Shikhir **Arora**

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Harnessing modernity, my passion lies heavily in the unique integration of multiple disciplines, with no compromises.

Education

University of Pittsburgh   *Pittsburgh, PA*

B.S. - Mathematics and Economics, Minor: Philosophy   *August 2012-Present*

- Pursuing a Bachelors of Science in Mathematics, Mathematical Economics, and a minor in Philosophy

Experience

The SARO Group Inc.   *Pittsburgh, PA*

President   *Jan. 2016 - Present*

- As the President and Chief Designer at The SARO Group, I am focused on innovations and applications in the emerging technology sector. My focus lies in three major areas: Machine Learning, Cryptography, and Signal Processing. Some specific case studies are briefly explained on our website, but I am working to develop machine learning algorithms for accurate ranking and topic modeling bases with a wide variety of applications in "Big Data" such as medicine, law, and purely machine based systems which adapt and learn to improve within a strict margin of error. My interests in cryptography lie in developing private and secure mechanisms for data retrieval without exposing user data with methods such as differential privacy which is employed in machine-learning based datasets. Additionally, signal processing serves as a related field and is a deep personal interest of mine. When coupled with machine learning algorithms, results can be achieved to manipulate signals and create real-time, accurate mapping for automation in lighting, audio visualization and more.

Freelance   *Pittsburgh, PA*

Freelance Audio Engineer   *Aug. 2014 - Present*

- Much of my spare time is dedicated to freelance audio design and engineering, and I am working on several projects in the realm of audio visualization, digital filter design and engineering, and audio fidelity. This long held passion of mine has led to a focus in my pure development-related activities in that I focus on working on low-latency audio related projects, as well as signal processing architecture.

Consultant   *Pittsburgh, PA*

IT Consultant   *Mar. 2013 - Apr. 2014*

- Various forms of consulting privately as an independent contractor within the realms of Information Technology and Corporate Finance. Including working with small businesses and integrating modern, cost-effective and smart solutions for new business.

Voxtro, Inc.   *Lansdale, PA*

CEO   *Aug. 2009 - Mar. 2013*

- At Voxtro, we conceptualize, construct and maintain excellent websites. Adhering stringently to principles of efficiency and elegance over developmental haste, we take the time to produce spotless applications with unparalleled runtime speed. Straightforward, low-risk corporate models ensure both prosperity and longevity; we know our stuff, bluntly enough, and wouldn't starve a masterpiece of its fame. My duties at Voxtro, Inc. were mainly fiscal and legal. I handled all of the accounting, taxes, payroll, and credit building for the company until its merging and eventual transition into private consulting.

Kumon North America, Inc.   *Norristown, PA*

Data Entry Specialist   *Oct. 2010 - Aug. 2011*

- My duties at Kumon Learning Center included entering numerical data into centralized CMS software to facilitate the proper progress reporting for various students ages 2-18. Data included numerical grades/ scores, time of completion, test results and other personalized information. The data was compounded and properly analyzed to develop learning solutions and coursework for the students.

SAR Networks   *Lansdale, PA*

Executive Team   *Nov. 2008 - Mar. 2009*

- SAR Networks was a small hosting firm specializing in budget VPS solutions. The company provided budget VPS solutions to many customers worldwide with an emphasis on Virtuozzo VM and cPanel hosting. The firm was eventually merged and dissolved into the VAServ, LTD. brand of companies in 2009.

Selected Coursework

Mathematical Cryptography   *University of Pittsburgh*

MATH1025, SPRING 2016, PROFESSOR THOMAS HALES   *Spring 2016*

- This was my favorite course within my studies, as I have a passion for the topic. It was a new offering but taught by Professor Thomas Hales, who is very passionate about his students and the work he does. I am honored to have had the rare opportunity to take the undergraduate class taught by Professor Hales, which was exemplified as there was a **true** level of interest in the classroom with all students, and Professor Hales was no exception to this. A glimpse at the course material is located at: https://pittmath1025spring2016.wordpress.com/ - and the class served as a modern, comprehensive look at Cryptography from the Mathematical side. As my focus is in that, I was very excited to further my knowledge in the area. A knowledge of number theory and Introductory Abstract Algebra were crucial as we focused on the theories behind prime factorization, finite fields, a review of modulo arithmetic and on to early cryptosystems and symmetric/asymmetric ciphers. Topics included the theory of Diffie-Hellman, El-Gamal, the related Discrete Log Problem, Euler's Formula, a brief discussion of complexity and bit operations but looked at Fermat's Little Theorem, Polynomial Time Theory, and a very small look at Quantum challenges. We also looked closely at the theory behind the famous RSA cryptosystem. The second half of the semester we moved to talk about Shannon, Information Security and the One Time Pad, with a fair amount of emphasis on the theory behind psuedorandom generation (Mathematically, of course!) and entropy. We spent a good portion of the last month of the course on Elliptical Curve Theory, Lenstra's Algorithm, and hash functions. We did a very brief primer on Zero Knowledge and Homomorphic Encryption Theory. This was an amazing learning experience - and a great atmosphere of truly interested individuals. We spent a lot of time discussing how these theories affect current events, and I am truly grateful to have had the chance to take the course!

Mathematical Economics   *University of Pittsburgh*

ECON1180, FALL 2016, PROFESSOR FATEMEH BORHANI   *Fall 2016*

- A rewarding course which I took in the Fall of 2016. The course focused on first-year Masters/PhD Micro-economic Theory, with heavy emphasis on mathematical theorems leading to General Equilibrium Theory. Starting with Consumer Preference and Utility and moving quickly to Theory of Demand, Walrasian and Hicksian Demand, we covered a wide range of topics - Slutsy Decomposition, Supply and Profit General Theorems, the Generalized Axiom of Revealed Preferences, moving to Producer Theory and developing a strong theory of both Supply/Demand. In the second half of the course we focused on Pareto Efficiency, the First and Second Welfare Theorems, and then to the model of Competitive Equilibrium and the uniqueness. We also looked at the Arrow-Debreu Model and Equilibrium. There were many other theorems for us to develop the models, but it is not feasible to list it all here! Briefly covered state-contingent commodities, Radner Equilibrium, and Asset Markets from Economical Theory. At the end of the course we did a primer on Game Theory. As this was a new class offered to undergraduates, only three other students were in the class, yet this allowed for much more attention to detail. This was an extremely rewarding class!

Game Theory   *University of Pittsburgh*

ECON1200, SPRING 2013, PROFESSOR ALISTAIR WILSON   *Spring 2013*

- A heavy math-based course on Game Theory, this class was truly one of my favorites within the Economics courses I have taken. After a review of Statistics (von Neumann-Morgenstern representations, Probability and Expectations, Choices/Preferences, Calculus, etc.) - we moved to Equilibrium: Pure and Mixed Strategy, followed by a lot of look at games (Prisoner's dilemma, Matching Pennies, Battle of the Sexes, Stag Hunt, Dove-Hawk) as well as Cournot and Bertrand and Public Goods - our Complete Games. Our major section there-onwards was with Extensive-Form Games: Stackelberg, Sub-game perfection, Game Trees, etc. The heart of the course was Incomplete Information in Game Theory, which accounted for Bayesian games, Auctions and Signaling, Voting 'Cheap Talk & Strategic Communication' theory and more. Brief coverage of Cooperative Game Theory, and we finished with Bargaining models (Rubinstein's model, Nash , etc.). Though challenging, this was a great class, blending mathematical concepts with social ideas and theory.