

**DIGITAL MICROFLUIDICS DROPLET DISCOVERY AND
IDENTIFICATION THROUGH USE OF HOUGH TRANSFORMS**

By

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ABSTRACT

This thesis in computer science outlines the problems inherent in using classical computer vision algorithms on a digital microfluidics device while making few assumptions about the nature of the aqueous solution being utilized on the device. The difficulty arises from attempting to properly locate single or potentially multiple distinct droplets of unknown color, transparency, and size suspended in a single contiguous background pool of silicone oil. A multi-step algorithm is presented that is capable of recognizing such droplets with good success. Several simple changes can be made to the system to improve accuracy and speed while still staying within the constraints and assumptions of the original system. The algorithm is presented in three distinct steps: a basic pre-processing step, a search-space reduction step to improve speed and remove false positives, and a circle-detection step. This algorithm is shown to work reasonably well in a poorly constructed system and to produce much better results with certain additions and changes to that system.