



Automated Manual Transmission

**Harald Naunheimer, Bernd
Bertsche, Joachim Ryborz, Wolfgang
Novak**



Automated Manual Transmission:

Gear Change Selection and Clutch Control of an Automated Manual Transmission Vehicle Enric Canal García, 2011 The aim of this report is to provide a detailed overview of Automated Manual Transmissions AMT from its control point of view An introduction about AMT is given stating its main advantages in terms of cost and efficiency compared to other transmission types and justifying the context which makes AMT an interesting system for investigation It is stated as well its importance for the Ford Focus prototype vehicle where the project will carry the investigation This leads to the aim and objectives Then previous research about AMT is summarized Starting with the common problems of AMT some proposed control strategies follow which aim to solve the discussed problems As well AMTs actuator control strategies are presented All this analysis led to some recommendations which guide the next steps of the project Continuing with the vehicle is introduced with major emphasis on the AMT system It is explained the present components and new drivers that are designed and built which provide the functionality needed for the AMT Next the controller architecture development process is discussed Starting from the low level controllers for each of the AMT actuators it is explained the strategy used to achieve the control of them It includes an interesting discussion on how to use the sensors present on the actuators to achieve position control without position feedback Then it follows the details on how each actuator is integrated in high level controllers until achieving the complete control of the AMT successfully Finally some conclusions are drawn stating the importance of the feedback sensors for gearbox controllers and the clutch control concerns Guidance is as well given for further investigation on the AMT system of the prototype vehicle Keywords Gearshift Gearbox Actuators Gearbox Control Clutch Control Shift Shock Shift Time Vehicle Start Simulink Stateflow Synchromesh dSpace *Advanced Transmission Systems: Dual-Clutch, Automated Manual & Hybrid Gearboxes* Mohammed Hamed Ahmed Soliman, 2025-09-27 Advanced automotive transmissions are no longer a niche topic they are at the heart of modern vehicle design performance and efficiency While many resources focus on traditional gearboxes or CVTs very few provide a comprehensive hands on guide covering the full spectrum of transmission technologies beyond CVT wet and dry dual clutch transmissions DCTs automated manual transmissions AMTs traditional automatics Tiptronic manual shift systems and hybrid electric drivetrains This book builds on the foundation laid in my previous work Mastering CVT Transmissions which focused exclusively on continuously variable transmissions their maintenance troubleshooting and optimization While the CVT book provided in depth guidance for one critical technology this new volume expands the coverage to all other advanced transmissions offering readers a truly comprehensive understanding of modern vehicle drivetrains By combining theoretical knowledge with practical real world experience this book offers Clear explanations of how each transmission type works and why it behaves the way it does Maintenance and troubleshooting guidance for longevity and reliability Performance optimization strategies including shift mapping torque management and hybrid electric considerations Case studies and practical examples drawn from racing

tuning and professional workshops Whether you are a professional mechanic automotive engineer tuning enthusiast or student this book equips you with the knowledge to understand diagnose maintain and optimize every major advanced transmission system By bridging the gap between theory and hands on practice it prepares you for the demands of modern vehicles and the rapidly evolving automotive landscape Simply put this book is designed to make complex transmission systems accessible understandable and usable helping you confidently tackle challenges that most resources leave unaddressed and serving as the perfect complement to the insights shared in Mastering CVT Transmissions Author Note My own experiences shaped the series tuning my personal vehicles since 1998 competing in formal Egyptian autocross races from 2001 to 2003 and running my YouTube channel CarTuningLovers where I share practical tips and tutorials with a global community of car enthusiasts These experiences combined with my academic background in mechanical and industrial engineering gave me both the hands on insight and technical expertise to craft guides that are practical accurate and actionable

Development of A Virtual Automated Manual Transmission System Soon Chin Chan, 2013 This research presented as the development virtual model of Automated Manual Transmission AMT The model is designed with the consideration of low mass low price and good quality in Solid Edge ST3 This AMT model is designed as three subsystems which are Dual Clutch Direct Shift Gearbox and Differential Gearbox The AMT system is developed by using MSC ADAM View 2011 software In which the AMT model has developed the performance with using simulation The input parameter applied to AMT model which are kinematic and mechanism The output analysis carried out as speed increment in different gear speed ratio shifting period and wheel turning speed Left and Right turn

Automatic Transmission Systems: A Comprehensive Guide Pasquale De Marco, 2025-07-23 Automatic Transmission Systems A Comprehensive Guide provides a thorough exploration of the inner workings of automatic transmissions equipping readers with the knowledge and skills necessary to diagnose repair and maintain these complex systems Written with a focus on practical application the book covers all aspects of automatic transmissions from their evolution and basic components to advanced control strategies and troubleshooting techniques It delves into the intricacies of hydraulic and electronic control systems providing readers with a deep understanding of how these components work together to ensure smooth and efficient gear shifting In addition to detailed technical information the book also emphasizes the importance of safety and environmental considerations It outlines proper procedures for fluid disposal electrical hazard prevention and adherence to environmental regulations By incorporating these principles into their practices technicians can ensure the responsible maintenance and repair of automatic transmissions Whether you re a practicing technician looking to expand your knowledge or a student eager to enter the automotive industry this comprehensive guide is an invaluable resource Its clear explanations practical examples and case studies provide a solid foundation for understanding the complexities of automatic transmission systems With its in depth coverage of both fundamental principles and cutting edge advancements Automatic Transmission Systems A

Comprehensive Guide is the essential reference for anyone seeking to master the diagnosis repair and maintenance of these essential vehicle components If you like this book write a review **Automated Manual Transmission Controller** ,1999 A powertrain system for a hybrid vehicle The hybrid vehicle includes a heat engine such as a diesel engine and an electric machine which operates as both an electric motor and an alternator to power the vehicle The hybrid vehicle also includes a manual style transmission configured to operate as an automatic transmission from the perspective of the driver The engine and the electric machine drive an input shaft which in turn drives an output shaft of the transmission In addition to driving the transmission the electric machine regulates the speed of the input shaft in order to synchronize the input shaft during either an upshift or downshift of the transmission by either decreasing or increasing the speed of the input shaft When decreasing the speed of the input shaft the electric motor functions as an alternator to produce electrical energy which may be stored by a storage device Operation of the transmission is controlled by a transmission controller which receives input signals and generates output signals to control shift and clutch motors to effect smooth launch upshift shifts and downshifts of the transmission so that the transmission functions substantially as an automatic transmission from the perspective of the driver while internally substantially functioning as a manual transmission **Automotive Transmissions** Harald Naunheimer,Bernd Bertsche,Joachim Ryborz,Wolfgang Novak,2010-11-09 This book gives a full account of the development process for automotive transmissions Main topics Overview of the traffic vehicle transmission system Mediating the power flow in vehicles Selecting the ratios Vehicle transmission systems basic design principles Typical designs of vehicle transmissions Layout and design of important components e g gearshifting mechanisms moving off elements pumps retarders Transmission control units Product development process Manufacturing technology of vehicle transmissions Reliability and testing The book covers manual automated manual and automatic transmissions as well as continuously variable transmissions and hybrid drives for passenger cars and commercial vehicles Furthermore final drives power take offs and transfer gearboxes for 4 WD vehicles are considered Since the release of the first edition in 1999 there have been a lot of changes in the field of vehicles and transmissions About 40% of the second edition s content is new or revised with new data

Automated and Autonomous Spatial Mobilities Aharon Kellerman,2018-02-23 This ground breaking book explores a rapidly developing aspect of contemporary life automated and autonomous spatial mobilities and their social and urban implications Presenting a wide ranging discussion on autonomous vehicle AV development and its future adoption this highly topical book points to the emergence of autonomously mobile cities and the new mobility landscapes they will present Academics as well as practitioners in the fields of mobility transportation urban planning geography and sociology will find this an essential read **Model-based calibration of automated transmissions** Huang, Hua,2016-11-18 With continuous restrictions on emission standards and demands for higher driving comfort the calibration of shift quality is linked deeply and widely to automated transmission control algorithms This calibration process is typically implemented with real vehicles on

the road under poorly reproducible conditions where the calibration engineer has no other choice but to try different control parameters till the subjective assessment on the shift quality meets certain requirements such as shifting comfort or sportiness. Compared with today's multiplying number of variants in vehicle engine transmission combinations and exponential growth of control parameters this traditional method is backward and costly. An efficient way to rise to the challenge is the model based automatic calibration. In contrast to the conventional shift quality calibration this novel method uses a closed loop approach based on a dynamic model instead of human know how. A shift quality correlated position trajectory is proposed. Compared to the traditional control parameter adjustment method the guided trajectory has a higher tolerance to the system's hardware components and a better compatibility with TCUs from diverse suppliers. Since shift quality is not restricted to a general summarized grade e.g. comfort and sportiness are always two conflicting influence factors in the terms of shift quality calibrations a multi objective evolutionary algorithm is applied to search the set of Pareto optimal front which includes all the optimal compromised control parameters of the gear shifting trajectory for possible choice. In this work a hydro mechanical AMT synchronization system is used as an example to explain the proposed optimization process. A Modelica based non linear hydro mechanical AMT system is modeled which describes the transient behavior during gear shifting in detail. An effective fuzzy sliding mode position controller is designed for the referenced position tracking during synchronization in contrast to the conventional trial and error tuning method a genetic algorithm is applied to automatically identify and optimize the sliding mode controller parameters. A novel multi objective evolutionary algorithm MLIA is developed to find out the optimal control set for the synchronization trajectories. Verification at a transmission test bench shows that this model based multi objective optimization method has a guiding capability in automated transmission calibration.

Mit deutlich strengeren gesetzlichen Anforderungen hinsichtlich der Abgasemissionen und einer zunehmend anspruchsvolleren Nachfrage bezüglich des Fahrkomforts rückt die Frage nach der Schaltqualität stärker in den Fokus der Getriebeentwicklung. Die Kalibrierung umgangssprachlich die Applikation ist deshalb ein Schwerpunkt bei der Entwicklung von Algorithmen für die Schaltqualität von automatisierten Getriebesteuerungen. Der Kalibrierungsprozess wird in der Regel im Fahrzeugversuch auf der Straße durchgeführt. Der Applikationsingenieur versucht unter diesen nicht reproduzierbaren Bedingungen verschiedene Steuerparameter zu adaptieren. Dies wird für eine Schaltung solange durchgeführt bis die subjektive Beurteilung der Schaltqualität und die zugehörigen Eigenschaften wie zum Beispiel Schaltkomfort und Sportlichkeit erfüllt ist. Dieser beschriebene Prozess ist zeit und personalaufwendig was mit dem aktuellen Angebot an Motor Getriebe Fahrzeugvarianten kaum bewältigt werden kann. Als weitere Herausforderung steigt die Anzahl der kalibrierbaren Parameter der Regler und Steuerungsmethoden stetig um die Kundenbedürfnisse zu befriedigen weshalb auch aus Kostensicht ein besserer Prozess gefunden werden muss. Eine effiziente Möglichkeit zur Lösung der skizzierten Problemstellungen ist die modellbasierte automatische Kalibrierung. Im Gegensatz zu der herkömmlich auf Fahrversuche

basierende Kalibrierung der Schaltqualität verwendet dieses neue Verfahren ein dynamisches Modell in einer geschlossenen Schleife Anstelle des Applikationsingenieurs für die Fahrvorgaben wird in der Schleife ein Fahrerregler und ein Optimierungsalgorithmus verwendet um so eine hohe Reproduzierbarkeit des Schaltereignisses sicherzustellen Es wird vorgeschlagen die Bewegung der Schaltstellung zu optimieren da diese mit der Schaltqualität korreliert Diametral steht dem die allgemein übliche Regleranpassung verschiedener Parameter für die Synchronisation gegenüber Die vorgeschlagene Methode der geführten Schaltbewegung weist eine deutlich höhere Toleranz gegenüber der Varianz an Hardwarekomponenten und damit eine bessere Kompatibilität zu den Getriebesteuergeräten TCUs verschiedener Lieferanten auf Die Schaltqualität lässt sich nicht auf ein subjektives Kriterium zusammenfassen es werden immer unterschiedliche Faktoren wie z.B. Komfort und Sportlichkeit den Schaltvorgang bestimmen Deshalb wird für die Optimierung des Schaltvorgangs eine mehrkriterieller evolutionärer Algorithmus angewandt um die Paretofront zu identifizieren was alle Kompromisse der Schaltbewegungsregelung einschließt Es wird ein Modell eines hydromechanischen Synchronisationssystems für ein automatisiertes Getriebe als Beispielanwendung benutzt um den vorgeschlagenen Optimierungsprozess zu demonstrieren Das nichtlineare hydromechanische Synchronisationssystem wird mit der objektorientierten Sprache Modelica modelliert Mit dem Modell werden Schaltvorgänge detailliert beschrieben Ein Fuzzy Sliding Mode Regler wird für die jeweilige Bewegung der Schaltung während der Synchronisation benutzt Im Gegensatz zur herkömmlichen empirischen Anpassung der Reglerparameter wird ein genetischer Algorithmus angewendet um die automatische Erkennung und Bewertung der Parameter vom Fuzzy Sliding Mode Regler zu optimieren Ein neuartiger evolutionärer mehrkriterieller Algorithmus MLIA wurde angewandt um eine optimale Bewegung der Schaltstellung während der Synchronisierung zu finden Die Validierung am Getriebeprüfstand zeigt dass diese modellbasierte Methode der mehrkriteriellen Optimierung in der automatisierten Getriebekalibrierung eine deutliche Verbesserung darstellt

Modeling and Control of an Automated Manual Transmission for EcoCAR 3 Vehicle Aditya Modak, 2017 EcoCAR 3 is a part of the Advanced Vehicle Technology Competition series hosted by the Department of Energy and it challenges 16 North American university teams to re-engineer a 2016 Chevrolet Camaro and turn it into a hybrid electric vehicle thus improving the environmental impact of the car while retaining its performance aspects The Ohio State University's EcoCAR 3 vehicle has a plug in hybrid architecture with operation in series and parallel power flows The architecture features a 5 speed manual transmission that was automated by the team to retain the efficiency of a manual transmission while providing the convenience of an automatic transmission The team developed controllers manage the clutch and shift actuators to provide supervisory control of the automated manual transmission The simplicity and efficiency of a manual transmission combined with the advantages provided by the hybrid architecture make it a good candidate for an HEV This thesis provides an overview of the modeling component testing and controls development for the AMT system The controls development includes high level control for vehicle launch gearshift process and strategies used in

different hybrid vehicle operation modes **The Automotive Transmission Book** Robert Fischer, Ferit Küçükay, Gunter Jürgens, Rolf Najork, Burkhard Pollak, 2015-05-11 This book presents essential information on systems and interactions in automotive transmission technology and outlines the methodologies used to analyze and develop transmission concepts and designs Functions of and interactions between components and subassemblies of transmissions are introduced providing a basis for designing transmission systems and for determining their potentials and properties in vehicle specific applications passenger cars trucks buses tractors and motorcycles With these fundamentals the presentation provides universal resources for both state of the art and future transmission technologies including systems for electric and hybrid electric vehicles

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