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# Optimized Diagnostics Implementing Offboard Diagnostics

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## Publications

Department of Transportation and related agencies appropriations for 1981  
Fundamentals of Medium/Heavy Duty Diesel Engines  
MFPG--detection, Diagnosis, and Prognosis  
Automatic Verification of Parameterized Systems by Over-Approximation  
Automotive Software Engineering  
Designing a Modern Skeleton Programming Framework for Parallel and Heterogeneous Systems  
International Aerospace Abstracts  
Proceedings  
Engine Modeling and Control  
Engineering Asset Management - Systems, Professional Practices and Certification  
Advanced Automotive Fault Diagnosis  
Electrical & Electronics Abstracts  
Modern Engine Technology  
Publications of the National Institute of Standards and Technology ... Catalog  
Bayesian Networks In Fault Diagnosis: Practice And Application  
Automotive Engineering  
Integrated Vehicle Health Management  
Latency-aware Resource Management at the Edge  
Methods and Tools for Efficient Model-Based Development of Cyber-Physical Systems with Emphasis on Model and Tool Integration  
Intelligent Transport Systems Standards  
Fieldbus Systems and Their Applications 2003  
Extensions for Distributed Moving Base Driving Simulators  
Vehicle Electronics to Digital Mobility  
Proceedings of the IEEE 1990 National Aerospace and Electronics Conference, NAECON 1990  
Diagnostics and Prognostics of Aerospace Engines  
Encyclopedia of Automotive Engineering  
Fundamentals of Medium/Heavy Duty Commercial Vehicle Systems  
Digital Twin Development and Deployment on the Cloud  
Exploring C2 Capability and Effectiveness in Challenging Situations  
Formal Verification of Tree Ensembles in Safety-Critical Applications  
Integrated Vehicle Health Management  
Automotive Diagnostics  
Off-Board Car Diagnostics Based on Heterogeneous, Highly Imbalanced and High-Dimensional Data Using Machine Learning Techniques  
Advanced Biomedical and Clinical Diagnostic Systems  
Annual Index/abstracts of SAE Technical Papers  
Spatio-Temporal Stream Reasoning with Adaptive State Stream Generation  
Industrial and Engineering Applications of Artificial Intelligence and Expert Systems

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Publications Linköping University Electronic Press

Model-based tools and methods are playing important roles in the design and analysis of cyber-physical systems before building and testing physical prototypes. The development of increasingly complex CPSs requires the use of multiple tools for different phases of the development lifecycle, which in turn depends on the ability of the supporting tools to interoperate. However, currently no vendor provides comprehensive end-to-end systems engineering tool support across the entire product lifecycle, and no mature solution currently exists for integrating different system modeling and simulation languages, tools and algorithms in the CPSs design process. Thus, modeling and simulation tools are still used separately in industry. The unique challenges in integration of CPSs are a result of the increasing heterogeneity of components and their interactions, increasing size of systems, and essential design requirements from various stakeholders. The corresponding system development involves several specialists in different domains, often using different modeling languages and tools. In order to address the challenges of CPSs and facilitate design of system architecture and design integration of different models, significant progress needs to be made towards model-based integration of multiple design tools, languages, and algorithms into a single integrated modeling and simulation environment. In this thesis we present the need for methods and tools with the aim of developing techniques for numerically stable co-simulation, advanced simulation model analysis, simulation-based optimization, and traceability capability, and making them more accessible to the model-based cyber physical product development process, leading to more efficient simulation. In particular, the contributions of this thesis are as follows: 1) development of a model-based dynamic optimization approach by integrating optimization into the model development process; 2) development of a graphical co-modeling editor and co-simulation framework for modeling, connecting, and unified system

simulation of several different modeling tools using the TLM technique; 3) development of a tool-supported method for multidisciplinary collaborative modeling and traceability support throughout the development process for CPSs; 4) development of an advanced simulation modeling analysis tool for more efficient simulation.

*Department of Transportation and related agencies  
appropriations for 1981* SAE International

Modern societies are affected by various threats and hazards, including natural disasters, cyber-attacks, extreme weather events and inter-state conflicts. Managing these challenging situations requires immediate actions, suspension of ordinary procedures, decision making under uncertainty and coordinated action. In other words, challenging situations put high demands on the command and control (C2) capability. To strengthen the capability of C2, it is vital to identify the prerequisites for effective coordination and direction within the domain of interest. This thesis explores C2 capability and effectiveness in three domains: interorganizational crisis management, military command and control, and cyber defence operations. The thesis aims to answer three research questions: (1) What constitutes C2 capability? (2) What constitutes C2 effectiveness? and (3) How can C2 effectiveness be assessed? The work was carried out as two case studies and one systematic literature review. The main contributions of the thesis are the identification of perspectives of C2 capability in challenging situations and an overview of approaches to C2 effectiveness assessment. Based on the results of the three studies, six recurring perspectives of capability in the domains studied were identified: interaction (collaboration), direction and coordination, relationships, situation awareness, resilience and preparedness. In the domains there are differences concerning which perspectives that are most emphasized in order to obtain C2 capability. C2 effectiveness is defined as the extent to which a C2 system is successful in achieving its intended result. The thesis discusses the interconnectedness of performance and effectiveness measures, and concludes that there is not a united view on the difference between measures of effectiveness and measures of performance. Different approaches to effectiveness

assessment were identified, where assessment may be conducted based on one specific issue, in relation to a defined goal for a C2 function or using a more exploratory approach.

*Fundamentals of Medium/Heavy Duty Diesel Engines* Artech House

This proceeding represents state-of-the-art trends and developments in the emerging field of engineering asset management as presented at the Eight World Congress on Engineering Asset Management (WCEAM). The Proceedings of the WCEAM 2013 is an excellent reference for practitioners, researchers and students in the multidisciplinary field of asset management, covering topics such as: Asset condition monitoring and intelligent maintenance, 2. Asset data warehousing, data mining and fusion, 3. Asset performance and level-of-service models, 4. Design and life-cycle integrity of physical assets, 5. Deterioration and preservation models for assets, 6. Education and training in asset management, 7. Engineering standards in asset management, 8. Fault diagnosis and prognostics, 9. Financial analysis methods for physical assets, 10. Human dimensions in integrated asset management, 11. Information quality management, 12. Information systems and knowledge management, 13. Intelligent sensors and devices, 14. Maintenance strategies in asset management, 15. Optimisation decisions in asset management, 16. Risk management in asset management, 17. Strategic asset management, 18. Sustainability in asset management. King WONG served as Congress Chair for WCEAM 2013 and ICUMAS 2013 is the President of the Hong Kong Institute of Utility Specialists (HKIUS) and Convener of International Institute of Utility Specialists (IIUS). Peter TSE is the Director of the Smart Engineering Asset Management laboratory (SEAM) at the City University of Hong Kong and served as the Chair of WCEAM 2013 Organising Committee. Joseph MATHEW served as the Co-Chair of WCEAM 2013 is also WCEAM's General Chair. He is the Chief Executive Officer of Asset Institute, Australia.

**MFPG--detection, Diagnosis, and Prognosis** Linköping University Electronic Press

Modern vehicles are complex systems. Different design stages for

such a complex system include evaluation using models and submodels, hardware-in-the-loop systems and complete vehicles. Once a vehicle is delivered to the market evaluation continues by the public. One kind of tool that can be used during many stages of a vehicle lifecycle is driving simulators. The use of driving simulators with a human driver is commonly focused on driver behavior. In a high fidelity moving base driving simulator it is possible to provide realistic and repetitive driving situations using distinctive features such as: physical modelling of driven vehicle, a moving base, a physical cabin interface and an audio and visual representation of the driving environment. A desired but difficult goal to achieve using a moving base driving simulator is to have behavioral validity. In other words, A driver in a moving base driving simulator should have the same driving behavior as he or she would have during the same driving task in a real vehicle.". In this thesis the focus is on high fidelity moving base driving simulators. The main target is to improve the behavior validity or to maintain behavior validity while adding complexity to the simulator. One main assumption in this thesis is that systems closer to the final product provide better accuracy and are perceived better if properly integrated. Thus, the approach in this thesis is to try to ease incorporation of such systems using combinations of the methods hardware-in-the-loop and distributed simulation. Hardware-in-the-loop is a method where hardware is interfaced into a software controlled environment/simulation. Distributed simulation is a method where parts of a simulation at physically different locations are connected together. For some simulator laboratories distributed simulation is the only feasible option since some hardware cannot be moved in an easy way. Results presented in this thesis show that a complete vehicle or hardware-in-the-loop test laboratory can successfully be connected to a moving base driving simulator. Further, it is demonstrated that using a framework for distributed simulation eases communication and integration due to standardized interfaces. One identified potential problem is complexity in interface wrappers when integrating hardware-in-the-loop in a distributed simulation framework. From this aspect, it is important to consider the model design and the intersections between software and hardware models. Another important issue discussed is the increased delay in overhead time when using a framework for distributed simulation.

### **Automatic Verification of Parameterized Systems by Over-Approximation** Routledge

This volume includes the proceedings from Proceedings of the Ninth International Conference Fukuoka, Japan, June 4-7, 1996. This work represents a broad spectrum of new ideas in the field of applied artificial intelligence and expert systems, and serves to disseminate information regarding intelligent methodologies and their implementation in solving various problems in industry and engineering.

*Automotive Software Engineering* Linköping University Electronic Press

A proceedings volume from the 6th IFAC International Conference, Puebla, Mexico, 14-25 November 2005

*Designing a Modern Skeleton Programming Framework for Parallel and Heterogeneous Systems* SAE International

Since the early seventies, the development of the automobile has been characterized by a steady increase in the deployment of onboard electronics systems and software. This trend continues unabated and is driven by rising end-user demands and increasingly stringent environmental requirements. Today, almost every function onboard the modern vehicle is electronically controlled or monitored. The software-based implementation of vehicle functions provides for unparalleled freedoms of concept and design. However, automobile development calls for the accommodation of contrasting prerequisites - such as higher demands on safety and reliability vs. lower cost ceilings, longer product life cycles vs. shorter development times - along with growing proliferation of model variants. Automotive Software Engineering has established its position at the center of these seemingly conflicting opposites. This book provides background basics as well as numerous suggestions, rare insights, and cases in point concerning those processes, methods, and tools that contribute to the surefooted mastery of the use of electronic systems and software in the contemporary automobile.

*International Aerospace Abstracts* CRC Press

Today's society is increasingly software-driven and dependent on powerful computer technology. Therefore it is important that advancements in the low-level processor hardware are made available for exploitation by a growing number of programmers of differing skill level. However, as we are approaching the end of Moore's law, hardware designers are finding new and increasingly

complex ways to increase the accessible processor performance. It is getting more and more difficult to effectively target these processing resources without expert knowledge in parallelization, heterogeneous computation, communication, synchronization, and so on. To ensure that the software side can keep up, advanced programming environments and frameworks are needed to bridge the widening gap between hardware and software. One such example is the pattern-centric skeleton programming model and in particular the SkePU project. The work presented in this thesis first redesigns the SkePU framework based on modern C++ variadic template metaprogramming and state-of-the-art compiler technology. It then explores new ways to improve performance: by providing new patterns, improving the data access locality of existing ones, and using both static and dynamic knowledge about program flow. The work combines novel ideas with practical evaluation of the approach on several applications. The advancements also include the first skeleton API that allows variadic skeletons, new data containers, and finally an approach to make skeleton programming more customizable without compromising universal portability.

*Proceedings* Springer

The increasing demands for internal combustion engines with regard to fuel consumption, emissions and driveability lead to more actuators, sensors and complex control functions. A systematic implementation of the electronic control systems requires mathematical models from basic design through simulation to calibration. The book treats physically-based as well as models based experimentally on test benches for gasoline (spark ignition) and diesel (compression ignition) engines and uses them for the design of the different control functions. The main topics are: - Development steps for engine control - Stationary and dynamic experimental modeling - Physical models of intake, combustion, mechanical system, turbocharger, exhaust, cooling, lubrication, drive train - Engine control structures, hardware, software, actuators, sensors, fuel supply, injection system, camshaft - Engine control methods, static and dynamic feedforward and feedback control, calibration and optimization, HiL, RCP, control software development - Control of gasoline engines, control of air/fuel, ignition, knock, idle, coolant, adaptive control functions - Control of diesel engines, combustion models, air flow and exhaust recirculation control, combustion-pressure-

based control (HCCI), optimization of feedforward and feedback control, smoke limitation and emission control This book is an introduction to electronic engine management with many practical examples, measurements and research results. It is aimed at advanced students of electrical, mechanical, mechatronic and control engineering and at practicing engineers in the field of combustion engine and automotive engineering. *Engine Modeling and Control* Linköping University Electronic Press

Digital Twin Development and Deployment in the Cloud: Developing Cloud-Friendly Dynamic Models Using Simulink®/Simscape™ and Amazon AWS promotes a physics-based approach to the field of digital twins. Through the use of multiphysics models running in the cloud, significant improvement to the diagnostics and prognostic of systems can be attained. The book draws a clear definition of digital twins, helping business leaders clearly identify the value it brings. In addition, it outlines the key elements needed for deployment, including the hardware and software tools needed. Special attention is paid to the process of developing and deploying the multi-physics models of the digital twins. - Provides a high-level overview of digital twins and their underutilization in the field of asset management and maintenance - Proposes a streamline process to create digital twins for a wide variety of applications using MATLAB® Simscape™ - Deploys developed digital twins on Amazon Web Services - Includes MATLAB and Simulink codes available for free download on MATLAB central - Covers popular prototyping hardware, such as Arduino and Raspberry Pi

*Engineering Asset Management - Systems, Professional Practices and Certification* Jones & Bartlett Learning

The increasing diversity of connected devices leads to new application domains being envisioned. Some of these need ultra low latency or have privacy requirements that cannot be satisfied by the current cloud. By bringing resources closer to the end user, the recent edge computing paradigm aims to enable such applications. One critical aspect to ensure the successful deployment of the edge computing paradigm is efficient resource management. Indeed, obtaining the needed resources is crucial for the applications using the edge, but the resource picture of this paradigm is complex. First, as opposed to the nearly infinite resources provided by the cloud, the edge devices have finite resources. Moreover, different resource types are required

depending on the applications and the devices supplying those resources are very heterogeneous. This thesis studies several challenges towards enabling efficient resource management for edge computing. The thesis begins by a review of the state-of-the-art research focusing on resource management in the edge computing context. A taxonomy is proposed for providing an overview of the current research and identify areas in need of further work. One of the identified challenges is studying the resource supply organization in the case where a mix of mobile and stationary devices is used to provide the edge resources. The ORCH framework is proposed as a means to orchestrate this edge device mix. The evaluation performed in a simulator shows that this combination of devices enables higher quality of service for latency-critical tasks. Another area is understanding the resource demand side. The thesis presents a study of the workload of a killer application for edge computing: mixed reality. The MR-Leo prototype is designed and used as a vehicle to understand the end-to-end latency, the throughput, and the characteristics of the workload for this type of application. A method for modeling the workload of an application is devised and applied to MR-Leo in order to obtain a synthetic workload exhibiting the same characteristics, which can be used in further studies.

*Advanced Automotive Fault Diagnosis* Elsevier

Part dictionary, part encyclopedia, *Modern Engine Technology* from A to Z will serve as your comprehensive reference guide for many years to come. Keywords throughout the text are in alphabetical order and highlighted in blue to make them easier to find, followed, where relevant, by subentries extending to as many as four sublevels. Full-color illustrations provide additional visual explanation to the reader. This book features: approximately 4,500 keywords, with detailed cross-references more than 1,700 illustrations, some in full color in-depth contributions from nearly 100 experts from industry and science engine development, both theory and practice

**Electrical & Electronics Abstracts** Linköping University Electronic Press

A lot of today's data is generated incrementally over time by a large variety of producers. This data ranges from quantitative sensor observations produced by robot systems to complex unstructured human-generated texts on social media. With data being so abundant, making sense of these streams of data

through reasoning is challenging. Reasoning over streams is particularly relevant for autonomous robotic systems that operate in a physical environment. They commonly observe this environment through incremental observations, gradually refining information about their surroundings. This makes robust management of streaming data and its refinement an important problem. Many contemporary approaches to stream reasoning focus on the issue of querying data streams in order to generate higher-level information by relying on well-known database approaches. Other approaches apply logic-based reasoning techniques, which rarely consider the provenance of their symbolic interpretations. In this thesis, we integrate techniques for logic-based spatio-temporal stream reasoning with the adaptive generation of the state streams needed to do the reasoning over. This combination deals with both the challenge of reasoning over streaming data and the problem of robustly managing streaming data and its refinement. The main contributions of this thesis are (1) a logic-based spatio-temporal reasoning technique that combines temporal reasoning with qualitative spatial reasoning; (2) an adaptive reconfiguration procedure for generating and maintaining a data stream required to perform spatio-temporal stream reasoning over; and (3) integration of these two techniques into a stream reasoning framework. The proposed spatio-temporal stream reasoning technique is able to reason with intertemporal spatial relations by leveraging landmarks. Adaptive state stream generation allows the framework to adapt in situations in which the set of available streaming resources changes. Management of streaming resources is formalised in the DyKnow model, which introduces a configuration life-cycle to adaptively generate state streams. The DyKnow-ROS stream reasoning framework is a concrete realisation of this model that extends the Robot Operating System (ROS). DyKnow-ROS has been deployed on the SoftBank Robotics NAO platform to demonstrate the system's capabilities in the context of a case study on run-time adaptive reconfiguration. The results show that the proposed system - by combining reasoning over and reasoning about streams - can robustly perform spatio-temporal stream reasoning, even when the availability of streaming resources changes.

Modern Engine Technology Springer

In the presence of data and computational resources, machine

learning can be used to synthesize software automatically. For example, machines are now capable of learning complicated pattern recognition tasks and sophisticated decision policies, two key capabilities in autonomous cyber-physical systems. Unfortunately, humans find software synthesized by machine learning algorithms difficult to interpret, which currently limits their use in safety-critical applications such as medical diagnosis and avionic systems. In particular, successful deployments of safety-critical systems mandate the execution of rigorous verification activities, which often rely on human insights, e.g., to identify scenarios in which the system shall be tested. A natural pathway towards a viable verification strategy for such systems is to leverage formal verification techniques, which, in the presence of a formal specification, can provide definitive guarantees with little human intervention. However, formal verification suffers from scalability issues with respect to system complexity. In this thesis, we investigate the limits of current formal verification techniques when applied to a class of machine learning models called tree ensembles, and identify model-specific characteristics that can be exploited to improve the performance of verification algorithms when applied specifically to tree ensembles. To this end, we develop two formal verification techniques specifically for tree ensembles, one fast and conservative technique, and one exact but more computationally demanding. We then combine these two techniques into an abstraction-refinement approach, that we implement in a tool called VoTE (Verifier of Tree Ensembles). Using a couple of case studies, we recognize that sets of inputs that lead to the same system behavior can be captured precisely as hyperrectangles, which enables tractable enumeration of input-output mappings when the input dimension is low. Tree ensembles with a high-dimensional input domain, however, seems generally difficult to verify. In some cases though, conservative approximations of input-output mappings can greatly improve performance. This is demonstrated in a digit recognition case study, where we assess the robustness of classifiers when confronted with additive noise.

*Publications of the National Institute of Standards and Technology ... Catalog* SAE International

Unique and groundbreaking—this highly-anticipated book addresses both basic and advanced concepts critical for the understanding and support of the developing field of Integrated

Vehicle Health Management (IVHM). From an initial idea by the SAE IVHM Steering Group, collaboratively written by experts from academia, research and industry, the thirteen chapters within this book represent the collective voice of the most qualified authorities in the field. Highlights of the book include: -a single definition and taxonomy of IVHM, as well as basic principles -the identification of how and where IVHM should be implemented -the commercial value of IVHM -vehicle health management systems engineering -algorithms and their impact on IVHM -IVHM future directions and issues -Case study on IHUMS This book serves as the perfect introduction to IVHM for engineers, executives, academic instructors, and students.

*Bayesian Networks In Fault Diagnosis: Practice And Application* Linköping University Electronic Press

This thesis presents a completely automatic verification framework to check safety properties of parameterized systems. A parameterized system is a family of finite state systems where every system consists of a finite number of processes running in parallel the same algorithm. All the systems in the family differ only in the number of the processes and, in general, the number of systems in a family may be unbounded. Examples of parameterized systems are communication protocols, mutual exclusion protocols, cache coherence protocols, distributed algorithms etc. Model-checking of finite state systems is a well-developed formal verification approach of proving properties of systems in an automatic way. However, it cannot be applied directly to parameterized systems because the unbounded number of systems in a family means an infinite state space. In this thesis we propose to abstract an original family of systems consisting of an unbounded number of processes into one consisting of a fixed number of processes. An abstracted system is considered to consist of  $k+1$  components— $k$  reference processes and their environment. The transition relation for the abstracted system is an over-approximation of the transition relation for the original system, therefore, a set of reachable states of the abstracted system is an over-approximation of the set of reachable states of the original one. A safety property is considered to be parameterized by a fixed number of processes whose relationship is in the center of attention in the property. Such processes serve as reference processes in the abstraction. We propose an encoding which allows to perform reachability

analysis for an abstraction parameterized by the reference processes. We have successfully verified three classic parameterized systems with replicated processes by applying this method.

*Automotive Engineering* World Scientific

Fault diagnosis is useful for technicians to detect, isolate, identify faults, and troubleshoot. Bayesian network (BN) is a probabilistic graphical model that effectively deals with various uncertainty problems. This model is increasingly utilized in fault diagnosis. This unique compendium presents bibliographical review on the use of BNs in fault diagnosis in the last decades with focus on engineering systems. Subsequently, eleven important issues in BN-based fault diagnosis methodology, such as BN structure modeling, BN parameter modeling, BN inference, fault identification, validation, and verification are discussed in various cases. Researchers, professionals, academics and graduate students will better understand the theory and application, and benefit those who are keen to develop real BN-based fault diagnosis system.

*Integrated Vehicle Health Management* Linköping University Electronic Press

Diagnostics, or fault finding, is a fundamental part of an automotive technician's work, and as automotive systems become increasingly complex there is a greater need for good diagnostic skills. Advanced Automotive Fault Diagnosis is the only book to treat automotive diagnostics as a science rather than a check-list procedure. Each chapter includes basic principles and examples of a vehicle system followed by the appropriate diagnostic techniques, complete with useful diagrams, flow charts, case studies and self-assessment questions. The book will help new students develop diagnostic skills and help experienced technicians improve even further. This new edition is fully updated to the latest technological developments. Two new chapters have been added – On-board diagnostics and Oscilloscope diagnostics – and the coverage has been matched to the latest curricula of motor vehicle qualifications, including: IMI and C&G Technical Certificates and NVQs; Level 4 diagnostic units; BTEC National and Higher National qualifications from Edexcel; International Motor Vehicle qualifications such as C&G 3905; and ASE certification in the USA.

**Latency-aware Resource Management at the Edge**

#### Academic Press

To list, summarize, and categorize intelligent transportation standards (ITS). Reviews best practices and provides listings for standards developing organizations at national and international levels. Provides guidance as to where to look in the future to find relevant standards for ITS. Presents strategies for integrating

standards in IRS planning, deployment, and operation.

[Methods and Tools for Efficient Model-Based Development of Cyber-Physical Systems with Emphasis on Model and Tool Integration](#) SAE International

A collection of papers from an Institute of Mechanical Engineers conference which discuss the latest developments and likely

future trends in automotive diagnostics. Coverage is given to all types of vehicles and all types of vehicle diagnostic systems, whether on or off board. Particular emphasis is given to - driver information systems, on-board diagnostics, off-board diagnostic equipment, data collections, testing, industry standardization, training and operator skills and design considerations.

#### Best Sellers - Books :

- [Beyond The Story: 10-year Record Of Bts](#)
- [I Love You Like No Otter: A Funny And Sweet Board Book For Babies And Toddlers \(punderland\) By Rose Rossner](#)
- [Meditations: A New Translation](#)
- [Saved: A War Reporter's Mission To Make It Home By Benjamin Hall](#)
- [The Shadow Work Journal: A Guide To Integrate And Transcend Your Shadows By Keila Shaheen](#)
- [Little Blue Truck's Springtime: An Easter And Springtime Book For Kids By Alice Schertle](#)
- [The Boy, The Mole, The Fox And The Horse](#)
- [The Body Keeps The Score: Brain, Mind, And Body In The Healing Of Trauma By Bessel Van Der Kolk M.d.](#)
- [Fast Like A Girl: A Woman's Guide To Using The Healing Power Of Fasting To Burn Fat, Boost Energy, And Balance Hormones By Dr. Mindy Pelz](#)
- [Regretting You By Colleen Hoover](#)