Meeting Notes

Meeting 1 - 20/09/2023

- Discussed many points relating to the scope of the project such as:
- It will be a development based project
- It's not necessary to create stuff entirely from scratch, can use templates, libraries, engines but can also add stuff and compare to other things people have done.
- The first steps is a lot of reading to narrow down the topic area, see what people have done recently in the field.
- Structure to diss = 5 sections
    - Intro
        - General overview
        - Little summary of contents
    - Literature review
        - Summary of literature
        - Start off general and focus in on topic question by end
        - Reflect on your own work
    - Methodology
        - This section includes all the work I will do
        - Stuff like algorithms, simulations, methods, theory, equations etc
        - Make sure that whatever i did is repeatable by someone reading it
    - Results
        - In this section can e.g. use parameters and record results with graphs, tables etc. discuss and compare what i found to what other people found, is it similar, is it different, and discuss why.
    - Conclusion
        - Give the reader a memorable takeaway of the paper, what new things i found, results.
        - Reflect on the topic question and whether i answered it well.

- Latex is very useful for physics equations, will probably use it, can use zotero to export .bib files that are useful
- Google scholar for things and can import to zotero
- Read more papers and build up a database of relevant papers
- Check out siggraph, gpugems, shaderX, gpu pro for potential things
- Try to narrow down topic ideas
- Be prepared to talk about the things i read and found interesting/hard/confusing to get more knowledge

Meeting 2 - 27/09/2023

- Discussed what I had researched regarding shape matching and skinning. Decided that it looked a bit too maths/physics heavy and that I wanted to focus on programming.

- Decided that i'd do research into what's the current methods regarding cloth in game development, and that a potential project could be on comparing different methods.
- Check whats state of the art in games right now, regarding cloth.
- Check alternative methods and compare them
- Check game engines to see what they can do, also if people have made plugins that have modifiable implementations

Meeting 3 - 04/10/2023

- Discussed what I found regarding cloth in games, talked about what I would implement it in.
- Discussed the project being about implementing extended position based dynamics, have to look at a language/framework that hasn't been explored yet
- Research into various physics simulation frameworks to see which would be a good fit

Meeting 4 - 11/10/2023

- Discussed a few frameworks that i researched and decided unity would be a good fit
- Asked about the IPO and contents, doesn't have to be set in stone at this point.
- Regarding literature review, asked about initial chapters and got an idea, needs further discussion next meeting after more research
- Read more literature and think more about topics/sections for the literature review
- Finish off IPO and upload it

Meeting 5 - 18/10/2023

- Gave my initial lit review topic plans and asked Babis' opinion on them, generally fine, reshuffling of a few topics to keep the flow nice.
- Don't have a dedicated optimisation section because all papers will do it, can mention it in another section
- Babis told me of a nice way to find critical evaluations, check the papers citations and compare the work to the previous papers work.
- State of the art papers have lots more information
- About figures, not necessary in lit review, but can include some if needed
- The week 9 lit review deadline isnt fixed can move it ahead a week, two weeks might be pushing it,
- Start draft of lit review to get feedback as soon as possible.

Meeting 6 - 25/10/2023

- Emailed the start of my lit review, have intro, history and a little bit on underlying physics to talk about during the meeting.

- History of cloth section is a good example of what the markers want to see in literature review, discussion and linking of papers
- The underlying physics section is a bit out of place, cause it explains stuff that eventually PBD doesnt even use (integration techniques). This can be moved down to the mass spring sections
- Start with real time methods, can link 2.7.1 and 2.7.2 by common math
- mention PBD in 2.7.1 for the future section
- Pbd and xpbd should be under 2.7 (2.7.4)

Meeting 7 - 03/11/2023

- calculating implicit euler -> expensive

- continuum section title is too general, need to clarify.

- offline section quite bare need more papers.

- has there been convergence? in technology, can speak about that

- don't forget to critically evaluate references

- make sure to speak about the drawbacks and good way to critically link papers.

- can email any time with changes

- schedule meeting for 15th november, email him "how many days do you need it in advance"
try to do 2:30 meeting wednesday

- siggraph -> not focused on real time, find them there
  - kesen real time rendering
  - focus on simulation

Meeting 8 - 08/11/2023

- Decided on the meeting time with Zia, would send an email after the meeting to see if he is free.
- Babis told me about latex labelling and how it’s used, and rewrote parts where I didn't use it.
- Don’t always need to write a page on a specific paper, can bundle in more papers and link them
- Start the PBD section with the original paper and talk about the maths.
- Babis linked a STAR paper by Matthias that i can use

Meeting 9 - 15/11/2023

Not much this meeting, basically just me writing more sections of the literature review

- Fix the precomputing sections title, too vague
- Say “the authors” because et al needs a citation nearby.
- Prep for second marker meeting

Honours Project Interim Meeting - 17/11/2023

Met with Babis and Zia to discuss the project so far. Zia asked me lots of questions such as:

- explaining cloth representation (triangles/particles etc)
- Ways to evaluate it (frame time, realism etc)
- If generative AI can do this (it cannot, physics too complicated for it rn)

Zia would then write the word doc on how it’s progressing which i received and uploaded to moodle.

Meeting 10 - 22/11/2023

Meeting was skipped as I was focussing on the other modules courseworks

Meeting 11 - 29/11/2023

- Continuum stops a bit at 2011, try to get more recent papers
- Talk about performance and pros/cons, compare it to the performance at the time
- Dont use the word exciting, try things like interesting
- Get more neural network papers and link them in
- Finish literature review
- Mention cpu and gpu implementations for real time
- Delete alternative methods section and make them into their own sections, more papers too
- Try to make a shape matching section and Babis linked a paper on it.

Meeting 12 - 06/12/2023

- Babis recommended for me to get some figures for sections such as shape matching as it can be quite hard to visualise without them.
- Next step is finish literature review
- Was recommended to think about what I can evaluate and what different scenarios i will do in the simulation (e.g. draping cloth, cloth falling on top of sphere etc).
- Last meeting before the break
- Need to send email before next semester starts to sort out meeting dates.

Meeting 13 - 25/01/2024

- Asked about the structure of the year and if there were any specific dates to watch out for and was told that the only date needed is the dissertation due date and to focus on that.
- Recommended to make a plan and try to estimate how long I will spend on each section (implementation, evaluation, writing it up etc).
- There will be a reflection process, how long things took, were they challenging etc.
- First thing to do is to get the hanging cloth working but do it in a way that its easy to modify for other scenarios like the sphere cloth.
- Babis mentioned an idea of parameterising the attachment points in time so that it can be added to a moving object (e.g. cape on a human character moving).
- Dont be shy with figures in the end.
- Base title can be “real time cloth simulation using position based dynamics” but can add extra stuff to make it unique
- Overall breakdown should be
    - 60% implementation
    - 20% writeup
    - 20% evaluation

Meeting 14 - 01/02/2024

- Created a plan with dates I wanted parts finished by (implementation/writeup/eval etc)
- Had a few more questions regarding the Unity setup before I really get started with the implementation

Meeting 15 - 08/02/2024

- Got a basic mesh creator working, fixed particles and constraints that use springs (Mass spring system).
- Asked Babis’ opinion if i was doing any bad practices but it seems fine so far

Meeting 16 - 15/02/2024

- Implemented a basic PBD setup.
- Asked about glm vec3 conversion from a c# vector3 and it should work fine.
- Babis showed a video of a character interpolating between poses and the cloth moving to fit which was interesting.
- Need to speed up a bit on progress for next week.

Meeting 17 - 22/02/2024

- The current way of generating mesh and constraints using grid_size isn’t great because it only works for a square x by x grid. Need to rework it and create constraints from adjacent triangles instead. Will be a bit tricky but it is probably necessary.
- Next feature after that to create is the click and drag feature.

Meeting 18 - 29/02/2024

- Shared all my stuff on screen and showed the new features like shear constraints, stiffness slider and all the new functions (triangles instead of grid size). Looks good so far

- Babis suggested a cool way of doing a more realistic wind with 3d perlin noise using the x and y of vertex to make the wind point different directions. He noted that since i already have working wind its better to focus on the more urgent things.

- He also suggested an unordered set for constraints as its a little faster but since I add it to a vector anyway it isn't that important.

- I asked about a section of the paper where it states that they had to also use collision checking with rigid bodies in case they fall through the triangles but this isn't applicable to this project as the collision checking will only happen with a big sphere on scenario2, so just the cloth collision is required.

- I asked about his thoughts on priority tasks and it seems the next steps are:
  XPBD -> Bend constraints if i can do it in an hour-ish -> fix mouseLocation bug with t he drag feature -> get the collision stuff working
- He recommended for me to use debug and breakpoints for the dll, not sure why i wasn't doing that in the first place.

Meeting 19 - 07/03/2024

- Showed my extended position based dynamics demo, looks a bit more stable than PBD. 10 substeps.
- Explained that my bend constraints are completely fine, the harder angle ones would be a bit better but are more complicated to implement.
- Babis recommended checking out the Unity recorder plugin and to implement a mass recording system. So that when i press a button it records a bunch of experiments which will be very useful for the results section.
- Babis also explained a way to reset the cloth object every time its run instead of needing to .clear() every vector. (g_ClothSim = {};) It would be a tiny bit slower but wouldn’t need to clear new vectors. Up to me if i want to change it.
- Asked if i could send an unlisted youtube video showing the simulation as the teams share screen isn’t great for showing it.

- Sent a video and got good and helpful feedback.

Meeting 20 - 14/03/2024

- Showed my collision code, looked good but Babis noticed that it looks a bit odd when the cloth weaves with itself and recommends trying to get self collision implemented to fix that
- Showed my recorder feature, looks good

Meeting 21 - 21/03/2024

- Discussed my layout for the methodology section. Overall reasonable, Babis suggested that I place the scenarios section in the results which is fair. Aso recommended to merge mesh creation into initialization which is a good idea.

Meeting 22 - 28/03/2024

- Shared my progress on writing the diss, good so far.
- Asked about the evaluation/reflection part to get some clarity on what should actually be in there.

Meeting 23 - 04/04/2024

- Asked Babis about the poster session, just general questions about how it will work.
- Asked how liberally I should be placing code snippets in the diss, was told not often, because no one really wants to just look through lines and lines of code, better to explain how it works. Use lots of figures though.

Meeting 24 - 11/04/2024

- Asked when the Viva usually is, just any time within 3 weeks of the submission it seems.
- The captions on figures are generally below the figures which is an easy enough fix
- Babis would send feedback of the diss after the meeting, so I can improve little bits before submission.