

# Rahul Thapa

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## EDUCATION

### Villanova University

Aug 2017 - May 2021

Villanova, PA

- Bachelor of Science with Honors in Computer Science; Minors in Mathematics and Physics
- Cumulative GPA: 4.00/ 4.00; Class rank: 1<sup>st</sup> out of 48 CS students
- **Relevant Courses**
  - Computer Science: Machine Learning (grad. level), Deep Learning
  - Mathematics: Applied Statistical Modeling, Stats Methods, Linear Algebra
  - Physics: Mathematical Physics, Computational Physics

## EXPERIENCES

### Villanova Electrical and Computer Engineering Department

Jan 2020 – Present

*Intelligent Systems Research Assistant*

Villanova, PA

- **Approximate Computing:** Minimized energy consumption on image processing applications by ~80% under a quality constraint of 0-5% by finding an optimal combination of approximate settings using the genetic algorithm on Python. Wrote a paper as the first author which is currently under review at the DATE 2020 Conference
- **Capstone Project:** Designed HDXplore framework to perform differential testing on Hyperdimensional computing, an emerging brain-inspired machine learning, for image processing applications. Increased the accuracy of HD models from 81% to 89% with a 40% reduction in discrepancies. Followed agile software development approach.

### The Vanguard Group

May 2020 – Jul 2020

*Software Engineering Intern*

Malvern, PA

- Validated on-prem fund data against the cloud data using Python for the analytics team to address any discrepancies
- Refactored and deployed Gurobi optimization models by connecting it with AWS using Boto3
- Created REST APIs using Flask to extract the analytics data from an on-prem server and store them in AWS
- Developed intramural sports league web app using Angular, Nodejs, and MongoDB in collaboration with eight interns

### University of California Irvine

Jun 2019 - Aug 2019

*Machine Learning Research Intern (REU)*

Irvine, CA

- Designed a mutual information-based algorithm to select 10/100 best features in an unmanned aerial vehicle system
- Modeled a recurrent neural network (RNN) in Tensorflow using Python to predict signal delay using sequence-to-sequence based approach with an accuracy of ~80% for a highly skewed and limited dataset

### Villanova Physics Department

Jan 2018 – Aug 2018

*Data Analytics Research Assistant*

Villanova, PA

- Created histogram of relative orientation between the magnetic field and the intensity gradient using Python
- Modeled a Red Blue Green image of Orion Nebula and plotted magnetic vectors over the image using APLpy

## INDEPENDENT PROJECTS

### COVID-Net

May 2020 – Present

- Designed a small-sized neural network using SqueezeNet and CapsNet to diagnose COVID-19 from chest X-ray (CXR)
- Preprocessed and augmented X-ray data, and trained model on Tensorflow, achieving an accuracy of 95.0%
- Currently extending this work on CheXphoto dataset to design an ML model that allows for automated interpretation of smartphone photos of CXR

### VuShares

Jan 2020 – Present

- Developing web application for students to buy and sell unused dormitory items as well as exchange service
- Awarded Villanova ICE Incubator Fund worth \$2500 as well as professional development and mentorship
- Landing Page: <https://vushares.web.app/>

### Deep Learning Final Project

Mar 2020 – May 2020

- **Title:** Survey on Deep Learning-based Methodologies for Solving Combinatorial Optimization Problems
- Maintained a GitHub with papers and other useful resources for deep learning enthusiasts: <https://bit.ly/3eaiidy>
- Link to paper: <https://bit.ly/3jE57Tu>

## Feastimate

Oct 2019 – Present

- Developing an intelligent system to record and forecast food waste at the dining hall to improve food planning
- Venture funded by Villanova Idea Accelerator Innovation Fund worth \$3500

## PUBLICATIONS

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- **Thapa R., Mitchell B.** Small-Sized Neural Network for Detection of COVID-19 from Chest X-rays. *IEEE MIT Undergraduate Technology Research Conference* 2020.
- **Thapa R., Mitchell B.** Predicting Capture-to-Control Delay in Automated UAV Systems. *Consortium for Computing Science in Colleges – Northeastern Region* 2020.

## PRESENTATIONS

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**MIT Undergraduate Research Technology Conference (virtual)** Oct 10, 2020

- **Paper Title:** Small-Sized Neural Network for Detection of COVID-19 from Chest X-rays

**Consortium for Computing Sciences in Colleges—Northeastern Region (virtual)** Apr 10, 2020

**University of California Irvine Undergraduate Research Symposium** Aug 05, 2019

**Southern California REU Student Conference** July 07, 2019

- **Poster Title:** Predicting Capture-to-Control Delay in Automated UAV Systems. Link: <https://bit.ly/3kyBjby>

**Villanova Undergraduate Research Symposium** Sept 21, 2018

- **Poster Title:** A First Look at the Orion Molecular Cloud from the HAWC+ Instrument

## OTHER CONFERENCES ATTENDED

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ACM-IMS Foundations of Data Science Conference 2020

ACM Richard TAPIA Conference 2020

## LEADERSHIP & OUTREACH

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**Developer Student Club (DSC); Lead**, Google Developers Apr 2020 – Present

- Train peers on Google technologies such as Google Cloud Platform, TensorFlow, and Firebase.
- Organized *Fireside chat with Dr. John Hennessy*, the former president of Stanford: <https://bit.ly/2G9OUYI>

**Veritas: Villanova Research Journal; Peer Reviewer/Copyeditor**, Center for Research and Fellowships Jun 2020 – July 2020

- Reviewed computer science manuscripts for the first peer-reviewed undergraduate research journal at Villanova

**Resident Assistant**, Villanova University Residency Life Aug 2019 – May 2020

- Organized community-building events, promoted diversity and inclusion

**Peer Tutor**, Center for Access Success and Achievement Jan 2019 – May 2019

- Tutored data structure and algorithm, discrete mathematics, and mechanics courses

## HONORS & AWARDS

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**Villanova University College of Liberal Arts and Sciences Dean's List** Fall 2017 – Spring 2020

- Awarded for six consecutive semesters for achieving a GPA over 3.50

**Villanova Center for Research and Fellowships Conference Travel Grant** Oct 2020

- Granted by the Villanova Undergraduate Research Advisory Board to present at the MIT UTRC

**Villanova Innovation, Creativity, and Entrepreneurship (ICE) Incubator Award** Sept 2020

- Awarded \$2500 in funding, education, and mentorship for VuShares startup project

**Sigma Pi Sigma Honors Society** Nov 2019

- Selected for membership into a selective honor society based on outstanding intellectual accomplishments in physics

**John P. Harkins '28 Endowed Scholarship** Aug 2017

- Merit-based tuition scholarship worth \$36,000/year

## SKILLS

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**Programming Skills:** Python, Java, C, Matlab, R, JavaScript, PHP, Tensorflow, Agile Methodologies, LATEX

**Language Skills:** English, Nepali, Hindi

**Hobbies:** Playing Guitar, Table Tennis, and Soccer; Singing and Songwriting; Sketching