Soumil Chugh

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``Be the change that you want to see in the world."

1 Education

University of Toronto — *Toronto, Canada*
MASc in Computer Engineering — *September 2020*

Panjab University — *Panjab, India*
BE in Electronics and Communication — *July 2015*

2 Skills

Deep Learning	Generative AI, Neural Networks
Machine Learning	Random Forest, Gradient Boosting, Clustering
Computer Vision	Object Detection and Tracking, Segmentation
Frameworks & Libraries	TensorFlow, Keras, PyTorch, OpenCV, NumPy, Pandas
Programming Languages	Python, C++, C, TypeScript

3 Experience

Human Machine Interaction Lab, Huawei
Toronto, Canada
Research Engineer — *Aug 2020 - PRESENT*

- Lead the project on eye tracking system for in-car and desktop scenarios.
- Designed and Developed multiple patented algorithms using minimal hardware to achieve $1.5°$ accuracy.
- Applied supervised and unsupervised machine learning techniques, including novel use of contrastive learning for eye feature extraction.
- Currently working on Generative AI methodologies including prompt engineering, text2image and image2image.

General Prognostics (GPx)
Toronto, Canada
Machine Learning and Software Consultant — *Aug 2020 - Dec 2023*

- Spearheaded the software development of a smartwatch designed for heart failure patients.
- Contributed to the design of a computer vision system for analyzing the quality of user-generated biological sample cards.
- Contributed to the design of a Machine learning approach for detecting changes in the blood parameters using smartwatch data.

University of Toronto
Toronto, Canada
Graduate Researcher — *Sep 2018 - Aug 2020*

- Designed a binocular eye tracking system for a virtual reality headset.
- Employed deep learning techniques (semantic segmentation) for accurate and precise eye feature estimation.
- Developed complete system software using C++, Python, and C#.
- Achieved an accuracy of $1°$ under device motion and changing fixation distance in 3D.

Jana Care
Bengaluru, India
Software and Hardware Engineer — *Sep 2015 - Aug 2018*

- Led the software development of a smartphone-controlled robotic system that automates complex blood tests, passing FDA approval.
- Wrote and reviewed interfaces between smartphones and MSP430 for audio communication.
- Implemented Bluetooth Low Energy Stack on Android and Cortex ARM-M4 platforms.

4 Patents and Publications

- S.Chugh, J.Ye and M.Eizenman, Gaze Tracking and Gaze Tracking Calibration, US Patent 2023.
- S.Chugh, J.Ye and M.Eizenman, Methods and Systems for Gaze Tracking using One Corneal Reflection, US Patent 2022.
- J.Ye, M.Singh and S.Chugh, Methods and Systems for Gaze-Assisted Interaction, US Patent 2022.
- S.Chugh and J.Ye, Methods and Devices for Gaze Estimation, US Patent, 2021.
- M.Depa, S.Chugh, J.Enrique, S.Matskuka and T.Tribble, Quality control of user-generated biological sample cards, 2021, US Patent.
- M.Brown, S.Chugh, J.Enrique and S.Matskuka, Characterizing blood parameters regarding renal heart failure using digital biomarkers, 2022, US Patent.
- S.Chugh, B.Brousseau, J.Rose. and M.Eizenman, Detection and correspondence matching of corneal reflections for eye tracking using deep learning. In 2020 25th International Conference on Pattern Recognition (ICPR), IEEE, 2020.
- S.Chugh, Eye Tracking for a Virtual Reality Headset, 2020, University of Toronto.
- S.Chugh and J.Kaur, Non-Invasive Hemoglobin Monitoring Device, International Conference on Control Communication Computing India (ICCC), IEEE, 2015.
- S.Chugh and J.Kaur, Low Cost Calibration Free Pulse Oximeter, Annual IEEE India Conference (INDICON), IEEE, 2015.
- S.Chugh, J.Kaur and D.Mittal, Exudates segmentation in retinal fundus images for the detection of diabetic retinopathy, 2014.
- S.Chugh and A.Akula, Effect of Different Signal Processing Techniques on a Calibration Free Pulse Oximeter, IEEE, 2018.