

# Leron Julian

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## RESEARCH INTERESTS

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Computer Vision, Computational Photography, Machine and Deep Learning.

## EDUCATION

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- 2019 - 2024 PhD in **Electrical & Computer Engineering** at **Carnegie Mellon University**  
*Advisor: Aswin Sankaranarayanan*  
*Thesis: Computational Imaging For Long-Term Solar Irradiance Forecasting*
- 2019 - 2022 M.S. in **Electrical & Computer Engineering** at **Carnegie Mellon University**
- 2015 - 2019 B.S. in **Computer Science** at **Morehouse College**

## EXPERIENCE

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- Carnegie Mellon University**, *Graduate Research Assistant* August 2019 - August 2024
- Developed and implemented algorithms using computer vision and computational photography to analyze sky images for solar irradiance forecasting.
  - Applied deep learning models to process and interpret complex visual data, improving the accuracy of solar irradiance predictions.
  - Managed data pipelines for handling large volumes of sky imagery, ensuring efficient preprocessing, training, and deployment of models.
  - Developed catadioptric computational imaging systems.
- Samsung Research America**, *Computer Vision Research Intern* June 2023 - August 2023
- Pioneered a proof of concept 3D reconstruction algorithm using Neural Radiance Fields (NeRF) to develop a real-time immersive telepresence application using a single monocular camera.
- Idaho National Laboratory**, *Data Analyst Intern* June 2019 - August 2019
- Enhanced predictive maintenance efficiency by developing machine learning models to automate crack length estimation in nuclear power plant assets resulting in increased operational effectiveness.
- NBCUniversal**, *Software Engineer Intern* June 2018 - August 2018
- Assisted in the revamping of legacy CNBC website from PHP and MySQL to modern full-stack including Node.js, JavaScript, GraphQL, MongoDB, and React.js.

## PUBLICATIONS

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- Julian, Leron et al. (2018). "The Development of a Conversational Agent Mentor Interface Using Short Message Service (SMS)". In: *Proceedings of the 2018 ACM SIGMIS Conference on Computers and People Research*. Association for Computing Machinery.
- Julian, Leron and Aswin C. Sankaranarayanan (2021). "Precise Forecasting of Sky Images Using Spatial Warping". In: *ICCV Workshop on Physics-based Vision meets Deep Learning*.

## PROJECTS

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### Enhanced Interaction Using Eye-Tracking For Virtual Reality Scene

- Improved interactions between users and objects within virtual and mixed-reality scenes using eye-tracking and the Meta Quest Pro headset.
- Developed using Unity and C# programming language.

### Dynamic Graphs For Point Cloud Completion

- Improved point cloud completion (inpainting) using a Dynamic Graphs.
- Added k-NN dynamic graphs into the learning pipeline as a prior to model the overall structure of the input, resulting in a more accurate reconstructed point cloud.
- Implemented using PyTorch and PyTorch3D.

### Novel View Synthesis of Transparent Objects using NeRF

- Improved traditional Neural Radiance Fields (NeRF) for novel view synthesis of transparent objects using shape from distortion and shape refinement.

### Color-Filtered Aperture for Image Depth Segmentation

- Used an RGB coded aperture to capture a depth image (RGB-D) in a single image capture

### Semi-Supervised Learning For Image Classification

- Investigated the effects that traditional regularization and consistency regularization methods had on performance of the self-training semi-supervised learning (SSL)

## SKILLS

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Python (Proficient - 9 years of experience)	C++ (Proficient - 9 years of experience)
MATLAB (5 years of experience)	Java
R	HTML/CSS/JavaScript
Pytorch (5 years of experience)	TensorFlow
Blender	Unity

## TEACHING

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CMU-18661 Machine Learning for Engineers    Morehouse-CSC160 Programming 2 (C++)  
C-SCORE (Python and Computer Vision)

## COURSEWORK

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Intro to XR systems	Intermediate Optics
Sports Technology	Learning Based 3D Computer Vision
Geometry-Based Vision	Estimation, Detection & Learning
Computational Photography	Machine Learning
Convex Optimization	Computer Vision
Image & Video Processing	