# **Traffic Sign Recognition for Autonomous Vehicle:**

**Challenge**: Develop a model that not only classifies traffic signs accurately but also highlights the transformative role of computer vision in making autonomous driving safer and more reliable.

As autonomous vehicles move closer to becoming mainstream, the ability to accurately recognize traffic signs is critical for ensuring safety and compliance with road regulations. Your challenge is to build a **Traffic Sign Recognition System** using the **German Traffic Sign Recognition Benchmark (GTSRB)** dataset.

Participants will:

**Preprocess Images**: Apply image preprocessing techniques such as grayscale conversion, normalization, and data augmentation to enhance the dataset and improve model robustness. **Design and Train a CNN**: Develop a **Convolutional Neural Network (CNN)** capable of classifying traffic signs into one of 40 categories. Experiment with different architectures, activation functions, and optimization techniques.

**Optimize Model Performance**: Fine-tune hyperparameters, including learning rates, batch sizes, and dropout rates, to maximize accuracy.

**Evaluate and Interpret Results**: Test the model on unseen data and visualize its performance using confusion matrices and accuracy metrics.

# **Key Goals**:

· Achieve high classification accuracy on the GTSRB dataset.

· Demonstrate a robust understanding of CNNs and image preprocessing.

· Showcase the system’s potential applications in real-world scenarios, particularly in autonomous vehicle technology.