Ulm University
Faculty of Engineering, Computer Science and Psychology
Institute of Media Informatics

A Title That Names the Contribution

Master's Thesis at Ulm University
in partial fulfillment of the requirements for the degree of Master of Science

Submitted by	Your Name (000000)
Examiner	First Examiner
Second examiner	Second Examiner
Supervisor	Your Supervisor
Submitted on	October 9, 2026

Abstract

*[**to write**] An abstract is five sentences, and each one has a job. The first names the problem and says why it matters to somebody outside this document. The second says what is already known, and what is still missing. The third says what you actually did, concretely enough that a reader can picture it: the system you built, the study you ran, the number of participants. The fourth reports what you found, with a number in it rather than a claim that one condition was better. The fifth says what follows for the people who design such systems. Aim for 150 to 250 words, and check afterwards that a reader who stops at the bottom of this page can still say what the thesis found.*

Zusammenfassung

*[**to write**] Die deutsche Zusammenfassung sagt dasselbe wie das englische Abstract, und zwar in derselben Reihenfolge: Problem, Forschungslücke, Vorgehen, Ergebnis, Konsequenz. Sie ist keine wörtliche Übersetzung, sondern eine eigenständige Fassung in gutem Deutsch. Fachbegriffe, die sich im Deutschen nicht eingebürgert haben, bleiben englisch und werden kursiv gesetzt. Schreiben Sie beide Fassungen am selben Tag, damit sie nicht auseinanderlaufen.*

Acknowledgments

*[**to write**] Thank the people who actually helped, and say what they helped with. Two or three sentences are enough. Name your supervisor, the people who took part in or supported the study, and anyone who read a draft. If the work was funded, the funder is named here as well.*

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1 Introduction

*[**to write**] Open the chapter with two or three sentences of your own before the first section heading. A reader who has just turned the page needs to know what this chapter is about, and a heading alone does not tell them. The same applies to every chapter in this thesis.*

1.1 Motivation

*[**to write**] Start outside the field. Describe the situation that makes this work worth doing, in language a competent engineer from another area would follow. Then narrow, in a paragraph or two, to the specific difficulty this thesis addresses. Resist the urge to review the literature here: that is what chapter 2 is for. One good figure showing the problem earns its place on this page.*

1.2 Research Questions

*[**to write**] State the questions as questions, numbered, each on its own line. A research question is answerable with the study you are about to describe, and you should be able to say in advance what an answer would look like. If a question cannot fail, it is a topic and not a question. Two or three are plenty for a thesis, and every one of them reappears in the results and again in the conclusion.*

1.3 Contributions

*[**to write**] List what this thesis adds that did not exist before: an artifact, a data set, an empirical finding, a design implication. Write each one as a sentence a stranger could check. Be honest about size. A well-scoped Bachelor's thesis contributes one thing properly, and claiming three weakens the one that is real.*

1.4 Structure of This Thesis

*[**to write**] Keep this section short, and write it last so it matches what the chapters ended up containing. One sentence per chapter, in order, saying what the reader will find there. The paragraph below shows the pattern and also demonstrates how cross-references are written in this template.*

chapter 2 reviews the relevant literature and identifies the gap this thesis addresses. chapter 3 describes the study design, the participants and the measures. chapter 4 reports the findings. chapter 5 interprets them and states the limitations of the work. chapter 6 summarizes the contribution and outlines what should be done next.

2 Related Work

*[**to write**] Say in two or three sentences how this chapter is organized and why it is organized that way. Related work grouped by theme reads as an argument; related work grouped by paper reads as a list.*

2.1 Background

*[**to write**] Explain what a reader needs to know before the rest of the chapter makes sense: the domain, the terminology, the standard method. Introduce each abbreviation exactly once, at its first use, the way the next sentence does.*

An external human–machine interface (eHMI) lets an automated vehicle communicate its intent to people outside it. Colley et al. [2] show that such displays exclude pedestrians with vision impairments unless non-visual channels are considered from the start.

2.2 Existing Approaches

*[**to write**] Group the work by the approach it takes, not by year. For each group, say what it achieves and where it stops. A paragraph that only reports what a paper did has not yet earned its place; the sentence that matters is the one saying what the paper means for your question.*

Reviews of the area organize the eHMI design space by modality and by the message being conveyed [4]. A parallel line of work examines the driver rather than the pedestrian, and reports that automated driving style shapes both trust and takeover behavior [3].

2.3 Research Gap

*[**to write**] Close the chapter by naming what is missing, in one paragraph, and connect it back to the research questions. The gap should follow from the work you have just reviewed rather than being asserted. A reader who disagrees with this paragraph will disagree with the whole thesis, so it is worth several drafts.*

3 Method

[to write] Say what kind of study this chapter describes and why that design answers the research questions. The rest of the chapter has one job: a competent reader should be able to run your study again from it, without asking you a single question.

3.1 Study Design

[to write] Name the design in the standard vocabulary: within-subjects or between-subjects, the independent variables and their levels, and how conditions were counterbalanced. If the study was preregistered, say where the registration is. Draw the design as a table if it has more than two factors.

3.2 Participants

[to write] Report how many people took part, how they were recruited, and what they were paid. Report age as a mean and a standard deviation, and report gender in the categories participants themselves chose. Add whatever else is relevant to your question, such as driving experience or prior contact with the technology. Table 3.1 shows the shape a reviewer expects; replace the numbers with your own.

3.3 Apparatus

[to write] Describe the hardware, the software and the environment precisely enough to be rebuilt: versions, screen sizes, simulator, seating distance. A photograph or a rendering of the setup belongs here. If you built the system yourself, say what it does here and leave how you built it for the appendix.

3.4 Procedure

[to write] Walk through the session in order, as a participant experienced it: briefing, consent, training trials, the conditions themselves, questionnaires, debriefing. Give the duration of each part. State here that participants gave informed consent, and name the body that granted ethics approval together with its reference number. The full materials belong in Appendix A.

Table 3.1: Participant demographics per condition. The caption sits above the table, and the label comes directly after the caption.

Condition	N	Age (M)	Age (SD)
Baseline	24	27.4	5.1
Prototype	24	28.1	6.3

3.5 Measures

*[**to write**] List every measure you collected, including the ones that did not work out. A measure that appears for the first time in the results chapter looks like a fishing expedition, even when it is not.*

3.5.1 Objective Measures

*[**to write**] Logged behavior: times, distances, error counts, gaze. For each one, say how it was computed from the raw data and what counts as a trial.*

3.5.2 Subjective Measures

*[**to write**] Questionnaires and interviews. Name each instrument, cite its original source, and give the number of items and the response scale. Do not silently modify a validated instrument; if you had to change it, say so and say why.*

3.6 Analysis

*[**to write**] State which test you applied to which measure, and why that test suits the data. Say how you handled assumptions, outliers and missing values, and fix the alpha level. For qualitative material, name the analytic approach and say who coded what. This template cites Braun and Clarke [1] as an example of how a method reference is attached to the sentence that uses it.*

4 Results

*[**to write**] Say what this chapter reports and in what order, and say nothing about what it means. Results and interpretation are separated on purpose: a reader must be able to disagree with your reading of the data while still trusting the data.*

4.1 Descriptive Results

*[**to write**] Report the numbers before the tests: means, standard deviations, counts. Every figure and every table is discussed in the running text, and the sentence that discusses it says what the reader should take from it rather than restating the caption. Figure 4.1 is the example this template ships with.*

*[**to write**] Note three things about the figure above. Its label comes directly after its caption, because a label placed before the caption silently numbers itself from whatever came earlier. It carries a `\Description` with the alt text a screen-reader user hears, which the ACM template requires and which is far easier to write now than a year from now. And it distinguishes the two lines by shape as well as by color, so that the figure survives being printed in grayscale.*

4.2 Inferential Results

*[**to write**] Report every test in full, in the order the research questions were asked. A complete report looks like this: $F(2, 46) = 4.71$, $p = .014$, partial eta squared $= .17$. The degrees of freedom make the test interpretable, the exact p value says more than a threshold does, and the effect size answers the question that a p value cannot, which is whether the difference is large enough to matter. Report the tests that came out null in exactly the same detail as the ones that did not.*

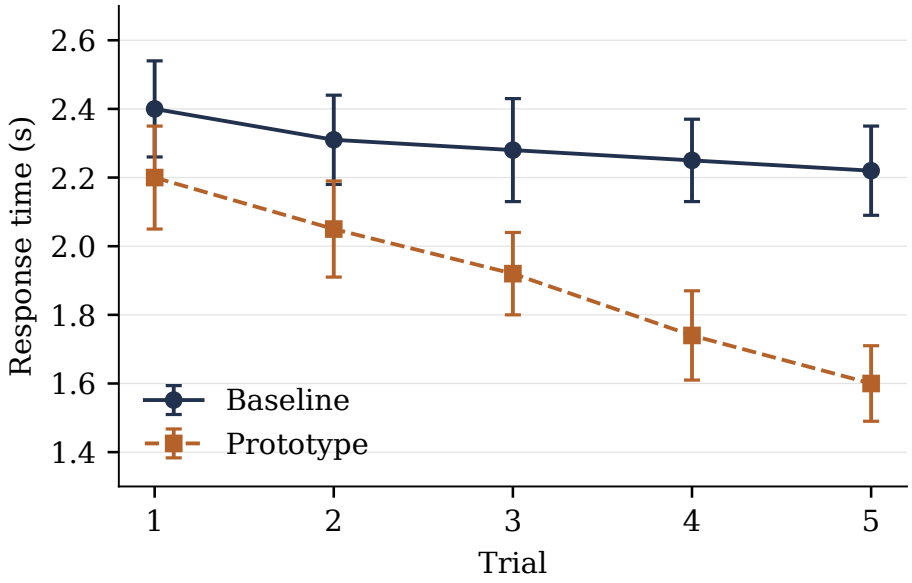


Figure 4.1: Mean response time per trial for the two conditions, with 95% confidence intervals.

5 Discussion

*[**to write**] Open by saying what the chapter does: interpret the findings, draw out what they mean for design, and be honest about what the study cannot support. This is the chapter examiners read most carefully, because it is the one that shows whether you understand your own results.*

5.1 Interpretation of the Findings

*[**to write**] Take the research questions in order and answer them, in words, with the evidence attached. Where a result contradicts the literature reviewed in chapter 2, say so and offer an explanation rather than passing over it. An unexpected result that you engage with is worth more than a confirmation you merely report.*

5.2 Design Implications

*[**to write**] Say what somebody building such a system should do differently tomorrow because of this work. Each implication follows from a specific finding, and you should be able to point at that finding. An implication that would have been just as true before the study is not an implication of the study.*

5.3 Limitations

*[**to write**] Name the things that genuinely constrain what the results support: sample composition, simulator fidelity, study duration, measures that did not capture what they were meant to. Write about each one as an effect on the conclusions rather than as an apology. Examiners find the limitations you leave out, so listing them yourself costs nothing and buys credibility.*

5.4 Future Work

*[**to write**] Two or three concrete next steps, each specific enough that somebody could start on it. Vague plans to study more people in more conditions belong nowhere. If a limitation names the obvious next study, say so here and connect the two.*

6 Conclusion

*[**to write**] Two or three sentences restating the problem and what this thesis did about it. The conclusion is not a summary of the document; it is the answer to the question the introduction asked. A reader should be able to read chapter 1 and this chapter and understand the thesis.*

6.1 Summary of Contributions

*[**to write**] Restate the contributions listed in section 1.3, now with the evidence behind them. Nothing new appears here. If a contribution you claimed at the start did not survive the study, this is where you say so, and saying so is a strength rather than a failure.*

6.2 Data Availability and Open Science

*[**to write**] Say where the data, the analysis code and the study materials are, and under which license. A repository link with a persistent identifier is preferred over a personal cloud folder that will not exist in three years. If something cannot be shared, name the reason: personal data, third-party licensing, an industry partner. "Data are available on request" is a sentence examiners have learned to read as a refusal.*

A Study Materials

*[**to write**] The appendix holds what a replication needs and what the argument does not: full questionnaires, interview guides, consent forms, code listings, additional plots. Nothing in the appendix may be load-bearing. If the reader has to come here to follow the argument, the material belongs in a chapter instead.*

A.1 Questionnaire Items

*[**to write**] Reproduce every item exactly as participants saw it, in the language they saw it in, with the response scale. If you translated a validated instrument, give both versions.*

A.2 Additional Figures

*[**to write**] Plots that support the analysis without being needed to follow it: distributions per condition, model diagnostics, per-participant traces. Give each one a caption that stands on its own, because nobody reads an appendix in order.*

Bibliography

[1] Virginia Braun and Victoria Clarke. Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2):77–101, 2006. doi: 10.1191/1478088706qp063oa.

[2] Mark Colley, Marcel Walch, Jan Gugenheimer, Ali Askari, and Enrico Rukzio. Towards inclusive external communication of autonomous vehicles for pedestrians with vision impairments. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems*, pages 1–14. ACM, 2020. doi: 10.1145/3313831.3376472.

[3] Zheng Ma and Yiqi Zhang. Drivers trust, acceptance, and takeover behaviors in fully automated vehicles: Effects of automated driving styles and driver's driving styles. *Accident Analysis & Prevention*, 159:106238, 2021. doi: 10.1016/j.aap.2021.106238.

[4] Alexandros Rouchitsas and Håkan Alm. External human–machine interfaces for autonomous vehicle-to-pedestrian communication: A review of empirical work. *Frontiers in Psychology*, 10, 2019. doi: 10.3389/fpsyg.2019.02757.

Declaration of Authorship

*[**to write**] Replace the paragraph below with the exact declaration your examination office prescribes, then delete this note. The text that follows is a common formulation, not an official one.*

I hereby declare that this thesis is my own work and that I have used no sources or aids other than those stated. Every passage taken from another source, whether quoted word for word or in substance, is identified as such. I have disclosed every use of generative AI tools, naming the tool and the purpose it was used for, and the intellectual content of this thesis is my own. This thesis has not been submitted, in the same or a similar form, to any other examination authority.

Place, date	Signature

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