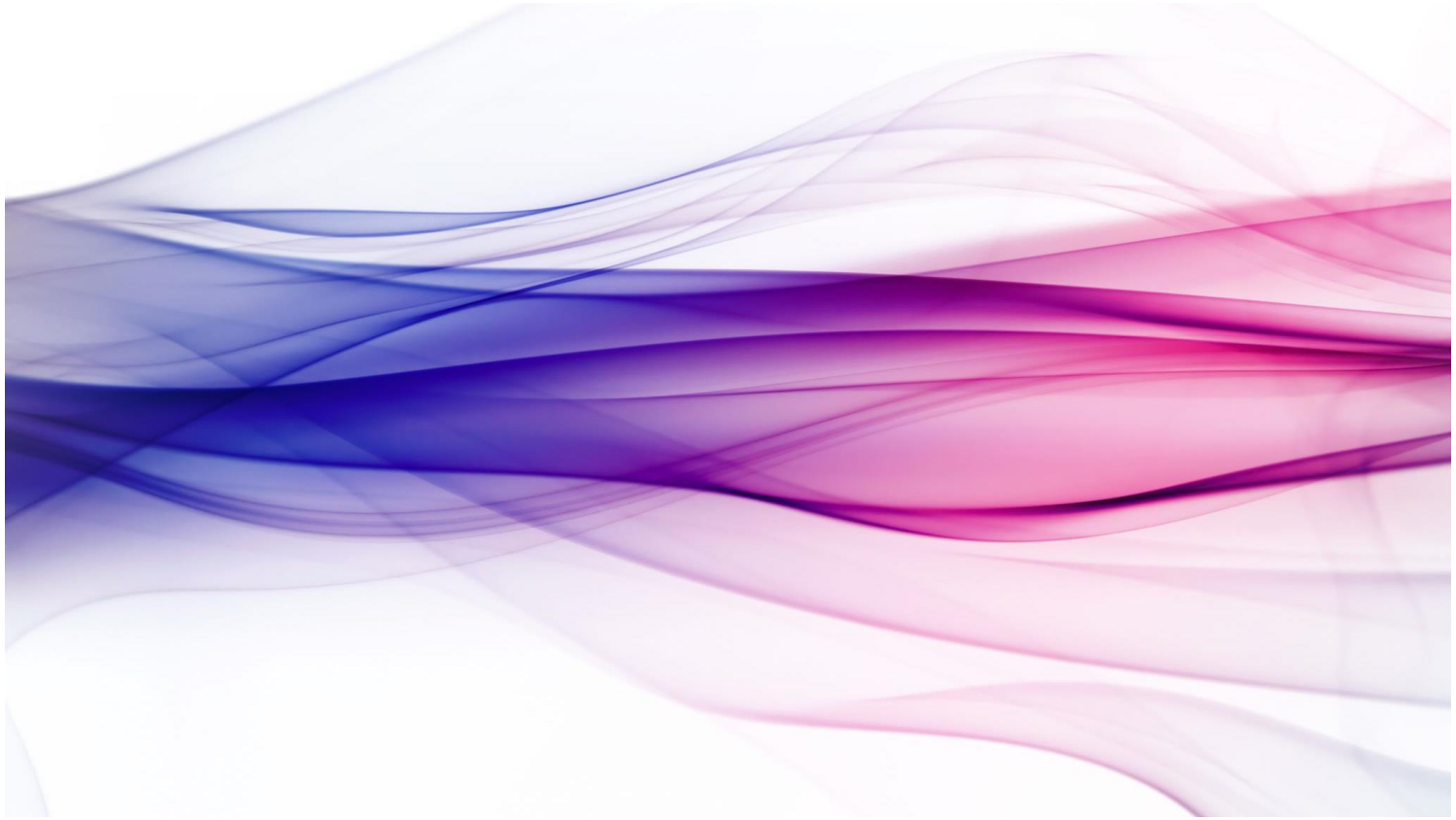
Low Light Space Object Tracking



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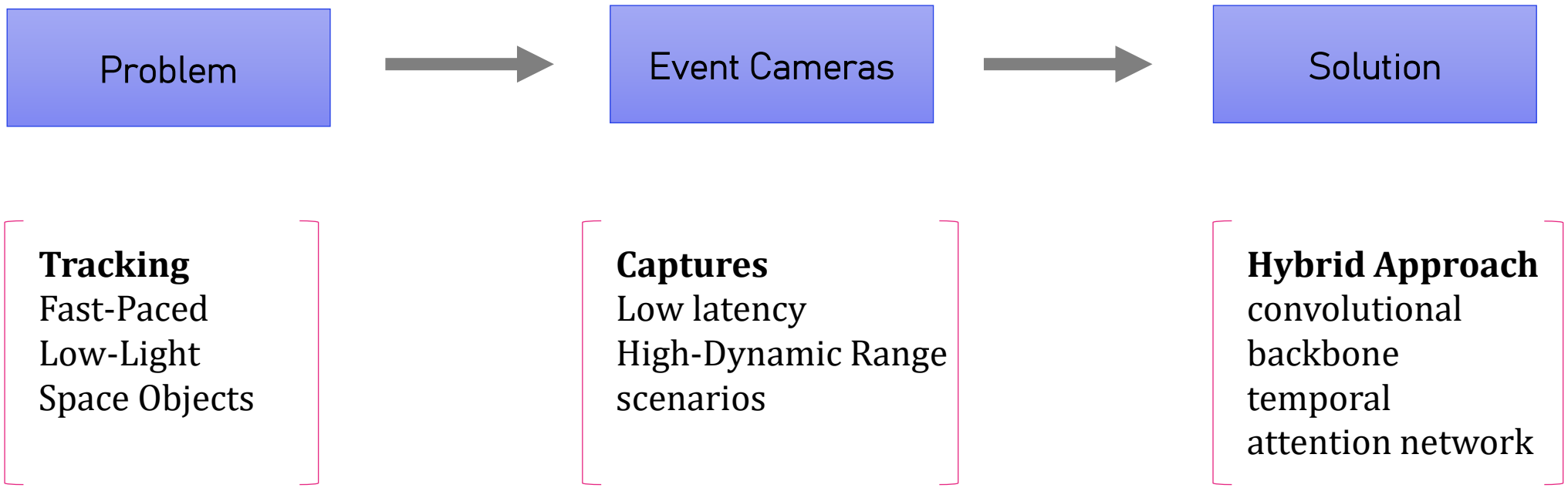
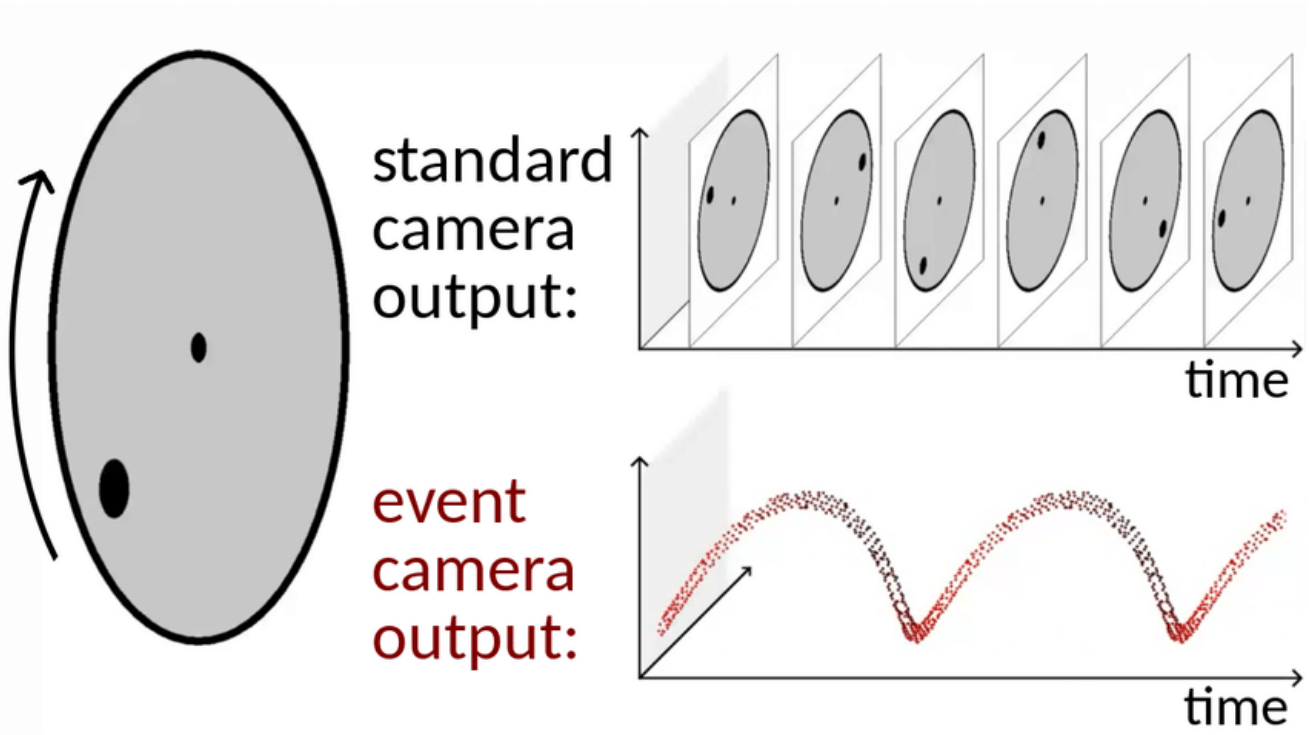
Introduction



Why Event Camera ?



•Standard Camera Outputs the frame at fixed rate giving redundant information

•Event cameras respond to pixel level brightness changes with microsecond latency

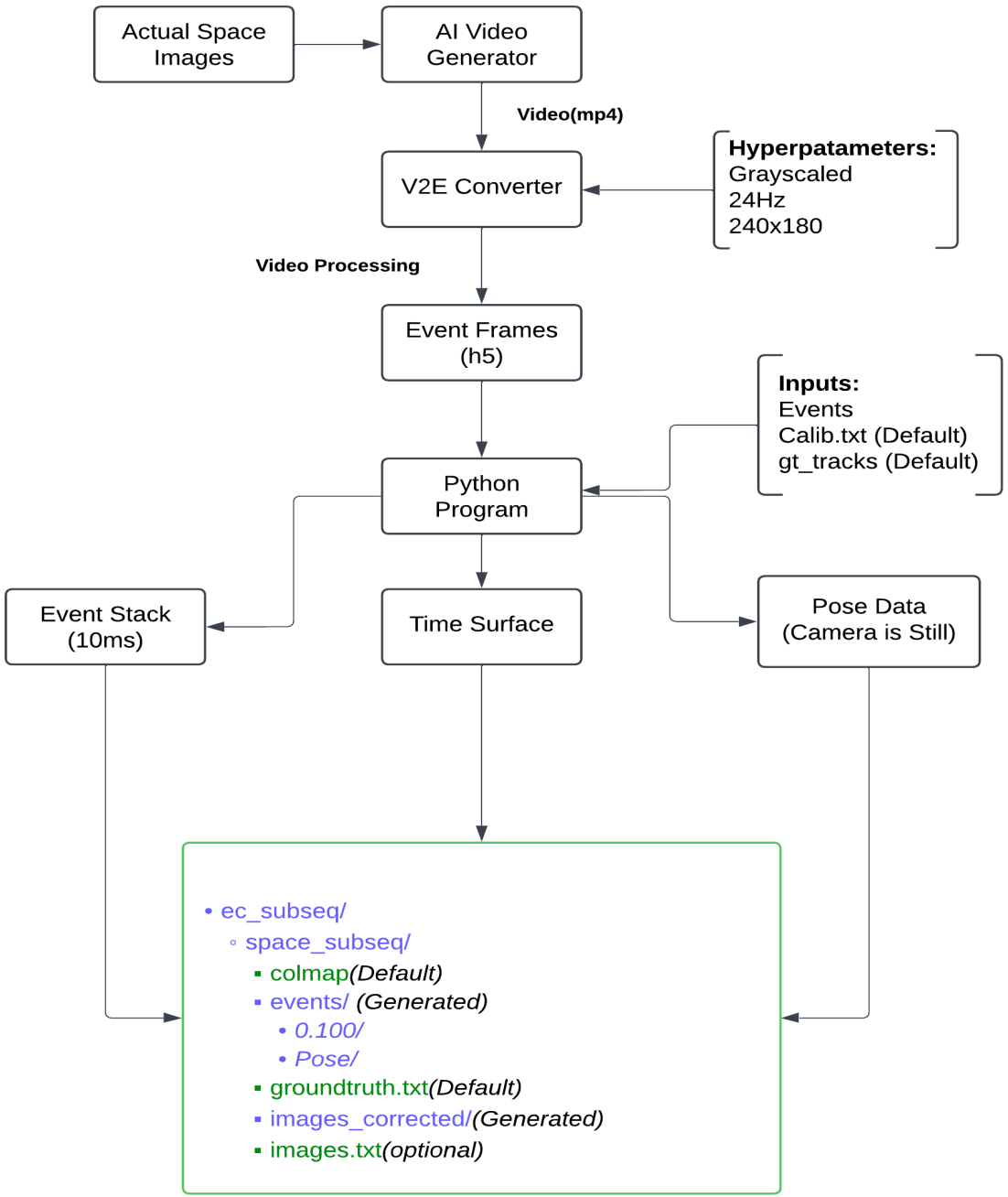
Approach

Data Driven Feature Tracking for Event Cameras.
Paper

Extending

- AI Generated Synthetic Data
- Synthetic Surface and Pose Creation,
- Handling Diverse Objects and Lightning,
- Leveraging on the models feature tracking feature and trained weights.

Flowchart


Actual Space Images
AI Video Generator
Video(mp4)
V2E Converter
Hyperpatameters:
Grayscaled
24Hz
240x180
Video Processing
Event Frames (h5)
Inputs:
Events
Calib.txt (Default)
gt_tracks (Default)
Python Program
Event Stack (10ms)
Time Surface
Pose Data (Camera is Still)
• ec_subseq/
◦ space_subseq/
▪ colmap(Default)
▪ events/ (Generated)
• 0.100/
• Pose/
▪ groundtruth.txt(Default)
▪ images_corrected/(Generated)
▪ images.txt(optional)

Results (Default Data)

Fig: **Boxes Rotation**

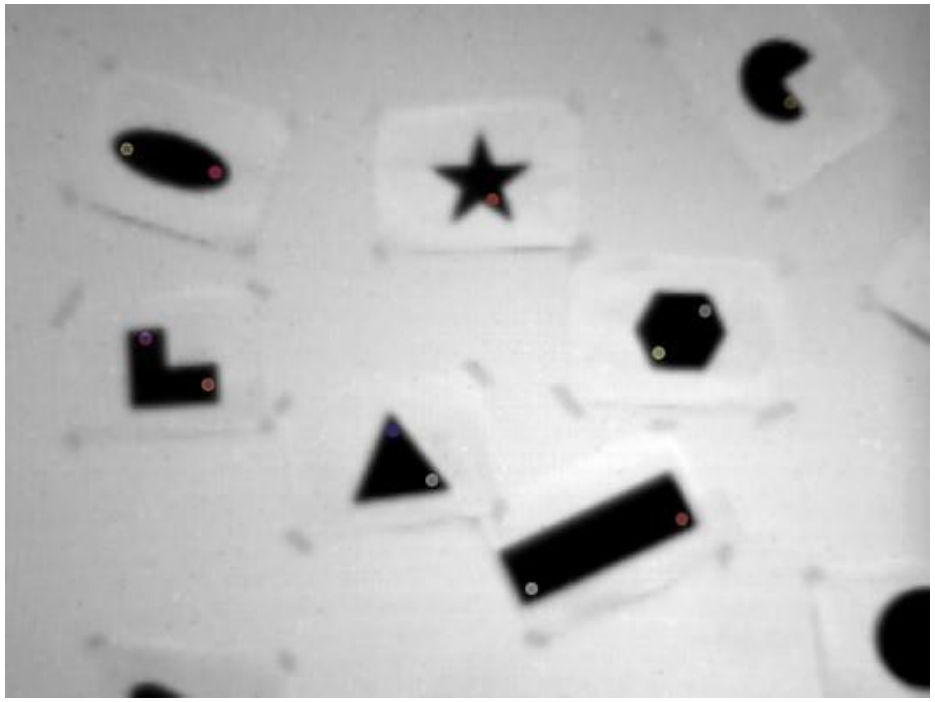


Fig: **Shapes Transition**

Result (Synthetic Data)

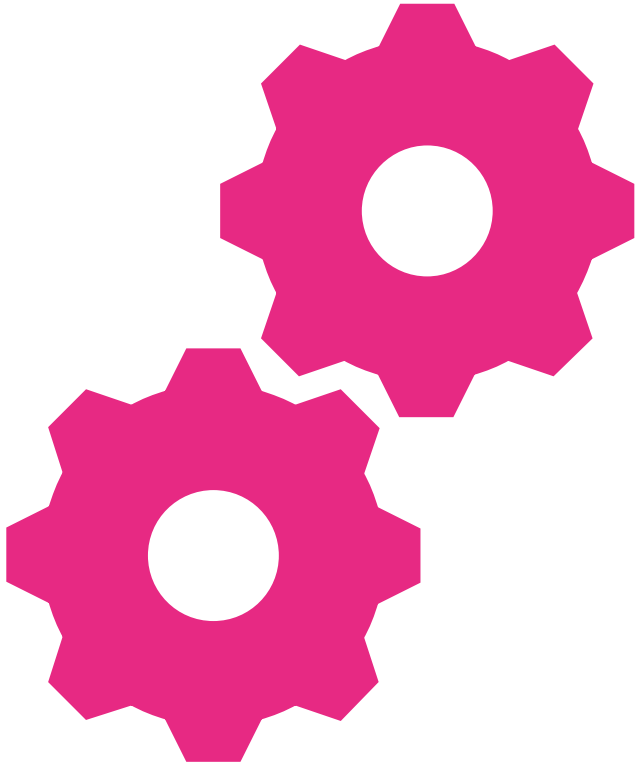
•Varied shapes and moving objects in space with challenging lightening condition.

•(Actual Images taken and rendered through AI generator)

Challenges

- Generalization Issues
  - Model was pre-trained on a specific set of data. New data requires re-training or fine-tuning.
- Pipeline Issues
  - More robust synthetic pipeline required with ground truth, surface and pose handling.

Note: Event cameras are robust, but generalization requires additional data and training.



Conclusion & Future Work

Successfully setup and ran event-tracking model on default data.

Created and setup a synthetic data handling pipeline.

Tested the model with new data and suggested future works.

Thank You