

COMPSCI 715

Advanced Computer Graphics

Writing Introductions



Today's Mission



1. How does a good introduction look like?
2. How do you explain and motivate your research problem?
3. How will the introduction for your project look like?

Typical Research Paper Structure

- 1. Introduction:** What is the **research problem**?
Introduce and motivate it. Summarize your contributions.
- 2. Related Work:** What have others done? How is it different?
Cite, summarize **other solutions** & compare it with your own.
- 3. Design:** **Your solution**. Describe it in enough detail so others can implement / replicate it. Software architecture (e.g. class diagram)? User interface (e.g. screen diagram)? Algorithms?
- 4. Implementation:** How have you implemented your solution?
Tools and technologies used? Implementation challenges?
- 5. Evaluation:** Explain the **methodology** you used for evaluation. Present the **results**. **Discuss** them.
- 6. Conclusion:** Summarize contributions. Point out future work.

Introduction (~1 page 2-column)



Explain and motivate your research problem concisely.

1. **Introduce the topic**, give some context for your research (use funnel strategy)
2. Define & explain your **research problem**
 - What exactly is it? Be specific and precise!
-> Some can be specified well with **research questions**
 - What does it mean?
-> Add explanation or **example** where useful
3. **Motivate** the problem: Why is it worth researching?
 - Explain **importance**: Useful applications? Impact?
 - Explain **novelty**: gap/limitation in literature
(point out limitation or describe the unexplored territory)



Introduction (Continued)

If there is enough space, more info can be added:

1. Give an overview of the **methodology & contributions**
 - How did you approach the problem?
E.g. implement prototype & evaluate with user study
 - What are the contributions (i.e. novel solutions)?
2. **Outline** of the paper (at the end of the Introduction)
 - Briefly mention for each section what type of information is contained there (~1 sentence each), e.g.
“Section 2 gives an overview of related work...”
 - Helps readers to get an overview of the paper structure (i.e. where to find what)



Exercise

Learn from good and bad example introductions

1. **Read** the introduction (note: examples are shortened)
2. **Identify** the following parts:
 - a. Topic introduction
 - b. Problem definition
 - c. Problem motivation (importance and novelty)
 - d. Methodology & contributions
 - e. Outline
3. **Discuss**:

What are the good and bad points?
How could it be improved?

Good Introduction Example 1

<https://www.cs.auckland.ac.nz/~lutteroth/publications/VanDykEtAl2012-GLDebug.pdf>

Computer graphics is applied in a vast number of fields such as entertainment, medicine, and computer-aided design. With so many applications for computer graphics, there is a demand for tools that assist programmers with the analysis and debugging of graphics code. [...]

In this paper, we explore the idea of using historical information to assist with graphics debugging. [...] In particular, we are addressing the following research questions: R1 How can graphics state history be supported in a debugger and presented to the user? R2 In how far does the use of graphics state history facilitate debugging? [...]

Previous works have not fully utilized and investigated historical information about OpenGL applications. We discuss how a graphics debugger can make this information easily available to assist in the OpenGL debugging process, addressing R1.

After completion of the GLDebug proof-of-concept prototype, a user study was conducted to evaluate the usefulness of the tool and address R2. [...]

Good Introduction Example 2

<https://www.cs.auckland.ac.nz/~lutteroth/misc/theses/HonsDissertation-LindsayShaw.pdf>

Regular exercise offers significant health benefits, both for reducing the incidence of obesity and obesity-related illnesses, for maintaining a general standard of health, and for promoting longevity [15, 29]. Conversely, lack of exercise can significantly increase the risk factor [...]

One of the approaches to solving the motivation problem is to combine exercise and entertainment in the form of exercise games (exergames). [...]

The bulk of the studies around exergames have investigated their effect on participant performance rather than motivation. In general, these studies have shown that exergames do offer a slight increase in performance, and may meet general exercise requirements, but do not solve the motivation issue to a satisfactory degree. [...] Little research has been done on the effects of immersive technologies on exergaming. [...]

From examining previous works related to exercise video games, the following research questions arise:

1. Do immersive exergames improve user exercise performance?
2. Do immersive exergames increase user enjoyment of exercise, and motivation to continue exercising?

Good Introduction Example 3

<https://www.cs.auckland.ac.nz/~lutteroth/publications/ZeidlerEtAl2013-AucklandLayoutEditor.pdf>

The use of graphical user interfaces (GUIs) is widespread, including on web and mobile platforms. WYSIWYG GUI builders facilitate the creation of GUIs by designers. [...]

Constraint-based layout models are naturally powerful: with the notable exception of flow layouts, many other layout models, including gridbag layout [26], can be reduced to constraint-based layouts [...]

While constraint-based layouts are more powerful, their creation may be more complex and poses challenges. General constraints are difficult to visualize and even harder to manipulate directly. Specifying individual constraints can be tedious and error-prone [... and] widgets may overlap each other (Figure 2) [...]

The novel Auckland Layout Editor (ALE) addresses these issues and simplifies the creation and modification of constraint-based layouts. [...]

We present several innovations [...] In particular, we introduce: 1. Detailed specifications of edit operations [...] 2. A new algorithm that automatically adds constraints at design-time to prevent widget overlap at all sizes [...]

Bad Introduction Example 1

This project focuses on the study and implementation of a transmission protocol called Applicability Statement 2 (AS2) for the electronic commerce company X. AS2 is based on the Hypertext Transfer Protocol (HTTP) and was developed by the Electronic Data Interchange-Internet Integration (EDIINT) to act as a means to send Electronic Data Interchange (EDI) documents between clients. Though still an internet draft, AS2 has already been implemented by several major business companies. [1, 2]

This report gives an overview of the party concerned (EDIS) and the AS2 messaging protocol, including its messaging process, technical specifications and any risks involved in implementation.

Bad Introduction Example 2

As we all know that now-a-days, 3D Modeling is present everywhere in the fields for education like science, engineering, medical, even in entertainment like movies and games. There is also a gradual increase of 3D modeling in urban design or architecture. Image-based modeling and related photogrammetric and computer vision techniques are now widely used to create accurate texture-mapped models of urban landscape. This encourages for more and more work and methodology in creating high quality 3D models. For this researchers are using each and every possible way to produce satisfactory models because it makes it easy and convenient to understand from a 3D model rather than understanding from 2D image.

In this project, we started by looking various rendering and modeling tools, but my focus is on the rendering part for creating high quality images, so I will discuss rendering technique more elaborately in the report.

Image-based rendering techniques such as [...] provide increased realism by blending between different viewpoints. However, they still fail to realistically depict scenes with reflections and gloss, since they only use a single 3D proxy to locally model the scene.

Bad Introduction Example 3

3D Collaborative Sculptor is a 3D sculpting tool for the modeling of a digital object where the object will look like a real life substance (e.g. clay). Multiple users will be able to use the tool simultaneously because of the collaborative nature of the tool.

The increasing availability of 3D rendering hardware and software alternatives in day to day life of normal people has increased the demand of 3D softwares, games and programs. So, graphics companies are working more in this field. The use of animation and 3D in movies, and TV programs has encouraged the need for tools where one can model an object into an animated character [...]

Sculpting tools are one very good solution for abovementioned need of graphics companies. There are many Sculpting tools available in the market e. g. Blender, Sculptris, Maya, MudBox, ZBrush etc. Here the motivation comes for our project. It is very difficult to find a Sculpting tool with collaborative feature. As collaboration increases the communication and productivity of a team working on a task, we decided to implement it in our project. I believe, sooner or later, collaboration will come into the picture for all the 3D products.

Good or Bad? Example 1

As X applications become more popular within businesses and organisations to interact with their customers easily and save time for staff in some cases, demand to create a custom X application is increasing. While there are many end user programming systems, none introduce the problem of allowing non-technical users to create or modify X applications.

The idea of user programmable X app came to surface while producing an application for X during my summer internship. Since this application was developed for a specific company, it could not be used by other companies without making minor changes with the help of a developer. This can be time consuming and a waste of time for a programmer to make minor changes such as logo change or a sentence replacement. Therefore, a system that would allow a user with no programming knowledge to modify the X application would be very well received.

User configurable X would save time from both parties as non-technical users would be able to modify the layout, text and certain logic of the application by themselves. This saves the developer valuable time to carry out other highly technical tasks.

Good or Bad? Example 2

A stroke is a traumatic event that results in the death of a localised area of brain cells. This can have significant long-term effects for victims which often include hemiparesis, the weakness of muscles on one side of the body [1]. Patients undergo extensive rehabilitation in order to regain some control of the affected limbs. One such technique used for rehabilitation is mirror therapy, in which the patient places their affected limb on one side of a mirror and their unaffected limb on the other side. The patient then performs certain exercises with the unaffected limb while looking into the mirror from the same side. The intention is that the patient will perceive the limb shown in the mirror as their affected limb and “trick” the brain into believing that it is, in fact, the stroke affected limb performing the movements. Mirror box therapy has also been proven to help alleviate the discomfort experienced by patients suffering from phantom limb pain [2].

In this article we study the feasibility and practicality of using the Microsoft Kinect RGB-D camera to implement mirror box therapy in a mixed reality environment. Section II reviews related work. Section III presents our requirements and an evaluation of finger tracking SDKs. Section IV [...]

This Week's Assignment: Write an Introduction (2.5%)



Write an abstract for your project (~1 page double-column)

- **Individual** submission, no group work
- Worth **2.5%** of your final mark
- Again, methodology and contributions are **hypothetical**: imagine your project is over and was successful
- Be **professional**: try to imitate well-written introductions
- Use **LaTeX**, e.g. <https://www.writelatex.com/>

Submit PDF by **Sunday 10/8 7pm** to assignment dropbox:
<https://adb.auckland.ac.nz>

All the best :-)