Machine Vision and Analysis for Optical Micromanipulation

Ryan Smith
Illinois Wesleyan University

John Van Fleet
Illinois Wesleyan University

Eric Macaulay
Illinois Wesleyan University

Gabriel C. Spalding, Faculty Advisor
Illinois Wesleyan University

Follow this and additional works at: https://digitalcommons.iwu.edu/jwprc

Smith, Ryan; Van Fleet, John; Macaulay, Eric; and Spalding, Faculty Advisor, Gabriel C., "Machine Vision and Analysis for Optical Micromanipulation" (2004). John Wesley Powell Student Research Conference. 17.
https://digitalcommons.iwu.edu/jwprc/2004/posters/17

This is protected by copyright and/or related rights. It has been brought to you by Digital Commons @ IWU with permission from the rights-holder(s). You are free to use this material in any way that is permitted by the copyright and related rights legislation that applies to your use. For other uses you need to obtain permission from the rights-holder(s) directly, unless additional rights are indicated by a Creative Commons license in the record and/ or on the work itself. This material has been accepted for inclusion by faculty at Illinois Wesleyan University. For more information, please contact digitalcommons@iwu.edu.
©Copyright is owned by the author of this document.
We are engaged in two distinct studies of optical micromanipulation, both of which require the development of machine vision algorithms. Our first study aims to characterize the extent of microparticle localization (i.e., the trap volume) in a single-beam optical gradient trap ("optical tweezers") via analysis of the distribution of particle positions over time, using the statistics of (three-dimensional) Brownian motion as a metric of the trapping potential. We hope to compare "isoprobability surfaces" for different laser wavelengths. Our second study involves multiple particle species that are not trapped, but are entrained within a microfluidic flow passing through a three-dimensional optical lattice. We hope to build up detailed statistics of particle channeling within the lattice, and the details of dense-flow interactions.