“What is your motivation for research?” I asked Prof. Morales-Luna. “It's fun.” The concise yet convincing answer perfectly encapsulates the pleasure and fulfillment he has derived from hard work in his field for decades. As a student, I have been committed to gaining recognition from those around me, but the professor’s answer exposed me to the significance of pursuing happiness by combining my interests with my professional career. Every week, Prof. Morales-Luna would assign me with new, challenging tasks. Efficiently accomplishing these tasks with flying colors and producing well-written research papers brought me a strong sense of satisfaction and achievement. However, during this process, I found that I had just seen the tip of the iceberg in the vast research field, which prompted me to widen my horizons. With a solid foundation in mathematics and computer science, I will devote myself to relevant scientific research so as to make significant contributions to the field that attracts my interest and aligns with my ambitions.

My undergraduate study at Technion - Israel Institute of Technology equipped me with a firm grounding in mathematics. Mathematics courses like *Probability Theory, Group Theory, Ring and Field Theory*, and *Topology* helped greatly hone my logical reasoning skills, while computer science courses such as *Combinatorial Algorithms, Data Structure, Numerical Analysis*, and *Modern Cryptography* familiarized me with the practical applications of mathematical principles. In addition, the individual computer science projects, i.e. *Programming Reduction of NP-Complement Problems* and *Public-Key Cryptosystem based on Chebyshev Polynomial*, deepened my understanding of mathematical modeling and algorithm implementation. Through these courses and projects, I realized the importance of mathematics for computer science as it plays a vital role in handling big data, optimizing robustness, enhancing computational thinking, and modeling real-world scenarios. It is worth mentioning that I have been enhancing my GPA through effective learning strategies and genuine efforts. Given my professional knowledge and skills, I am confident of carrying out more pioneering research in computer science in the future.

Recognizing the importance of practical application, I seized the opportunity to join Prof. Karki's Functional Nonlinear Spectroscopy Lab in December 2021. To my pride, I successfully developed data acquisition programs that significantly increased the experimental efficiency, and I also improved my ability to tackle complex research tasks by co-authoring an in-depth research paper. However, the research process turned out to be challenging enough. As the sole student majoring in mathematics and computer science in the lab, I took on the responsibility of aiding fellow graduate students in writing scripts, developing programs, analyzing and processing experimental data, and understanding the algorithms. To solve the problem of retrieving spectral phase from an unknown ultrashort pulse, I conducted a thorough literature review to adopt the method *Frequency Resolved Optical Gating* (FROG) based on the *Principal Component Generalized Projection* algorithm. I excelled in the mathematical logic of the FROG algorithm as a mathematics student, yet I struggled with grasping the optical properties. Worse still, I failed to achieve perfect results of the implementation. To find out the reasons behind the failure, I focused on gaining a deeper understanding of the optical implications of the algorithm. Unfortunately, my limited knowledge of optics posed an enormous obstacle, consuming a lot of my time. In this case, I decided to seek the guidance of Prof. Karki who emphasized in our conversation, "I know you are a hardworking and skilled independent researcher, but it is better to collaborate with others when facing an area you are unfamiliar with. This will greatly improve your efficiency." Encouraged by his advice, I proactively asked a graduate student in the lab for help. With his expertise, I managed to identify the flaws of the algorithm and ultimately achieved perfect results. On top of that, our cooperation helped me grow into a collaborative team worker with an open mind and strong communication skills.

Moreover, I availed myself of every research opportunity. In October 2023, I earned an opportunity to join Prof. Morales-Luna's research group, where I assisted in a project centered on Cryptography: *Public-Key Cryptosystem based on Chebyshev Polynomial.* In this project, I was tasked with implementing the system and assessing its robustness against a common attack. Given that the cryptosystem necessitated precise calculations and extensive iterations, I utilized the GNU Multiple Precision Library for accurate floating-point arithmetic, and the GNU MPFR Library for high-precision trigonometric functions. Additionally, I employed matrix representations of Chebyshev polynomials and binary expression factorization of the extremely large numbers to boost computational efficiency. To realize the encryption and decryption of ASCII text, we proposed 2 methods, one for direct conversion, and the other using the envelope technique. However, things were not going as smoothly as expected. When trying to perform an attack on the cryptosystem following Bergamo's method, I struggled with the complicated computation in Number Theory. After weeks of dedicated efforts to acquire fundamental knowledge, grasp the algorithm, and make exhaustive searches for debugging, I still could not yield the expected attack results. This left me feeling disappointed with my deprived talent in mathematics and falling into self-doubt about my future in research. When I turned to Prof. Morales-Luna for advice, he recognized my struggle and offered invaluable encouragement, saying "No need to be negative about not being a genius in mathematics, I believe you can do it with your persistence." Inspired by his words, I immersed myself in perusing more papers relevant to my work while exploring studies in other fields for relaxation. Surprisingly, one paper provided me with profound insights into debugging techniques suitable for my situation, leading me to discover the instability of the MPREAL data structure of the MPFR library. Furthermore, through full discussions with Prof. Morales-Luna, I also found out the minor misunderstandings that had been hindering my progress, which enabled me to eliminate some terms of the previous complicated equation and obtain a refined and beautiful formula. Besides, the sophisticated attack I performed finally succeeded in retrieving the desired keys in some specific cases. In that moment of achieving a significant breakthrough, I felt satisfied seeing my efforts finally lead to progress, appreciated the elegance of mathematics, and became motivated and enthusiastic about pursuing further studies and conducting deeper research. We then pointed out the correlation between the effectiveness of the attack and the number of significant digits of plaintexts l, and the precision of the arithmetical calculation, m. Thanks to Prof. Morales-Luna's constant guidance and my relentless effort, we submitted our paper "On the effectiveness of a common attack to Chebyshev Chaotic Encryption Scheme" to a journal. This experience fully demonstrated my innovative spirit, problem-solving skills, and pursuit of perfection, and strengthened my determination to embark on a career as a researcher.