# NaturePill Meeting Minutes

**Date: 24 June 9:30am**
**Present:**

- Lynn
- Soo
- James

**Points of Discussion:**

1. Equipment
    - A desktop will be accessible in the Ishango lab on the bottom floor of the CS building
    - HTC Vive headsets will be provided, hopefully by Friday the 2nd of July
    - HTC Vive trackers to be arranged, currently only 2 available
2. Work Plan for after exams:
    - Set up Unity and Unity Collaborate with Soo before he is on leave (from 9 to 17 July)
    - Get Unity student pack, which is a prerequisite for unity collaborate. Github student pack approval can take upto a month so it would be good to get this verified as soon as possible.
3. SDKs to install:
    - VRTK4
    - SteamVR
    - XR Interaction Toolkit
4. Create a tutorial environment in order to upskill on Unity 3D/VR
    - Game (or Experience) design document
        - Plan for user experience, since Lynn is covering more elements she will need to do more research here
        - *James will send us example documents*
    - Later: Technical Document
        - More for Soo (Plan to start after getting back from holiday around July 18)
5. Purchasing a bench
    - Budget: R2000
    - Ensure dealer has credit card facility
    - Can be a “flat” bench without a back.
6. Finding a branch
    - Ensure that the branch is not of complicated structure, since we will model by hand (likely using Blender)
7. Project Proposal Presentation
    - **Due on 9 July**
    - Short powerpoint, can either do voiceover or vid. An idea suggested by James was to just do a brief headshot before speaking about the project, and continue with voiceover. However, the headshot is not necessary.

- Summary of proposal, with emphasis on context, motivation, and goals on project. Leave out details such as risk and exact timeline, but mention that we are doing an iterative approach
- Assume the audience are Computer Science students, but that they have little knowledge on VR

8. Smell Design
    - Purchasing smells: https://aromaprime.com/museums-attractions-aromas/outdoors-habitats/
    - Preferred smell being: https://aromaprime.com/after-rain-petrichor-aroma-oil/
    - Dispensing the smell: https://aromaprime.com/dispensers/ could either purchase this, or modify a home scent dispenser like airwick

Next meeting on Tuesday 20 July, 9:30am

**Date: 20 July 9:30am**
**Present:**

- Lynn
- Soo
- James

**Points of Discussion:**

1. Controllers
    - Developing the application HTC Vive without considering other HMD is fine (don't need to design for Oculus, etc.)
    - Only one hand controller movement is fine.
2. Branch
    - The weight of trackers being attached to a thin branch was of concern. 89g seemed reasonable to cope with. Searching for a thicker branch to use is an alternative.
    - Using epoxy to glue on tracker to branch is a possible solution
    - Maybe use controller for one hand only, or have controllers dangle off wrists with use of straps
    - Try implementing the branch locomotion and consider dropping it if it does not work well
3. Visible hands
    - Possibly only let the left hand be visible
    - Possibly add one already grabbing the branch
4. Bench
    - Option 4 - The one with the easy to model straight planks. James to order this week
    - https://modernbenches.co.za/product/garden-benches/ -> Bench to model
5. User interface
    - Agreed to use the standard steamVR interface.
6. Concerns regarding rivers:
    - There's no research that quotes the benefits of rivers aside from generic blue space benefits.
    - The current implementation of the river looks like the ocean.
    - Use river sounds longer than 1 minute to avoid the recognition of clear repetitiveness.
7. Rendering
    - To shift around the goals of the project as rendering was easier than previously thought
    - Try out 10 different tree models and **stress test** - further this by making a dense forest.
    - Considering the NatureRenderer asset, sending James a link.
8. Modelling bench and branch
    - Time is concerning as we still haven't done the modelling for bench and branch
    - Start with bench modelling first

    - Soo to take on modelling
9. Consider adding more haptics such as fake grass (this will exist in the experiment room so the user can walk through these objects)
10. General environment design
    - Consider biome, like pine does not go with grass
    - Better river transition (rocks)
    - Maybe add snow on mountains if we are going to put pine trees (in that case put pine trees in far distance)
11. Lynn's to do
    - Get rid of grass in VR environment
        i. Wait until feedback on assets
    - Take stuff off of GitHub
    - Informal stress testing
        i. Add various types of trees
        ii. Test it and see how it impacts the performance
    - Biomes/types of trees
    - More detail into design documents
    - Fake grass (artificial )
12. Soo's to do
    - Send James email regarding Asset purchase Nature Renderer - test out trial before motivating purchase
    - Look into modelling benches
    - Technical Design document
    - Find adapter asap for vr
    - Research biome types and try to find matching trees
13. Together to do
    - Redistribute tasks officially, as it turns out some of the tasks are much easier than we thought
    - Revised proposal

Next meeting Tuesday, 27 July at 9am

**27 July 2021, 9am**
**Present:**

- Lynn
- Soo
- James

**Points of discussion:**

1. Bench : James will order them this week then claim back from UCT. To purchase from an external maker.
2. Scents : James to order this week, send James a selection today. Options discussed:
    - Petrichor
    - Forest
    - Pine Forest
    - Undergrowth
3. Assets : James to purchase this week
    - Soo to include him in Unity organization NaturePill
    - Maybe James will create an organisation, in which case move the project
        i. Result: still in team nature pill, but we have a seat in his organisation now
4. Revised proposal
    - Q: any specific content pointers?
    - A: Don't include additional research we did. Rather fix the feedback we received from James and Second reader. Fix the task distribution as well, and scope too. Ethics clearance : Supervisor-based heuristic evaluation. Create two different environments, then AB test it.
5. Project presentation to Gosia Lipinska a day or two after the Graphics exam (3 August).
    - Demonstrate design forks of the project, (e.g. different ways to move, scent combinations).
6. Flowers
    - Requires further research, include if necessary. It might be difficult getting suitable models, and it seems that there's more undergrowth at forest ground level than anything else, and not flowers.
    - Suggested adding flowers might be inefficient
7. Technical Design Document
    - Merge into GDD
    - Focus on and Talk about model fidelity and efficiency (responsiveness).
8. Further research ideas
    - Park design in conjunction with Old forests
9. Interesting Aside
    - Some species are 60 times more likely to seed on decaying branches

**5 August 2021, 1pm,** ***Design Presentation / Demonstration to James and Gosia***
**Present:**

- Lynn
- Soo
- James
- Gosia

**Admin prior to presentation:**

1. Scents have been ordered to south africa directly, no middlemen necessary
2. Bench has been ordered and should arrive next week wednesday or tuesday
3. Asset purchases were successful

**Points of discussion:**

Overall, they seemed happy with the design choices and impressed with the environment's progress, but there were some points to critique/consider/reconsider

1. Grasslands vs trees(forest)
    - Movement of trees therapeutic (Gosia explained that our eyes automatically track the trees moving on our sides are similar to REM sleep; she would look for a source for us to cite)
    - Grass does not look realistic in VR (that was a concern of James, but there are assets that make realistic grass, e.g. our current asset Forest Environment has very nice grass, albeit it is of limited types)
2. Waterfall
    - Having it further away is a good idea
        - Near could look unrealistic (James was concerned with water particles, but actually the asset already took that into account and allows realistic modelling of these water particles that go up as water falls, and allows water that fall in a parabolic, spread out trajectory)
        - Avoid rendering artefacts
        - No need to worry about fine water particle detailed rendering (but we can very easily and I think we should)
3. Alignment with bench
    - Home square
    - Locked teleportation, point relevant to where you are in the room
4. Light design
    - Volumetric, though he seemed impressed so far (yep, it's already volumetric)
5. More than one [virtual] bench is an option
6. Terrain elevations are okay,  but in walkable area only a gradual slope
7. Ensure wind sound matches animation (rustling of leaves recommended)

**10 August 2021, 2pm,** ***Initial Software Feasibility***
**Present:**

- Lynn
- Soo
- Patrick Marais

**Feedback on demo:**

1. Try randomise tree spread
    - Less regular spread
    - Forest planting and distribution
    - Cluster the undergrowth
    - Ensure there is a clear path to follow
2. Make ground more random/textured so that it is not repetitive
3. Reduce swaying of tree stem, add more leaf animations
4. Look for a third party to use blender to model the branch and bench
    - Since modelling is not the core of our project
    - 3D animation school
    - Ask James about ex-students
    - Gamer(s) SA who might be keen to be on the credits role
    - Use software such as Kinect 3d which apparently Samuel Chetty at UCT has, or use photogrammetry software such as Meshroom

**16 August 2021, 12pm**
**Present:**

- Lynn
- Soo
- James

**Points of Discussion:**
**What is required for the Final Draft of Project?**

1. feedback from Patrick Discussed
    - Irregularities in the planting are a good idea.
    - Add appropriate details in shady areas. Ferns good in shade, so consider that in design
2. Showed overall progress, seems we are on track
3. Performance
    - Volumetric light and clouds performance impact is not good
    - FPS that widely varies could be nauseating, Soo suggested using frame locking with frame interpolation. James stated as long as the decision is made based on research, we can choose either.
    - More realism reduces FPS, as expected
    - Optimise the scene after testing on UCT PC, as the current benchmarking was done on laptops
    - Spread out geometry, no clusters
    - Occlusion culling, if we have a big hill objects behind it can be culled away
    - **Can still begin optimizing now, so the optimization will be ready for the PC at UCT that will be running VR?**
    - Don't have overlapping (intersecting) geometry.
4. Locomotion
    - Gridded texture arm-swing boundaries
        - Could be nice, but also could be ambiguous with SteamVR's room boundaries
        - If choose to: add texture
    - Arm swing "ruled surface" boundaries
        - With waypoints, curved wall.
        - Suggestion for curved boundaries: Ruled surface, you can put waypoints along the river, placed along a curve, then you create another curve that's vertically offset, and connect them with rectangles. Relatively simple to create geometry for it.
    - Teleportation boundaries
        - Zones of occlusion
        - Map where trees are
            - Image to lookup, precomputed shift values/coordinates
        - Baking nav meshes
5. **Do you have connections to any modellers?** Yes, but slow and quickly gets expensive. Rather keen to let us do it ourselves.
6. **Do you have HTC Vive tracker straps?** Rather screw for firmness

7. **What do you think of the branch? (we showed pics of a thicker, sturdier branch)** Suitable.
8. **Update on bench status?** Ask Sam, it should have arrived
9. Draft of Paper due 6 September
    - Averse to using weblinks as references, rather use them as footnote with information stating access date
    - Look at previous VR project papers
    - No experimental component
    - Making decisions, supporting design, own small scale
    - Locomotion design , natural, intuitive, respect argue through, discuss alternatives, discard with basis
        - Argue with HCI heuristics, consistency, e.g. Nielsen's Heuristics
    - 10 page final (double column , 8 pages or so with smaller font.) draft for feedback on direction of writing. Draft should be 60-70% of final paper length
    - Individual? Yes, separate (not too much overlap) references can, writing cant
    - Outline of paper - sections and subsections (what we will put into)
        - skeleton of final paper for next meeting send before meeting
        - ACM [SIGGRAPH] format

**23 August, 11am**
**Present**

- James
- Soo
- Lynn

**Points of discussion**

1. Sam's updates on bench/branch/trackers. Need to still ask Sam for 2 trackers
2. Will setup build in lab for James to test
3. Locomotion progress: bug fixes and will try implement your feedback
4. Arm swing new border system (helped fix bugs)
5. Outline for thesis
6. James would like to try the VR before heuristic evaluation (Wednesday 25 August, 11:30am)
7. Unity does free frustum culling, we discussed optimizations of it
8. We should place our research questions in the paper introduction
9. Revise title for Soo's paper to "Restorative forested virtual environments"
10. Subsections should have more than a few sentences
11. Set route for frame rate testing, using an animation clip might be a good alternative
12. Heuristic testing on Fri 10 Sep. Environment must be very close to finished

**30 August, 10:45am**
**Present**

- James
- Soo
- Lynn

**Points of discussion**

1. Turning off the displaying of hands when using the branch is not an option in code. It would also be difficult for the user to know where to pick it up again since the hand is gone. Maybe change the hands to display as controllers so the user can keep track of it.
    - Better to keep hands
    - Weigh up the Pros and cons, choose the option with least cons. Mention technical problems but without elaborating too much
2. Implemented my own chaperone system (took ages), but can't seem to turn off SteamVR one visually. Can't turn it off overall since we still need its functionality.
    - Is it okay to just make it floor grid? - yes
3. Should we have an in game tutorial for arm swinging, or can we just explain it to users prior to them entering the environment?
    - We should include an image plane at the start that the users can read, which explains the basic controls
4. For heuristic evaluation
    - Nielsen with descriptions (cited) vs questionnaires
        - Both. Give list of Nielsen heuristics.
        - Create general questions about experience and severity, but refer to validated questionnaires such as the SSQ - Simulator Sickness Questionnaire, and Game Experience Questionnaire
    - Mention in report: questionnaire is not validated, but the evaluation is a small component, with no statistical analysis is needed. More in the nature of qualitative not quantitative. Open ended questions were asked.
5. The river texturing is obvious. Make it look more dynamic and less like a carpet.
    - Flow rate too little compared to slope
6. Support decision of excluding snap turning in the report
7. **Visuals**
    - Add rocks to steep areas
    - Add fog or increase shadow distance
    - Make the waterfall two steps or increase water flow rate. #Likely do both
8. **Lynn's todo**
    - enlarge the chaperone to include the bench when nearby
    - Try find a solution to the hand floating problem when holding the branch
    - Include a tutorial image
    - Fix arm swinging bugs
    - Add snap turning to paper
    - Audio design
    - Remove small plants for final navmesh
    - Follow up with Gosia and email Patrick about heuristic evaluation

**8 September, 10:00am**

**Present**

- James
- Soo
- Lynn

**Points of discussion**

1. Evaluation on Friday
    - How are the forms? Change mind - rather use VR Heuristics
    - Should we print it? yes
2. Sound design
    - No footstep sounds - okay since would be hard to map to sound realistic
    - Keep in teleport sounds but maybe make it softer
3. Details
    - Happy with waterfall now
    - Add more undergrowth
4. Soo's paper feedback
    - Some minor comments
    - Do not use contractions (can't/don't)
    - High level comments
        - Writing level has improved, more polished, upskilled :)
        - System development section should move
        - Need to have a high level overview of the environment (diagram)
        - Explain Design process
            1. "Design methodology" even though it wasn't formal
        - Mention we made a design document
        - Expand intro, shorten background work
    - References need to be improved
5. Lynn's feedback to be sent via email.
6. Scents
    - Finally arrived! Delay due to being stuck in customs.
    - Will get to us Friday morning

**16 September, 10:00am**

**Present**

- James
- Soo
- Lynn

**Points of discussion**

1. Feedback on reports
    - We should mention that we used an agile, user-centric methodology for design with user consultations (meetings and feedback on design)
    - More detailed feedback given through comments
2. Should include a readme about how to run code
3. Page limit? 10 excluding references and appendix
4. River sections looks good, can leave it as is in both reports
5. Referencing of Nielsen's heuristics - rather reference it as a web page
6. It is okay to keep the figure of the controllers early on