Digital Learning Group

HackOrbit 2025

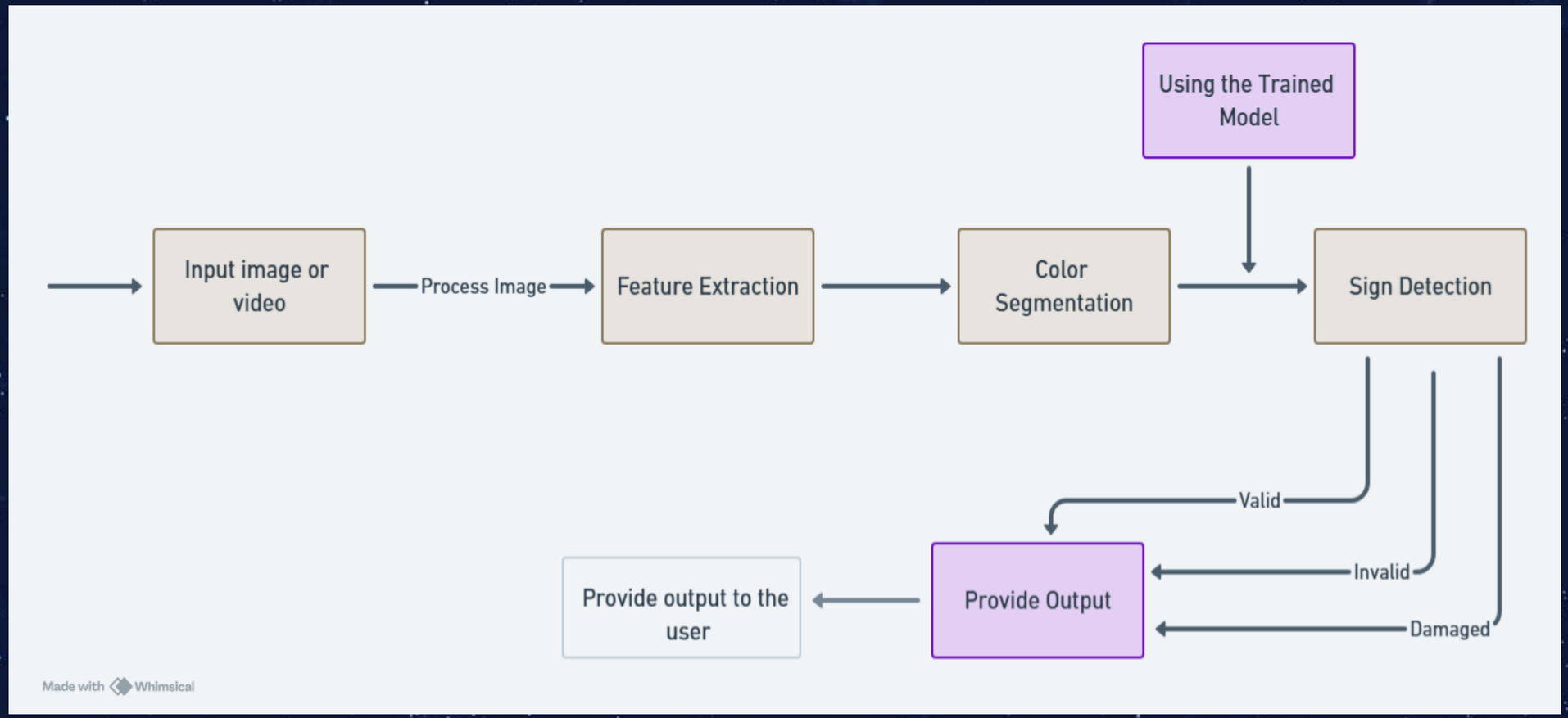
"AI for Safer Roads: Enhancing Human & Autonomous Traffic Awareness"

“Build an AI-powered system that not only recognizes traffic signs in real time, but also detects damaged and assists visually impaired or autonomous agents in navigating with awareness and context.”

PROPOSED SOLUTION

- **Real-Time Traffic Sign Detection & Classification**
- **Damage & Obstruction Detection**
- **Accessibility Support for Visually Impaired**
- **Context Awareness & Navigation Assistance**
- **Provide Output with 99.9% accuracy**
- **Robustness Testing**

FLOWCHART / DIAGRAM



FLOWCHART / DIAGRAM

- Input - Take input from the user in the form of image or video.
- Feature Extraction- After input it process image and Extract Feature.
- Color Segmentation - In this step Color segmentation is done RGB to Grayscale image
- Sign Detection - According to the used deep learning model we detect the which Traffic Sign is
- Provide Output - It provide the output in the form of valid, invalid and damaged
- End user Output - This is the final Output which is showed for user

- **Real-Time Sign Detection & Classification**
  Accurately detects and classifies various traffic signs from live camera input using advanced objec
  detection models.

- **Damaged and Obstructed Sign Detection**
  Goes beyond standard detection by identifying broken, faded, tampered, or blocked traffic signs.

- **Context-Aware Navigation Assistance**
  Provides intelligent feedback based on GPS and camera feed — warns about missing or misplaced signs.

- **Audio Feedback for Visually Impaired Users**
  Converts detected signs into natural language and delivers spoken instructions in real time.

- **Model Robustness Under Real-World Conditions**
  Tests model performance on challenging conditions like rain, fog, blur, low light, and occlusion using synthetic augmentations.

- **Human + Machine Assistive Fusion**
  Combines traditional CV with assistive tech (TTS, audio cues) and autonomous navigation suppor

- **Model Accuracy in Edge Cases**
  Detection accuracy may drop significantly under poor lighting, heavy occlusion, extreme weather, o
  low-resolution input.

- **Dependence on Internet for LLM/TTS APIs**
  Real-time voice explanations and contextual reasoning may rely on internet connectivity unless
  offline models are integrated.

- **Hardware Limitations on Edge Devices**
  Running real-time object detection and audio feedback on low-end mobile or embedded devices
  can cause performance bottlenecks.

- **Multilingual or Uncommon Signs Handling**
  System may struggle with regional, hand-made, or non-standard traffic signs unless fine-tuned on
  diverse datasets.

- **Accessibility Delay in Noisy Environments**
  For visually impaired users, audio cues may be hard to hear in noisy or outdoor settings without
  proper haptics or alternative feedback.

Team - CoDev

Name of team members and their contact details

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Thank you