

# Graduate School of Science and Technology Master's Thesis Abstract

Laboratory name (Supervisor)	Mathematical Informatics (Kazushi Ikeda (Professor))		
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Thesis title	Engineering a Data Processing Pipeline for an Ultra-Lightweight Lensless Fluorescence Imaging Device with Neuronal-Cluster Resolution		
Abstract			
<p>In working towards the goal of uncovering the inner workings of the brain, various imaging techniques have been the subject of research. Among the prominent technologies are devices that are based on the ability of transgenic animals to signal neuronal activity through fluorescent indicators. This paper investigates the utility of an original ultra-lightweight needle-type device in fluorescence neuroimaging. A generalizable data processing pipeline is proposed to compensate for the reduced image resolution of the lensless device. In particular, a modular solution centered on baseline-induced noise reduction and principal component analysis is designed as a stand-in for physical lenses in the aggregation and quasi-reconstruction of neuronal activity. Data-driven evidence backing the identification of regions of interest is then demonstrated, establishing the relative superiority of the method over neuroscience conventions within comparable contexts.</p>			