Neck Positioner
for fluoroscopy examination

Team Members:
Tasha Benkovich
Kaitlin Brendel
Amy Lenz
Vincent Mi

Client:
Victor Haughton, M.D.

Advisor:
Bill Murphy, Ph.D.

Overview

- Motivation
- Background Information
- Design Specifications
- Previous design and testing
- Design options
- Design matrix
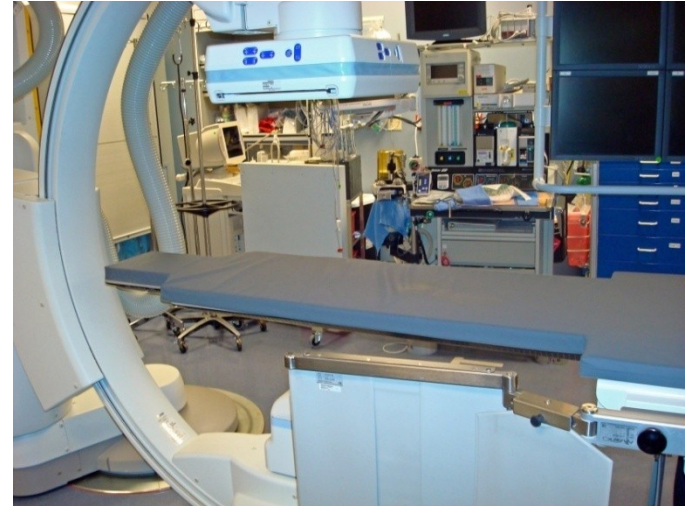- Final design
- Acknowledgements

Motivation

- Aids in treatment of neck injury via fluoroscopic imaging
- Provides steady, controlled, quantitative movement of neck
- Minimize radiation exposure to hospital staff
- Does not interfere with imaging equipment

Fluoroscopic Imaging

- Real-time imaging
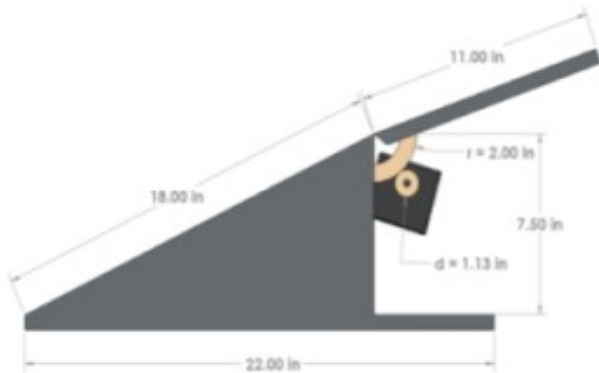- Diagnostic procedure for cervical spine

Extension   Flexion

Previous Design

- Test Results
  - Not reliable
  - Speed varies
  - Range of motion
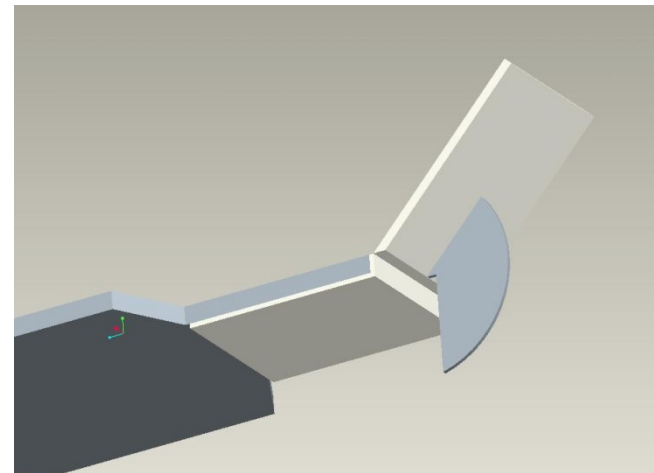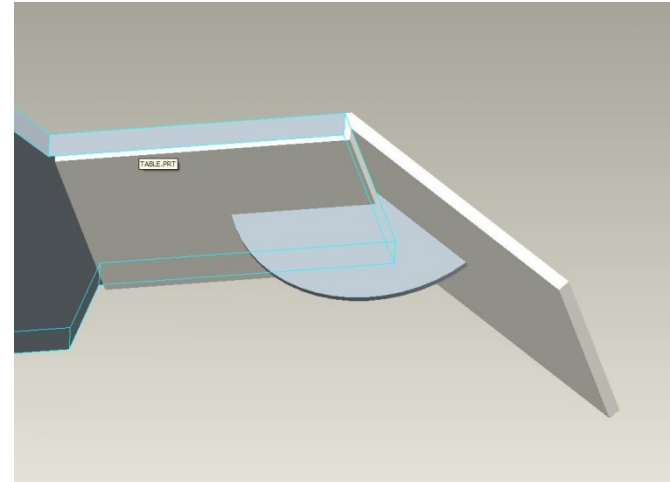- Inclined backboard

Design Specifications

- Achieve 45° of flexion and extension
- Constant rotation of 2.5° per second
- No obstruction of lateral imaging view
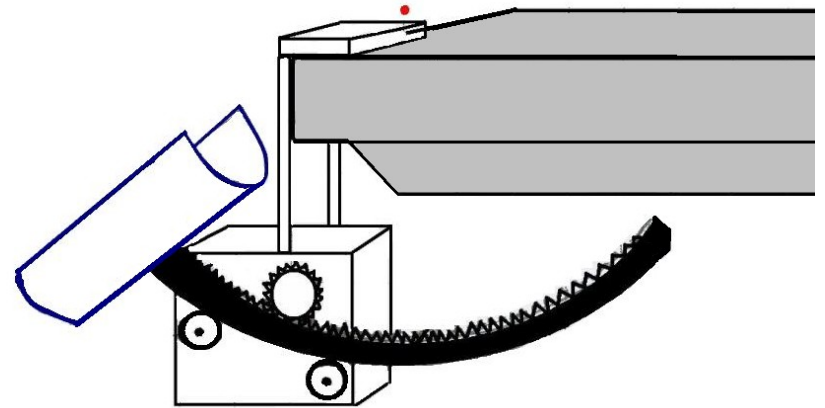- Stabilize head during operation

Gear and Motor with Gearbox

- Motor and worm-gear box are stationary
- Gear connected to headboard is centered at hinge
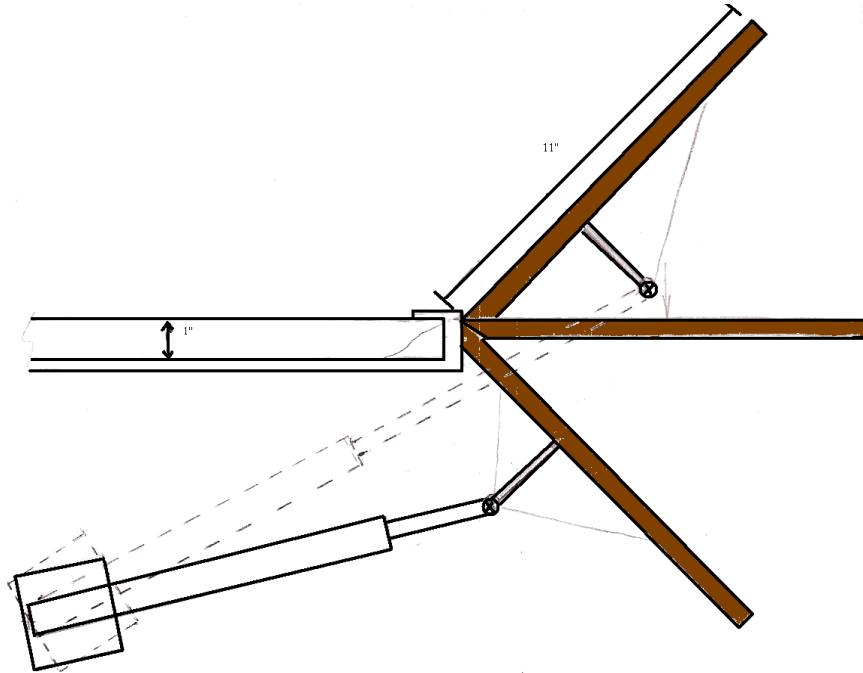- Large gear driven by small spur gear

Detached Gear and Motor

- Device not dependent on the table
- Allows the center of rotation to be at the center of the neck

Rotating Linear Actuator

- Linear actuator drives the headboard
- Device attached to the fluoroscopy table
- Linear actuator pin connected at both ends with rotating clevis

Design Matrix

	Gear and Motor with Gearbox	Floating Gear and Motor System	Linear Actuator
Safety (25)	15	20	19
Mechanics (25)	18	23	20
Aesthetics (15)	8	12	14
Ease of Operation (5)	4	4	4
Reliability (20)	12	16	14
	57	**75**	71

Proposed Solution

- Allows flexion and extension to be at correct place of cervical spine

- Gear system track that allows smooth movement of headboard
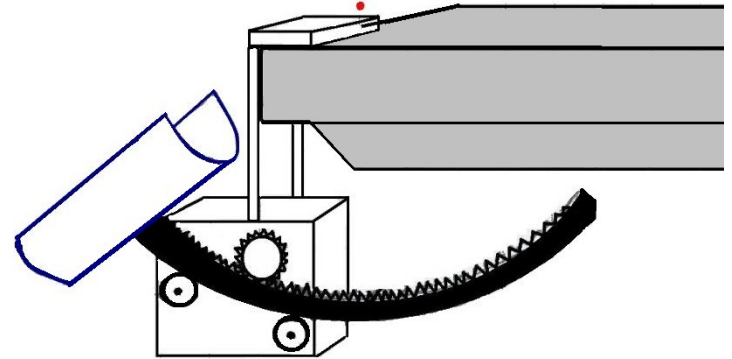
Building of the Design

- Contact motor and gear suppliers
- Research carbon fiber materials
- Start constructing prototype

Acknowledgements

- Professor Murphy
- Dr. Haughton