Sohair Abdullah
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Education

Colorado College. Aug 2015—May 2019
Toward Bachelor of Arts in Physics, Major GPA: 3.98
Cumulative GPA: 3.93.

Honors and Awards

• Gold Medalist, University Physics Competition, 2017: best research paper, top 1.5% in the world and the only team in the US to win a gold medal.

• Euclid Scholarship, Colorado College, 2016: Awarded to students who show exceptional promise in mathematics or computer science.

• Honorable mention, Mathematical Contest in Modelling, 2018: Top 10% among thousands of competing teams in the world.

• Dean's List High Honors, Colorado College, Aug 2015 – Present: Awarded to students who consistently maintain grade point average of 3.75 or higher.

Research and Work Experience

Electrical Engineering Intern, Axellio Inc., Colorado Springs, CO. Nov 2017—Sep 2018
Mentor: Aaron Danis.

• Designed a power loss protection circuit that flushes cache data from the host to a solid-state drive. Capacitors connected to LTC3643 bidirectional power supply chip provide current during power loss, and pulse reset of the chip initiates cache flush. This process hardens data on the solid-state drive when host loses power.

• Performed product test, verification, and characterization of high speed, high bandwidth, and low latency Axellio Edge Computing systems and flash storage modules.

• Conducted signal analysis in circuit systems, using DPO7000 Oscilloscope: time domain reflectometry, serial link data analysis, eye diagram analysis, power measurements, spectral analysis, and fast Fourier transforms.

Research Intern, Solid State Physics, Colorado College May 2017—Nov 2017
Mentor: Dr. Phillip Cervantes.

- Investigated the relationship between energy bandgaps and pressure in zirconium tungstate in high pressure experiments.

- Conducted spectroscopy experiments on materials inside diamond anvil cells by analyzing the diffraction patterns of reflected light from the material using charged-coupled detectors. Wrote code in Python to analyze the reflected light patterns.

- Designed and built three instruments custom instruments in the process: Fourier Transform Infrared Spectrometer, Electric Discharge Machine, and a system to concentrate and collimate white light.

Research Intern, Complex Analysis, Colorado College May 2016—Aug 2016
Mentor: Dr. Jane McDougall.

- Independently discovered a unique Schwarz-Christoffel transform to generate a new family of minimal surfaces, which have a rosette pattern and constant height property.

- Coded these Schwarz-Christoffel mappings in Java and Mathematica and discovered a triply periodic minimal surface with a constant height property that has not been described before in the mathematical literature.

International Competitions

The University Physics Competition. Nov 2017

- Developed a model for directing exhaust from ion thrusters using a magnetic lens. Worked as part of a team of three to research the topic, create a model, and wrote a research paper in just 48 hours.

Mathematical Contest in Modeling, 2018 Jan 2018

- Modelled radio waves bouncing off the ionosphere, the ground, and various ocean surfaces to determine maximum transmission distance. Applied Maxwell's equations to the interaction of electromagnetic waves with dielectrics. Generalized the interaction of electromagnetic waves to rough surfaces.

Publications and Patents

A power loss protection circuit architecture to initiate cache flush in Toshiba M.2 drives, 2018.
Danis, A. and Abdullah, S.
Submitted to the United States Patent and Trademark Office.
https://git.io/fpbrQ

Multi-hop high frequency radio wave propagation across turbulent oceans, 2018.
Nicholas, C., Abdullah, S., and Schrott, J.
Mathematical Contest in Modelling, 2018.
Submitted to The Undergraduate Mathematics and Its Applications (UMAP) Journal.
https://git.io/fpbrn

Fully Enumerated Bootstrap for Convolutions and Other Random Variable Algebraic Operations, 2018.
Sullivan, K., Abdullah, S., and Gu, P.
To appear, as a chapter in Professor Andrew Glen's book on Mathematical Statistics.
https://git.io/fpbrd

Using Magnetic Fields to Direct Exhaust from Ion Thrusters, 2017.
Crews, N., Abdullah, S., and Schrott, J.
University Physics Competition, 2017.
http://www.uphysicsc.com/2017contest.html

Research Talks and Posters

Colorado College Student Collaborative Research Symposium
Colorado Springs, Colorado — Sept 2018
Poster talk.
Abdullah S, Sullivan K, Gu P.
Fully Enumerated Bootstrap for Convolutions and Other Random Variable Algebraic Operations.

Colorado College Student Collaborative Research Symposium
Colorado Springs, Colorado — Sep 2017
Poster talk.
Abdullah S. and McDougall J.
Energy band gaps vs. pressure in negative coefficient of thermal expansion materials.

Young Mathematician's Conference
Ohio State University — Aug 2017
Oral Presentation.
Abdullah S. and McDougall J.
On Minimal Surfaces and Harmonic Mappings.

Mathematical Association of America, MathFest.
Chicago, Illinois. — July 2017
Oral Presentation.
Abdullah S. and McDougall J.
A Triply Periodic Minimal Surface with applications to Optical computing.

Midstates Consortium for Math and Science
Washington University in St. Louis — Dec 2016

Oral Presentation.
Abdullah S. and McDougall J.
On Minimal Surfaces and Harmonic Mappings.

Colorado College Student Collaborative Research Symposium
Colorado Springs, Colorado Sep 2016
Poster talk.
Abdullah S. and McDougall J.
A new family of Minimal Surfaces.

Other Experiences

Physics Grader and Teaching Assistant, Colorado College Dec 2016—Nov 2018

- Tutored students and graded assignments in upper level electromagnetic theory and in introductory level physics and mathematics classes.

Languages:

Native or Bilingual proficiency: Urdu, English, Punjabi, Hindi.