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## Master thesis

Theory, systematic literature review, analysis

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### **Technological advances to enhance the reliability and safety of autonomous and assisted systems in inland navigation: a literature review**

*Keywords: Autonomous inland navigation, safety and reliability*

#### **Conditions**

Duration:	6 Months
Requirements:	Experience of literature research, scientific writing
Language:	English/Deutsch
Target groups:	Master students

#### **Content:**

The development of technologies for remote-controlled and autonomous operation in inland navigation has the potential to have a significant impact on transportation on waterways. These innovations aim to improve efficiency, safety and environmental sustainability while reducing costs. Faced with challenges such as the shortage of skilled workers and increasing transportation volumes, this technology offers promising solutions for the future of shipping.

In this context, the master's thesis offers the opportunity to systematically investigate the requirements and measures necessary to increase the reliability and safety of autonomous and assisted systems in inland navigation. The thesis includes a scientific review of the current state of the art and provides a thorough analysis of these aspects. This research will contribute to academic knowledge and deepen expertise in a critical and evolving field.

The aim of the master's thesis is to review and summarize existing research on the topic of "Reliability and safety optimization in autonomous and assisted systems for inland navigation", focusing on the most important technological developments and challenges. These include fault tolerance in autonomous systems, risk assessment in automated navigation, fail-safe design in maritime systems and collision avoidance systems. The result will be a scientific discussion on this topic.

The steps in detail are:

- Investigation of the current state of the art: Systematic review of existing studies in the field of inland navigation and maritime automation, with a focus on safety aspects (1.5 months).
- Evaluation of the sources: Definition of criteria for the inclusion or exclusion of studies. Evaluation of the quality and relevance of the sources (e.g. impact factors, publication data) (1 month).
- Literature analysis: Review of the development of the research topic. Synthesize existing knowledge and evaluate current methods and theories. Analyze and compare methods, results and assumptions. Identify unanswered or contradictory questions (1.5 months).

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# Lehrstuhl Steuerung, Regelung und Systemdynamik

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- Critical evaluation: examine the strengths and weaknesses of the literature. Identify methodological or theoretical problems, biases and relevance of results to the field (1.5 months).
- Research gaps and future directions: Propose relevant research questions for future studies. Summarize key findings (0.5 months).
- Documentation and presentation of the results.