Users can dramatically improve the design, performance, and manageability of object-oriented code without altering its interfaces or behavior. "Refactoring" shows users exactly how to spot the best opportunities for refactoring and exactly how to do it, step by step.

This book aims to help governments and public authorities to establish effective light rail-light metro transit (LRMT) systems, and focuses on use of Public Private Participation (PPP) arrangements. Rather than identify a single approach, we present options and discuss practical issues related to preparing and implementing new LRMT PPP schemes. The approach is focused on providing information that can be used to make informed decisions, adapted to local policy and objectives. The material presented is intended as a practical guide to developing LRMT PPPs in both developed and developing countries. This work endeavors to provide answers to readers questions regarding how to successfully incorporate private sector participation in LRMT with a lesser emphasis on why LRMT and the private sector may be beneficial. The primary focus of this text is guiding the reader from design through to project implementation. It starts from the premise that underlying transport policy decisions will have already been made and that LRMT has already been identified as the appropriate transport solution. We have included some limited discussion of policy and technical issues where these directly impact the LRMT PPP approach. The approach is presented in nine sections, and in preparing it the author drew on current international LRMT PPP experience, through a series of interviews and case studies. The sections covered are: 1. Urban Transport and Light Rail/Light Metro Transit (LRMT) 2. Selected Technical Aspects 3. Incorporating Private Sector Participation in LRMT Initiatives 4. Understanding and Allocating Risk 5. Specifications, Oversight and Performance Management 6. Funding and finance 7. Developing a PPP Agreement 8. Procurement 9. Conclusions and Recommendations
Railway Transportation Systems covers the entire range of railway passenger systems, from conventional and high-speed intercity systems to suburban, regional, operating on steep gradients, and urban ones. It also examines in depth freight railway systems transporting conventional loads, heavy loads, and dangerous goods. For each system, the text provides a definition; an overview of its evolution and examples of good practice; the main design, construction, and operational characteristics; and the preconditions for its selection. Additionally, it offers a general overview of safety, interfaces with the environment, forces acting on the track, and techniques that govern the stability and guidance of railway vehicles. This new edition brings two new chapters. One concerns pre-feasibility studies of urban rail projects, and the other analyses the operation of railway systems under specific weather conditions and natural phenomena. New material examines dilemmas, trends and innovations in rail freight transportation; a new definition for high-speed rail; a number of case studies; and an update of cutting-edge technologies. It is ideal for graduate students, engineers, consultants, manufacturers, and transport company executives who need a reference and guide.

This book conveys mechanical fundamentals of electric railway propulsion, which includes rail-bound guidance, transmission of traction effort from wheel to rail under the influence of non-constant levels of adhesion and the transmission of motor torque to a spring-mounted and thus sliding drive set.

Since the advent of steam engines and higher throughput railways during the early nineteenth century, the rate of development has been rather steady and incremental. The development of advanced electronic control and command systems, increasing levels of automation, and electrified high-speed railways over the past few decades have transformed the rail transportation posing it as a competitor to aviation. Modern railways are no longer the sole forte of civil and mechanical engineering and involve a broad multidisciplinary engineering disciplines from advanced computing, telecommunications, and networking to big data analytics and even AI. This volume addresses the diverse, evolving, and advanced engineering disciplines including enabling practices and processes involved in shaping modern railways.

This NAO report examines how effectively the Strategic Rail Authority/Department for Transport and Network Rail turned around the West Coast programme between 2002 and 2006 in terms of delivering outputs and expected outcomes in line with the schedule and targets set by the government and set out in the West Coast Main Line Strategy of June 2003. Three areas were examined in detail: how the Strategic Rail Authority/Department of Transport and Network Rail addressed the weaknesses in programme management before 2002 to achieve delivery to schedule; whether costs have been brought under control; whether the programme is delivering its anticipated benefits. A number of findings and conclusions have been set out, including: that the SRA and Network Rail did turn around the programme through an industry-supported strategy, reducing technology risk through reliance on conventional signalling for most of the upgrade; there were some implementation problems in two areas, axle counters and computer-based interlocking signalling, which resulted in an increase in costs; in general, Network Rail’s control of costs has improved, but an analysis of its reported and forecast expenditure shows a final programme spend of £8.6 billion, with an overspend of around £300 million; for renewal work on the west coast route, Network Rail is within its overall
funding allowance and on course to achieve 70% of the £940 million cost efficiencies assumed by the rail Regulator; at present the Strategic Rail Authority provides subsidies on an annual basis to Virgin West Coast of £590 million in 2005-06 period, this amount represents a payment needed to maintain train services and is outside the £8.6 billion; the project has delivered journey time improvements, with punctuality and train reliability on the West Coast having improved since 2005; in the 2005-06 period, passenger journeys on Virgin West Coast grew by over 20%, and the remaining work on the programme to 2009 will increase passenger train and freight capacity, but the consensus in the rail industry is that around 2015 to 2020, the line will have insufficient capacity to sustain current levels of growth in passenger and freight traffic; the overall strategy has delivered passenger benefits from a modernised track, but value for money for the programme has not been maximised. The report sets out a number of recommendations, including: that the Department in future should model and appraise costs and benefits for different options for the timing of delivery of the project; that the Department and the Office of Rail Regulation should further develop standard definitions for costs for different stages and elements of transport projects; where projects propose new technology at significant cost, the Department and ORR should ensure that Network Rail draws up a supporting business case, addressing costs, benefits and possible challenges along with a supporting implementation and maintenance strategy; the ORR should ensure Network Rail progresses its plans and adopts best practice strategy, and this approach should include a company-wide strategy that addresses whole life costs in its investment appraisal/project business cases, along with improved recording of maintenance and renewals costs for its equipment.

This book focuses on selected research problems of contemporary railways. The first chapter is devoted to the prediction of railways development in the nearest future. The second chapter discusses safety and security problems in general, precisely from the system point of view. In the third chapter, both the general approach and a particular case study of a critical incident with regard to railway safety are presented. In the fourth chapter, the question of railway infrastructure studies is presented, which is devoted to track superstructure. In the fifth chapter, the modern system for the technical condition monitoring of railway tracks is discussed. The compact on-board sensing device is presented. The last chapter focuses on modeling railway vehicle dynamics using numerical simulation, where the dynamical models are exploited.

This is a comprehensive overview of the basics of fuzzy control, which also brings together some recent research results in soft computing, in particular fuzzy logic using genetic algorithms and neural networks. This book offers researchers not only a solid background but also a snapshot of the current state of the art in this field.

An index to translations issued by the United States Joint Publications Research Service (JPRS).

This book examines the requirements, risks, and solutions to improve the security and quality of complex cyber-physical systems (C-CPS), such as production systems, power plants, and airplanes, in order to ascertain whether it is possible to protect engineering organizations against cyber threats and
to ensure engineering project quality. The book consists of three parts that logically build upon each other. Part I "Product Engineering of Complex Cyber-Physical Systems" discusses the structure and behavior of engineering organizations producing complex cyber-physical systems, providing insights into processes and engineering activities, and highlighting the requirements and border conditions for secure and high-quality engineering. Part II "Engineering Quality Improvement" addresses quality improvements with a focus on engineering data generation, exchange, aggregation, and use within an engineering organization, and the need for proper data modeling and engineering-result validation. Lastly, Part III "Engineering Security Improvement" considers security aspects concerning C-CPS engineering, including engineering organizations' security assessments and engineering data management, security concepts and technologies that may be leveraged to mitigate the manipulation of engineering data, as well as design and run-time aspects of secure complex cyber-physical systems. The book is intended for several target groups: it enables computer scientists to identify research issues related to the development of new methods, architectures, and technologies for improving quality and security in multi-disciplinary engineering, pushing forward the current state of the art. It also allows researchers involved in the engineering of C-CPS to gain a better understanding of the challenges and requirements of multi-disciplinary engineering that will guide them in their future research and development activities. Lastly, it offers practicing engineers and managers with engineering backgrounds insights into the benefits and limitations of applicable methods, architectures, and technologies for selected use cases.

Provides an integrated introduction to artificial intelligence. Develops AI representation schemes and describes their uses for diverse applications, from autonomous robots to diagnostic assistants to infobots. DLC: Artificial intelligence.

Cities across the globe are looking to develop affordable, environmentally friendly, and socially responsible transportation solutions that can meet the accessibility needs of expanding metropolitan populations and support future economic and urban development. When appropriately planned and properly implemented as part of a larger public transportation network, urban rail systems can provide rapid mobility and vital access to city centers from surrounding districts. High-performing urban rail services, when carefully approached as development projects, can help enhance quality of life by giving citizens access to employment opportunities, essential services, urban amenities, and neighboring communities. The purpose of this Handbook is to synthesize and disseminate knowledge to inform the planning, implementation, and operations of urban rail projects with a view towards: -- Emphasizing the need for early studies and project planning; -- Making projects more sustainable (economically, socially, and environmentally); -- Improving socioeconomic returns and access to opportunities for users; -- Maximizing the value of private participation, where appropriate; and -- Building capacity within project implementing and managing institutions. This Handbook provides experiential advice to tackle the technical, institutional, and financial challenges faced by decision makers considering urban rail projects. It brings together the expertise of World Bank staff and the input of numerous specialists to synthesize international ‘good practices’ and recommendations that are independent of commercial, financial political, or other interests. The material presented is intended as an honest-broker guide to maximize the impact and manage the challenges of urban rail systems in cities in both developed and developing countries. Rather than identify a single approach, this Handbook acknowledges the complexities and context necessary when approaching an urban rail development by helping to prepare decision makers to ask the right questions, consider the key issues, perform the necessary studies, apply adequate tools, and learn from international good practice all at the right time in the project development process.
Online Library Rail Automation Solutions For Mainline And Regional Railways

This book provides a comprehensive overview of the latest research and standardization progress towards the 5th generation (5G) of mobile communications technology and beyond. It covers a wide range of topics from 5G use cases and their requirements, to spectrum, 5G end-to-end (E2E) system architecture including core network (CN), transport network (TN) and radio access network (RAN) architecture, network slicing, security and network management. It further dives into the detailed functional design and the evaluation of different 5G concepts, and provides details on planned trials and pre-commercial deployments across the globe. While the book naturally captures the latest agreements in 3rd Generation Partnership Project (3GPP) New Radio (NR) Release 15, it goes significantly beyond this by describing the likely developments towards the final 5G system that will ultimately utilize a wide range of spectrum bands, address all envisioned 5G use cases, and meet or exceed the International Mobile Telecommunications (IMT) requirements for the year 2020 and beyond (IMT-2020). 5G System Design: Architectural and Functional Considerations and Long Term Research is based on the knowledge and consensus from 158 leading researchers and standardization experts from 54 companies or institutes around the globe, representing key mobile network operators, network vendors, academic institutions and regional bodies for 5G. Different from earlier books on 5G, it does not focus on single 5G technology components, but describes the full 5G system design from E2E architecture to detailed functional design, including details on 5G performance, implementation and roll-out.

The Routledge Handbook of Public Transport is a reference work of chapters providing in-depth examination of the current issues and future developments facing public transport. Chapters in this book are dedicated to specific key topics, identifying the challenges therein and pointing to emerging areas of research and concern. The content is written by an international group of expert contributors and is enhanced through contributions from practitioners to deliver a broader perspective. The Handbook deals with public transport policy context, modal settings, public transport environment, public transport delivery issues, smart card data for planning and the future of public transport. This comprehensive reference work will be a vital source for academics, researchers and transport practitioners in public transport management, transport policy and transport planning.

This volume is based on the Ninth Residential Course on Railway Signalling and Control Systems.

This thesis takes a pedagogical stance in demonstrating how results from theoretical computer science may be applied to yield significant insight into the behaviour of the devices computer systems engineering practice seeks to put in place, and that this is immediately attainable with the present state of the art. The focus for this detailed study is provided by the type of solid state signalling systems currently being deployed throughout mainline British railways. Safety and system reliability concerns dominate in this domain. With such motivation, two issues are tackled: the special problem of software quality
assurance in these data-driven control systems, and the broader problem of design dependability. In the former case, the analysis is directed towards proving safety properties of the geographic data which encode the control logic for the railway interlocking; the latter examines the fidelity of the communication protocols upon which the distributed control system depends. The starting point for both avenues of attack is a mathematical model of the interlocking logic that is derived by interpreting the geographic data in process algebra. Thus, the emphasis is on the semantics of the programming language in question, and the kinds of safety properties which can be expressed as invariants of the system's ongoing behaviour. Although the model so derived turns out to be too concrete to be effectual in program verification in general, a careful analysis of the safety proof reveals a simple co-induction argument that leads to a highly efficient proof methodology. From this understanding it is straightforward to mechanise the safety arguments, and a prototype verification system is realised in higher-order logic which uses the proof tactics of the theorem prover to achieve full automation. The other line of inquiry considers whether the integrity of the overall design that coordinates the activities of many concurrent control elements can be compromised. Therefore, the formal model is developed to specifically answer safety-related concerns about the protocol employed to achieve distributed control in the management of larger railway networks. The exercise reveals that moderately serious design flaws do exist, but the real value of the mathematical model is twofold: it makes explicit one's assumptions about the conditions under which the faults can and cannot be activated, and it provides a framework in which to prove a simple modification to the design recovers complete security at negligible cost to performance.

This pioneering text provides a holistic approach to decisionmaking in transportation project development and programming, which can help transportation professionals to optimize their investment choices. The authors present a proven set of methodologies for evaluating transportation projects that ensures that all costs and impacts are taken into consideration. The text's logical organization gets readers started with a solid foundation in basic principles and then progressively builds on that foundation. Topics covered include: Developing performance measures for evaluation, estimating travel demand, and costing transportation projects Performing an economic efficiency evaluation that accounts for such factors as travel time, safety, and vehicle operating costs Evaluating a project's impact on economic development and land use as well as its impact on society and culture Assessing a project's environmental impact, including air quality, noise, ecology, water resources, and aesthetics Evaluating alternative projects on the basis of multiple performance criteria Programming transportation investments so that resources can be optimally allocated to meet facility-specific and system-wide goals Each chapter begins with basic definitions and concepts followed by a methodology for impact assessment. Relevant legislation is discussed and available software for performing evaluations is presented. At the end of each chapter, readers are provided resources for detailed investigation of particular topics. These include Internet sites and publications of international and domestic agencies and research institutions. The authors also provide a companion Web site that offers updates, data for analysis, and case histories of project evaluation and decision making. Given that billions of dollars are spent each year on transportation systems in the United States alone, and that there is a need for thorough and rational evaluation and decision making for cost-effective system preservation and improvement, this text should be on the desks of all transportation planners, engineers, and educators. With exercises in every chapter, this text is an ideal course book for the subject of transportation systems analysis and evaluation.

TCRP report 155 provides guidelines and descriptions for the design of various common types of light rail transit (LRT) track. The track structure types include ballasted track, direct fixation ("ballastless") track, and embedded track. The report considers the characteristics and interfaces of vehicle wheels and rail, tracks and wheel gauges, rail sections, alignments, speeds, and track moduli. The report includes chapters on vehicles, alignment, track structures,
track components, special track work, aerial structures/bridges, corrosion control, noise and vibration, signals, traction power, and the integration of LRT track into urban streets.

A different kind of politics for a new kind of society—beyond work, scarcity and capitalism In the twenty-first century, new technologies should liberate us from work. Automation, rather than undermining an economy built on full employment, is instead the path to a world of liberty, luxury and happiness—for everyone. Technological advance will reduce the value of commodities—food, healthcare and housing—towards zero. Improvements in renewable energies will make fossil fuels a thing of the past. Asteroids will be mined for essential minerals. Genetic editing and synthetic biology will prolong life, virtually eliminate disease and provide meat without animals. New horizons beckon. In Fully Automated Luxury Communism, Aaron Bastani conjures a vision of extraordinary hope, showing how we move to energy abundance, feed a world of 9 billion, overcome work, transcend the limits of biology, and establish meaningful freedom for everyone. Rather than a final destination, such a society merely heralds the real beginning of history.

It is currently quite easy for students or designers/engineers to find very general books on the various aspects of safety, reliability and dependability of computer system architectures, and partial treatments of the elements that comprise an effective system architecture. It is not so easy to find a single source reference for all these aspects of system design. However, the purpose of this book is to present, in a single volume, a full description of all the constraints (including legal contexts around performance, reliability norms, etc.) and examples of architectures from various fields of application, including: railways, aeronautics, space, automobile and industrial automation. The content of the book is drawn from the experience of numerous people who are deeply immersed in the design and delivery (from conception to test and validation), safety (analysis of safety: FMEA, HA, etc.) and evaluation of critical systems. The involvement of real world industrial applications is handled in such a way as to avoid problems of confidentiality, and thus allows for the inclusion of new, useful information (photos, architecture plans/schematics, real examples).