**Project Title: Road Category Recognition Utilizing Time-Frequency Representation of Tire Sensor Data**

**Abstract:** Smart tire technologies provide innovative sensing methodologies for vehicle environment perception by directly measuring tire dynamics. This data enhances advanced driver assistance systems and autonomous vehicle controls, improving vehicle performance and safety. Previous project have explored the categorization of road types using tire sensor signals, leveraging time-frequency analysis and machine learning to address the challenges posed by non-linear and non-stationary signals. Existing methods lack robustness under diverse environmental and operational conditions. Our project integrates a custom tire measurement system into a Nissan Leaf test vehicle to collect real-world data under various conditions. We develop advanced algorithms that combine time-frequency distributions with machine learning to enhance road-type classification accuracy and robustness. The proposed work utilizes signal processing techniques in conjunction with supervised machine learning algorithms.Our approach demonstrates stronger correlations with road quality and higher predictive reliability under real-world scenarios. The proposed system outperforms existing methods by offering improved accuracy and robustness, making it a better fit for automatic vehicle control applications such as intelligent speed adaptation.