

# OS INSPIRED COMPLETE KERNEL FUSION

A Thesis

Presented to the Faculty of the Graduate School  
of Cornell University

in Partial Fulfillment of the Requirements for the Degree of  
Master of Science

by

Osayamen Jonathan Aimuyo

August 2025

© 2025 Osayamen Jonathan Aimuyo

ALL RIGHTS RESERVED

## **ABSTRACT**

Your abstract goes here. Make sure it sits inside the brackets. If not, your biosketch page may not be roman numeral iii, as required by the graduate school.

## BIOGRAPHICAL SKETCH

Osayamen Jonathan Aimuyo is a computer science researcher who develops systems and algorithms that address distributed and parallel computing performance bottlenecks. His work thus far focuses on systems optimizations for large-scale machine learning training and inference. Jonathan earned a BS in computer engineering, *summa cum laude*, with Tau Beta Pi and Phi Kappa Phi Honors from the University of Texas at Dallas (class of 2023), where he was a Presidential Achievement Scholar and a semifinalist for the national Jack Kent Cooke Transfer Scholarship (2019). He is currently a second-year CS MS student at Cornell University, advised by Dr. Rachee Singh. While at Cornell, he received an Honorable Mention recognition for the **National Science Foundation Graduate Research Fellowships Program** (NSF GRFP 2025). He has built large-scale distributed systems within the industry via internships at Microsoft ('24, '23, '22), Chime Financial ('22), and JPMorgan Chase ('21, '20). Post graduation from Cornell, he will intern at NVIDIA with the CUDA Math Libraries team, after which he will start his computer science PhD at Stanford University in Fall 2025.

*To those who say yes—still—when everything else screams no.*

## ACKNOWLEDGEMENTS

First and foremost, I thank God—the Author of all things good—for sustaining me through every moment of this journey. He remained faithful in seasons of clarity and in the shadows of doubt. The merit this work holds is but a fragment of the grace I have received.

To my amazing advisor, **Dr. Rachee Singh**, *thank you* for the trust, the freedom, and the support. For giving me the space to think outside the box and for being an excellent mentor and overall incredibly generous person. I am grateful for your supervision and your unique willingness to support your students to no end, ensuring that they succeed in blossoming as well-rounded researchers. I am also very appreciative of the lab equipment (GPUs) you made readily accessible to me and our lab. I did most of the preliminary exploration and hypothesis testing for this thesis research on those GPUs, and I acknowledge they contributed immense value to my work.

To my minor field member, **Dr. Giulia Guidi**, I thank you for being an excellent mentor, incredibly generous with your time, and for providing me with access to high-performance supercomputing resources. I made excellent use of this computing infrastructure for this research, and I am well aware of the privilege of using them for my work.

To my second minor field member, **Dr. Chris De Sa**, I am very grateful to have had the privilege of learning about Machine Learning Systems (MLSys) from you! Your enthusiasm and passion for the field are highly encouraging. In addition, you are an excellent teacher. I wish I could retake your MLSys class!

I would also like to acknowledge the Christ Chapel community and Choir ('24/25 semester) for being my second family outside my biological family. I joined you all without knowing how to read sheet music, yet you welcomed

me and gave me the space to grow rapidly. I am incredibly grateful for this kindness, which made me the slightly more competent musician and vocalist I am today. I am specifically grateful to Dr. Art Ostrander (Choir Director); Carrie Ostrander (Soprano); Dr. Debbie Martin (Alto and pianist); Jyying Juliana Kan (Soprano); Margaret Brodhead (Pianist); Jim and Cindy Van Duren (Bass and Soprano); Amy Blumenthal (Alto); Debbie Axtell (Alto); and Lawrence and Wendy Lyon.

I would be remiss not to mention my colleagues at Cornell who made my time memorable: the CS MS class of '24 and '25, Dr. Singh's group, Julian Bellavita and the systems research group.

Finally, I want to acknowledge my parents, whose instrumental support has played an immeasurable role in my academic endeavors, thank you.

## TABLE OF CONTENTS

Biographical Sketch . . . . .	iii
Dedication . . . . .	iv
Acknowledgements . . . . .	v
Table of Contents . . . . .	vii
List of Tables . . . . .	viii
List of Figures . . . . .	ix
<b>1 Introduction</b>	<b>1</b>
1.1 SECTION 1 . . . . .	1
1.2 SECTION 2 . . . . .	1
1.2.1 Subsection heading goes here . . . . .	1
1.3 SECTION 3 . . . . .	2
<b>2 Alice in Wonderland</b>	<b>3</b>
2.1 The Black Kitten . . . . .	3
2.2 The Reproach . . . . .	4
<b>3 Chapter 3</b>	<b>6</b>
<b>4 Chapter 4</b>	<b>7</b>
<b>A Chapter 1 of appendix</b>	<b>8</b>
<b>Bibliography</b>	<b>9</b>



## LIST OF TABLES

## LIST OF FIGURES

# CHAPTER 1

## INTRODUCTION

### 1.1 SECTION 1

The text for Section 1 goes here, without brackets.

### 1.2 SECTION 2

Section 2 text.

#### 1.2.1 Subsection heading goes here

Subsection 1 text

##### Subsubsection 1 heading goes here

Subsubsection 1 text

##### Subsubsection 2 heading goes here

Subsubsection 2 text

### 1.3 SECTION 3

Section 3 text. The dielectric constant at the air-metal interface determines the resonance shift as absorption or capture occurs.

$$k_1 = \frac{\omega}{c(1/\epsilon_m + 1/\epsilon_i)^{1/2}} = k_2 = \frac{\omega \sin(\theta) \epsilon_{air}^{1/2}}{c} \quad (1.1)$$

where  $\omega$  is the frequency of the plasmon,  $c$  is the speed of light,  $\epsilon_m$  is the dielectric constant of the metal,  $\epsilon_i$  is the dielectric constant of neighboring insulator, and  $\epsilon_{air}$  is the dielectric constant of air.

## CHAPTER 2

### ALICE IN WONDERLAND

#### 2.1 The Black Kitten

One thing was certain, that the WHITE kitten had had nothing to do with it—it was the black kitten's fault entirely [1]. For the white kitten had been having its face washed by the old cat for the last quarter of an hour (and bearing it pretty well, considering); so you see that it COULDN'T have had any hand in the mischief.

The way Dinah washed her children's faces was this: first she held the poor thing down by its ear with one paw, and then with the other paw she rubbed its face all over, the wrong way, beginning at the nose: and just now, as I said, she was hard at work on the white kitten, which was lying quite still and trying to purr—no doubt feeling that it was all meant for its good.

But the black kitten had been finished with earlier in the afternoon, and so, while Alice was sitting curled up in a corner of the great arm-chair, half talking to herself and half asleep, the kitten had been having a grand game of romps with the ball of worsted Alice had been trying to wind up, and had been rolling it up and down till it had all come undone again; and there it was, spread over the hearth-rug, all knots and tangles, with the kitten running after its own tail in the middle.

## 2.2 The Reproach

‘Oh, you wicked little thing!’ cried Alice, catching up the kitten, and giving it a little kiss to make it understand that it was in disgrace. ‘Really, Dinah ought to have taught you better manners! You OUGHT, Dinah, you know you ought!’ she added, looking reproachfully at the old cat, and speaking in as cross a voice as she could manage—and then she scrambled back into the arm-chair, taking the kitten and the worsted with her, and began winding up the ball again. But she didn’t get on very fast, as she was talking all the time, sometimes to the kitten, and sometimes to herself. Kitty sat very demurely on her knee, pretending to watch the progress of the winding, and now and then putting out one paw and gently touching the ball, as if it would be glad to help, if it might.

‘Do you know what to-morrow is, Kitty?’ Alice began. ‘You’d have guessed if you’d been up in the window with me—only Dinah was making you tidy, so you couldn’t. I was watching the boys getting in stick for the bonfire—and it wants plenty of sticks, Kitty! Only it got so cold, and it snowed so, they had to leave off. Never mind, Kitty, we’ll go and see the bonfire to-morrow.’ Here Alice wound two or three turns of the worsted round the kitten’s neck, just to see how it would look: this led to a scramble, in which the ball rolled down upon the floor, and yards and yards of it got unwound again.

‘Do you know, I was so angry, Kitty,’ Alice went on as soon as they were comfortably settled again, ‘when I saw all the mischief you had been doing, I was very nearly opening the window, and putting you out into the snow! And you’d have deserved it, you little mischievous darling! What have you got to say for yourself? Now don’t interrupt me!’ she went on, holding up one finger.

'I'm going to tell you all your faults. Number one: you squeaked twice while Dinah was washing your face this morning. Now you can't deny it, Kitty: I heard you! What that you say?' (pretending that the kitten was speaking.) 'Her paw went into your eye? Well, that's YOUR fault, for keeping your eyes open—if you'd shut them tight up, it wouldn't have happened. Now don't make any more excuses, but listen! Number two: you pulled Snowdrop away by the tail just as I had put down the saucer of milk before her! What, you were thirsty, were you?

CHAPTER 3

**CHAPTER 3**



CHAPTER 4

**CHAPTER 4**

APPENDIX A  
**CHAPTER 1 OF APPENDIX**

Appendix chapter 1 text goes here

## BIBLIOGRAPHY

- [1] Lewis Carroll (Charles L. Dodgson). *Alice's Adventures in Wonderland*. George MacDonald, 1865.