Digital Materialities:
A pilot project exploring transdisciplinary collaboration across fashion, photography and digital design in a higher education context

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Fig 1: screen shot of 3d model created using photogrammetry
wearing look by Master of Fashion Design student

Abstract

This practice research explores a transdisciplinary collaboration between fashion, photography and digital design, challenging the perception of the 'digital' and 'material'. In a collaborative studio, high-end 3D scanning was used to pilot pedagogies exploring the shifts between. This engages with the 'everywhen', the disciplines co-mingling between the encounters of body, material, space, time and pixel.

The data generated from 3D scans becomes complex representations of unfixed time, an emerging past, present and future of images, bodies and spaces. Process, data, workflow and outcomes speak to a decentering of these within our disciplines. The scanned 'fashion body', comprised of material arrangements and compositions, was informed by direction from photography and animation students. The assembling of individual images to create a moving tableau of frames were configured post scan. As data the past moment, aligned by machines, creates a realistic depiction of the present moment, and through the use of this data, they become rendered, cleaned, and representative of a multiplicities of future images.

Fashion is amplified in its capacity for characterisation and depiction of materiality. It has potential to invert the standard workflow in games and animation that often involve a character being determined first, followed by its digital clothes.

Figure 2: Image capture in photogrammetry rig

Abstracts

The Proceedings of the International Symposium on Electronic Art will be compiled from electronic manuscripts submitted by the authors. This paper provides brief style instructions that will facilitate high-quality, consistent, proceedings. The title “Abstract” should be 10 point, bold type, centered at the beginning of the left column. The body of the abstract summarizing the thesis and conclusion of the paper in no more than 200 words should be 9 point, justified, regular type.

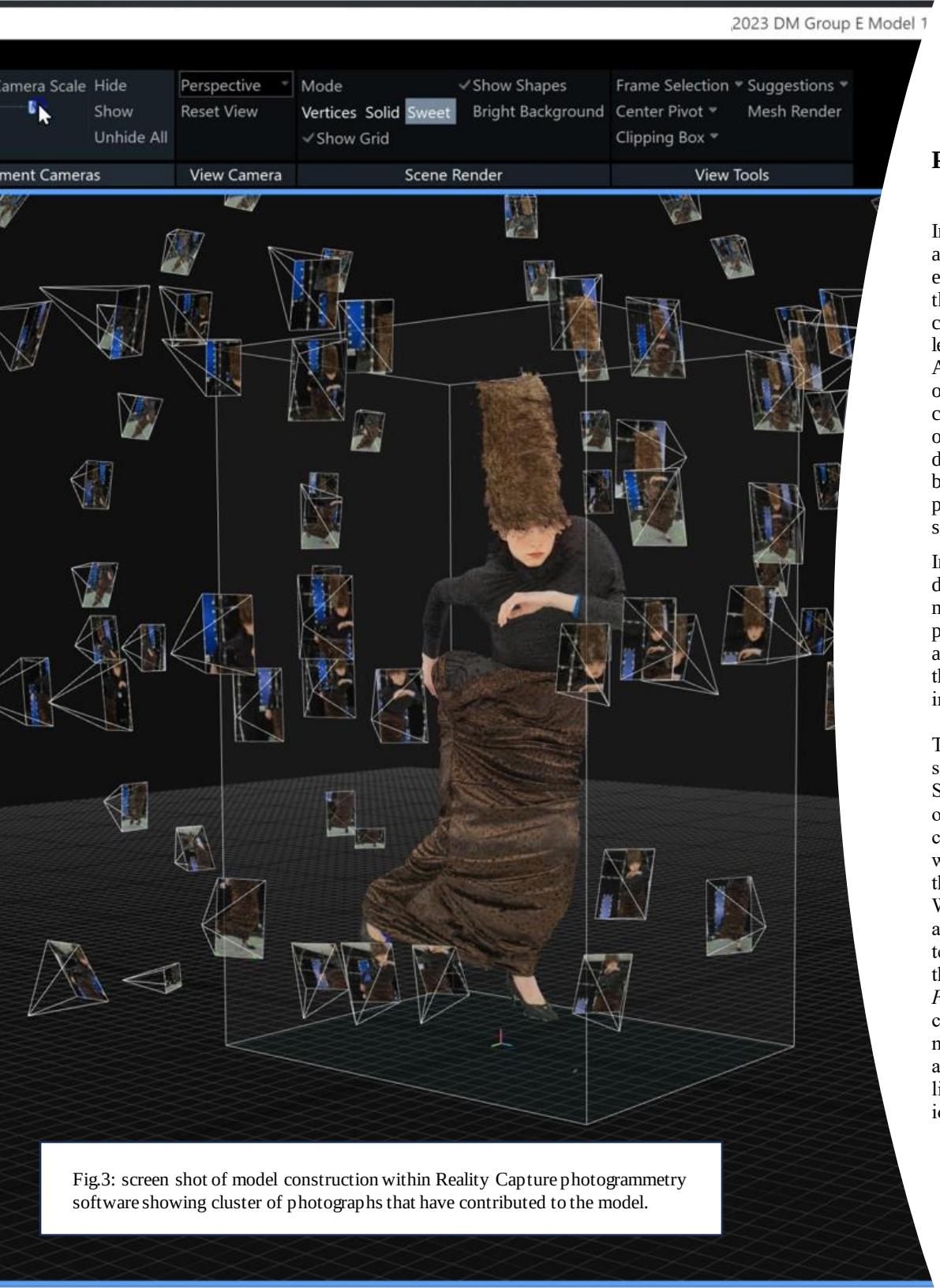

Fig.3: screen shot of model construction within Reality Capture photogrammetry software showing cluster of photographs that have contributed to the model.

Project Overview

In this pilot project exploring the potential of digital materialities as a studio, the complexities and differences between disciplines were embraced. The three cohorts approaches the placement of the project in their respective disciple in different ways from a key communication element of project work in fashion, to an industry learning experience in photography and as part of a major project in Animation and Games. This included differences where the project was optional or obligatory in coursework in Masters programs. The cohorts came together for the intensive project and were allocated after a series of introductory workshops from each discipline area into cross disciplinary teams. Between the cohorts there were therefore differences between the credit point weighting of the related courses, and if the project was integrated into learning activities or an optional project to sync to major project work.

In this pilot version, the basis for the collaboration between the disciplines was to create a digital fashion performance, using real material fashion bodies, created as part of the fashion students graduating projects. 'Material' was digitized through the 3D scanning, and animated throughout the process. Our approach considers the translation of the material into the digital and how it can be re-contextualised and re-imagined in the transformation between.

The collaboration is related to current trends and creative work as seen in several different phenomenon, such as the development of virtual fashion. Second Life, still with a thriving community and online marketplace, was one of the original environments to make digital fashion a focal-point of the community-led co-creation of the world. Since, many other games and worlds online and in VR have continued and expanded this trend. We see this now gone mainstream as well, with events such as Metaverse Fashion Week showcasing well established brands such as Tommy Hilfiger, Coach, and Adidis. In the 21st century, there has been an ongoing dialogue and tension between the digital/mechanical and the handcrafted, as examined in the text *Postdigital Artisans - Craftmanship with a New Aesthetic in Fashion, Art, Design and Architecture.* Increasingly, the boundaries both conceptual and methodological between traditional interpretations of materiality and the digital are dissolving, at the same time practitioners are exploring these intersections and carving out new niches. Practitioners like James Walsh and Laura Senk are good examples of this, reconfiguring ideas of fashion, craft, and digital primacy.

Methodology & Pedagogical Workflow

This project was undertaken as a practice research project. We tested our hypothesis in the field through a pilot project involving students, staff, and industry partners across three disciplines.

In early 2022, Associate Deans of Fashion, Photography, & Digital Design at our university identified that each of our disciplines are 'expanding' with increasing domains of intersection and overlay. For example, students in fashion design are increasingly working in a digital-first workflow. Photography is becoming diffused with ubiquitous computing. Digital Design tools are becoming increasingly 'photographic' in image quality and visual language.

In the context of 'curriculum architecture', a university wide program to develop interdisciplinary program structures, we saw an opportunity to recalibrate the institutional borders of our academic disciplines to reflect contemporary industry practices and potentials.

In mid 2023, we secured a s mall grant from Adobe to test this observation in the field and develop pedagogical models to integrate students and staff from different disciplines in a collaborative project.

Using these funds, we brokered an industry partnership with a commercial VFX/photography company that have built a state-of-the-art photogrammetry rig to use their facilities. This industry partner had previously reached out to us with a desire to foster expanded photography skills amongst emerging professionals.

Rather than creating a new course, students remained in their separate program courses. Examining the Course Learning Outcomes, we determined that it was possible to align assessments and class schedules. Classes were co-delivered with all students in a single space together. The project covered the first six weeks of a twelve-week semester. For the remaining 6 seeks of the semester, students returned to their separate classrooms and continued with their individual studio projects.

A sessional teacher was employed to act as a central point of connection for all students and staff from each discipline joined each week, depending on the task.

Students were formed into interdisciplinary teams that comprised of students from each discipline program, the Master of Fashion Design, Master of Photography, and the Master Animation, Games & Interactivity.

Using fashion designs created by the Master of Fashion (Design) students, the teams worked together to create 3D assets and explore potential outcomes

Class Schedule:

- Week 1: Orientation
- Week 2: Introduction to photogrammetry and webXR
- Week 3: master class with industry partner
- Week 4: group shoot day planning
- Week 5: full day of shooting using photogrammetry rigg
- Week 6: processing of photographs into 3D models using Reality Capture

Fig.4: student adjusting fashion design on model within the photogrammetry rig during shoot day.

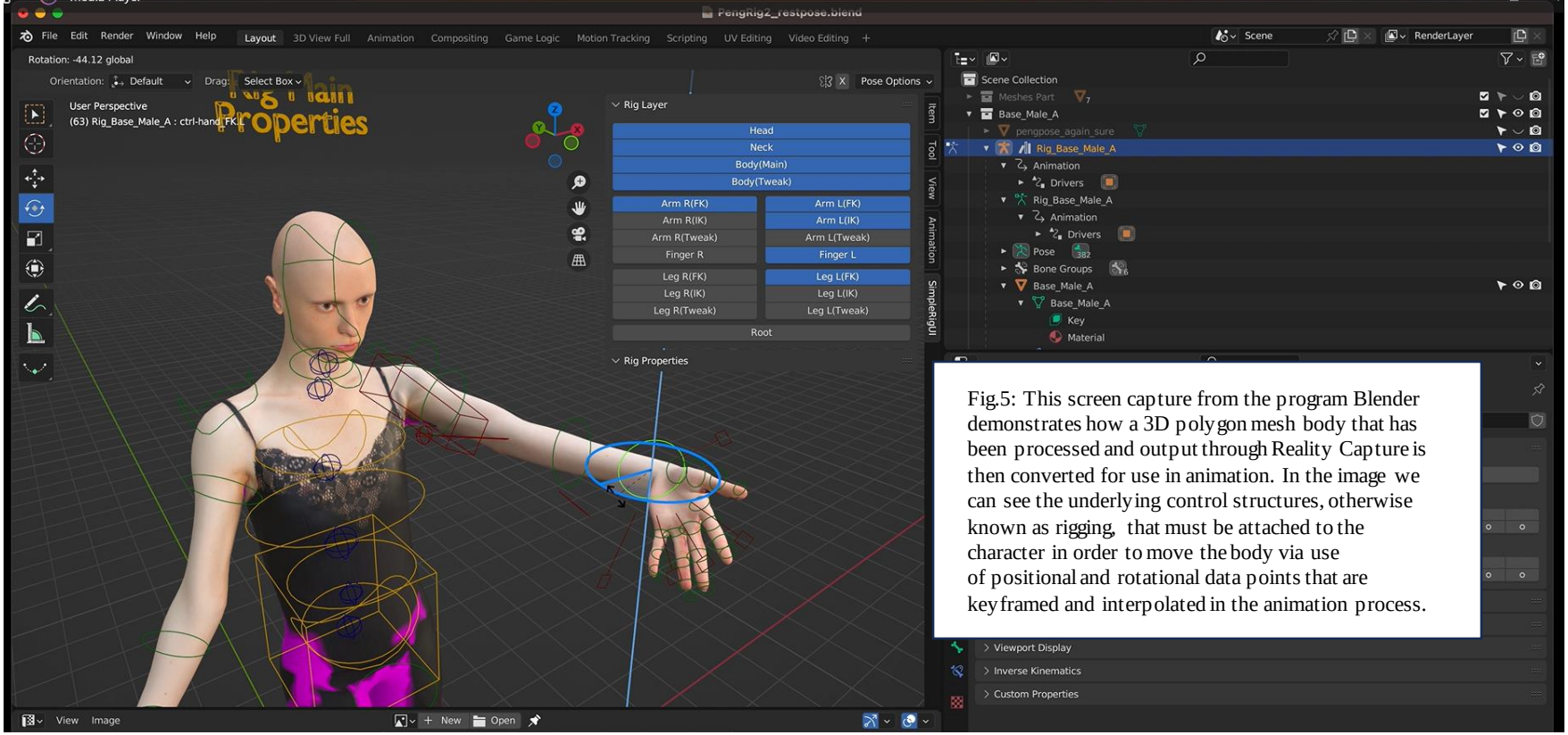

Fig.5: This screen capture from the program Blender demonstrates how a 3D polygon mesh body that has been processed and output through Reality Capture is then converted for use in animation. In the image we can see the underlying control structures, otherwise known as rigging, that must be attached to the character in order to move the body via use of positional and rotational data points that are keyframed and interpolated in the animation process.

Outcomes and Findings

This collaborative studio culminated in a series of digital performances, animations and games produced by cross-disciplinary teams from Masters students in fashion, photography, animation and games. Whilst the project intended to capture immense shifts that are occurring in the reality of capturing, encountering and understanding materials in the digital world, a key outcome is also the way these processes dissolve our structured dependence on linear time, as part of the everywhere, where in digital data time exists simultaneously. Time becomes the critical underpinnings of different disciplines, where time is contracted or expanded in various stages of workflow.

Photography is always about time, however photography as encounter becomes further complex in the various stages of workflows and new relationships emerge between time and space. The project has the potential to evolve into further pedagogical models, with learning to be applied in summer school intensives and potential to use the project as an exemplar for building new curriculum across disciplinary boundaries. Another version of the project is intended to run to challenge further the intergration of digital technologies to experiment with materiality as opposed to capture material that exists in reality.

A recommendation is to further this collaboration by allowing animation and games to show fashion students the digital design skills to transform how they might conceive of form prior to real life fabrication. Challenges also include the complexities of working with an industry partner who was juggling commercial bookings whilst supporting the educational project.

Furthermore, this project relates to furthering the discourse on how digital translates across materialities. New discourses are emerging that require this area to be distinct and enabling across disciplines. The project's key outcome is that it presents the potential for future models to build an integrated curriculum around digital imaging and material representations, irrespective of disciplines.

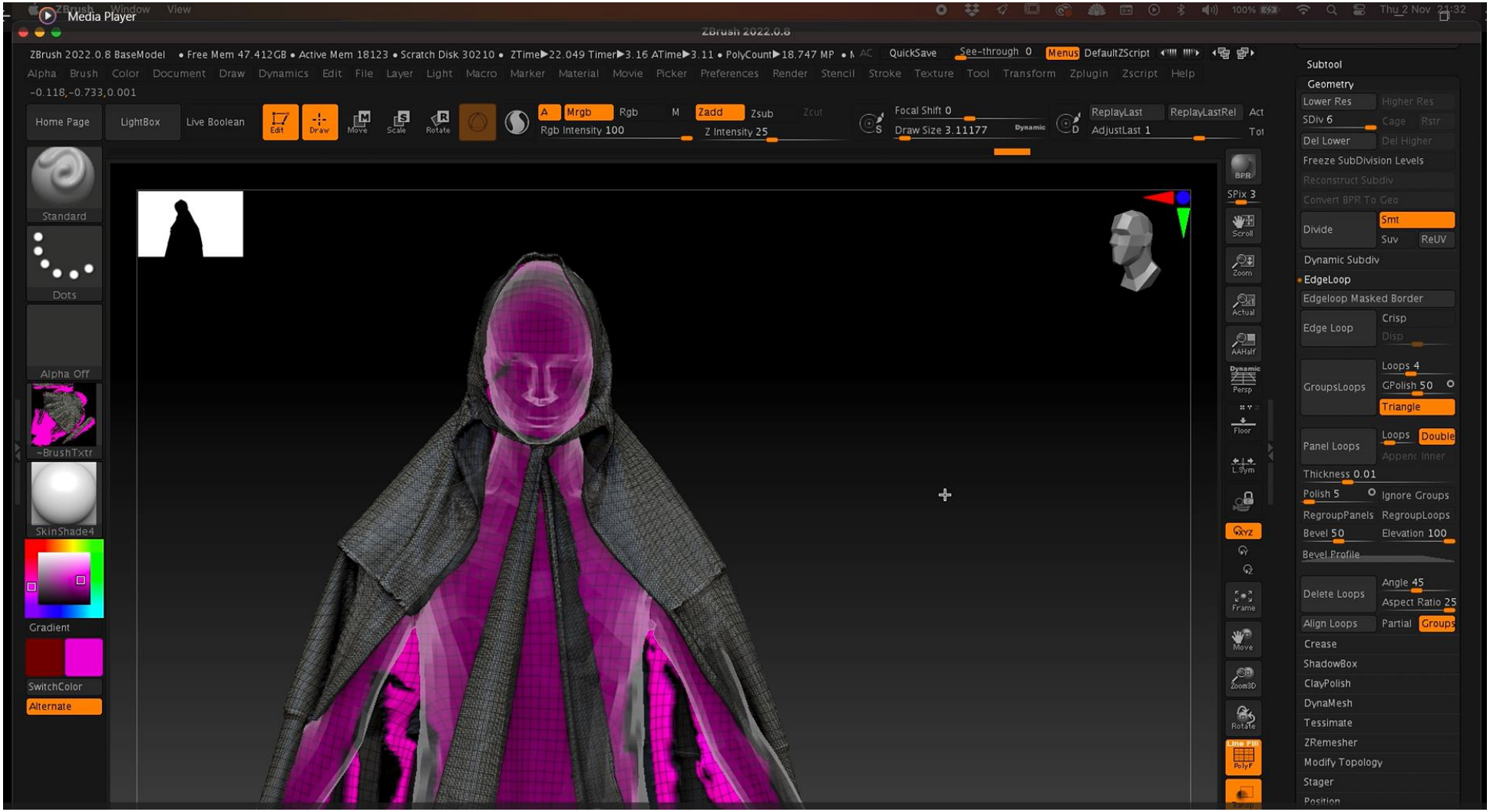

Fig. 6: In this image from ZBrush, the figure has been imported into a 3d modeling sculpting environment, where anomalies and holes in the mesh surface that resulted from the photogrammetry scanning and processing phase can be manually adjusted where desired. This is another point of digital malleability in the creative production process that allows for re-interpretation of the original material forms The phtotogrammertry rig consisted of approximately 163 separate SLR cameras linked together in an array. Students used Reality Capture software to take the images, and later to reconstruct the point clouds and mesh surfaces that became the digital models they used as a starting point in their creations. David Zeleznikow-Johnston.

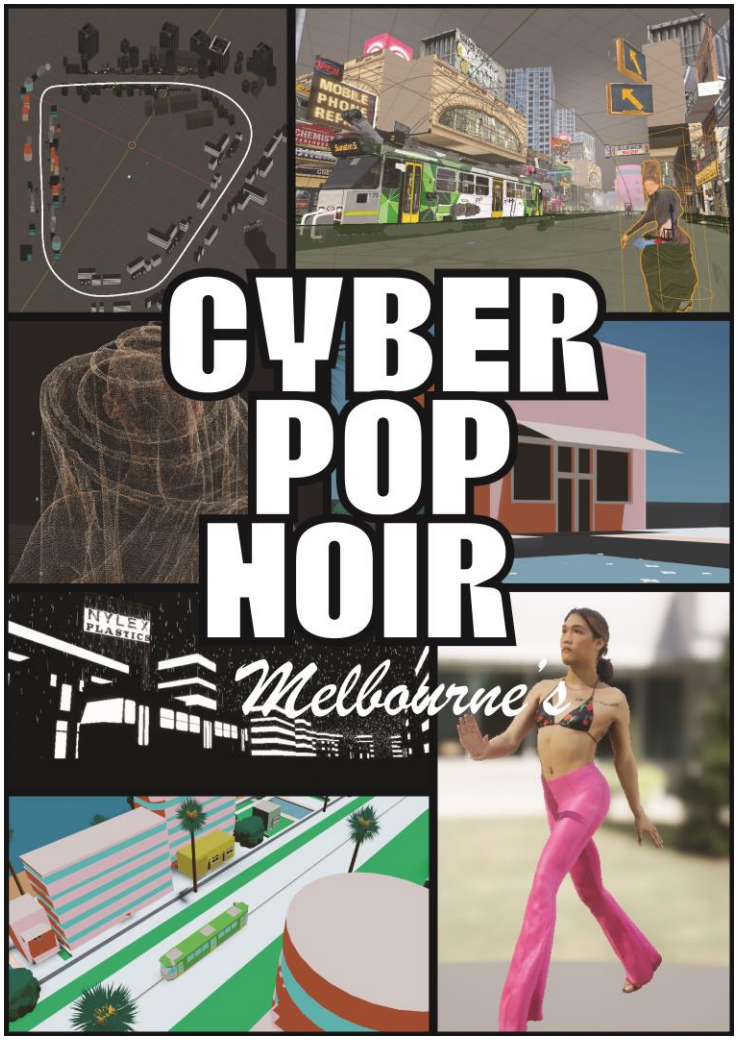

Fig. 7 & 8: *Cyber Pop Noir* is an experimental game environment interactive walk-through experience that features the creator, Nattha ~~Dhamabuttru,~~ as the main playable avatar that users inhabit to explore the landscape (featured in the lower right corner of the poster). Natthu was captured during the photo shoot and converted herself into her own avatar. In the work, you travel through four radically different digitally stylised interpretations of Melbourne, Australia via riding the tram from location to location. Along the way, you encounter several Non-player characters that inhabit the world and wander the footpaths and roadways. These characters have also come from the Digital Materialities project, adopted and incorporated from several of the other collaborative student working groups. An example is visible in situ in the Unreal game engine editor in the upper right corner. The rendering to the left of the poster elegantly showcases one of these characters in greater detail, demonstrating a variety of poses made possible by the rigging process. For the animation and games students who worked on this, it was technically challenging at times to understand how to work digitally with the radical physical forms created by the fashion students. These costumes sometimes posed difficulties that they would not normally encounter, such as furry or spring-loaded headpieces. In these cases, the photogrammetry scanning produces some artifacts and glitches as some of these subtleties are difficult to triangulate with the array of cameras to exact precision. However, often these elements were embraced by the students as aesthetic features that enhanced their projects and revealed some of the digital materiality process. The interactive game was created in Unreal engine and featured several different environments/ moments in time as a fanciful reinterpretation of the city of Melbourne.

Fig.9: *Reimagining History* is a short animation that features a trans woman observing themselves in the mirror, situated in a grand aristocratic hall. This work features the fashion of a student that was scanned during the photogrammetry shoot and then rigged and animated. The incredibly high resolution and fidelity of the original capture allows the figure to blend seamlessly into the environment. This type of photogrammetry practice is increasingly in use in industries such as film and advertising, where models are recorded, translated, and re-imagined in different environments and contexts, particularly when the subject matter has an essential material, physical, or social property (for instance, a specific actor or celebrity), that makes it unique as a starting asset. Digitally reconstructed actors and objects are also routinely incorporated in Virtual Production workflows. In this work, we see a student subverting this process, remaking history in a creative social intervention.

Recommendations and Future Plans

Thinking ahead, if the same three disciplines were to repeat this pilot experience, we believe there would be much to be gained by changing the origination of the content development to a different department each time. In this iteration, the fashion students had primacy in that they had created their fashion looks as the starting point of the collaboration, and photo and animation and games students were responding to that work. What might happen, for instance, if the starting point was located in animation instead? In this case, fashion students might be designing for the digital narrative from the beginning. This would transform ideation, focus, technical and logistical processes in the collaboration, resulting in different learnings and perspectives.

This project could also be expanded to include the use of AI tools to reinterpret the digital materiality in a novel algorithmic approach, applying yet another data-driven permutation to the origin point of physical fabrics worn on the body. In truth, almost all contemporary fashion is already imbued with or created with some sort of digital process as well, whether it be in the design or manufacturing phase. For fashion students, and sometimes games and animation designers, they are often using Clo3d or Marvelous Designer to create their works, software programs specifically engineered for garment design and simulation with an emphasis on emulating real-world materiality. Diving even deeper conceptually into the permeability and interdependence of material and digital approaches will enhance the sophistication of future practices as developed by current students.

In addition, careful thought should be given to how to specifically engage students from each discipline and in respect to how their skills can be applied and amplified. Working with an industry partner also enhanced the student experience, however attention needs to be on their disruptions of scheduling due to taking up commercial jobs. The potential is also for this project to unite industry partners also from other disciplines bring greater focus to the studio. In addition, the way this work might evolve with the testing of interactive elements with audience could be ideal.

Fig.10: Students attending Master Class on use of the photogrammetry rig.

Fig. 11: Students from three different disciplines/programs collaborating during shoot day at industry partner facility.

Acknowledgements

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