## Contents

1. **Introduction**  
   1.1. Context ........................................................................ 2  
   1.2. Related Work on Component and Connector Modeling and Analyses .. 3  
   1.3. Objective and Main Results ........................................ 9  
   1.4. Thesis Organization .................................................... 11  

2. **Component and Connector Software Architectures**  
   2.1. Component and Connector Models ................................ 14  
   2.2. Modeling Component and Connector Models Using MontiArc .......... 17  
   2.3. Component Type Definitions and Component and Connector Models .. 20  
   2.4. Related Component and Connector Architecture Description Languages . 21  

3. **Component and Connector Views for Component and Connector Models**  
   3.1. Introducing the Pump Station System .............................. 26  
   3.2. Component and Connector Views Usage Scenarios and Language Features 28  
   3.3. Component and Connector Views .................................... 33  
   3.4. Satisfaction of Component and Connector Views ................ 36  
   3.5. Component and Connector Views Specifications .................. 38  
   3.6. Modeling Component and Connector Views using MontiArcView ........ 40  
   3.7. Discussion and Views Related Concepts .......................... 44  

4. **Component and Connector Views Verification**  
   4.1. Component and Connector Views Verification Example ............ 50  
   4.2. Component and Connector Views Verification Problem ............. 54  
   4.3. Checking Satisfaction and Generating Witnesses .................. 55  
   4.4. Implementation and Evaluation ..................................... 74  
   4.5. Discussion .............................................................. 86  
   4.6. Related Work ......................................................... 90  

5. **Component and Connector Model Synthesis from Views Specifications**  
   5.1. Component and Connector Model Synthesis Example ............ 94  
   5.2. Synthesis Problem Definition ...................................... 98  
   5.3. Component and Connector Model Synthesis ...................... 100  
   5.4. Advanced Features .................................................. 123  
   5.5. Synthesis with Architectural Styles ................................ 129  
   5.6. Implementation and Evaluation ..................................... 141  

Bibliografische Informationen  
http://d-nb.info/1058753487
A. Symbols 359
B. Translation Rule Notation 361
C. How to Use the C&C Views Verification Plug-In 371
D. How to Use the C&C Views Synthesis Plug-In 381
E. How to Use the MontiArcAutomaton Verification Implementation 391
F. How to Use the MontiArcAutomaton Java Code Generator 399
G. Complete PumpStation Component and Connector Model 407
H. Survey – Helpfulness of Generated Witnesses 413
   H.1. Reference Materials .................................................. 413
   H.2. Printed Survey ......................................................... 416
I. Complete C&C Views Synthesis Alloy Translation Example 433
J. MontiArcAutomaton Grammar for Human Reading 441
K. MontiArcAutomaton Specification Suite Grammar for Human Reading 443
L. Complete MontiArcAutomaton Mona Translation Example 445
   L.1. Example Translation of a Composed Component ................ 445
   L.2. Example Translation of a MAA_{ls} automaton .................. 448
M. Curriculum Vitae 451