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	Neural Networks, Convolutional Neural Networks, Recurrent Neural Networks, Long Short-Term Memory
Machine Learning	Linear/Logistic Regression, Decision Trees, Random Forest, SVM, PCA, Clustering Algorithms
Computer Vision	Image Processing, Feature Extraction, Object Detection, Segmentation, Head Pose Estimation and Face Tracking
Frameworks & Libraries	TensorFlow, Keras, PyTorch, scikit-learn, OpenCV, NumPy, Pandas, Matplotlib, seaborn
Programming Languages	Python, C++, C

3 Experience

Human Machine Interaction Lab, Huawei — *Toronto, Canada*

Research Engineer — *Aug 2020 - PRESENT*

- Leading a team in designing an infrared-based eye tracking system for in-car scenarios.
- Developed multiple patented algorithms using minimal hardware to achieve 1.5 accuracy.
- Applied supervised and unsupervised machine learning techniques, including contrastive learning, for eye feature extraction.
- Designed a deep learning-based RGB eye tracking system that runs on everyday devices such as laptops and smartphones, achieving an accuracy of 5/30 mm under varying conditions.

General Prognostics (GPx) — *Toronto, Canada*

Software Engineer (Consultant) — *Aug 2020 - PRESENT*

- 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

[1] S.Chugh, B.Brousseu, J.Rose, and M.Eizenman, "Corneal reflection detection and matching for eye tracking using deep learning," *International Conference on Pattern Recognition (ICPR)*, vol. 1, no. 1, pp. 2210–2217, 2020.

[2] S.Chugh, J.Ye, and M.Eizenman, "Eye tracking system using one corneal reflection," Patent 92 023 266PCT01, 2022, filed: 2022-08-01.

[3] J.Ye, M.Singh, and S.Chugh, "Methods and systems for gaze assisted interaction," Patent 92 026 995US01, 2022, filed: 2023-02-01.

[4] S.Chugh and J.Ye, "Methods and devices for gaze estimation," Patent 92 005 506US01, 2021, filed: 2021-12-01.

[5] M.Depa, S.Chugh, Javi, Sean, and Theressa, "Quality control of user-generated biological sample cards," Patent PCT/US2022/050 057, 2021, filed: 2022-11-01.

[6] S. Chugh, *Eye Tracking for a Virtual Reality Headset*. University of Toronto, 2020.

[7] S.Chugh and J.Kaur, "Non-invasive hemoglobin monitoring device," *International Conference on Control Communication Computing India (ICCC)*, vol. 1, no. 1, pp. 380–383, 2015.

[8] S.Chugh, "Low cost calibration free pulse oximeter," *Annual IEEE India Conference (INDICON)*, vol. 1, no. 1, pp. 1–5, 2015.

[9] S.Chugh, J.Kaur, and D.Mittal, "Exudates segmentation in retinal fundus images for the detection of diabetic retinopathy," *Int J Eng Res Technol*, vol. 1, no. 1, pp. 673–677, 2014.

[10] S.Chugh and A.Akula, "Effect of different signal processing techniques on a calibration free pulse oximeter," *3rd International Conference for Convergence in Technology (I2CT)*, vol. 1, no. 1, pp. 1–6, 2018.