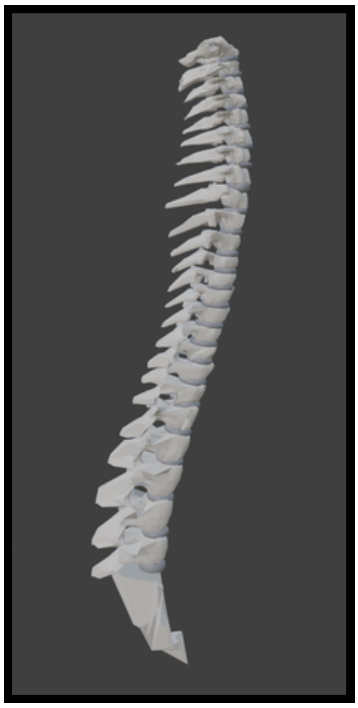
Spinal Cord Render in Blender

By Kevin Lu



Project Introduction

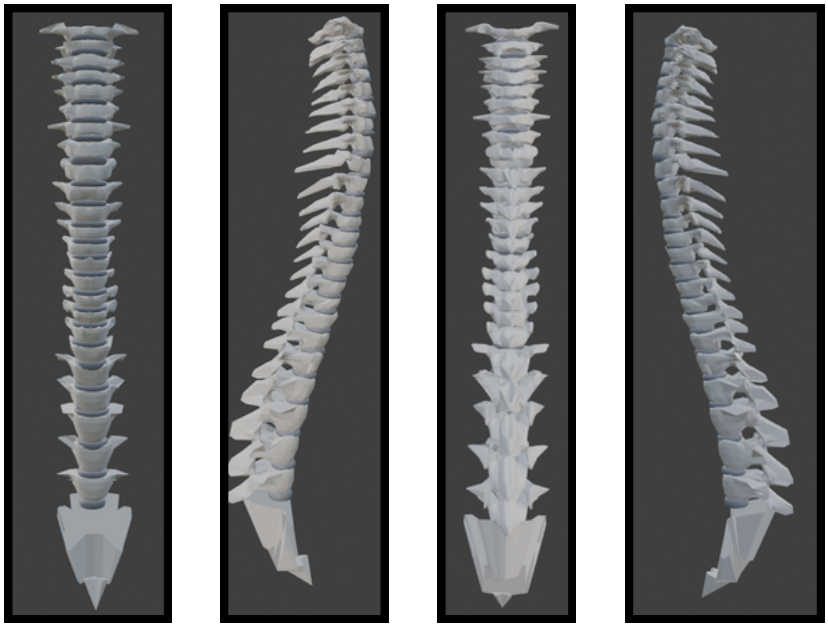
My project idea was to build some sort of 3D model of the spinal cord.

The figure to the left here shows the main component of this project - a 3D spinal cord render done in Blender. No presets or models were used. Each vertebrae was sculpted individually and then fitted together to form the full spinal cord.

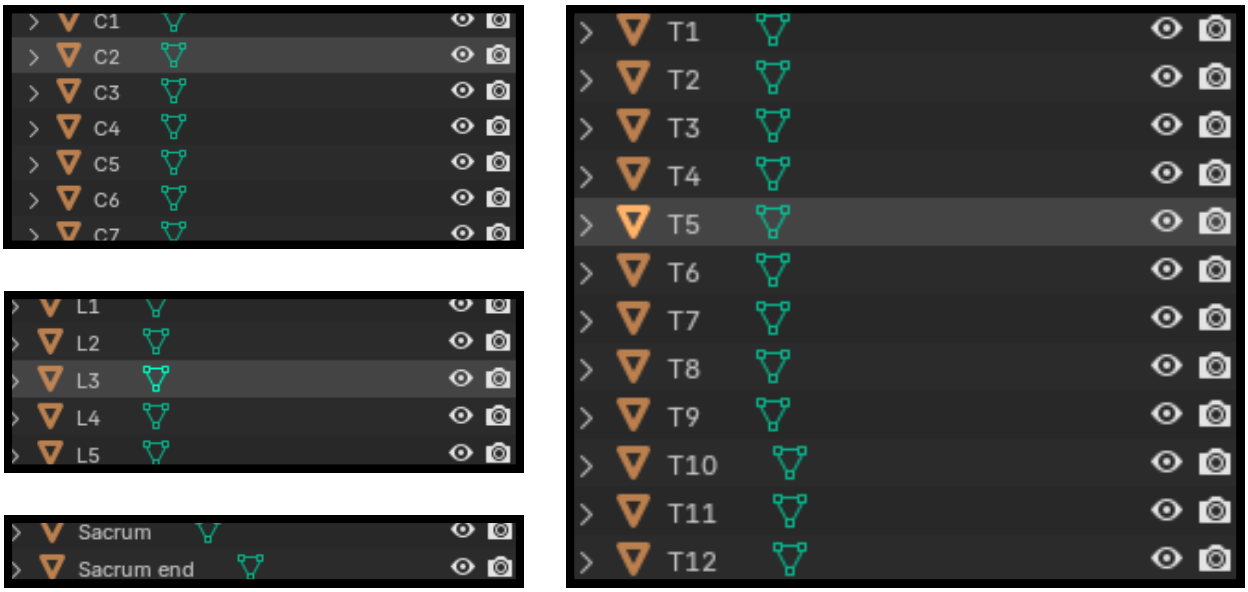
This was my very first time using Blender. While it was definitely challenging having to learn a completely new technology, it proved both fun and rewarding at the same time.

The rest of the document will first provide an overview of the build and its components. Following that, annotations on the model will be shown highlighting important aspects of spinal cord anatomy.

Model Overview

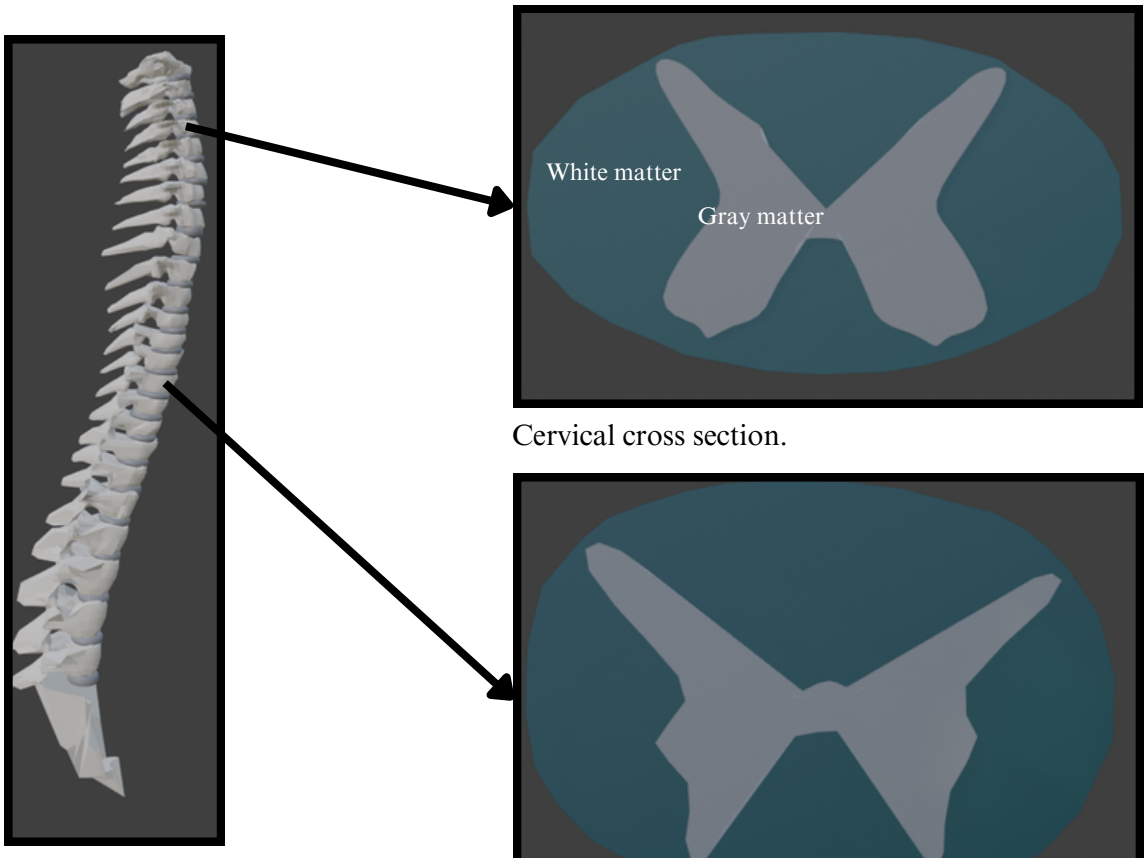


As mentioned in the introduction, all components of the spinal cord were sculpted separately. No models or presets were used.



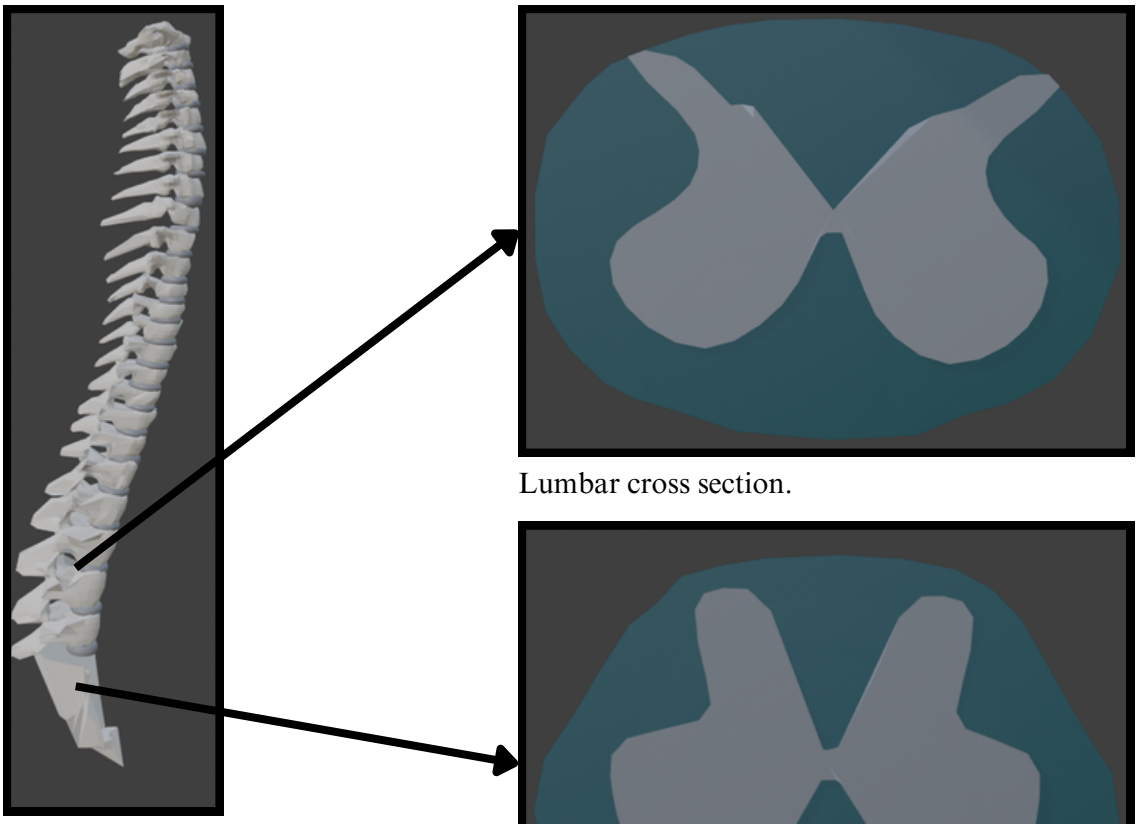
Each vertebrae of the spinal cord was created as a unique object.

Spinal Cord Anatomy - Cross Sections



Cervical cross section.

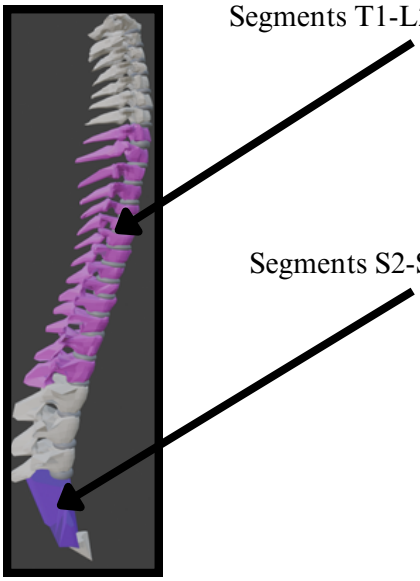
Thoracic cross section.



Lumbar cross section.

Sacral cross section.

Spinal Cord Anatomy - Visceral and Somatic

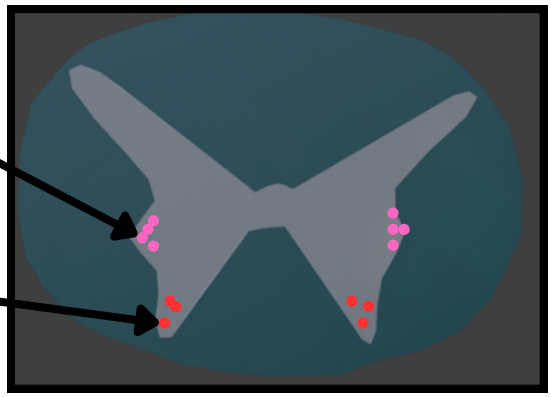


Segments T1-L2 contain sympathetic visceral motor neurons.

Segments S2-S4 contain parasympathetic visceral motor neurons.

Visceral motor cell bodies are found in the lateral horn.

Somatic motor cell bodies are found in the ventral horn.

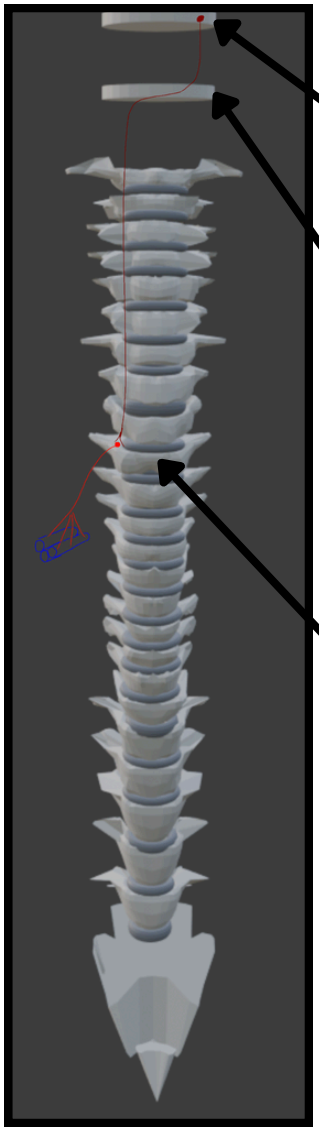


- Somatic motor cell bodies
- Visceral motor cell bodies

Thoracic cross section.

Spinal Cord Anatomy - Tract Tracing

The corticospinal tract will be used as an example here. Annotations were done in Procreate.



Motor cortex (simplified)
The dark-red cell body represents the location of an upper motor neuron.

Brainstem (simplified)
The corticospinal tract crosses the midline at the caudal medulla.

Thoracic cord
Lower motor neuron cell body is depicted in red. Lower motor neurons in the corticospinal tract are found in the ventral horn at different levels of the spinal cord.

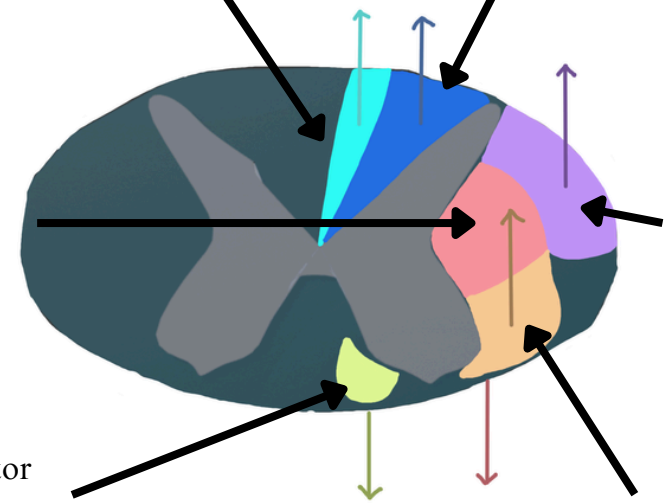
Spinal Cord Anatomy - Motor and Sensory Tracts

Arrows show the direction of tracts (ascending or descending)

Fasciculus Gracilis - sensory information from lower half of body

Fasciculus Cuneatus - sensory information from upper half of body

Lateral corticospinal - motor control of limbs



Spinocerebellar - unconscious proprioception of limbs

Anterior corticospinal - motor control of core

Spinothalamic - pain and temperature sensation

Cervical cross section.