

A miniature microscope for fluorescence imaging

Client: Prof. Matthew Merrins

Advisor: Professor Jeremy Rogers

Team:

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Kadina Johnston	kejohnston2@wisc.edu (Communicator)
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Problem Statement: An affordable miniature fluorescence microscope needs to be developed the excitation source should be an LED with a wavelength of 430nm and filters will be required to filter 470 nm and 535 nm light.

Last Week's Goals: Figure out client's design specifications and perform background research

Summary of Team Role Accomplishments:

- John: Created a spreadsheet to organize potential components for each design idea
- Kadina: Created block diagrams of each design idea and researched pricing for tube lens's and LEDs.
- Kaitlyn: Started the paper and made major contributions to background information. Got welding certification.
- Zach: Preparing for BSAC meeting this week. Started a solidworks model of a stand for microscope. Got welding certification.

Summary of Design Accomplishments:

- Team completed design matrix
- Team started mid semester paper
- Team created price estimates of each design idea

This Week's Goals/Individual Goals:

Kaitlyn: I want to do more research regarding different types of cameras to use. It may be possible to use a smartphone as the camera. In addition I want to begin the preliminary report.

Kadina: I would like to send an email to Professor Merrins so that we can get his input on our three design ideas before deciding on the one we would like to pursue. I would also like to see how much the image quality of infinite vs. finite matters (is the price worth it?).

Zach: I am focusing on the microscope stand and how the system will be integrated together. I want to create SolidWorks models to visualize our system and start on drafting fabrication protocols for these parts.

John: My goal this week is to determine which LED we are going to use and design a constant current source that matches the power needs of the light source. I also want to learn more about image processing and how to go about analyzing our future results.

Project Difficulties:

When researching prices and options for tube lenses we are unsure if what we are looking at is tube lenses for infinite conjugate systems. We are also unsure on whether or not biconvex lenses can be used as the eyepiece for the camera/detector. We are curious if drilling into an optical filter is feasible or not. Lastly, we need to teach ourselves some image processing which may occur while we are waiting for materials to arrive.

Same Challenges:

- N/A

New Challenges:

- Determine if we should use infinite or finite conjugate objective setup
- Figure out if we are looking at the right tube lens for an infinite conjugate system
- Figure out if moving the eyepiece would focus the image.
- Once we capture the image, what the best way to analyze the images?
- Will biconvex lens act as an effective eyepiece for the camera?

Tasks Completed by Team Members:

Kaitlyn: Kaitlyn started the mid semester report as well as received her welding certification. Also helped with completing the design matrix.

Kadina: Kadina along with team members help complete design matrix. Also created block diagrams of design ideas.

Zach: Zach got his welding certification. Began pricing out the stand for the microscope and creating a solidworks model for the stand. Also helped with completing design matrix

John: John, along with team members completed the design matrix. John also did research into image processing software and download FIJI(Fiji is just imageJ).