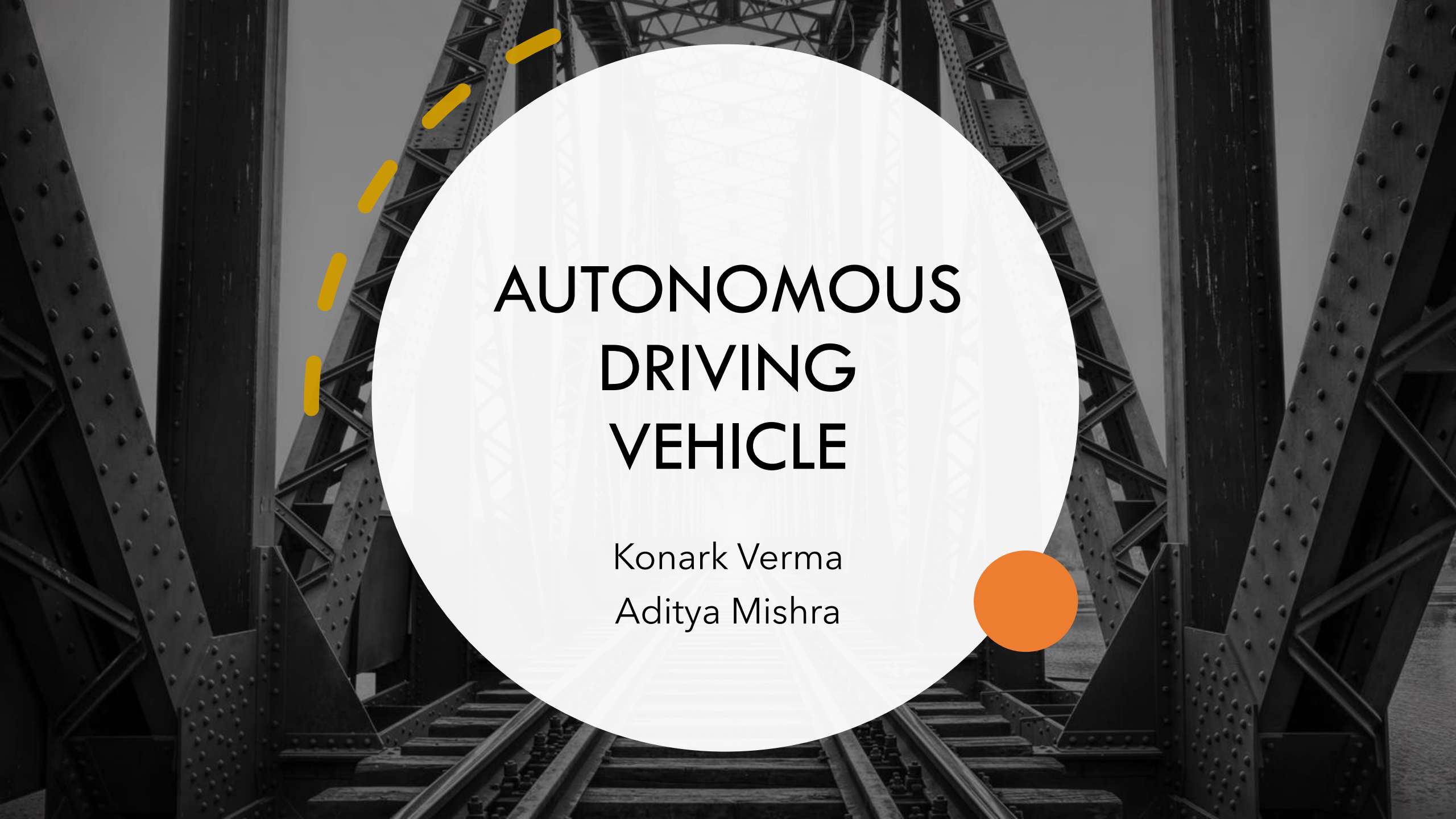
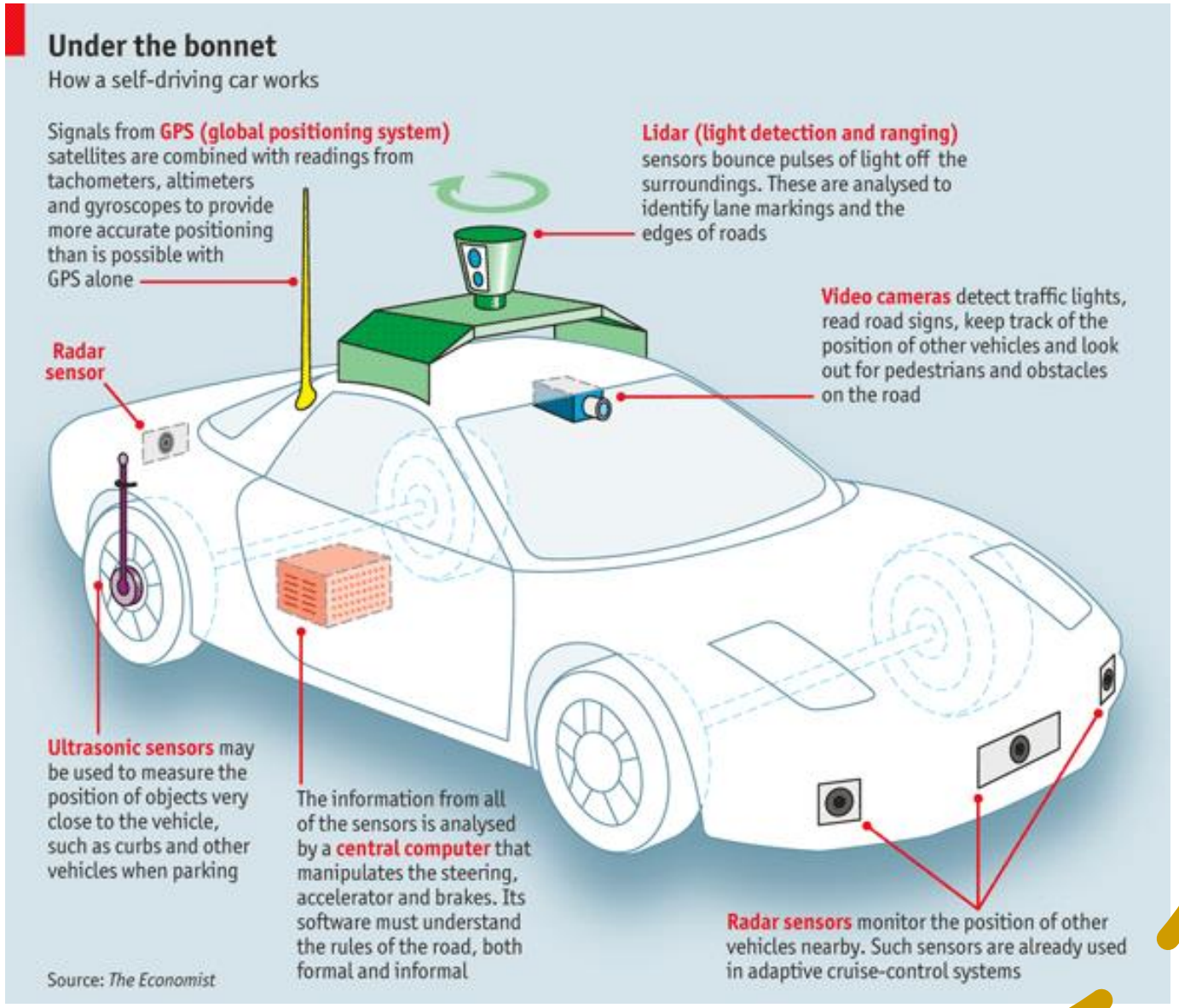


AUTONOMOUS DRIVING VEHICLE

Konark Verma
Aditya Mishra

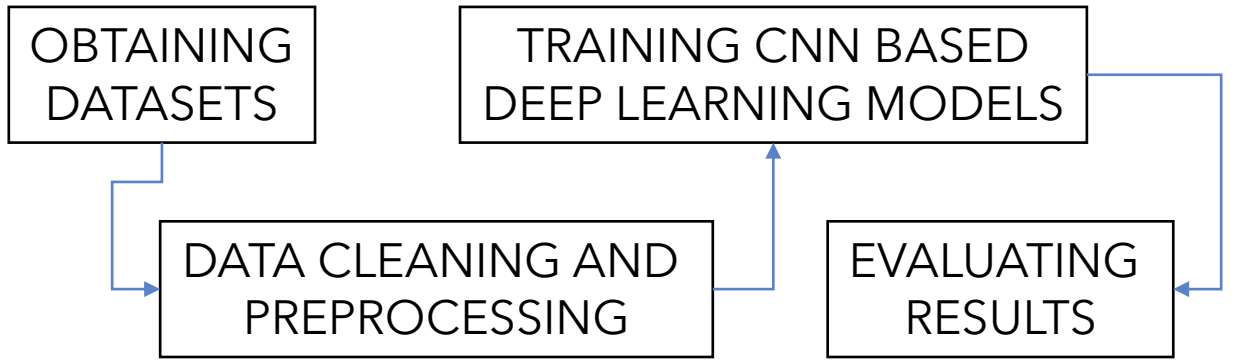
SELF DRIVING CAR



PROBLEM STATEMENT

- Problem is to implement a self driving car's steering wheel component with front board video as sensory input.
- We must predict the angle of rotation of the steering wheel according to the curvature of the road.
- Various CNN based deep learning methods are used to solve this problem. Our main goal here is to reduce the training MSE loss.

PIPELINE

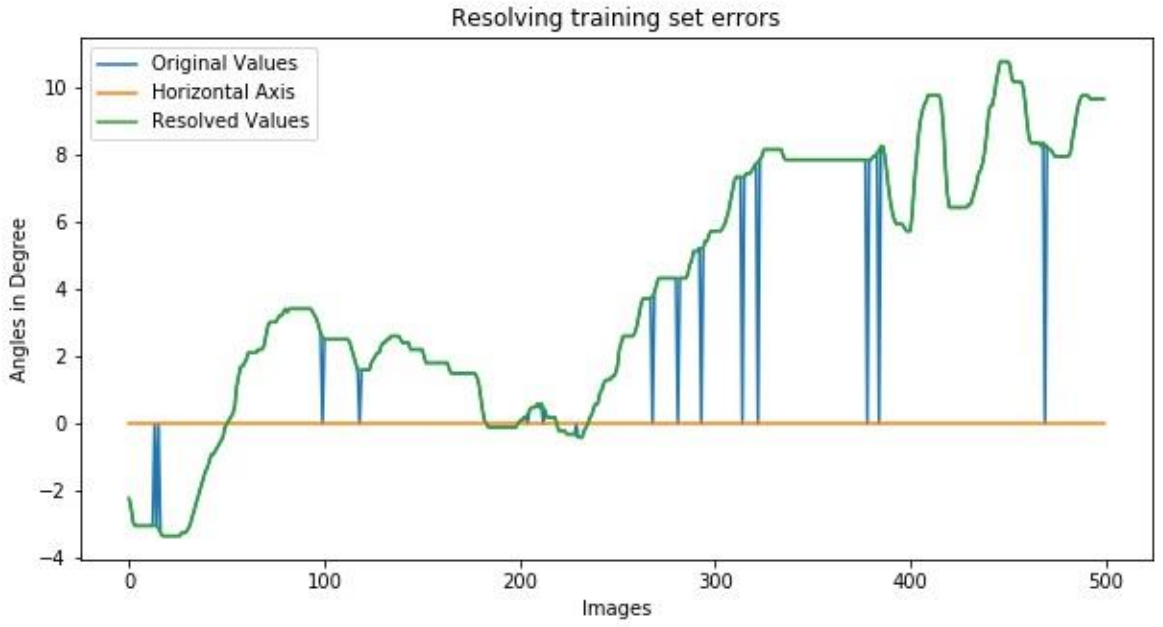


DATASET & REFERENCES

- Our Dataset:
  - Recorded Video of length 25 minutes
  - Size = 2.3 GB
  - It contains 25*60*30 = 45,000 images
- Obtained from:
  - https://github.com/SullyChen/Autopilot-TensorFlow
  - https://drive.google.com/file/d/0B-KJCaaF7elleG1RbzVPZWV4Tlk/view
- Research Papers read:
  - End to End Learning for Self-Driving Cars by Nvidia.
  - https://arxiv.org/pdf/1604.07316.pdf

DATA CLEANING & PREPROCESSING

- Video file is first split into a sequence of 45405 images.
- Each image is then converted to a 200 * 200 pixel image from a 256 * 455 pixel image.
- The RGB values between 0-255 are converted to values between 0 and 1.
- The angles file contained some errors, which are resolved by smoothening the curve.
- The angles are also converted to radians from degrees.



CNN BASED DEEP LEARNING MODEL

Model: "sequential"

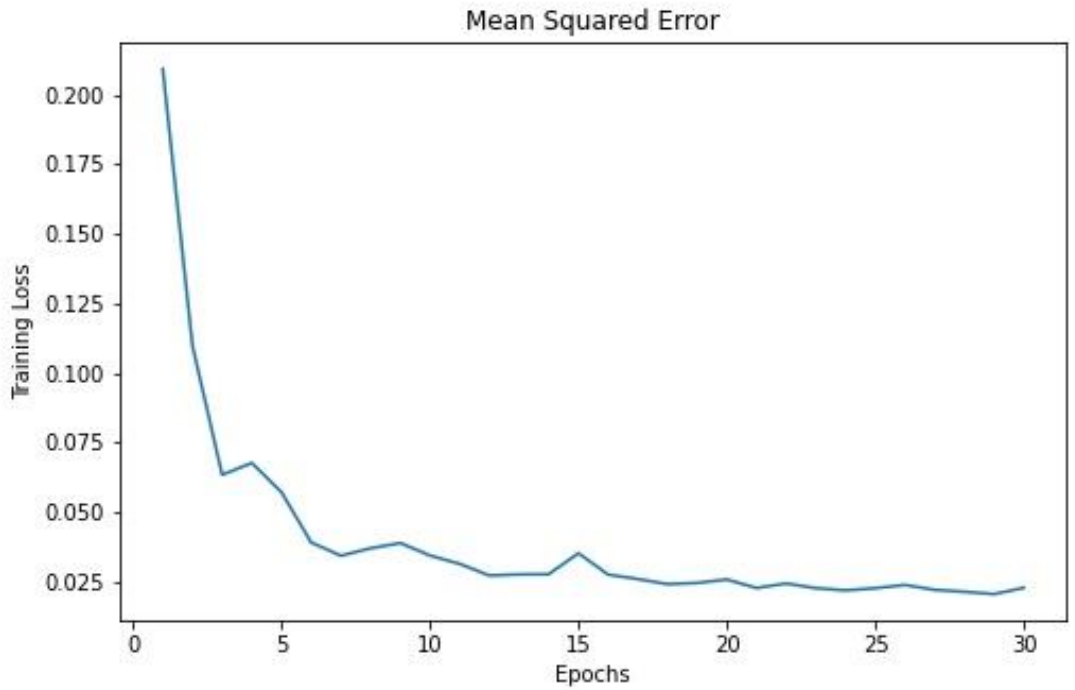
Layer (type)	Output Shape	Param #
conv2d (Conv2D)	(None, 198, 198, 64)	1792
max_pooling2d (MaxPooling2D)	(None, 99, 99, 64)	0
conv2d_1 (Conv2D)	(None, 97, 97, 64)	36928
max_pooling2d_1 (MaxPooling2	(None, 48, 48, 64)	0
conv2d_2 (Conv2D)	(None, 46, 46, 128)	73856
max_pooling2d_2 (MaxPooling2	(None, 23, 23, 128)	0
conv2d_3 (Conv2D)	(None, 21, 21, 128)	147584
max_pooling2d_3 (MaxPooling2	(None, 10, 10, 128)	0
flatten (Flatten)	(None, 12800)	0
dense (Dense)	(None, 512)	6554112
dropout (Dropout)	(None, 512)	0
dense_1 (Dense)	(None, 64)	32832
dropout_1 (Dropout)	(None, 64)	0
dense_2 (Dense)	(None, 1)	65

Total params: 6,847,169
Trainable params: 6,847,169
Non-trainable params: 0

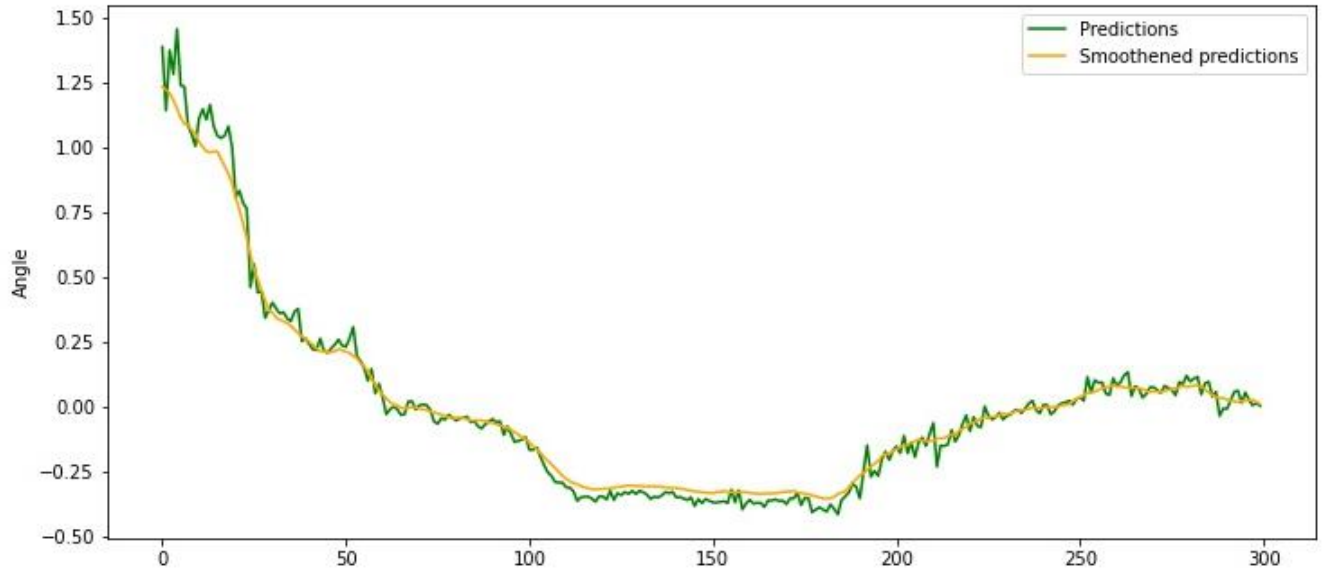
TRAINING THE MODEL

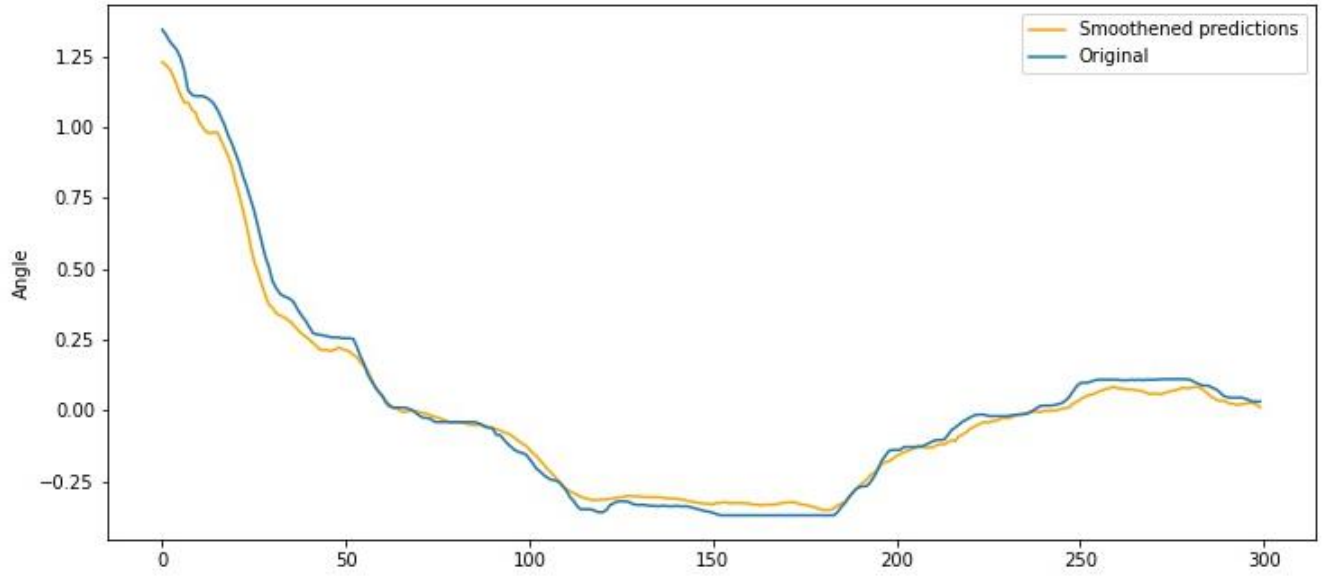
Parameters:

- Optimizer = Adam
- Learning Rate = 0.001
- Decaying learning rate
- Loss = Mean Squared Error (MSE)
- Epochs = 30



PREDICTION PLOTS





DEMO

THANK YOU.