

IDE Master Graduation

Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT

Download again and reopen in case you tried other software such as Preview (Mac) or a web browser

STUDENT DATA & MASTER PROGRAMME

Save this form according the format "IDE Master Graduation Project Brief_familyname_firstname_studentnumber_dd-mm-yyyy"
Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1!

family name Zhao 6681

initials J given name Jiaqing

student number 

street & no. 

zipcode & city 

country 

phone 

email 

Your master programme (only select the options that apply to you):

IDE master(s): IPD Dfl SPD

2 / max IDE master

individual programme (give date of approval)

honours programme Honours Programme Master

research / annotation Medisign

Tech. in Sustainable Design

Entrepreneurship

SUPERVISORY TEAM

Fill in the required data for the supervisory team members. Please check the instructions on the right!

** chair Willemijn Elkhuizen dept. / section: Mechatronic Design

** mentor Maarten Wijntjes dept. / section: Human Information Con

mentor

supervisor

client

- Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter with a:
- Second mentor only applies in case the assignment is hosted by an external organisation.
- For a non-homogeneous team (case you wish to include two team members from two different sections) please explain why.

APPROVAL PROJECT BRIEF

To be filled in by the chair of the supervisory team.

chair Willemijn Elkhuisen date 20 - 07 - 2023

signature _____

Digitally signed by tudelft.protect Jamf Protect CSR Identity Date: 2023.07.20 15:30:31 +0200

CHECK STUDY PROGRESS

To be filled in by the SSC E&SA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair. The study progress will be checked for a 2nd time just before the green light meeting.

Master electives no. of EC accumulated in total: 26 EC

Of which, taking the conditional requirements into account, can be part of the exam programme 26 EC

List of electives obtained before the third semester without approval of the BoE

YES all 1st year master courses passed

NO missing 1st year master courses are:

ID4060 Manage your Master (2,0)

name Robin den Braber date 21 - 07 - 2023

signature _____

Robin den Braber
Digitaal ondertekend door Robin den Braber
Datum: 2023.07.21 09:06:52 +0200

FORMAL APPROVAL GRADUATION PROJECT

To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked **. Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

- Does the project fit within the (MSc)-programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?
- Is the level of the project challenging enough for a MSc IDE graduating student?
- Is the project expected to be doable within 100 working days/20 weeks ?
- Does the composition of the supervisory team comply with the regulations and fit the assignment ?

Content: APPROVED NOT APPROVED

Procedure: APPROVED NOT APPROVED

- the missing course ID4060 should be finished before the green light meeting

comments

name Monique von Morgen date 01 - 08 - 2023

signature _____

Design pop-up book reading experience in VR from the principles of material experience project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 27 - 02 - 2023 end date 28 - 07 - 2023

INTRODUCTION **

Please describe the context of your project and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money, ...), technology, ...)

The KB (the national library of The Netherlands) holds a large collection of historical pop-up and movable children's books. Currently, because it is too fragile, this collection is not accessible for anyone to enjoy or even experience. This is a pity. The KB is keen to explore the role of new digital technologies to support their mission of providing access to visual and written heritage. Recently, they cooperated with TUD to try to use VR/AR technology to allow people to read these pop-up and movable children's books in the virtual world.

The KB currently provides a beta version of pop-up books demo in VR, which we used to conduct several observation study in The KB and TUD libraries before project started. We interviewed a total of 34 subjects, observed and recorded the difference in their behavior when reading a real pop-up book and reading in VR.

Through observation and interview data, I found that the reading experience of historic pop-up books is very unique. Its exquisite structure can always bring a strong visual impact to readers, thus intentionally guiding their reading order. Readers often read a pop-up book with a strong curiosity and desire to explore and expect these emotions to be responded to.

There is a big difference between virtual reading and reality. So, how to let the virtual pop-up book also intuitively guide readers' reading, better provide their expected emotional value, so that readers can have a more immersive reading experience? I think the way pop-up books interact in the virtual world needs to be redefined.

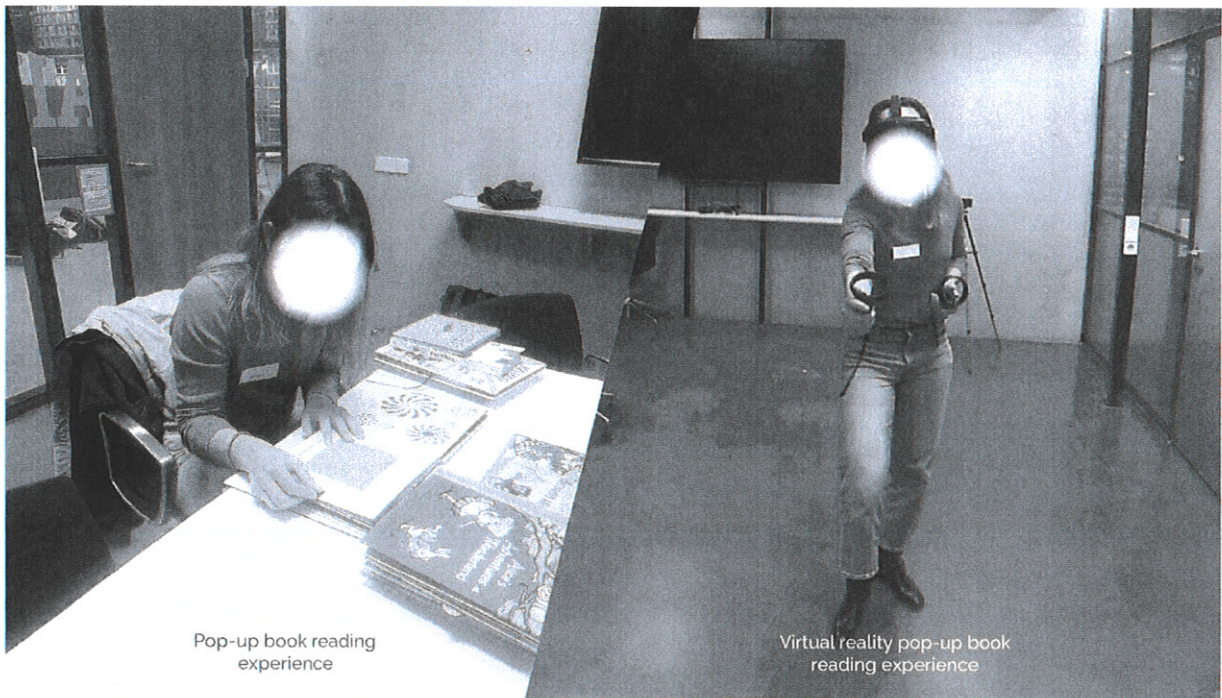
Based on the four levels of "Sensorial, Interpretive, Affective, and Performative" levels of Material experience, I will redesign the interaction between people and pop-up books in the virtual reading experience. I hope to study the behavioral guiding effect of scene size, overall environment, material feeling, and material hint on the way people read, in order to stimulate people's desire to explore, allowing them to better immerse themselves in the reading experience. I hope that the final result can meet the needs of The KB and at the same time let more people accept this new way of reading.

I chose to use VR as the carrier of the virtual pop-up book due to its more widespread adoption, and thereby other more extended technological possibilities (i.e. in software and hardware support). Also as mentioned above, The KB currently provides a beta VR demo to help me get started. At the same time, The KB gave me access to some pop-up books, allowing me to digitize them.

space is available for images, figures on next page

Personal Project Brief - IDE Master Graduation

Introduction (continued) space for images



Pop-up book reading experience

Virtual reality pop-up book reading experience

image / figure 1: Observation study: We observe the behavior difference between reading in VR and reality.



image / figure 2: Meeting with The KB: We brainstormed the project with The KB side.

PROBLEM DEFINITION **

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

Main challenges:

1. Virtual reading environment deprives the sense of smell, taste and part of the feeling obtained by touching the paper. How should I use the advantages of VR to make up for the lack of somatosensory, so as to create a better sense of immersion?
2. In reality, we certainly know how to interact with books, but even so, many pop-up books still need to remind readers how to trigger the mechanism correctly. So how do I prompt readers to interact with the book properly in VR without destroying their desire to explore themselves?
3. What kind of scenes and interactions can make virtual reading more immersive, allowing readers to better understand the emotions in the story without affecting normal reading?
4. What kind of experience can VR, a new carrier, bring to reading? Why do users choose to use VR to read pop-up books? (If it weren't for the fact that many pop-up books are too fragile to flip through) What kind of new users can this new way of reading attract?
5. What kind of virtual environment should I use to present pop-up books? What is the right scale of the environment to increase the reader's sense of immersion and stimulate their desire to explore?

Potential challenges: (not the challenges caused by the main research object, but problems that must be solved if the project needs to be implemented)

1. Most of the users who come to The KB (the national library of The Netherlands) have no experience in using VR, many of them are even rarely exposed to games. How can I help them master this virtual interaction method faster? And how to simplify the operation difficulty of VR for them?
2. How to clearly capture the pictures on the pop-up book?
3. How to meet the reading postures used by different users?

ASSIGNMENT **

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance: a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

I will design a VR experience for The KB (The national library of The Netherlands) that allows users to read the historical pop-up books in virtual reality. I will mainly study the interaction between readers and objects in VR. I hope that through the help of the principles of material experience, the final virtual environment and interaction can let readers immerse themselves in reading and explore actively.

The solution I aim to deliver:

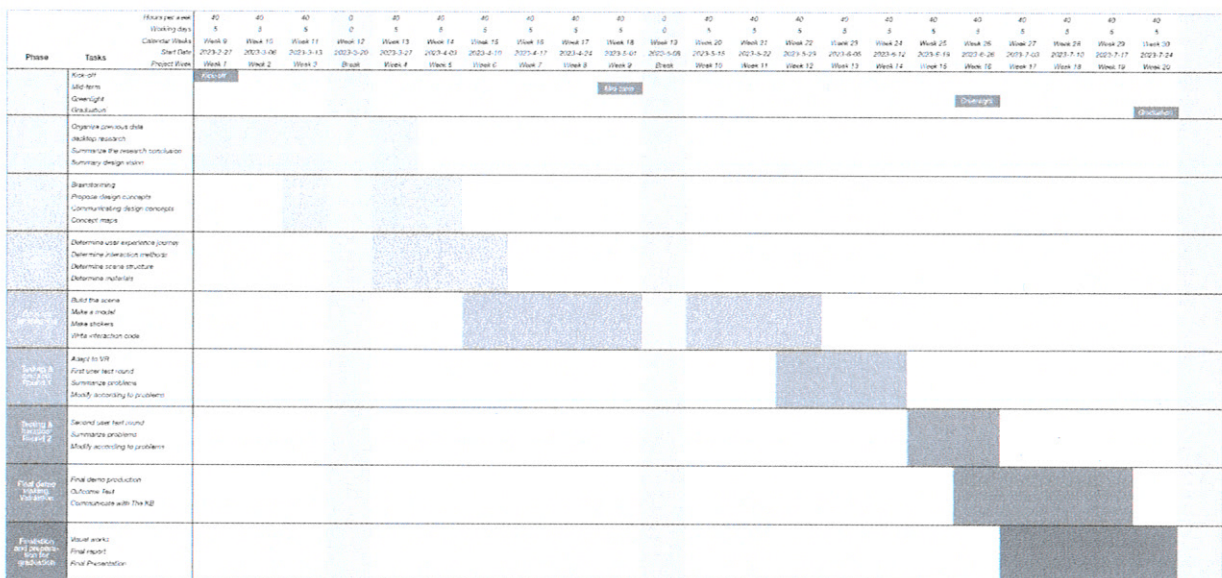
1. A VR functional prototype. It contains a scene and an interactive historical pop-up book. Users can experience reading these pop-up books in it.
2. A novel virtual reading experience. Stimulate users' curiosity through size changes and material changes, so as to attract users to read actively and continuously.
3. Numerous novel and realistic interaction methods. These interactive way preserve the appealing qualities of pop-up books and amplify them through the advantages of VR, in order to make it easier for users to accept virtual reading.
4. An immersive virtual environment, to help users get a better immersive experience.
5. An interactive hint system mainly based on material properties. Let users interact with the pop-up book correctly and intuitively without too many distracted prompts.
6. An interesting operation guide for beginners, and a relatively simple operation method.

PLANNING AND APPROACH **

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full-time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 27 - 2 - 2023

28 - 7 - 2023 end date



- Kick-off meeting: Project Week 1, Feb 27th
- Mid-term meeting: Project Week 9, May 1th
- Green light meeting: Project Week 16, Jun 26th
- Graduation ceremony: Project Week 20, Jul 28th

The specific date of meetings will be scheduled during the kick-off meeting.
 The project is initially divided into 8 stages:
 Research summarize,
 Ideation,
 Confirm concept details,
 Concept prototyping,
 Testing & iteration: Round 1,
 Testing & iteration: Round 2,
 Final demo making & Validation,
 Finalisation and preparation for graduation. Some stages will be performed simultaneously.

- Breaks:
- 1) Mar 20th - Mar 26st, after Project Week 3.
 - 2) May 8th - May 14th, after Project Week 9.

MOTIVATION AND PERSONAL AMBITIONS

Explain why you set up this project, what competences you want to prove and learn. For example, acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology. Stick to no more than five ambitions.

1. Learn how to design user experience / learn to use a VR development engine (i.e. Unreal engine):

I have always had a dream of entering the game industry. And VR games, a relatively new but booming market for the game industry, happens to be the field I want to enter in the future. In fact, the interaction between the reader and the pop-up book in VR is a game experience. I want to learn how to design the user's experience, let the user get immersive through the interaction in the scene, and satisfy the user's curiosity through guidance. These are all skills that a good game designer needs to master. At the same time, this project is also a test of my proficiency in using Unreal. I hope that I can use Unreal proficiently after the project is over.

2. Learn more about the culture behind the pop-up book :

I like pop-up books very much. I think this is a very magical and ingenious structure showing human intelligence. When I was traveling in Germany and Spain, I used to buy several pop-up books at the local bookstore. Therefore, I would like to have a deeper understanding of pop-up books through this project. For example, its evolution history, its structural design, and its cultural value.

3. Make up for my knowledge lacking in how to make the project implemented :

In the first year of graduate school, I came into contact with a very excellent graduation project - Harp-E electronic harp. This product is now in mass production. This is largely due to the author's pragmatic design philosophy. I hope that my graduation project is also a project that can be implemented. It can prove to be valuable in a business environment, not just a concept. I want to make up for my lack of knowledge in the implementation of the project through the graduation project. For example, how to effectively connect with research participants? How to scientifically conduct user research, and repeatedly iterate your own results.

FINAL COMMENTS

In case your project brief needs final comments, please add any information you think is relevant.

