

# OMKAR N KULKARNI

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## Education:

### State University of New York at Albany, NY - USA<sup>anu</sup>

*Doctor of Philosophy in Computer Science*

*Jary 2019 – Expected: May 2024*

### State University of New York at Albany, NY - USA

*Master of Science in Computer Science*

*August 2017 – December 2018*

### Shivaji University, MH - India

*Bachelor of Engineering in Computer Science*

*May 2012 – April 2017*

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## Research Interests:

**Computer Vision**

**Algorithmic Bias**

**Artificial Intelligence**

**Machine Learning**

**Computer Vision**

**Data Analysis**

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## Skills: :

### Languages:

Python, C, C++, MATLAB, Java, Bash Shell, Powershell, HTML

### Operating Systems:

Linux (Ubuntu, CentOS, Fedora, RedHat, Raspbian), macOS, Windows

### Frameworks & Packages:

OpenCV, SciKit Learning, Numpy, Matplotlib

### Software Engineering:

AWS EC2 & RDS, Spring Boot, MongoDB, Bootstrap, Agile/Waterfall software development methodologies

### Collaboration Tools:

GitHub

### Networks & Protocols:

TCP/IP, LAN, WAN, Bluetooth, Frame Relay, OSPF, IS-IS, IGRP, EIGRP, RIP, EGP, BGP

### Other:

Computer Architecture, NS3, Wireshark, Netstat, LateX, PC Hardware Support Skills, MS Office

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## Publications:

- **‘A Multi-stage Bias Reduction Framework for Eye Gaze Detection’**. Omkar N. Kulkarni, Shashank Arora, Aryan Mishra, Vivek K. Singh and Pradeep K. Atrey : *IEEE Conference on Multimedia Information Processing and Retrieval (MIPR 2023)*
- **‘GARGI: Selecting Gaze-Aware Representative Group Image from a Live Photo’**. Omkar N. Kulkarni, Shashank Arora and Pradeep K. Atrey : *IEEE Multimedia Information Processing and Retrieval (MIPR 2022)*
- **‘Accuracy and Fairness of Pupil Detection Algorithms’**. Omkar N. Kulkarni, Vikram Patil, Vivek K. Singh and Pradeep K. Atrey : *IEEE Multimedia Big data (BigMM 2021)*
- **‘Secure GPS Trajectory Compression Over Cloud Using Douglas Peucker Simplification Algorithm’**. Vikram Patil, Shivam Parikh, Omkar N. Kulkarni, Kalika Bhatia and Pradeep K. Atrey : *IEEE Conference on Communications and Network Security (SPC 2021)*
- **‘Can You All Look Here? Towards Determining Gaze Uniformity In Group Images’**. Omkar N. Kulkarni, Vikram Patil, Shivam B. Parikh, Shashank Arora, and Pradeep K. Atrey : *IEEE International Symposium on Multimedia 2020 (ISM 2020)*
- **‘Virtual Try-on Experience using MIRAALoop Interactive Mirror’**. Omkar kulkarni, Manasi Kamate, Aishwarya Jadhav, Aditya Galitkar, Pratik Sutar, Radhika J. Dhanal : *International Journal of Engineering Science and Computing, April 2017 Volume 7 Issue 4*

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## Research Experience:

### **Albany Lab for Privacy & Security (Advisor: Dr. Pradeep Atrey)**

State University of New York at Albany

June 2020 – Present

**Gaze estimation & Correction in multi view Group photo:** If we have a group photo wherein there are one or more person(s) in the group who aren't looking at the camera, we might be able to use the gaze of those from a similar image taken from a different angle and correct the original image to synthesize an image with all subjects' gaze towards one direction. We make use of a novel approach of calculating the Gaze Uniformity Index to calculate the gaze variance in a given group photo. This approach has an outlook towards extension to live images.

**Gender Bias in Computer Vision and Machine Learning Algorithms:** Multiple face recognition and other computer vision algorithms have been reported to be biased, thus reducing users' trust in them. However, most system designers still choose algorithms and tune parameters that optimize accuracy, disregarding fairness. We study the problem of fairness in a new area: pupil detection. We inspect the state of the art and popular algorithms in the domain to check for bias and fairness based on some social attributes like gender, color etc. which can result in the denial of equal opportunity and lead to discrimination and prejudicial treatment to certain parts of the society.

### **Ubiquitous Networking Lab (Advisor: Dr. Mariya Zheleva)**

State University of New York at Albany

January 2019 – December 2019

**Smart Connected Community: Using Next-Gen Technology to improve emergency response:** In this \$1.5 Million Project, funded by the National Science Foundation, the performance of the currently deployed TVWS network was analyzed. Also, through a partnership with the town of Thurman, N.Y., and the Warren County Office of Emergency Services, we are developing a platform for timely information collection, integration, and dissemination to support EPR in rural areas.

**Performance analysis of TV White space Network at Thurman, NY - Master's Research Project:** In this project, we analyzed the performance of an already deployed TV white space network in the town of Thurman, in upstate New York. The analysis focused on the effects of Net-Neutrality on the performance of the network. Also, furthermore the analysis digged deep into each link/user performance in order to categorize the users based on various metrics. This detailed analysis was performed at three different layers, namely- the Data-link Layer, the Transport Layer and the Application Layer

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## **Co-Curricular Projects:**

### **EA Sports: FIFA '17 & '18 Analysis**

#### *Master's Data Analysis Project*

With a team of 4, our goal was to present the machine learning findings on the FIFA 2017 and FIFA 2018 datasets. We cleaned the data of sizes 17,341 x 53 and 17,793 x 75 to identify 25 shared features. We simulated offensive/defensive scores on both datasets for all teams competing against each other and designed a rubric for K-Means clustering based on the number of wins per team. The calculated purity of clusters was found to be 75.5% and 77.12% on the FIFA 2017 and FIFA 2018 datasets respectively.

### **Virtual Try-on Experience Using MIRAALoop Interactive Mirror**

#### *Final Year Undergraduate Project*

The aim of the system was to build a compelling, interactive and highly realistic virtual system, where users/customers can choose between many different types of garment designs and proceed to simulate these garments on themselves virtually. We proposed a system which helps in coordination of everyday fashion. The system "MIRAALoop Interactive Mirror" involves virtually trying out different garments, done by mining the user's image and rendering it with the selected garment's image. Our main goal here was to save time for the users while trying out different attires while shopping in stores and increase sales from the store's point of view.

### **Routing Protocols**

#### *Cisco Certified Network Administrator Project*

The module described different types of routing protocols. Protocols are a set of rules that are defined for data transfer. Two classifications of protocols, namely, Routing Protocols and Routed Protocols were discussed. Some routing protocols like OSPF (Open Shortest Path First), IS-IS (Intermediate System - Intermediate System), IGRP (Interior Gateway Routing Protocol), EIGRP (Enhanced Interior Gateway Routing Protocol), RIP (Routing Information Protocol), EGP (Exterior Gateway Protocol), BGP (Border Gateway Protocol) etc. were specified in detail and their working was explained and demonstrated using the Cisco Packet Tracer application.

### **Network Settings**

#### *Networking Project*

Network settings deal with the location of computers and other devices connected to the network. For data packets, delivery from host to destination is done through the subnet with the help of IPv4, which provides various address types and services. IPv6 too has its different types of address and functions which were detailed in the module. It was done as a part of a networking project in the certification.

### **Server Configuration, Setup and Troubleshooting**

#### *Field Study Report*

'Server Configuration, Setup and Troubleshooting' : Field Study has the main aim to make students aware of the real world. The field study report has been taken from the company named 'SHREE CHHATRAPATI SHAHU COOPERATIVE SUGAR MILL LTD.', Kolhapur, MH, INDIA. Different aspects of the actual implementation of server USES HAS been studied in the visit. Some of the key points of field visit were Server Configuration, Server setup, Hardware of the server, actual working of server in industry, and various problems related to server - with their troubleshooting tips.

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## **Certifications:**

- **Microsoft Certified Technical Associate: Security Fundamentals**
  - **JCHNE – Jetking Certified Hardware And Networking Engineer**
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## Experience:

- **Teaching Assistant** of Prof. Pradeep Atrey, University at Albany, for “**Cryptography**” course in Spring 2023
  - **Teaching Assistant** of Prof. Pradeep Atrey, University at Albany, for “**Capstone Project in Computer Science**” course in Spring 2023
  - **Teaching Assistant** of Prof. Michael Phipps, University at Albany, for “**Principles of Programming languages**” course in Spring 2023
  - **Teaching Assistant** of Prof. Pradeep Atrey, University at Albany, for “**Capstone Project in Computer Science**” course in Fall 2022
  - **Teaching Assistant** of Prof. Amir Masoumzadeh, University at Albany, for “**System Fundamentals**” course in Fall 2022
  - **Teaching Assistant** of Prof. Vladimir Kuperman, University at Albany, for “**System Fundamentals**” course in Spring 2022
  - **Teaching Assistant** of Prof. Vladimir Kuperman, University at Albany, for “**Operating Systems**” course in Spring 2022
  - **Teaching Assistant** of Prof. Vladimir Kuperman, University at Albany, for “**Discrete Structures**” course in Fall 2021
  - **Teaching Assistant** of Prof. Amir Masoumzadeh, University at Albany, for “**System Fundamentals**” course in Fall 2021
  - **Teaching Assistant** of Prof. Pradeep Atrey, University at Albany, for “**Capstone Project in Computer Science**” course in Spring 2021
  - **Teaching Assistant** of Prof. Jackson Marques de Carvalho, University at Albany, for “**Operating Systems**” course in Spring 2021
  - **Research Assistant** of Prof. Pradeep Atrey, University at Albany, for “**Gaze detection and redirection in group photo**” from Summer 2020 to Fall 2020
  - **Research Assistant** of Prof. Mariya Zheleva, University at Albany, for “**Network performance analysis in TV white space networks in rural New York**” from Spring 2019 to Fall 2020
  - **Teaching Assistant** of Prof. Mariya Zheleva, University at Albany, for “**Computer Communications Networks 1**” course in Fall 2018
  - **Teaching Assistant** of Prof. Charalampos Chelmiss, University at Albany, for “**Systems Programming**” course in Fall 2018
  - **Student assistant** of Prof. Mariya Zheleva, University at Albany, for “**Mobile Wireless Networks**” course in Spring 2018
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