Congratulations for seeking Govt. Sponsored Project

Name: **Dr. Sanjeev Kumar (Principal Investigator)**

Department: **EEE**

Project Title: **Development of a hand-held smart E-Tongue for rapid onsite quality assessment of agricultural products**

Funding Agency: **ANRF-PMECRG (Anusandhan National Research Foundation – Prime Minister Early Career Research Grant ANRF-PMECRG)**

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Tenure: **3 Years**

Abstract:

The quality and safety of agricultural products are crucial for food security, consumer health, and market value. Traditional food quality assessment methods based on human taste, aroma, and visual inspection are subjective, qualitative, and prone to fatigue and inconsistency. Conventional laboratory techniques such as chromatography and spectroscopy, although accurate, are expensive, time-consuming, and require skilled personnel, making them unsuitable for rapid onsite analysis in rural and field environments. These limitations highlight the need for a compact, intelligent, and affordable system capable of real-time quality evaluation of agricultural produce.

This project proposes the development of a smart Electronic Tongue (E-Tongue) based on voltammetric sensor arrays for rapid onsite quality detection. Inspired by the human taste system, the E-Tongue captures unique electrochemical responses generated when sensors are excited by pulsating voltage signals. These responses are processed using advanced signal processing and machine learning techniques to generate reliable chemical fingerprints of analytes. The fingerprints can then be correlated with important quality indicators such as freshness, ripeness, spoilage, and overall product quality.

The project further integrates miniaturized electrodes, IoT connectivity, and machine learning algorithms to create a portable, hand-held, and connected device suitable for field applications. Experimental datasets collected from agricultural samples will undergo feature extraction, statistical analysis, and predictive modelling for quality assessment. The successful implementation of this project will deliver an affordable and intelligent tool for fast food quality evaluation, reduce wastage, improve supply-chain monitoring, and support sustainable agriculture practices.