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A Scientific Society under Ministry of Electronics & Information, Technology, Government of India

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TO WHOM IT MAY CONCERN

I am writing to express my strong and sincere support for **Mr. Sagnik De**, a highly motivated and exceptionally talented student who completed his **B.Tech** in **Electronics and Communication Engineering** in 2025 from **University of Calcutta, Kolkata**. He successfully carried out his internship under my supervision from **April 10, 2023,** to **October 9, 2023**, on the topic *"Deep Learning and Signal Processing Approaches for Early Detection of Parkinson's Disease using EEG Signals."*

During his internship, Sagnik demonstrated exceptional skills in developing innovative approaches for the early detection of Parkinson's Disease (PD) using EEG signals. He focused on extracting and analyzing time-frequency representations of EEG data to identify subtle neural patterns indicative of PD. Building on this, he developed ParViT, a **novel Vision Transformer architecture** designed to process these structured time-frequency blocks, achieving high accuracy for early PD diagnosis, which was published in an **IEEE conference**. Recognizing that early PD is often accompanied by chemosensory dysfunction, he **extended** his research to **chemosensory EEG** to analyze brain responses to olfactory stimuli as potential early biomarkers. This study, which introduced advanced feature extraction and machine learning strategies, was published in **IEEE Sensors Letters** and also featured in the **Innovative Spotlight** section of the IEEE Xplore Digital Library.

Sagnik stands out for his expertise in advanced deep learning frameworks, including *Vision Transformers*, *graph-based neural networks*, and *explainable AI methods*, as well as his deep understanding of *neural signal modeling* and *signal decomposition techniques*. He effectively integrates theoretical knowledge with practical application, demonstrating a strong understanding of complex concepts and translating them into impactful real-world solutions. This positions him as a valuable asset to the academic community.

Beyond his technical expertise, Sagnik demonstrates exceptional leadership, teamwork, and communication skills. His disciplined work ethic, curiosity, and problem-solving mindset place him among the **top 2%** of students I have mentored. Overall, he is a sincere, innovative, and capable individual with a strong foundation in **deep learning**, **biomedical signal processing**, and **brain-computer interaction**. I am confident he will continue to excel during his graduate program and make meaningful contributions to his chosen field.

I would be happy to provide any other information about Mr. Sagnik De, if required.

Sincerely,

(Dr. Anil Kumar Gupta)