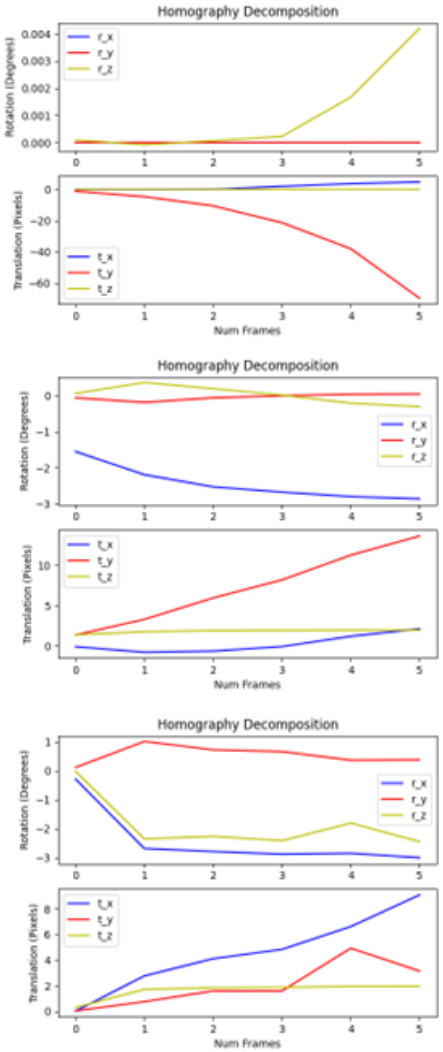
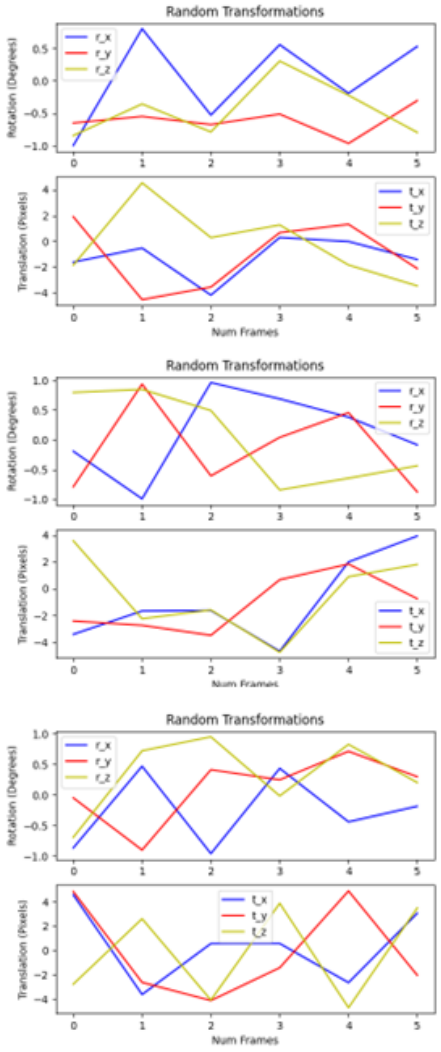
Supplementary Material

1. Synthetic Data Engine

We provides more details of our synthetic data egnine. Figure 1 provides more examples of the temporal and spatial correlation of motion within a multi-frame data capture. Figure 2 shows visual results for the SOTA model in MFSR [1] trained on our dataset with motion sampled from a uniform distribution of rotations and translations against sampling from a dataset of real handheld homography matrices.



Sampling transformation from distribution of real handheld burst photography homographies



Sampling transformation from a uniform distribution of pre-defined parameters

Figure 1. Sampling transformations from a uniform distribution of pre-defined rotations and translation parameters (right) versus sampling transformations from a dataset of homography matrices defining the transformations within a real handheld burst photography capture (left). Uniform distribution sampling does not contain spatial and temporal correlations found in real handheld motion.

Figure 2. Burstormer [2] trained on our dataset with motion vectors sampled from a uniform distribution of pre-defined rotations and translation parameters (left) versus Burstormer trained on the same dataset but with motion vectors sampled from a dataset of homography matrices defining the transformations within a real handheld burst photography capture as per our synthetic data engine (right). All experimental conditions identical.

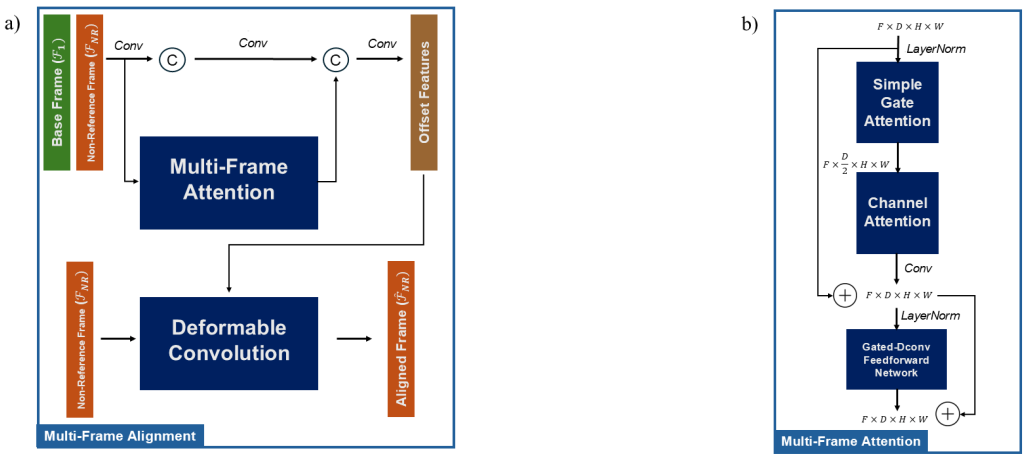


Figure 3. MFSR-GAN modules for (a) Multi-Frame Alignment, and (b) Multi-Frame Attention. Descriptions in Section **??**.

2. Model Architecture Details

We provide more details for our model architecture previously introduced in Section 4. Our model architecture builds upon the work previously completed for MFSR by [2]. Our adaptions of the Multi-Frame Alignment and Multi-Frame Attention modules are presented in Figure 3 with descriptions in Section 4.2.2.

References

[1] Akshay Dudhane, Syed Waqas Zamir, Salman Khan, Fahad Shahbaz Khan, and Ming-Hsuan Yang. Burst Image Restoration and Enhancement. In *2022 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, pages 5749–5758, 2022. ISSN: 2575-7075. 1

[2] Akshay Dudhane, Syed Waqas Zamir, Salman Khan, Fahad Shahbaz Khan, and Ming-Hsuan Yang. Burstormer: Burst Image Restoration and Enhancement Transformer. In *2023 IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)*, pages 5703–5712, 2023. ISSN: 2575-7075. 2, 3