# Siddhartha Gairola

*E-mail*: siddhartha.gairola18@gmail.com

*Website:* https://sidgairo18.github.io

## Education

**International Institute of Information Technology, Hyderabad** Hyderabad, India

MS by Research in CSE 2018 - 2020

- Advisor: Prof. P. J. Narayanan
- Thesis: *Image Representations for Style Retrieval, Recognition and Background Replacement Tasks*
- CGPA: **9.75/10**

BTech with Honours in CSE 2014 - 2018

- CGPA: **8.91/10**

## Work Experience

**Microsoft Research, India** - *Research Fellow* Aug 2020 - Present

· Advisor: Dr. Mohit Jain, Dr. Nipun Kwatra
· Developed a low-cost smartphone-based corneal topographer in collaboration with Sankara Eye Hospital. Published at ACM IMWUT/Ubicomp 2021.
· Also worked on training deep learning models under limited data settings. Published at EMBC 2021.

**Microsoft Research, India** - *Research Intern* Jan 2020 - Jul 2020

· Advisor: Dr. Mohit Jain, Dr. Nipun Kwatra
· Worked on building smartphone based diagnostic solutions for eye diseases using mobile computing, computer vision and machine learning.

**Adobe Systems, India** - *Research Intern* Jun 2019 - Jan 2020

· Advisor: Balaji K., Mayur Hemani
· Worked at the **Media and Data Science Research** lab.
· Worked on Guided Few-shot Image Segmentation, beat the SOTA by 6%. Published at IJCAI 2020 and filed a patent for the same.

**IIIT Hyderabad** - *Research Assistant* May 2016 - May 2019

· Advisor: Prof. P. J. Narayanan
· Research assistant at the Center for Visual Information and Technology (CVIT)
· Worked on representation learning for image style search and retrieval. Published at WACV 2020.
· Also worked on task of color-consistent background replacement. Published at MMM 2018.

**Google Summer of Code (GSoC)** - *Student Developer* May 2018 - Aug 2018

· Was accepted as a developer for the Google Summer of Code Program for a $2^{nd}$ time with Scilab org.
· Implemented a DEMO in C/C++ and Scilab as a working example for the MEX Library in Scilab.

**Google Summer of Code (GSoC)** - *Student Developer* May 2017 - Aug 2017

· Was accepted as a developer for the Google Summer of Code Program for the organization Scilab.
· Implemented a C/C++ wrapper for Matlab MEX-API on current API Scilab.

## Patents

- **S. Gairola**, M. Hemani, A. Chopra, J. Dahl, Balaji K. (2020), Improved Similarity Propagation for One-Shot and Few-Shot Image Segmentation **(US 16/906,954)**.

## Peer-Reviewed Publications

**S. Gairola**, M. Bohra, N. Shaheer, N. Jayaprakash, P. Joshi, A. Balasubramaniam, K. Murali, N. Kwatra, and M. Jain. SmartKC: Smartphone-based Corneal Topographer for Keratoconus Detection. *In Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT), Volume 5, Issue 4, 2021.*

**S. Gairola**, F. Tom, N. Kwatra, and M. Jain. RespireNet: A Deep Neural Network for Accurately Detecting Abnormal Lung Sounds in Limited Data Setting. *43rd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), 2021.*

**S. Gairola**, A. Chopra, M. Hemani, Balaji K. SimPropNet: Improved Similarity Propagation for Few-Shot Image Segmentation. *International Joint Conference on Artificial Intelligence (IJCAI), 2020.*

**S. Gairola**, R. Shah, P. J. Narayanan. Unsupervised Image Style Embeddings for Retrieval and Recognition Tasks. *IEEE Winter Conference on Applications of Computer Vision (WACV), 2020.*

V. Kumar*, D. Khattar*, **S. Gairola***, Y. K. Lal*, V. Varma. Identifying Clickbait: A Multi-Strategy Approach Using Neural Networks. *The 41st International ACM SIGIR Conference on Research & Development in Information Retrieval, 2018.*

S. Rawat*, **S. Gairola***, R. Shah, P. J. Narayanan. Find Me a Sky: A Data-Driven Method for Color-Consistent Sky Search and Replacement. *International Conference on Multimedia Modeling (MMM), 2018.*

## Academic Achievements

- Awarded the **Dean's Research Award** for a paper published at an international conference while in undergraduate, 2018.
- Awarded the **Dean's List Award** for 6 semesters straight for being in top 10% of the class in Monsoon 2015, 2016, 2017 and Spring 2016, 2017, 2018.
- Qualified for the **ACM ICPC Asia Onsite Regionals** twice (2015, 2016).
- **All India Rank 2262** in **JEE Advanced 2014** (**98.5%** percentile among 150,000 students).
- **All India Rank 3856** in **JEE Mains 2014** (**99.7%** percentile among 1.2 million students).

## Academic Service

**Reviewer:** ICLR 2022, IHCI 2021.

## Talks and Conference Presentations

- RespireNet: A Deep Neural Network for Accurately Detecting Abnormal Lung Sounds in Limited Data Setting, *EMBC 2021* (video).
- SimPropNet: Improved Similarity Propagation for Few-shot Image Segmentation, *IJCAI 2020* (video).
- Unsupervised Image Style Embeddings for Retrieval and Recognition Tasks, *IEEE WACV 2020* (video).

*equal contribution

## Teaching Experience

**CSE251: Computer Graphics**, IIIT Hyderabad — Spring 2019

· Head Teaching Assistant with Prof. P. J. Narayanan.

**CSE478: Digital Image Processing**, IIIT Hyderabad — Monsoon 2018

· Teaching Assistant with Prof. Ravi Kiran.

**CSE578: Computer Vision**, IIIT Hyderabad — Spring 2018

· Teaching Assistant with Prof. Avinash Sharma.

**CSE478: Digital Image Processing**, IIIT Hyderabad — Monsoon 2017

· Teaching Assistant with Prof. Avinash Sharma.

**CSE371: Artificial Intelligence**, IIIT Hyderabad — Spring 2017

· Teaching Assistant with Prof. Praveen Paruchuri.

**IEC101: Digital Logic and Processors**, IIIT Hyderabad — Monsoon 2016

· Teaching Assistant with Prof. Madhav Krishna.

The duties as a TA involved taking regular tutorials, setting up assignments and conducting evaluations.

## Selected Projects

**Guided Few-Shot Segmentation**: Developed a deep learning system to perform few-shot image segmentation with guidance propagation using *Python and PyTorch. Monsoon 2019*

**Unsupervised Style Learning**: Developed a deep learning model in *Python and PyTorch* to learn robust style representations without supervision. Achieved state-of-the-art results for this task and was accepted as a paper (code). *Spring 2019*

**Sketching with Style**: Implemented the paper Sketching with Style[b] (*ICCV 2017*) in *PyTorch and Python* (code). *Monsoon 2018*

**Movie Genre Classification**: Developed a deep learning model to predict the genres of a movie based on its poster, using *Python and TensorFlow. Monsoon 2017*

**Wiki-Search Engine:** Implementation of an efficient and scalable search engine on Wikipedia dump in *Python*. Retrieve top relevant documents based on input query. Handled field as well as phrase queries. Documents were re-ranked based on 'tf-idf' measure. For fast retrieval used threading and multi-level indexing. *Monsoon 2017*

**High Dynamic Range Images:** HDR imaging - generating images with a greater range of luminance levels than which can be achieved by taking only a single photograph with a fixed exposure. Using tone mapping, high-boost filtering and bilateral filtering for improvements. *Monsoon 2016*

**Tic-tac-toe Bot:** Designed an automated agent bot to play the a modified version of tic-tac-toe game. Using a minimax algorithm and alpha-beta pruning. *Spring 2016*

## Technical Skills

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| **Working Knowledge** | Bash, C/C++, Python, Matlab, Octave, OpenCV, Android-SDK |
| **Software & Tools** | GNU/Linux, HTML, CSS, JavaScript, LaTeX, Excel |
| **Deep Learning Frameworks** | PyTorch, TensorFlow, Keras, Caffe |
| **Past Experience** | Java, OpenGL, WebGL, Django, Web2py |

[b] J. Collomosse, T. Bui, M. Wilber, C. Fang, and H. Jin. Sketching with style: Visual search with sketches and aesthetic context. In 2017 IEEE International Conference on Computer Vision (ICCV), 2017.

## References

**Prof. P. J. Narayanan**, Director, IIIT-Hyderabad, India (email)
**Dr. Mohit Jain**, Senior Researcher, Microsoft Research, India (email)
**Dr. Nipun Kwatra**, Principal Researcher, Microsoft Research, India (email)
**Balaji Krishamurthy**, Principal Scientist, Adobe Systems, India (email)
**Mayur Hemani**, Senior Research Scientist, Adobe Systems, India (email)