Microscope Slide Scanner

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Figure 1: Cytology set up [1]

Problem Statement

- Tasked with finding a more efficient or accurate way to scan microscope slides using digital scanning
- Clients current scanner is time consuming and has low quality images
- Updated scanner should enhance the user quality of scanner as well as the images themselves

Clients: Terri Stewart and Joshua Faulkes

Background

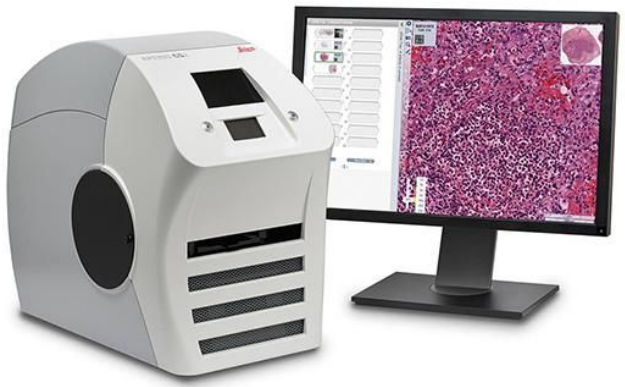

Figure 2: Lika CS2 Scanner

- Client works in a cytology lab
- Slide scanners work by taking many high resolution images of a slide and stitching them together
- Needs high quality images of cells (especially the nucleus)

Main Issues: Slow, Low quality images, Meant for 2d scans [2]

Summary of PDS

- 10 - 15 minute per scan
- Clear images/proper stitching
- No interference or damage caused to the slide
- Must work until a new scanner can be purchased
- Scanner must not interfere with other equipment in the lab
- No capital purchase over $5000

The Slide Glider

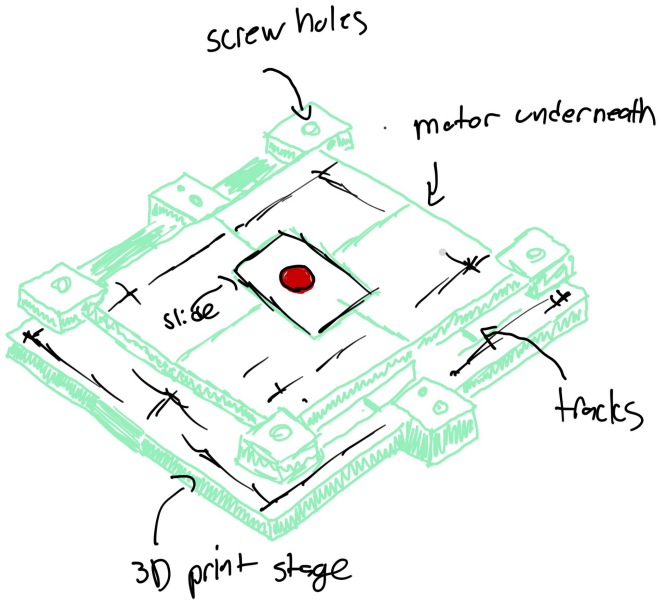

Figure 3: Slide Glider Diagram

Advantages:

- Camera controls
- Image quality
- XY Accuracy

Disadvantages:

- Cost
- Complexity

Figure 4: Process of stitching pictures together

Deconvolution

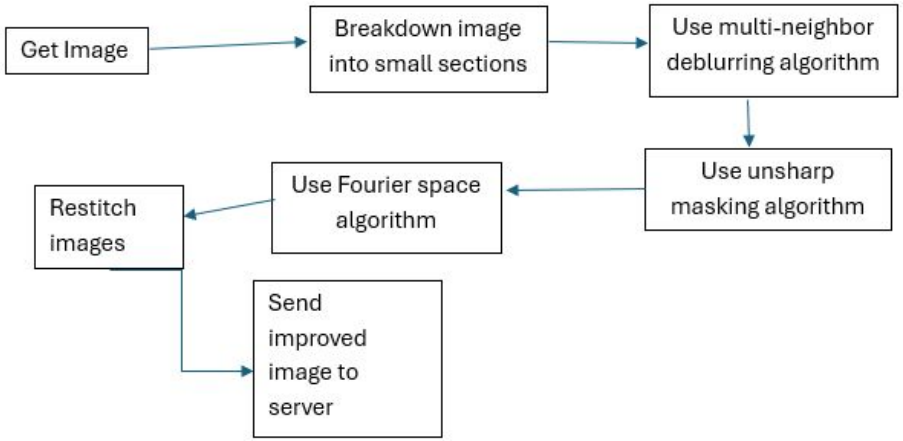

Figure 5: Deconvolution Flow Chart

Advantages:

- Removes blurriness.
- Adjusts Z-stack for better image depth.
- Cost effective

Disadvantages:

- Computer intensive
- Accuracy
- Create artificial noise in image.

AI Image Improving

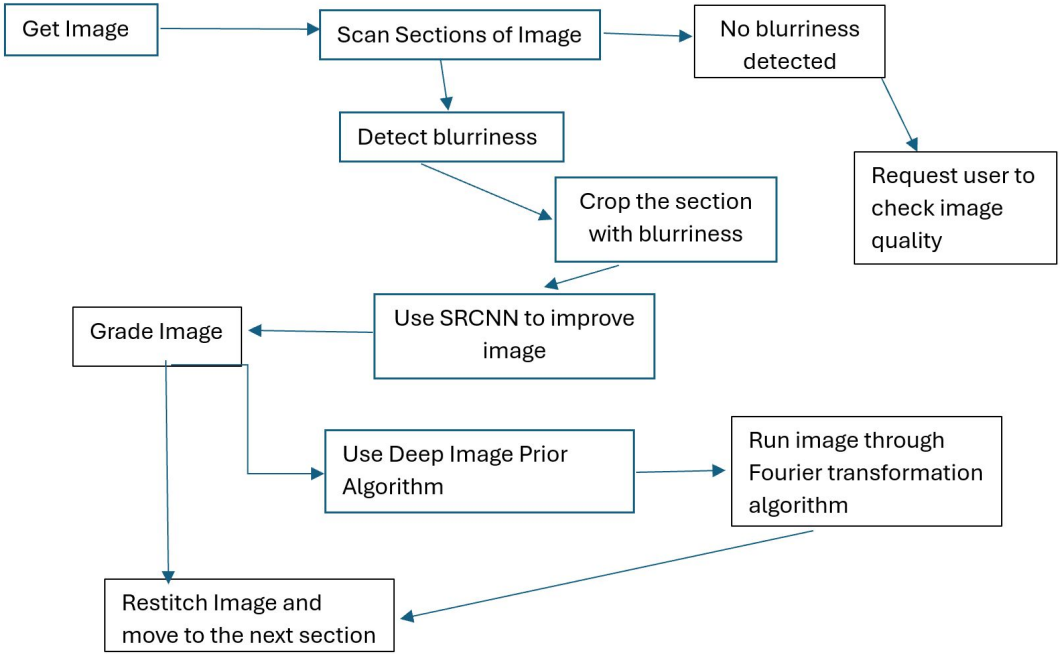

Figure 6: AI image improving flowchart

Advantages:

- Clarity of image is greatly improved.
- Cost effective
- Consistent improvement

Disadvantages:

- Speed.
- Computationally demanding.
- Very complex.

Design Matrix

- Highest Rated Categories: accuracy and feasibility
- Lowest Rated Categories: cost and manufacturability
- Glider scored highest in most, but lowest in cost

Design Criteria	Design #1: Automatic Slide Glider		Design #2: Deconvolution		Design #3: AI Image Improvement	
Accuracy (30)	4/5	24	3/5	18	4/5	24
Feasibility (25)	3/5	15	3/5	15	2/5	10
Useability (20)	4/5	16	4/5	16	3/5	12
Speed (15)	4/5	12	2/5	6	3/5	9
Cost (5)	3/5	3	5/5	5	5/5	5
Manufacturability (5)	4/5	4	5/5	10	4/5	8
Total (100)	74		70		68	

Figure 7: Design Matrix

Final Design

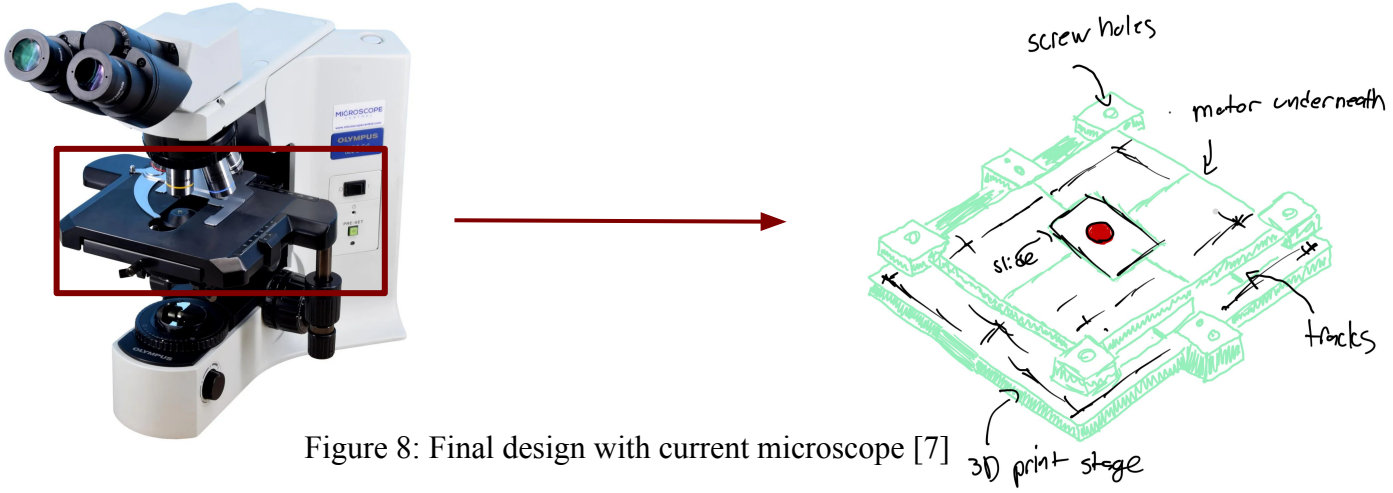

Figure 8: Final design with current microscope [7]

Figure 9: Automated stitching process

Future Work

This Semester:

- Decide on materials
- Outline software procedures
- Test design

Later Down the Road:

- Apply deconvolution to scanned slides
- Make design more universal

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