ECE 579 Intelligent Systems, Winter 2024

Project Initiative Report

**Project title: Facial Expression Recognition System for Personalized Vehicle Settings.**

**Students in the project group: Julio Murillo Amezcua and Luis Castaneda-Trejo.**

**Project Description**: In this project, we will design and develop a facial expression recognition system using Phyton and TensorFlow in Google Colab. This system will be situated directly in front of the vehicle's steering wheel, where it will analyze the driver's facial expressions to predict their emotional state that could potentially lead to unsafe driving behaviors such as over speed limit. Depending on the recognized expression, the system will adjust the maximum speed limit parameter by sending a custom CAN message and in scenarios where the emotional state is significantly a concern notify the user’s emergency contacts. The model User Interface will be developed in NI LabVIEW. For CAN communication the system will use an NI USB-8506 and the simulated vehicle network will be done using Vector CANoe.

**Data Description:**

Our project will use FER2013 (Facial Expression Recognition 2013) that is one of the most used datasets available for facial expression recognition, containing 35,887 facial images of grayscale images of human faces sourced from internet. Each image is a 48x48 pixel grayscale photograph. The resolution is relatively low, which can be a challenge for detecting subtle facial expressions but is advantageous for training models with less computational power.

It includes seven categorical expressions (Neutral, Happy, Sad, Surprise, Fear, Disgust, Anger). The dataset is publicly accessible, making it a good choice for developing this project.

**Activities by group member:**

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| --- | --- | --- | --- |
| Group Member | Task | Completion Date | Deliverable |
| LCastaneda | User Interface for I/O controls. | 2/8/2024 |  |
| LCastaneda | Vehicle message handling | 2/29/2024 |  |
| LCastaneda | Vehicle network integration in CANoe. | 2/29/2024 |  |
| JMurillo | Model training | 3/15/2024 |  |
| JMurillo | Model integration | 3/29/2024 |  |
| All | Testing | 4/10/2024 |  |

\*Additional activities might be added or changed based on the workload of the participants.