# Samruddhi Kahu

26110 Laguna Ct Laguna Hills CA 92653
(+1) (949) 690-8659
samruddhikahu@gmail.com

## EXPERIENCE

**Video Codec Algorithm Development Engineer** Nov. 2021 - Mar. 2024
*AV2 Standard Team @ Tencent Media Labs, Palo Alto, CA*

- Research and development of novel algorithms for the next-generation AV2/AVM standard.
  - Adding/Optimizing features in the AV1/AVM C codebas to reduce run-time and computational complexity.
  - Cross Component Sample Offset - filtering chroma components using the information in the reconstructed luma component.
  - Coefficient coding - predicting signs of transform coefficients using spatial correlation in video frames / images.
  - Block Partition optimization to reduce run-time without losing quality gains.
  - Optical Flow Refinement optimization

**Multimedia Codec Development Intern** Aug. 2020 - July 2021
*AV2 Standard Team @ Tencent Media Labs, Palo Alto, CA*

- Research and development of novel algorithms for the next-generation AV2 standard.
  - Adding/Optimizing features in the AV1/AV2 C codebase.
  - Statistical analysis of AV1 video codec feature usage using Python.
  - Non Separable Secondary Transforms (NSST).

## EDUCATION

**Doctor of Philosophy (CGPA 9.57/10)** Sept. 2019
*Visvesvaraya National Institute of Technology, Nagpur, India*

- Thesis: Image and Video Compression Techniques in CIE L*a*b* Color Space.
  - Proposed a technique to reduce redundancy from the use of Contourlet Transform for video coding.
  - Proposed histogram-based division into non-uniform sub-blocks for improved flexibility.
  - Proposed low overhead image-dependent quantization using the LA-JND model for CIE L*a*b* color space.
- Relevant Courses: Pattern Recognition, Image Analysis and Computer Vision.

**Master of Technology (Communication Systems Engineering) (CGPA 8.96/10)** June 2014
*Visvesvaraya National Institute of Technology, Nagpur, India*

- Thesis: Histogram-based Segmentation of Color Images using Genetic Algorithms.
- Relevant Courses: Fuzzy Logic & Neural Networks, Digital Image Processing, Statistical Signal Analysis, Embedded Systems.

**Professional Master's (Embedded and Cyber-Physical Systems)(4.00/4)** June 2020
*University of California, Irvine, USA*

- Project: Fast Block-size Split Decision in HEVC encoder using Convolutional Neural Networks
  - 64x64 blocks are partitioned using CNN model inference.
  - Real-time Canny Edge Detector optimized for Raspberry Pi
- Relevant Courses: Embedded Systems Modeling and Design

**Bachelor of Engineering (Electronics & Comm. Engg.) (73.71%)(1st Division)** June 2011
*Shri Ramdeobaba Kamla Nehru Engineering College, Nagpur, India*

- Project: Detecting speed of cars using video sequences.

## PATENTS

1. M. P. Krishnan, **S. Y. Kahu**, X. Zhao, S. Liu, "Context-Adaptive Secondary Transform for Video Coding," US Patent Application 17/490,967, Filed Sept. 30, 2021.
2. M. P. Krishnan, **S. Y. Kahu**, X. Zhao, S. Liu, "Context-Adaptive Secondary Transform for Video Coding," US Patent Application 17/361,239, Filed Jun. 28, 2021.
3. **S. Y. Kahu**, X. Zhao, M. P. Krishnan, S. Liu, "Coefficient Sign Prediction for Transform Skip," US Patent Application 17/984,229, Nov. 9, 2022.
4. **S. Y. Kahu**, X. Zhao, M. P. Krishnan, S. Liu, "Systems and Methods for frequency-dependent Coefficient Sign Prediction," US Patent Application 18/121,422, Oct. 5, 2023.
5. **S. Y. Kahu**, X. Zhao, M. P. Krishnan, S. Liu, "Systems and Methods for joint signaling of Transform Coefficient Signs," US Patent Application 18/143,516, Dec. 21, 2023.
6. **S. Y. Kahu**, X. Zhao, M. P. Krishnan, S. Liu, "Systems and Methods for Transform Coefficient sign prediction and coding," US Patent Application 18/127,566, Nov. 16, 2023.

## PUBLICATIONS

1. **S. Y. Kahu**, M. P. Krishnan, X. Zhao, S. Liu, "Context-Adaptive Secondary Transform for Video Coding," *IEEE International Conference on Image Processing 2021*, Anchorage, USA.
2. **S. Y. Kahu**, K. M. Bhurchandi, "A low-complexity, sequential video compression scheme using frame differential directional filter bank decomposition in CIE *La*b** color space," *IEEE Access*, vol. 5, pp. 14914-14929, 2017.
3. **S. Y. Kahu**, K. M. Bhurchandi, "JPEG-based variable block-size image compression using CIE *La*b** color space," *KSII Transactions on Internet and Information Systems.*, vol. 12, no. 10, pp. 5056 - 5078, 2018.
4. **S. Y. Kahu**, R. B. Raut, K. M. Bhurchandi, "Review and evaluation of color spaces for image/video compression," *Color Research and Application, Wiley*, vol. 44, no. 1, pp. 8 - 33, 2019.
5. P. Sneha Latha, Pawan Kumar, **S. Y. Kahu**, K. M. Bhurchandi, "Segmentation of color images using genetic algorithm with image histogram," *7th International Conference on Machine Vision 2014*, Milano, Italy.

## AREAS OF INTEREST

Directional, Non-separable Transforms
Discrete Sine & Cosine, Wavelet Transforms
Chroma filtering using Luma, CCSO
Contourlet Transforms
Color Spaces
JND-based Quantization
Optical Flow Refinement and Optimization
Inter Intra Prediction
Block Partitions

## SKILLS

| | |
|---|---|
| *Programming Languages* | MATLAB, C/C++, Python |
| *Tools* | git/version control, bash/shell scripting, Linux/Unix, pthread, OpenMP, RaspberryPi |
| *Softwares* | H.264/AVC, H.265/HEVC, AV1, AV2/AVM, PyTorch, Keras, basic SystemC |