

Pathology Slide Scanner

Project research engineer - IIT Bombay

Objective:

- The goal was to develop a pathology slide scanner to scan pathology slides and store them in a digital format. The scanned images of pathology slides can be stored and sent to doctors overseas for evaluation and diagnosis of critical diseases like cancer.

Approach:

- To capture the microscopic details, a 20X zoom lens is required. At this level of magnification, the camera's field of view narrows to 1mm x 1mm.
- To capture the entire slide and convert it into a digital format, we decided to develop a 3-axis mechanism.
- The slide will move in the x and y directions to capture a series of images, while the z-axis will be used to adjust the camera's focus.

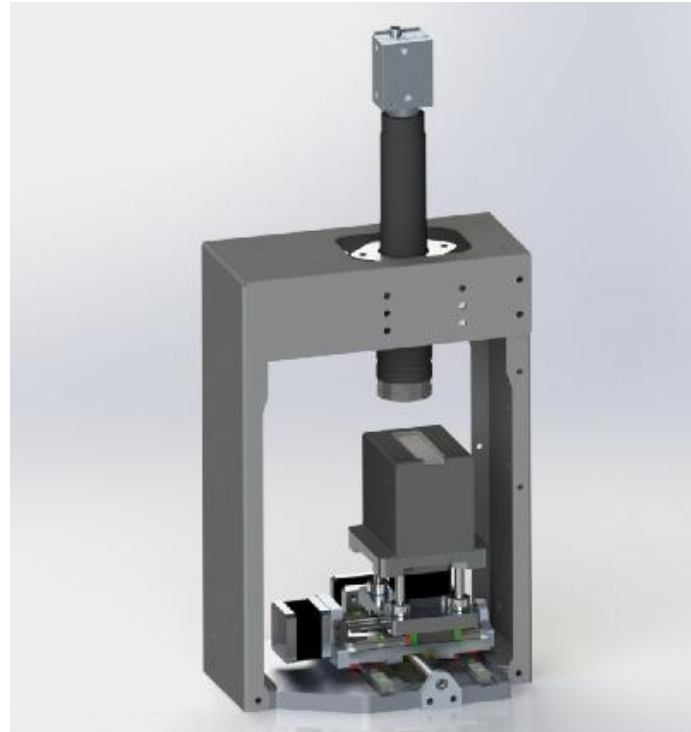
Solution:

- Phase 1 - Built a digital microscope prototype from scratch using lead screws. Achieved 1.25 $\mu\text{m}/\text{step}$ resolution, 50-micron accuracy. This prototype allowed the coding and electronics teams to test and trial their code.
- Phase 2 - Prototype two was optimized to achieve 0.3 $\mu\text{m}/\text{step}$ resolution, 20-micron accuracy, and autofocus using ball screws. It also included linear encoders to create a closed-loop system. I completed both fully functional prototypes within the specified timelines.

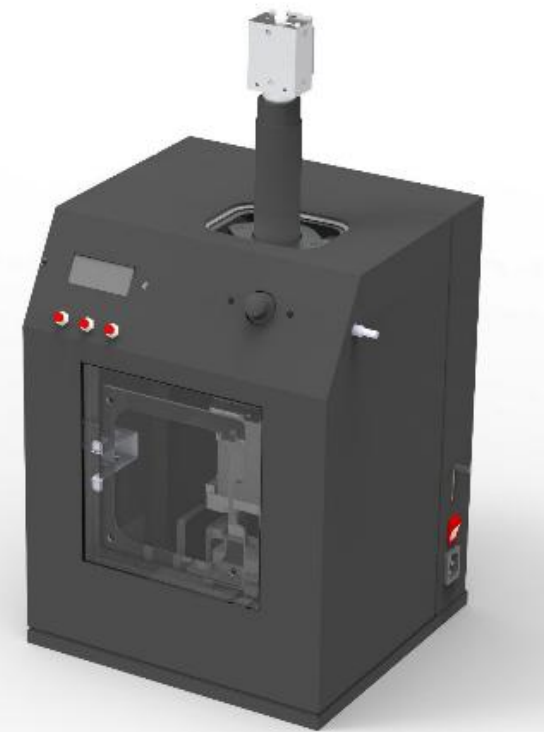
My Role:

- Conceptualized the design, created CAD models, and developed production drawings with GD&T while coordinating closely with the professor at IIT Bombay.
- Applied Design for Manufacturing & Assembly (DFMA) principles to streamline manufacturing and assembly.
- Manufacturing from vendors and procurement of off-the-shelf parts.
- Assembly & Testing.

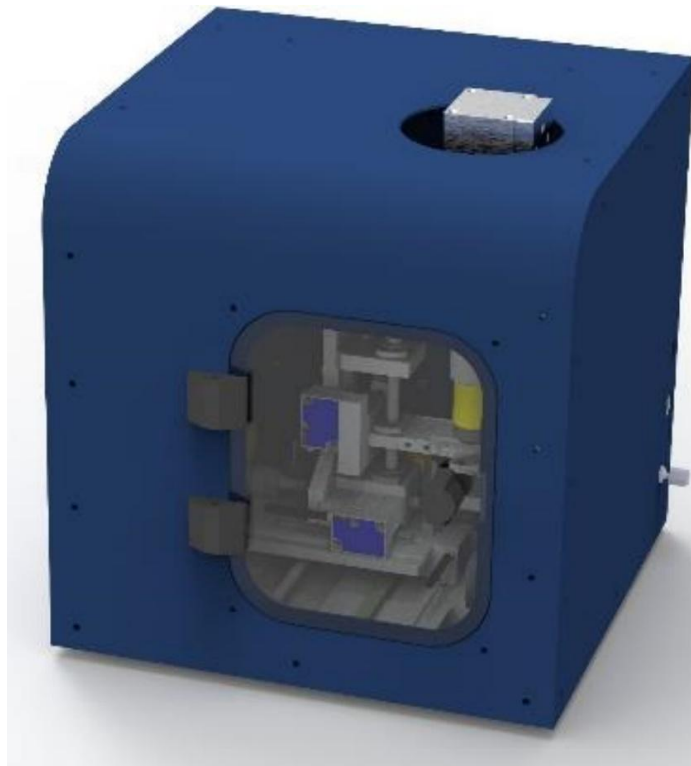
• Phase 1 prototype:



• Phase 1 prototype Inside:



• Phase 2 prototype:



• Phase 2 prototype Inside:

