

# Laboratory for Optical and Computational Instrumentation (LOCI) Clathrin Light Chain with Green Fluorescent Protein (CLC-GFP) Segmentation

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This project aims to segment human clathrin light chains that have been tagged with green fluorescent proteins. They can be described as “a large, soluble protein composed of heavy and light chains. It functions as the main structural component of the lattice-type cytoplasmic face of coated pits and vesicles which entrap specific macromolecules during receptor-mediated endocytosis.” [1] The images have been provided to the group by the Laboratory for Optical and Computational Instrumentation (LOCI) [2] and will be segmented using a variety of Matlab [3] image filtering and identification functions in Matlab’s Image Processing Toolbox [4]. Challenges of this segmentation include small, blurry blobs that are necessary to segment (Aim 2), but that are easily removed using traditional filtering segmentation techniques so new methods must be researched and utilized. A stretch goal is to implement a tracking of the segmentations between captured frames. The knowledge gained from the completion of each successive Aim will allow later, more accurate segmentation and tracking of images that have a wide range of intensities. An human segmented example, single blob segmentation of Aim 1 and Aim 2 can be seen when comparing Figure 1a and Figure 1b. A successful blob tracking algorithm can be seen in the Figure 1b to Figure 1c comparison.

## Aim 1. Segmentation of Bright Blobs

## Aim 2. Segmentation of Small, Blurry Blobs

## Aim 3. Tracking Blob Movement Between Frames

## References

- [1] GeneCards Database. (n.d.). CLTA Gene - Gene Cards. Retrieved February 12, 2018, from <http://www.genecards.org/cgi-bin/carddisp.pl?gene=CLTA>
- [2] Laboratory for Optical and Computational Instrumentation. (n.d.). Retrieved February 12, 2018, from <https://loci.wisc.edu/>
- [3] Matlab Corp. (2017, March 9). MATLAB. Retrieved February 12, 2018, from <https://www.mathworks.com/products/matlab.html>
- [4] Matlab Corp. (2017, March 9). MATLAB. Retrieved February 12, 2018, from <https://www.mathworks.com/products/image.html>
- [5] Liang L., Shen H., Camilli P. D., Duncan J. S. (2014, April). A Novel Multiple Hypothesis Based Particle Tracking Method for Clathrin Mediated Endocytosis Analysis Using Fluorescence Microscopy. Retrieved February 12, 2018, Image Processing, IEEE Transactions on. 23. 1844-1857. 10.1109/TIP.2014.2303633

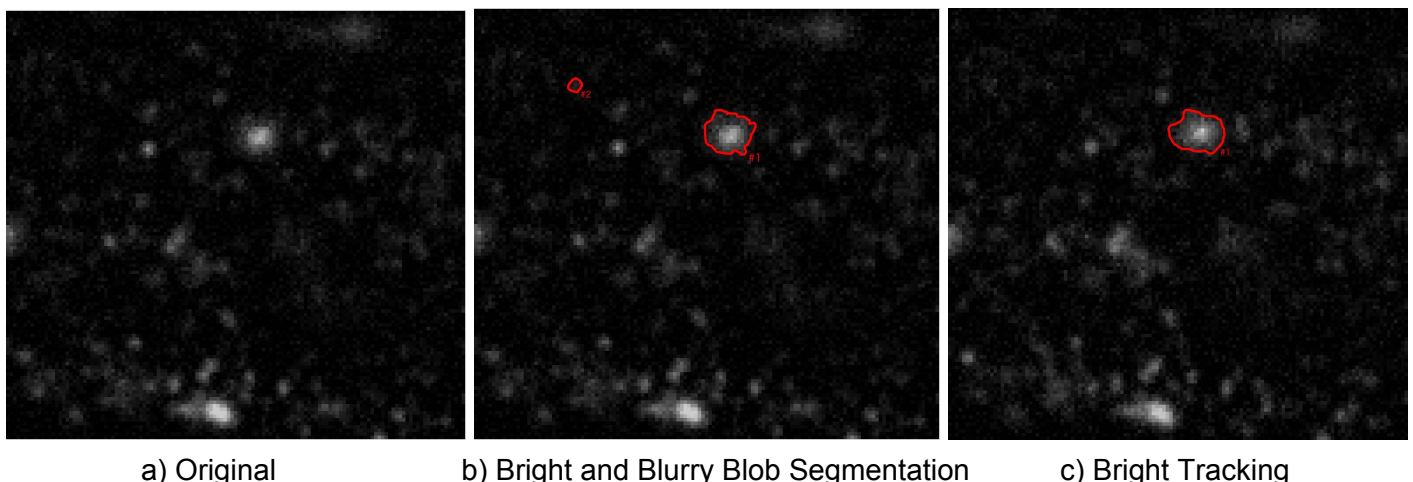


Figure 1. Segmentation and Tracking Example