



**COLLEGE OF ENGINEERING  
AND COMPUTER SCIENCE**  
FLORIDA ATLANTIC UNIVERSITY

Announces the Ph.D. Dissertation Defense of

## **Robert Fennell**

for the degree of Doctor of Philosophy (Ph.D.)

### **“The Development of Wide-Field Bio-Imaging for Point of Care diagnostic Assays in Resource Constrained Settings”**

**October 14, 2021, 11:00 a.m.**  
**Virtual Dissertation**

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**DEPARTMENT:**

Electrical Engineering and Computer Science.

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**PH.D. SUPERVISORY COMMITTEE:**

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**ABSTRACT OF DISSERTATION**

**The Development of Wide-Field Bio-Imaging for Point of Care diagnostic Assays in Resource Constrained Settings.**

The World Health Organization has identified the need for affordable, specific, rapid and deliverable point of care assays for infectious diseases in areas that are resource poor and lacking readily available complex testing methods.

The objective of this research is to discover improved methods of capturing and counting CD4+T, in a portable assay to aide in the detection of HIV or other diseases that are informed by cell identification and count.

The research divides into 4 major objectives: Design an improved portable, microchip. Explore, design and prove the optical technology that provides large field-of-view and enables imaging large surface area simultaneously. Test and analyze the microchip and optics to verify the specificity and efficiency of the biological process. Identify and count the cells in an automated manner.

**BIOGRAPHICAL SKETCH**

Born in Rapid City, South Dakota, USA

BSEE, Bradley University, Peoria, Illinois, USA, 1970

BFA Florida Atlantic University, Boca Raton Florida, 1999

M.S.E.E. Florida Atlantic University, Boca Raton, Florida, 1978

Ph.D., Florida Atlantic University, Boca Raton, Florida, 2021

**CONCERNING PERIOD OF PREPARATION  
& QUALIFYING EXAMINATION**

**Time in Preparation: 2015 - 2021**

**Qualifying Examination Passed: March 17, 2017**

**Published Papers:**

Robert Fennell, 1,2Mazhar Sher,1,2 Waseem Asghar1,2,3, “Improved Microfluidic chip module and process to separate and automatically counts the number of CD4+ T cells from whole blood at a point of care location” 2021. Under Review

Fennell, Robert, Asghar, Waseem, “Image Sensor Road Map and Solid-State Imaging Devices”, 2017, Sub Nanoworld, Volume 1, Issue 4.

Fennell, R.D., Sher, M., Asghar, W., " Design, Development, and Performance Comparison of Wide Field Lensless and Lens-Based Optical Systems for Point-of-Care Biological Applications"  
2021, Optics and Lasers in Engineering, Volume 137. ISSN 0143-8166

Fennell, Robert, D., "Quality System Dynamics", 1987, International Conference on Quality Control, Tokyo, Proceedings, A-1-17, Page 87-90. Oral presentation also given.

Fennell, Robert D., " Noise Considerations in Digital Systems" 1978, Master's Thesis, Florida Atlantic University, Boca Raton, Florida.