

MscThesis

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Master of Science Thesis
Laboratory Name
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Botond Ortutay

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1 Introduction

1.1 The goals of this thesis

This thesis aims to design and implement a system that integrates a backend powered computer vision with an Augmented Reality (AR) interface. The concept involves a device capturing an image feed through its camera, which is then transmitted to a processing unit. Here, computer vision algorithms analyze the data to extract meaningful information, which is subsequently sent to the AR interface to give feedback to user. In this thesis, I document the journey of developing this system and assess its performance.

1.2 Research Questions

The thesis aims to answer the following Research Questions:

RQ1: What are the technological challenges in combining advanced computer vision algorithms with an AR user interface?

RQ2: Can a system with a backend computer vision system and an AR user interface be used in a cooking environment?

RQ3: Can such a system provide satisfactory user experience?

1.3 Methodology Overview

The work covered in this thesis mostly consist of the following three phases: firstly I conduct a literature review in chapter 3. The purpose of this is to learn about the technologies involved in this project, to find out what perceived challenges were found by other people working with these technologies and to search for projects similar to ours, conducted by the scientific community. Starting with a literature review should also provide a firm scientific basis to the later phases.

The second phase of the work concerns architecture design and prototype development. All relevant technological challenges found during the literature review are collected to chapter 4.1 for further analysis. Based on all these findings we then propose an architecture for a prototype in chapter 4.2. The prototype is then implemented and the whole development process, the technologies used, as well as anything notable that happens during development is described in chapter 5.

The third phase of the work is an empirical usability study conducted on the developed prototype. Here the finished prototype is given out to test subjects to measure how well the system performs. Usability is measured both through asking the opinions of the test subjects through a questionnaire and through measurements made by the prototype software. All the collected data and the questionnaire used can be found in the attachments. This phase of work is more thoroughly described in the chapters 6 and 7.

2 Background (IF NOT COVERED BY 1.1)

Notes:

- This may be in 1.1 or as a separate chapter (2)
- Right now it is written as a separate chapter, decide precise datastructure later.
- The purpose of the background is to justify the research questions!
 - Phases described in #8 :
 - * RQ1 answered by phases 1 & 2 (chapters 3,4,5)
 - * RQ2 has to be considered in phase 2 (chapters 4 & 5) but is only fully answered in phase 3 (chapters 6 & 7)
 - * RQ3 is answered by phase 3 (chapters 6 & 7)

Tasks:

- Create a more in depth “skeleton” of the bg chapter
- identify, look at, take notes & read through sources you need for this chapter
- Write the chapter

3 Literature review

3.1 Client-Server Architectures } }

3.2 Computer Vision (CV) } } (COMBINE IF NEEDED)

3.3 Augmented Reality (AR) }

3.4 Prototypes Similar to Ours

4 Architecture Description

4.1 Perceived Challenges

- Do this based on 3
- Mention challenges encountered by others possible solutions if needed
- Add as many subsections as needed

4.2 Proposed Architecture

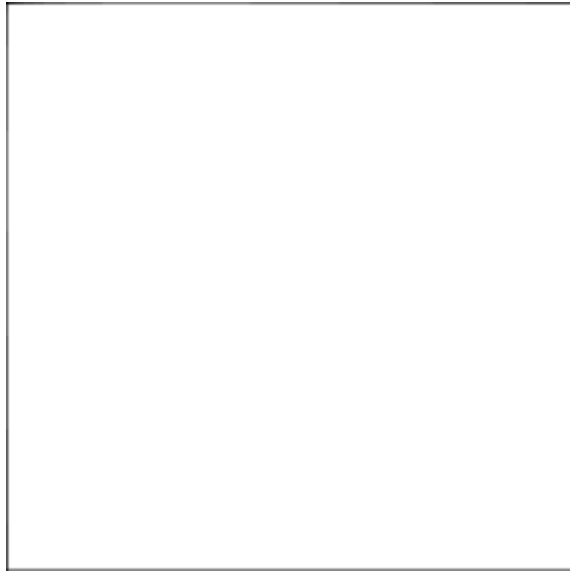


Figure 4.1: Visual Representation of the Proposed Architecture

5 (IMPLEMENTING AN ARCHITECTURE FOR A SOFTWARE SYSTEM WITH AR AND CV)

6 (USABILITY)

7 (FEASIBILITY)

8 Conclusion and summary

8.1 Overview of Results

8.2 Answering Research Questions

8.3 Summary