

Development of Interactive Modeling System for the Computational Biomechanics Simulation using Medical Imaging Data

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Tomoaki Hayasaka
hayasaka@postman.riken.go.jp

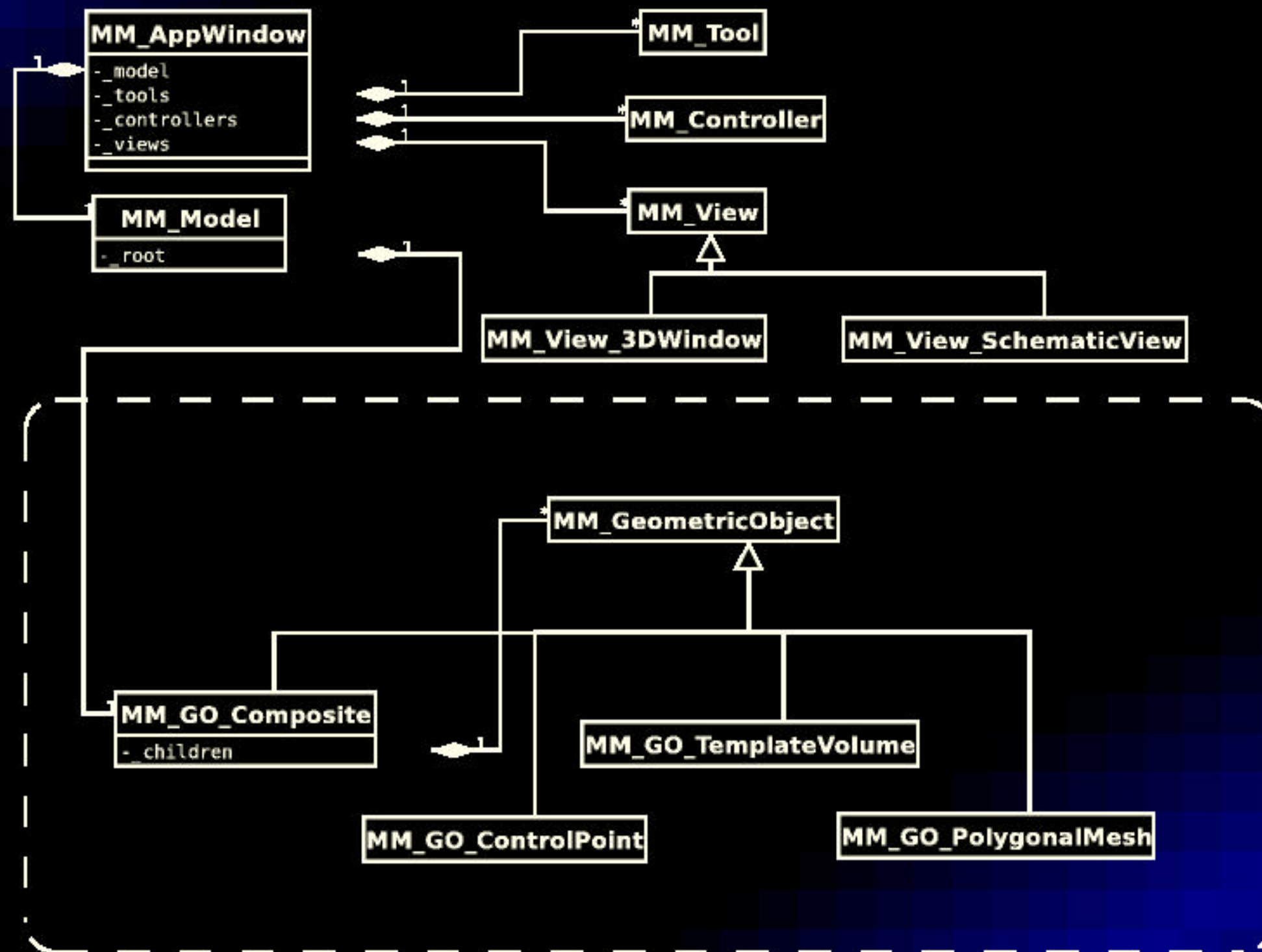
Introduction

- Patient specific and realistic models are needed.
- Modeling based on volumetric images.
- Medical imaging data contains various artifacts.
- It is hard to construct a geometric model automatically.

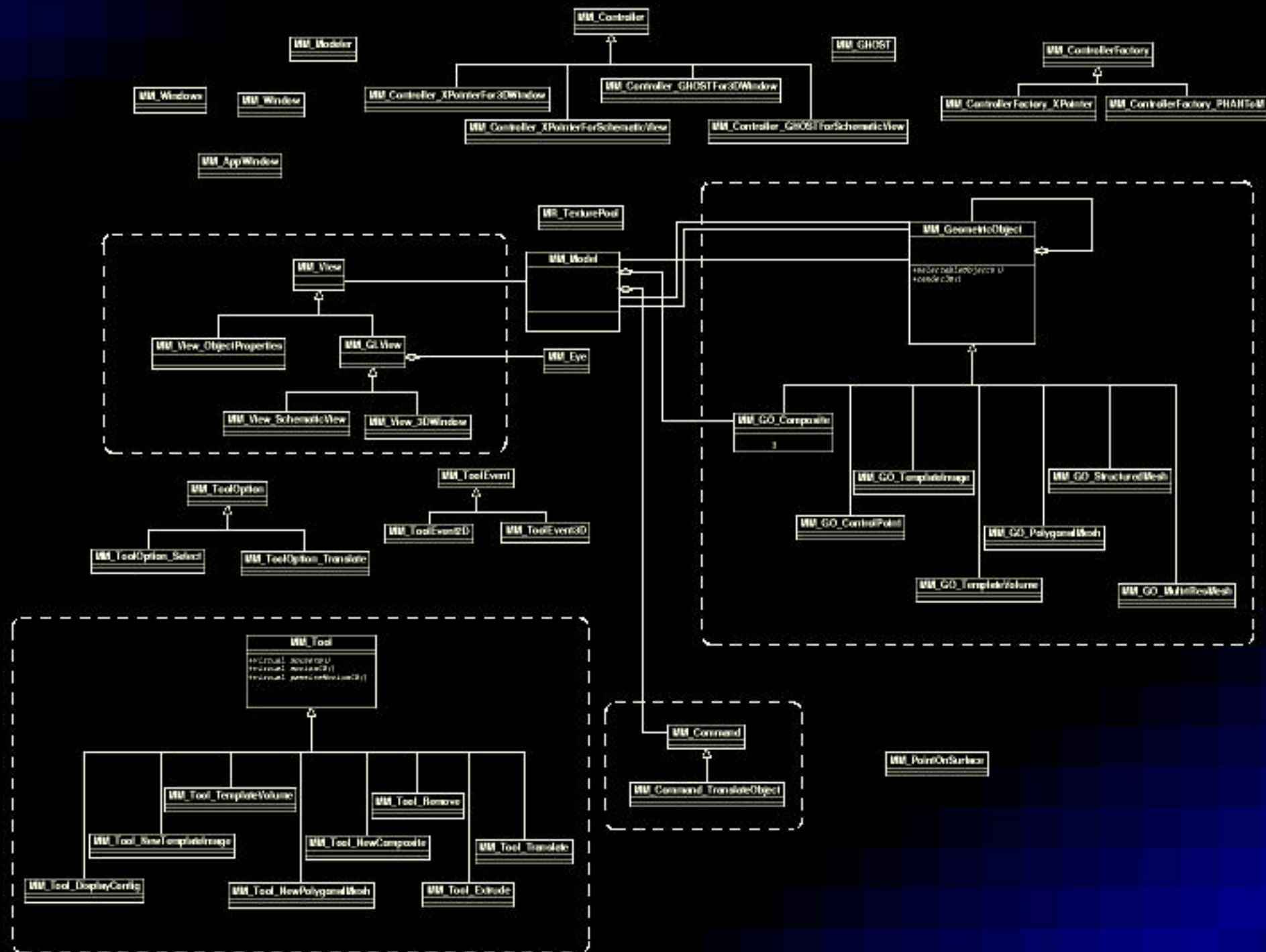
Goal

- Develop a novel modeling system to construct geometric models from medical imaging data interactively with directly using the operator's anatomical knowledge and ability of space perception.
- The system can render volumetric images acquired with MRI.
- Users can directly manipulate the geometric model rendered over the volumetric image.

Geometric objects



Device independent input



Realtime volume rendering

The system uses volume slicing:

- simulates traditional ray casting using texture mapping and alpha blending
- can produce a projected image at interactive frame rate with dedicated texture mapping hardware

Multiresolution mesh editing

Development environments

■ Hardwares

- Debian GNU/Linux PC + Millennium G400
- Debian GNU/Linux PC + Oxygen VX1
- SGI ONYX2 Reality Monster + Immersive Work Bench

■ Softwares

- GNU C++ Compiler □ MIPS Pro C++ Compiler
- Mesa + Utah-GLX □ OpenGL
- FLTK
- libsigc++

Results

TODO

- support 6 DOF input device
- support haptic rendering
- automatic segmentation
- mesh generation