NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE
School of Computer Science and Engineering
College of Engineering

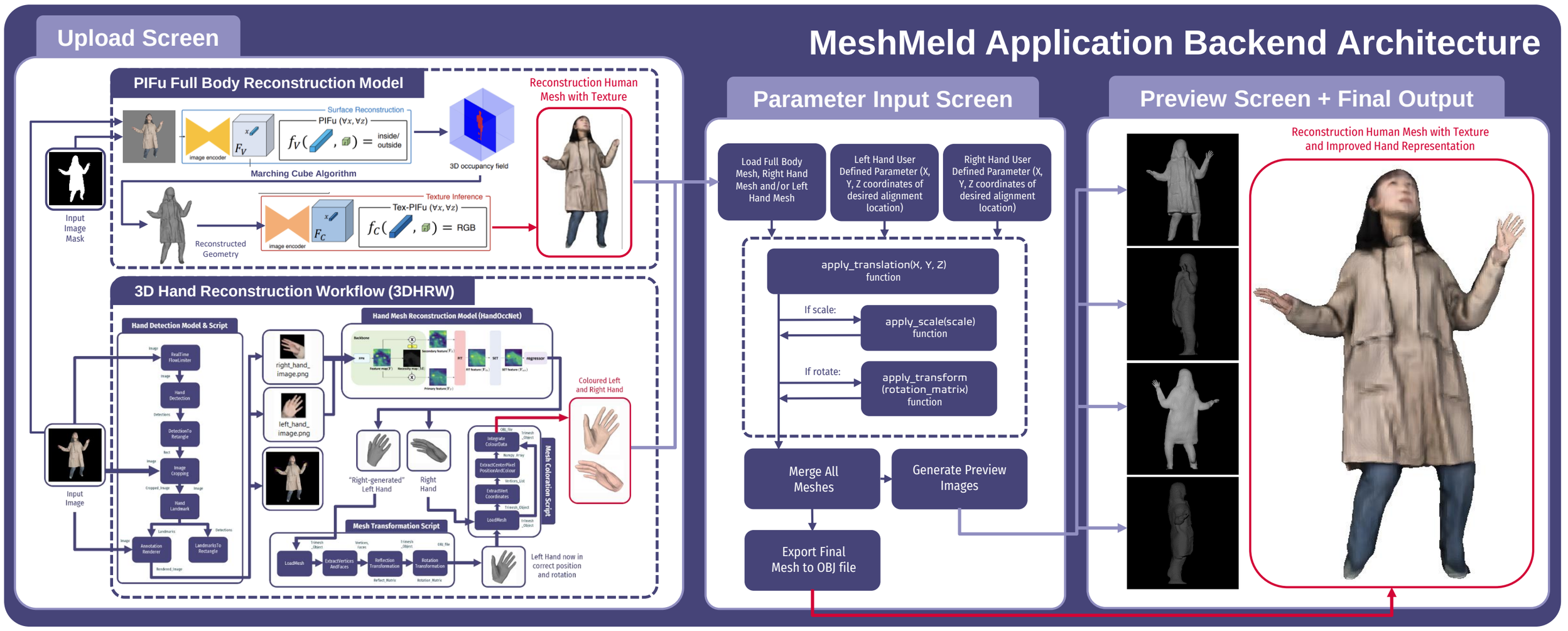
# 3D Human Reconstruction

Student: Gucon Nailah Ginylle Pabilonia  Supervisor: Professor Lin Weisi

## Project Objectives

- Train and evaluate a Pixel-Aligned Implicit Function (PIFu) model.
- Build a novel 3D Hand Reconstruction Workflow (3DHRW) to improve hand representation.
- Develop a specialised mesh merging application to combine the outputs of PIFu and 3DHRW.
- Explore a practical utilisation of PIFu's output through the creation of an automated character rigging workflow.

## MeshMeld Application Backend Architecture




## PIFu and 3DHRW Integration

- The MeshMeld application leverages the capabilities of PIFu and 3DHRW to generate a full body mesh and hand meshes, while streamlining the hand alignment process with enhanced accuracy with just one user-defined parameter, outputting a more intricated full body mesh.

| | THuman2.0 | | RenderPeople | |
|---|---|---|---|---|
| **Method** | Chamfer Distance | Point To Surface Distance | Chamfer Distance | Point To Surface Distance |
| **PIFu** | 5.511 | 6.874 | 5.781 | 10.269 |
| **PIFu + 3DHRW** | **5.326** | **3.661** | **5.495** | **6.965** |

## Streamlined Character Rigging: PIFu Mesh to Game Avatar




- Developed an automated character rigging workflow using YOLOv5, PIFu, and RigNet to streamline 3D human character model base creation and rigging, showcasing its versatility in an Unreal Engine use case.
- Shows the potential to make game development more accessible, as no prior knowledge is needed to run the workflow.