components, features, and unique capacity for group collaboration. You'll learn how to: • Navigate a disassembly • Use Ghidra's built-in decompiler to expedite analysis • Analyze obfuscated binaries • Extend Ghidra to recognize new data types • Build new Ghidra analyzers and loaders • Add support for new processors and instruction sets • Script Ghidra tasks to automate workflows • Set up and use a collaborative reverse engineering environment Designed for beginner and advanced users alike, The Ghidra Book will effectively prepare you to meet the needs and challenges of RE, so you can analyze files like a pro.

REVERSE ENGINEERING

RECENT ADVANCES AND APPLICATIONS

BoD – Books on Demand Reverse engineering encompasses a wide spectrum of activities aimed at extracting information on the function, structure, and behavior of man-made or natural artifacts. Increases in data sources, processing power, and improved data mining and processing algorithms have opened new fields of application for reverse engineering. In this book, we present twelve applications of reverse engineering in the software engineering, shape engineering, and medical and life sciences application domains. The book can serve as a guideline to practitioners in the above fields to the state-of-the-art in reverse engineering techniques, tools, and use-cases, as well as an overview of open challenges for reverse engineering researchers.

REVERSE ENGINEERING

AN INDUSTRIAL PERSPECTIVE

Springer Science & Business Media This edited collection of essays from world-leading academic and industrial authors yields insight into all aspects of reverse engineering. Methods of reverse engineering analysis are covered, along with special emphasis on the investigation of surface and internal structures. Frequently-used hardware and software are assessed and advice given on the most suitable choice of system. Also covered is rapid prototyping and its relationship with successful reverse engineering.

REVERSE ENGINEERING IN CONTROL DESIGN

John Wiley & Sons Reverse Engineering in Control Design proposes practicalapproaches to building a standard H-infinity problem taking intoaccount an initial controller. Such approaches allow us to mixvarious control objectives and to initialize procedures for afixed-structure controller design. They are based on theObserver-Based Realization (OBR) of controllers. The interest ofOBR from the controller implementation point of view is detailedand highlighted in this book through academic examples. Anopen-source toolbox is available to implement these approaches inMatlab®. Throughout the book academic applications are proposed toillustrate the various basic principles. These applications havebeen chosen by the author for their pedagogic contents and demofiles and embedded Matlab® functions can be downloaded soreaders can run these illustrations on their personalcomputers. Contents 1. Observer-based Realization of a Given Controller. 2. Cross Standard Form and Reverse Engineering. 3. Reverse Engineering for Mechanical Systems. Appendix 1. A Preliminary Methodological Example. Appendix 2. Discrete-time Case. Appendix 3. Nominal State-feedback for Mechanical Systems. Appendix 4. Help of Matlab® Functions. About the Authors Daniel Alazard is Professor in System Dynamics and Control atInstitut Supérieur de l'Aéronautique et de l'Espace(ISAE), Toulouse, France – SUPAERO Graduate Program. His mainresearch interests concern robust control, flexible structurecontrol and their applications to various aerospace systems.

REVERSING

SECRETS OF REVERSE ENGINEERING

John Wiley & Sons Beginning with a basic primer on reverse engineering-including computer internals, operating systems, and assembly language-and then discussing the various applications of reverse engineering, this book provides readers with practical, in-depth techniques for software reverse engineering. The book is broken into two parts, the first deals with security-related reverse engineering and the second explores the more practical aspects of reverse engineering. In addition, the author explains how to reverse engineer a third-party software library to improve interfacing and how to reverse engineer a competitor's software to build a better product. * The first popular book to show how software reverse engineering can help defend against security threats, speed up development, and unlock the secrets of competitive products * Helps developers plug security holes by demonstrating how hackers exploit reverse engineering techniques to crack copy-protection schemes and identify software targets for viruses and other malware * Offers a primer on advanced reverse-engineering, delving into "disassembly"-code-level reverse engineering-and explaining how to decipher assembly language

FUNCTIONAL REVERSE ENGINEERING OF MACHINE TOOLS

CRC Press The purpose of this book is to develop capacity building in strategic and non-strategic machine tool technology. The book contains chapters on how to functionally reverse engineer strategic and non-strategic computer numerical control machinery. Numerous engineering areas, such as mechanical engineering, electrical engineering, control engineering, and computer hardware and software engineering, are covered. The book offers guidelines and covers design for machine tools, prototyping, augmented reality for machine tools, modern communication strategies, and enterprises of functional reverse engineering, along with case studies. Features Presents capacity building in machine tool development Discusses engineering design for machine tools Covers prototyping of strategic and non-strategic machine tools Illustrates augmented reality for machine tools Includes Internet of Things (IoT) for machine tools

REVERSE ENGINEERING OF RUBBER PRODUCTS

CONCEPTS, TOOLS, AND TECHNIQUES

CRC Press Reverse engineering is widely practiced in the rubber industry. Companies routinely analyze competitors' products to gather information about specifications or compositions. In a competitive market, introducing new products with better features and at a faster pace is critical for any manufacturer. Reverse Engineering of Rubber Products: Concepts, Tools, and Techniques explains the principles and science behind rubber formulation development by reverse engineering methods. The book describes the tools and analytical techniques used to discover which materials and processes were used to produce a particular vulcanized rubber compound from a combination of raw rubber, chemicals, and pigments. A Compendium of Chemical, Analytical, and Physical Test Methods Organized into five chapters, the book first reviews the construction of compounding ingredients and formulations, from elastomers, fillers, and protective agents to vulcanizing chemicals and processing aids. It then discusses chemical and analytical methods, including infrared spectroscopy, thermal analysis, chromatography, and microscopy. It also examines physical test methods for visco-elastic behavior, heat aging, hardness, and other features. A chapter presents important reverse engineering concepts. In addition, the book includes a wide variety of case studies of formula reconstruction, covering large products such as tires and belts as well as smaller products like seals and hoses. Get Practical Insights on Reverse Engineering from the Book's Case Studies Combining scientific principles and practical advice, this book brings together helpful insights on reverse engineering in the rubber industry. It is an invaluable reference for scientists, engineers, and researchers who want to produce comparative benchmark information, discover formulations used throughout the industry, improve product performance, and shorten the product development cycle.

PRODUCT DESIGN

TECHNIQUES IN REVERSE ENGINEERING AND NEW PRODUCT DEVELOPMENT

逆向工程與新產品開發技術 技術手冊:工程類

REVERSE ENGINEERING: MECHANISMS, STRUCTURES, SYSTEMS & MATERIALS

McGraw Hill Professional A comprehensive look at reverse engineering as a legitimate learning, design, and troubleshooting tool This unique book examines the often underappreciated and occasionally maligned technique of reverse engineering. More than a shortcut for the lazy or unimaginative to reproduce an artless copy of an existing creation, reverse engineering is an essential brick – if not a keystone – in the pathway to a society's technological advancement. Written by an engineer who began teaching after years in industry, Reverse Engineering reviews this meticulous analytical process with a breadth and depth as never before. Find out how to: Learn by "mechanical dissection" Deduce the role, purpose, and functionality of a designed entity Identify materials-of-construction and methods-of-manufacture by observation alone Assess the suitability of a design to purpose from form and fit The rich heritage of engineering breakthroughs enabled by reverse engineering is also discussed. This is not a dry textbook. It is the engaging and enlightening account of the journey of engineering from the astounding creations of ancient cultures to what, with the aid of reverse engineering, promises to be an even more astounding future! Coverage includes: Methods of product teardown Failure analysis and forensic engineering Deducing or inferring role, purpose, and functionality during reverse engineering The Antikythera mechanism Identifying materials-of-construction Inferring methods-of-manufacture or -construction Construction of Khufu's pyramid Assessing design suitability Value and production engineering Reverse engineering of materials and substances Reverse engineering of broken, worn, or obsolete parts for remanufacture The law and the ethics of reverse engineering

PRACTICAL MALWARE ANALYSIS

THE HANDS-ON GUIDE TO DISSECTING MALICIOUS SOFTWARE

No Starch Press Malware analysis is big business, and attacks can cost a company dearly. When malware breaches your defenses, you need to act quickly to cure current infections and prevent future ones from occurring. For those who want to stay ahead of the latest malware, Practical Malware Analysis will teach you the tools and techniques used by professional analysts. With this book as your guide, you'll be able to safely analyze, debug, and disassemble any malicious software that comes your way. You'll learn how to: –Set up a safe virtual environment to analyze malware –Quickly extract network signatures and host-based indicators –Use key analysis tools like IDA Pro, OllyDbg, and WinDbg –Overcome malware tricks like obfuscation, anti-disassembly, anti-debugging, and anti-virtual machine techniques –Use your newfound knowledge of Windows internals for malware analysis –Develop a methodology for unpacking malware and get practical experience with five of the most popular packers –Analyze special cases of malware with shellcode, C++, and 64-bit code Hands-on labs throughout the book challenge you to practice and synthesize your skills as you dissect real malware samples, and pages of detailed dissections offer an over-the-shoulder look at how the pros do it. You'll learn how to crack open malware to see how it really works, determine what damage it has done, thoroughly clean your network, and ensure that the malware never comes back. Malware analysis is a cat-and-mouse game with rules that are constantly changing, so make sure you have the fundamentals. Whether you're tasked with securing one network or a thousand networks, or you're making a living as a malware analyst, you'll find what you need to succeed in Practical Malware Analysis.

THE EFFICIENCY OF REVERSE ENGINEERING IN THE DESIGN OF THE ORCA XI AUTONOMOUS UNDERWATER VEHICLE

Reverse engineering is the process of determining how a system works to aid duplication, maintenance, or redesign. Applications of reverse engineering include mechanical, electrical, software, and process systems. Although it has been known for centuries in the vernacular as tinkering with things to see how they work, reverse engineering has only recently been recognized as a systematic process valid for study. Reverse engineering can be applied to both simple and complex systems. The MIT ORCA team applied reverse engineering to build ORCA XI, the first autonomous underwater vehicle (AUV) to issue forth from the ORCA Project in several years. In addition to college-level systems, reverse engineering can be applied to navies, aiding in the prototyping of individual vessels as well as the manufacturing of entire fleets. There is evidence that China is using reverse engineering in this manner to develop a regionally-capable navy. The effectiveness of reverse engineering on the ORCA Project is compared to that of the Chinese navy to determine how a reverse engineering method could be expected to scale from a simple system to a more complex one. To quantify the relationship between the complexity of the system and how effective reverse engineering that system is, a reverse engineering efficiency based on the time necessary to complete a project with reverse engineering and the time necessary to complete the same project without reverse engineering was used. The efficiency values obtained from this comparison show that applying reverse engineering to an AUV can be just as effective as applying reverse engineering to a naval vessel, but that designing the production line necessary to manufacture a fleet of vessels decreases the efficiency of reverse engineering. These results suggest that new reverse engineering methodologies can be tested for efficiency on simple prototypes before being applied to time-consuming, complex projects.

INDUSTRY INTEGRATED ENGINEERING AND COMPUTING EDUCATION

ADVANCES, CASES, FRAMEWORKS, AND TOOLKITS FOR IMPLEMENTATION

Springer This book introduces recent global advances and innovations in industry integrated engineering and computing education to academics, program managers, department heads, and deans, and shares with readers a critical perspective on future potentials in industry integrated engineering education. It covers topics and issues such as integrated engineering and computing education, part-time engineering masters programs, secure BIM learning, ethics, and IT workforce development. The book concludes with detail information on summarizing and extracting different frameworks, cases, and models into a practitioner toolkit, along with pragmatic recommendations for engineering education academics to quickly utilize, adopt, and adapt the toolkits for their own curricular development activities.

RAPID PROTOTYPING, RAPID TOOLING AND REVERSE ENGINEERING

FROM BIOLOGICAL MODELS TO 3D BIOPRINTERS

Walter de Gruyter GmbH & Co KG This book introduces the role of Rapid Prototyping Techniques within the product development phase. It deals with the concept, origin, and working cycle of Rapid Prototyping Processes with emphasis on the applications. Apart from elaboration of engineering and non-engineering applications, it highlights recent applications like Bio-Medical Models for Surgical Planning, Molecular Models, Architectural Models, Sculptured Models, Psycho-Analysis Models. Special emphasis has been provided to the technique of generating human organs from live cells/tissues of the same human named 3D BIO PRINTERS. As the Rapid Prototyping Techniques are for tailor made products and not for mass manufacturing hence the book also elaborates on the mass manufacturing of rapid prototyped products. This includes casting and rapid tooling. The book concludes with Reverse Engineering and the role played by Rapid Prototyping Techniques towards the same. With globalization of market and advances in science and technology, the life span of products has shortened considerably. For early realization of products and short development period, engineers and researchers are constantly working together for more and more efficient and effective solutions. The most effective solution identified has been usage of computers in both designing and manufacturing. This gave birth to the nomenclatures CAD (Computer Aided Designing) and CAM (Computer aided Manufacturing). This was the initiation that ensured short product development and realization period. Researchers coined the concept as Rapid Prototyping. In contrast to Prototyping, Rapid prototyping is a group of techniques used to quickly fabricate a scale model of a physical part or assembly using three-dimensional computer aided design (CAD) data. Construction of the part or assembly is usually done using 3D printing or "additive or subtractive layer manufacturing" technology. The first methods for rapid prototyping became available in the late 1980s and were used to produce models and prototype parts. Today, they are used for a wide range of applications and are used to manufacture production-quality parts in relatively small numbers if desired without the typical unfavorable short-run economics. This economy has encouraged online service bureaus for early product realization or physical products for actual testing. This book is expected to contain Seven Chapters. Chapter 1 would explain product life cycle and the product development phase in the same, introducing role of Rapid Prototyping Techniques in Product development phase. Chapter 2 would deals with the concept, origin and working cycle of Rapid Prototyping Processes. Chapter 3 would concentrates on the applications of Rapid Prototyping Technology. Apart from elaboration of engineering and non-engineering applications, it also elaborates on recent applications like Bio-Medical Models for Surgical Planning, Molecular Models, Architectural Models, Sculptured Models, Psycho-Analysis Models etc. Chapter 4 would introduce the various Rapid Prototyping systems available worldwide. The chapter also introduces the technique of generating human organs from live cells/tissues of the same human named 3D BIO PRINTERS hence ensuring low rejection rate by human body. As the Rapid Prototyping Techniques are for tailor made products and not for mass manufacturing hence Chapter 5 would elaborates on the mass manufacturing of rapid prototyped products. This includes Casting and Rapid Tooling. Chapter 6 would deal with Reverse Engineering and the role played by Rapid Prototyping Techniques towards the same. As the product realization is primarily dependent on various softwares which are required to be understood for better accuracy so the concluding chapter of the book i.e. Chapter 7 would explain some software associated with the various techniques.

ADVANCES ON MECHANICS, DESIGN ENGINEERING AND MANUFACTURING

PROCEEDINGS OF THE INTERNATIONAL JOINT CONFERENCE ON MECHANICS, DESIGN ENGINEERING & ADVANCED MANUFACTURING (JCM 2016), 14-16 SEPTEMBER, 2016, CATANIA, ITALY

Springer This book gathers papers presented at the International Joint Conference on Mechanics, Design Engineering and Advanced Manufacturing (JCM 2016), held on 14-16 September, 2016, in Catania, Italy. It reports on cutting-edge topics in product design and manufacturing, such as industrial methods for integrated product and process design; innovative design; and computer-aided design. Further topics covered include virtual simulation and reverse engineering; additive manufacturing; product manufacturing; engineering methods in medicine and education; representation techniques; and nautical, aeronautics and aerospace design and modeling. The book is divided into eight main sections, reflecting the focus and primary themes of the conference. The contributions presented here will not only provide researchers, engineers and experts in a range of industrial engineering subfields with extensive information to support their daily work; they are also intended to stimulate new research directions, advanced applications of the methods discussed, and future interdisciplinary collaborations.

ADVANCED MANUFACTURING PROCESSES II

SELECTED PAPERS FROM THE 2ND GRABCHENKO'S INTERNATIONAL CONFERENCE ON ADVANCED MANUFACTURING PROCESSES (INTERPARTNER-2020), SEPTEMBER 8-11, 2020, ODESSA, UKRAINE

Springer Nature This book offers a timely yet comprehensive snapshot of innovative research and developments at the interface between manufacturing, materials and mechanical engineering, and quality assurance. It covers a wide range of manufacturing processes, such as cutting, grinding, assembly, and coatings, including ultrasonic treatment, molding, radial-isostatic compression, ionic-plasma deposition, volumetric vibration treatment, and wear resistance. It also highlights the advantages of augmented reality, RFID technology, reverse engineering, optimization, heat and mass transfer, energy management, quality inspection, and environmental impact. Based on selected papers presented at the Grabchenko's International Conference on Advanced Manufacturing Processes (InterPartner-2020), held in Odessa, Ukraine, on September 8–11, 2020, this book offers a timely overview and extensive information on trends and technologies in production planning, design engineering, advanced materials, machining processes, process engineering, and quality assurance. It is also intended to facilitate communication and collaboration between different groups working on similar topics and offer a bridge between academic and industrial researchers.

MECHANICAL ENGINEERING EDUCATION HANDBOOK

Mechanical engineering students' learning preferences / Charles E. Baukal, Jr., John Zink Hamworthy Combustion, Tulsa, OK, and others -- Leveraging technology to elevate pedagogy in mechanical engineering teaching and learning / Krishna Pakala, PhD, and Diana Bairaktarova, PhD, Boise State University, Boise, ID, and others -- Mastery-based learning : From exposure to expertise / Kurt M DeGoede, PhD, Sara A. Atwood, PhD, Elizabethtown College, Elizabethtown, PA, US.

PRACTICAL REVERSE ENGINEERING

X86, X64, ARM, WINDOWS KERNEL, REVERSING TOOLS, AND OBFUSCATION

John Wiley & Sons Analyzing how hacks are done, so as to stop them in thefuture Reverse engineering is the process of analyzing hardware orsoftware and understanding it, without having access to the sourcecode or design documents. Hackers are able to reverse engineersystems and exploit what they find with scary results. Now the goodguys can use the same tools to thwart these threats. PracticalReverse Engineering goes under the hood of reverse engineeringfor security analysts, security engineers, and system programmers,so they can learn how to use these same processes to stop hackersin their tracks. The book covers x86, x64, and ARM (the first book to cover allthree); Windows kernel-mode code rootkits and drivers; virtualmachine protection techniques; and much more. Best of all, itoffers a systematic approach to the material, with plenty ofhands-on exercises and real-world examples. Offers a systematic approach to understanding reverseengineering, with hands-on exercises and real-world examples Covers x86, x64, and advanced RISC machine (ARM) architecturesas well as deobfuscation and virtual machine protectiontechniques Provides special coverage of Windows kernel-mode code(rootkits/drivers), a topic not often covered elsewhere, andexplains how to analyze drivers step by step Demystifies topics that have a steep learning curve Includes a bonus chapter on reverse engineering tools Practical Reverse Engineering: Using x86, x64, ARM, WindowsKernel, and Reversing Tools provides crucial, up-to-dateguidance for a broad range of IT professionals.

USING TOPOLOGY OPTIMIZATION TO NUMERICALLY IMPROVE BARRIERS TO REVERSE ENGINEERING

Here explored is a method by which designers can use the tool of topology optimization to numerically improve barriers to reverse engineering. Recently developed metrics, which characterize the time (T) to reverse engineer a product, enable this optimization. A key parameter used in the calculation of T is information content (K). The method presented in this thesis pursues traditional topology optimization objectives while simultaneously maximizing K, and thus T, in the resulting topology. This thesis presents new algorithms to 1) evaluate K for any topology, 2) increase K for a topology by manipulating macro-scale geometry and micro-scale crystallographic information for each element, and 3) simultaneously maximize K and minimize structural compliance (a traditional topology optimization objective). These algorithms lead designers to desirable topologies with increased barriers to reverse engineering. It is concluded that barriers to reverse engineering can indeed be increased without sacrificing the desirable structural characteristic of compliance. This has been shown through the example of a novel electrical contact for a consumer electronics product.

ENVIRONMENTALLY CONSCIOUS MECHANICAL DESIGN

John Wiley & Sons This volume focuses on environmental design - understanding it and implementing it. Coverage includes the important technical and analytical techniques and best practices of designing industrial, business, and consumer products that are environmentally friendly and meet environmental regulations.

BEYOND THE CODE

PROTECTION OF NON-TEXTUAL FEATURES OF SOFTWARE

Oxford University Press Although the law on infringement is relatively straightforward in relation to the copying of literal and textual elements of software, it is the copying of non-literal and functional elements that poses complex and topical questions in the context of intellectual property (IP) protection. In many cases, it is these non-literal and functional elements that contain the real value of a software product. This book concerns the copying of non-literal and functional elements of software in both the United States and European Union, using a holistic approach to address the most topical questions facing experts concerned with legal protection of software products across a range of technological platforms. The book focuses on six distinct but interrelated areas: contract, copyright, patents, trade-dress, designs and trade secrets, discussing these areas separately and in relation to one another. The book discusses software as a multilayered functional product, setting the scene for other legal discussions by highlighting software's unique characteristics. It examines models for the provision of software, addressing licensing patterns and overall enforceability, as well as the statutory and judicial tools for regulating the use of such licences. It assesses the protection of non-literal and functional software elements under EU and US laws, focusing on internal architecture, interfaces, behavioural elements and GUIs.

FUNCTIONAL REVERSE ENGINEERING OF STRATEGIC AND NON-STRATEGIC MACHINE TOOLS

CRC Press This book describes capacity building in strategic and non-strategic machine tool technology. It includes machine building in sectors such as machine tools, automobiles, home appliances, energy, and biomedical engineering, along with case studies. The book offers guidelines for capacity building in academia, covering how to promote enterprises of functional reverse engineering enterprises. It also discusses machine tool development, engineering design, prototyping of strategic, and non-strategies machine tools, as well as presenting communication strategies and IoT, along with case studies. Professionals from the CNC (Computer Numeric Control) machine tools industry, industrial and manufacturing engineers, and students and faculty in engineering disciplines will find interest in this book.

DESIGN ENGINEERING JOURNEY

Morgan & Claypool Publishers This book provides an introductory treatment of the design methodology for undergraduate students in multiple disciplines. It introduces the principles of design, and discusses design tools and techniques from traditional and multidisciplinary perspectives and comprehensively explores the design engineering process. Innovation, creativity, design thinking, collaboration, communication, problem solving, and technical skills are increasingly being identified as key skills for practicing engineers in tackling today's complex design problems. Design Engineering Journey addresses the need for a design textbook that teaches these skills. It presents a broad multidisciplinary perspective to design that encourages students to be innovative and open to new ideas and concepts while also drawing on traditional design methods and strategies. For example, students are provided with design solutions inspired by nature as well as the arts to nurture their creative problem solving skills. This book provides an overview from establishing need to ideation of concepts and realization techniques and prototyping, presented in an engaging and visually appealing manner, incorporating multidisciplinary examples that aim to reinforce the student's evolving design knowledge. The technical level of this book is kept at an introductory level so that freshman and sophomore students should be able to understand and solve a variety of design problems and come up with innovative concepts, and realize them through prototype and testing. This book also can serve as a reference text for senior capstone design projects, and the readers will find that the examples and scenarios presented are representative of problems faced by professional designers in engineering.

RAPID PROTOTYPING, RAPID TOOLING AND REVERSE ENGINEERING

FROM BIOLOGICAL MODELS TO 3D BIOPRINTERS

Walter de Gruyter GmbH & Co KG This book introduces the role of Rapid Prototyping Techniques within the product development phase. It deals with the concept, origin, and working cycle of Rapid Prototyping Processes with emphasis on the applications. Apart from elaboration of engineering and non-engineering applications, it highlights recent applications like Bio-Medical Models for Surgical Planning, Molecular Models, Architectural Models, Sculptured Models, Psycho-Analysis Models. Special emphasis has been provided to the technique of generating human organs from live cells/tissues of the same human named 3D BIO PRINTERS. As the Rapid Prototyping Techniques are for tailor made products and not for mass manufacturing hence the book also elaborates on the mass manufacturing of rapid prototyped products. This includes casting and rapid tooling. The book concludes with Reverse Engineering and the role played by Rapid Prototyping Techniques towards the same. With globalization of market and advances in science and technology, the life span of products has shortened considerably. For early realization of products and short development period, engineers and researchers are constantly working together for more and more efficient and effective solutions. The most effective solution identified has been usage of computers in both designing and manufacturing. This gave birth to the nomenclatures CAD (Computer Aided Designing) and CAM (Computer aided Manufacturing). This was the initiation that ensured short product development and realization period. Researchers coined the concept as Rapid Prototyping. In contrast to Prototyping, Rapid prototyping is a group of techniques used to quickly fabricate a scale model of a physical part or assembly using three-dimensional computer aided design (CAD) data. Construction of the part or assembly is usually done using 3D printing or "additive or subtractive layer manufacturing" technology. The first methods for rapid prototyping became available in the late 1980s and were used to produce models and prototype parts. Today, they are used for a wide range of applications and are used to manufacture production-quality parts in relatively small numbers if desired without the typical unfavorable short-run economics. This economy has encouraged online service bureaus for early product realization or physical products for actual testing. This book is expected to contain Seven Chapters. Chapter 1 would explain product life cycle and the product development phase in the same, introducing role of Rapid Prototyping Techniques in Product development phase. Chapter 2 would deals with the concept, origin and working cycle of Rapid Prototyping Processes. Chapter 3 would concentrates on the applications of Rapid Prototyping Technology. Apart from elaboration of engineering and non-engineering applications, it also elaborates on recent applications like Bio-Medical Models for Surgical Planning, Molecular Models, Architectural Models, Sculptured Models, Psycho-Analysis Models etc. Chapter 4 would introduce the various Rapid Prototyping systems available worldwide. The chapter also introduces the technique of generating human organs from live cells/tissues of the same human named 3D BIO PRINTERS hence ensuring low rejection rate by human body. As the Rapid Prototyping Techniques are for tailor made products and not for mass manufacturing hence Chapter 5 would elaborates on the mass manufacturing of rapid prototyped products. This includes Casting and Rapid Tooling. Chapter 6 would deal with Reverse Engineering and the role played by Rapid Prototyping Techniques towards the same. As the product realization is primarily dependent on various softwares which are required to be understood for better accuracy so the concluding chapter of the book i.e. Chapter 7 would explain some software associated with the various techniques.

ADVANCES IN DESIGN ENGINEERING II

PROCEEDINGS OF THE XXX INTERNATIONAL CONGRESS INGEGRAF, 24-25 JUNE, 2021, VALENCIA, SPAIN

Springer Nature This book contains the papers presented at the XXX International Congress INGEGRAF, "Digital Engineering, its application in Research, Development and Innovation", held on 24–25 June 2021 in Valencia, Spain. The book reports on cutting-edge topics in product design and manufacturing, such as industrial methods for integrated product and process design; innovative design; and computer-aided design. Further topics covered include virtual simulation and reverse engineering; additive manufacturing; product manufacturing; engineering methods in medicine and education; representation techniques; and nautical, engineering and construction, aeronautics and aerospace design and modeling. The book has six sections, reflecting the focus and primary themes of the conference. The contributions presented here will not only provide researchers, engineers, and experts in a range of industrial engineering subfields with extensive information to support their daily work; but also they are intended to stimulate new research directions, advanced applications of the methods discussed, and future interdisciplinary collaborations.

RECENT ADVANCES IN MECHANICAL ENGINEERING

SELECT PROCEEDINGS OF ICRAME 2020

Springer Nature This book presents the select proceedings of the International Conference on Recent Advancements in Mechanical Engineering (ICRAME 2020). It provides a comprehensive overview of the various technical challenges faced, their systematic investigation, contemporary developments, and future perspectives in the domain of mechanical engineering. The book covers a wide array of topics including fluid flow techniques, compressible flows, waste management and waste disposal, bio-fuels, renewable energy, cryogenic applications, computing in applied mechanics, product design, dynamics and control of structures, fracture and failure mechanics, solid mechanics, finite element analysis, tribology, nano-mechanics and MEMS, robotics, supply chain management and logistics, intelligent manufacturing system, rapid prototyping and reverse engineering, quality control and reliability, conventional and non-conventional machining, and ergonomics. This book can be useful for students and researchers interested in mechanical engineering and its allied fields.

MASTERING REVERSE ENGINEERING

RE-ENGINEER YOUR ETHICAL HACKING SKILLS

Packt Publishing Ltd Implement reverse engineering techniques to analyze software, exploit software targets, and defend against security threats like malware and viruses. Key FeaturesAnalyze and improvise software and hardware with real-world examplesLearn advanced debugging and patching techniques with tools such as IDA Pro, x86dbg, and Radare2.Explore modern security techniques to identify, exploit, and avoid cyber threatsBook Description If you want to analyze software in order to exploit its weaknesses and strengthen its defenses, then you should explore reverse engineering. Reverse Engineering is a hackerfriendly tool used to expose security flaws and questionable privacy practices.In this book, you will learn how to analyse software even without having access to its source code or design documents. You will start off by learning the low-level language used to communicate with the computer and then move on to covering reverse engineering techniques. Next, you will explore analysis techniques using real-world tools such as IDA Pro and x86dbg. As you progress through the chapters, you will walk through use cases encountered in reverse engineering, such as encryption and compression, used to obfuscate code, and how to to identify and overcome anti-debugging and anti-analysis tricks. Lastly, you will learn how to analyse other types of files that contain code. By the end of this book, you will have the confidence to perform reverse engineering. What you will learnLearn core reverse engineeringIdentify and extract malware componentsExplore the tools used for reverse engineeringRun programs under non-native operating systemsUnderstand binary obfuscation techniquesIdentify and analyze anti-debugging and anti-analysis tricksWho this book is for If you are a security engineer or analyst or a system programmer and want to use reverse engineering to improve your software and hardware, this is the book for you. You will also find this book useful if you are a developer who wants to explore and learn reverse engineering. Having some programming/shell scripting knowledge is an added advantage.

HUMAN FACTORS IN AUGMENTED REALITY ENVIRONMENTS

Springer Science & Business Media Advances in hardware and networking have made possible a wide use of augmented reality (AR) technologies. However, simply putting those hardware and technologies together does not make a "good" system for end users to use. New design principles and evaluation methods specific to this emerging area are urgently needed to keep up with the advance in technologies. Human Factors in Augmented Reality Environments is the first book on human factors in AR, addressing issues related to design, development, evaluation and application of AR systems. Topics include surveys, case studies, evaluation methods and metrics, HCI theories and design principles, human factors and lessons learned and experience obtained from developing, deploying or evaluating AR systems. The contributors for this cutting-edge volume are well-established researchers from diverse disciplines including psychologists, artists, engineers and scientists. Human Factors in Augmented Reality Environments is designed for a professional audience composed of practitioners and researchers working in the field of AR and human-computer interaction. Advanced-level students in computer science and engineering will also find this book useful as a secondary text or reference.

THE ART OF REVERSE ENGINEERING

OPEN - DISSECT - REBUILD

transcript Verlag Reverse Engineering is a term that comes originally from the field of mechanical engineering. Reverse Engineering indicates the process of analysing an existing object or system by laying out its construction plan to then rebuild it in every detail. This manner of reconstruction allows for modifications and adjustments to new demands and requirements, it signifies creative appropriation, democratisation of knowledge, further development. The contributions in this volume take Reverse Engineering to another level, applying it to the fields of arts, sciences and politics in an attempt to reveal the procedures of culture and technology at work, and the importance of access, knowledge and skills in reshaping our present times and future.

FOUNDATIONS OF A REVERSE ENGINEERING METHODOLOGY

Reverse engineering is broadly defined as the process of analyzing existing products to learn how to create better products in the future. Including reverse engineering as part of the engineering design process can provide a number of benefits, including a more thorough understanding of existing products, lower cost for the redesign of products, and faster times to market. While reverse engineering can be applied to a wide range of domains, this thesis deals with methodologies for extracting technical data from electro-mechanical products for the purpose of recreating them functionally and dimensionally, to an acceptable level of accuracy. An integrated and evolved reverse engineering methodology is presented. This new methodology is built upon previous work, and results from an effort to integrate all previous methods into the simplest and most useful form. Five novel reverse engineering techniques are introduced to solve problems previously unaddressed in the literature: Bounding Pertinent Geometry, Reassembly by Function, Determining Sample Size, Estimating Production Volume and Accounting for Physical Degradation. Throughout the thesis, a running example of the reverse engineering of the Craftsman Auto Hammer is used to illustrate the application of the evolved methodology.

SECURITY WARRIOR

KNOW YOUR ENEMY

"O'Reilly Media, Inc." When it comes to network security, many users and administrators are running scared, and justifiably so. The sophistication of attacks against computer systems increases with each new Internet worm.What's the worst an attacker can do to you? You'd better find out, right? That's what Security Warrior teaches you. Based on the principle that the only way to defend yourself is to understand your attacker in depth, Security Warrior reveals how your systems can be attacked. Covering everything from reverse engineering to SQL attacks, and including topics like social engineering, antiforensics, and common attacks against UNIX and Windows systems, this book teaches you to know your enemy and how to be prepared to do battle.Security Warrior places particular emphasis on reverse engineering. RE is a fundamental skill for the administrator, who must be aware of all kinds of malware that can be installed on his machines -- trojaned binaries, "spyware" that looks innocuous but that sends private data back to its creator, and more. This is the only book to discuss reverse engineering for Linux or Windows CE. It's also the only book that shows you how SQL injection works, enabling you to inspect your database and web applications for vulnerability.Security Warrior is the most comprehensive and up-to-date book covering the art of computer war: attacks against computer systems and their defenses. It's often scary, and never comforting. If you're on the front lines,

defending your site against attackers, you need this book. On your shelf--and in your hands.

BIOINSPIRATION AND BIOMIMICRY IN CHEMISTRY

REVERSE-ENGINEERING NATURE

John Wiley & Sons Can we emulate nature's technology in chemistry? Through billions of years of evolution, Nature has generated some remarkable systems and substances that have made life on earth what it is today. Increasingly, scientists are seeking to mimic Nature's systems and processes in the lab in order to harness the power of Nature for the benefit of society. Bioinspiration and Biomimicry in Chemistry explores the chemistry of Nature and how we can replicate what Nature does in abiological settings. Specifically, the book focuses on wholly artificial, man-made systems that employ or are inspired by principles of Nature, but which do not use materials of biological origin. Beginning with a general overview of the concept of bioinspiration and biomimicry in chemistry, the book tackles such topics as: Bioinspired molecular machines Bioinspired catalysis Biomimetic amphiphiles and vesicles Biomimetic principles in macromolecular science Biomimetic cavities and bioinspired receptors Biomimicry in organic synthesis Written by a team of leading international experts, the contributed chapters collectively lay the groundwork for a new generation of environmentally friendly and sustainable materials, pharmaceuticals, and technologies. Readers will discover the latest advances in our ability to replicate natural systems and materials as well as the many impediments that remain, proving how much we still need to learn about how Nature works. Bioinspiration and Biomimicry in Chemistry is recommended for students and researchers in all realms of chemistry. Addressing how scientists are working to reverse engineer Nature in all areas of chemical research, the book is designed to stimulate new discussion and research in this exciting and promising field.

APPLIED MECHANICS REVIEWS

MECHANICAL ENGINEERING EDUCATION HANDBOOK

"This book is believed to be the first to specifically address mechanical engineering education. It is divided into three sections : pedagogy, curriculum, and future. The pedagogy section contains seven chapters on various aspects of enhancing student learning. Chapter one concerns research regarding mechanical engineering (ME) students' learning preferences. ME students are much more visual and prefer more problem solving compared to the general population. Chapter two is on leveraging technology to elevate pedagogy. The authors show many different ways of using technologies, such as the use of iMovie and Doceri, to enhance the practice of teaching. Chapter three on mastery-based learning concerns assessing students on what skills they can do well rather than almost solely on how well they do on exams. Chapter four discusses how team-based assignments can be used to meet multiple student outcomes. Examples are given for a fluid mechanics lab and a thermodynamics class. Chapter five describes how team-based active learning can be used to expose students to the aerospace design process and industry practices. Chapter six shows how a problem-based learning approach was converted to an entrepreneurially minded learning approach in a mechatronics design course. The application of the Kern Entrepreneurial Engineering Network (KEEN) framework showed a significant increase in the students' entrepreneurial mindset. Chapter seven recommends the inclusion of open-ended problems in courses at all levels to help prepare students for real-world problems, which often have multiple possible correct solutions. Section two on curriculum has five chapters more specifically on ME courses and programs. Chapter eight advocates incorporating more hands-on design into the ME curriculum because of its importance in practice. Chapter nine shows an example of how an entrepreneurial mindset can be fostered and developed in an engineering experimentation course. Chapter ten demonstrates how research has shown that replacing thermodynamic tables, which students often struggle to use, with thermodynamic property charts can help students form better mental models. Chapter eleven discusses the use of active learning techniques to more effectively incorporate the teaching of materials in the ME curriculum. Chapter twelve considers how reverse engineering can be incorporated into the ME curriculum. While original design is incorporated into the ME curriculum, reverse engineering of existing designs can be a valuable addition that can help prepare MEs for professional practice. Section three has two chapters related to the future. Chapter thirteen discusses how ME students can be more effectively prepared for their future in the industry, not so much by changing the curriculum, but by changing the teaching approach. Some examples include less theory and more practice, improved problem solving and simulating the industrial work environment. The authors include those who work or have worked full time in industry and work part time or full time in academia, as well as two relatively recent ME graduates. The last chapter discusses possible future areas of research for improving mechanical engineering education. Those areas include, for example, improved course content, curriculum, communication, assessment, virtual reality, codes and standards, multimedia and innovation/entrepreneurship"--

ADVANCED CAD MODELING

EXPLICIT, PARAMETRIC, FREE-FORM CAD AND RE-ENGINEERING

Springer The book discusses the theoretical fundamentals of CAD graphics to enhance readers' understanding of surface modeling and free-form design by demonstrating how to use mathematical equations to define curves and surfaces in CAD modelers. Additionally, it explains and describes the main approaches to creating CAD models out of 3D scans of physical objects. All CAD approaches are demonstrated with guided examples and supported with comprehensive engineering explanations. Furthermore, each approach includes exercises for independent consolidation of advanced CAD skills. This book is intended for engineers and designers who are already familiar with the basics of modern CAD tools, e.g. feature based and solid based modeling in 3D space, and would like to improve and expand their knowledge and experience. It is also an easy-to use guide and excellent teaching and research aid for academics and practitioners alike.

GATEWAY TO ENGINEERING

Cengage Learning Project Lead the Way, Inc. (PLTW) is a pioneer in the development of project- and problem-based curriculum for middle school technology and engineering education . The all-new Gateway to Engineering text now offers the perfect tool for mastering Project Lead the Way's objectives, by introducing young students to the process of design, the importance of engineering graphics, and applications of electricity and electronics, mechanics, energy, communications, automation/robotics, manufacturing processes and control systems/computer programming This text will help students build a solid foundation in technological literacy while they study engineering-related careers and educational pathways. Everyday examples show how engineers and their innovations affect the world around them. A strong technical focus is complemented by a clear, straightforward writing style. Coverage of social impacts of new technologies will allow students to explore possibilities for career pathways in engineering and engineering technology. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

INTRODUCTION TO SOLIDWORKS

A COMPREHENSIVE GUIDE WITH APPLICATIONS IN 3D PRINTING

CRC Press This senior undergraduate level textbook is written for Advanced Manufacturing, Additive Manufacturing, as well as CAD/CAM courses. Its goal is to assist students in colleges and universities, designers, engineers, and professionals interested in using SolidWorks as the design and 3D printing tool for emerging manufacturing technology for practical applications. This textbook will bring a new dimension to SolidWorks by introducing readers to the role of SolidWorks in the relatively new manufacturing paradigm shift, known as 3D-Printing which is based on Additive Manufacturing (AM) technology. This new textbook: Features modeling of complex parts and surfaces Provides a step-by-step tutorial type approach with pictures showing how to model using SolidWorks Offers a user-Friendly approach for the design of parts, assemblies, and drawings, motion-analysis, and FEA topics Includes clarification of connections between SolidWorks and 3D-Printing based on Additive Manufacturing Discusses a clear presentation of Additive Manufacturing for Designers using SolidWorks CAD software "Introduction to SolidWorks: A Comprehensive Guide with Applications in 3D Printing" is written using a hands-on approach which includes a significant number of pictorial descriptions of the steps that a student should follow to model parts, assemble parts, and produce drawings.

GEOMETRIC DESIGN TOLERANCING: THEORIES, STANDARDS AND APPLICATIONS

Springer Science & Business Media The importance of proper geometric dimensioning and tolerancing as a means of expressing the designer's functional intent and controlling the inevitable geometric and dimensional variations of mechanical parts and assemblies, is becoming well recognized. The research efforts and innovations in the field of tolerancing design, the development of supporting tools, techniques and algorithms, and the significant advances in computing software and hardware all have contributed to its recognition as a viable area of serious scholarly contributions. The field of tolerancing design is successfully making the transition to maturity where deeper insights and sound theories are being developed to offer explanations, and reliable implementations are introduced to provide solutions. Machine designers realized very early that manufacturing processes do not produce the nominal dimensions of designed parts. The notion of associating a lower and an upper limit, referred to as tolerances, with each dimen sion was introduced. Tolerances were specified to ensure the proper function of mating features. Fits of mating features included clearances, location fits, and interference fits, with various sub-grades in each category assigned a tolerance value depending on the nominal size of the mating features. During the inspection process, a part is rejected if a dimension fell outside the specified range. As the accuracy requirements in assemblies became tighter, designers had to consider other critical dimensions and allocate tolerances to them in order to ensure the assembly's functionality.