



Project Proposal for Ph.D.

Project Details	
Project Title	Deep learning-based quality evaluation of Soybean crop and kernels
Project Summary (Minimum 500 and maximum 2000 characters)	Agriculture is a crucial industry in India, contributing 17-20% to GDP and employing 40-45% of the workforce, providing essential crops like rice, wheat, pulses, fruits, vegetables, and animal products. Soybean (Glycine max L. Merrill), a key seed legume, accounts for 25% of global edible oil production and two-thirds of protein concentrates for livestock. Historically, it has been a staple food source in East Asia, earning the nickname 'cow of the field.' India ranks fifth in global soybean production, but with only 4% of the world's output from 10% of the total cultivation area, it suffers from poor land utilization (1.1t/ha vs. 2.2t/ha globally). Soybean crops, initially disease- and pest-free, now face increasing challenges with expanding cultivation, which can cause yield losses from 20-100%. Better crop management could increase yields by 30-35%. Post-harvest kernel damage, due to cracks or scratches during handling and transportation, further reduces market value, storage potential, and germination rates. This work introduces a novel approach using an unlabelled dataset of high-magnification images of soybean leaf and kernel damages to demonstrate an unsupervised segmentation method. This method identifies, localizes, and quantifies damage, analyzing metrics such as damage area, centroid, and spatial distribution to offer deeper insights into damage patterns and enhance understanding of soybean plant health.

Ph.D. Supervisors			
Role	Name of Faculty	Academic Unit in IITD/Institute/University	Email ID (Official)
Supervisor 1	Dr. Husain Kanchwala	IIT Delhi	husaink@iitd.ac.in
Supervisor 2	Dr. Ankur Miglani	IIT Indore	amiglani@iiti.ac.in

Project requirements (Student qualifications, experience required, etc) *The candidate will be shortlisted based on common shortlisting criteria decided by ScRC (SIRe)
- BE/Btech in mechanical, electrical, electronics or computer science with 7 CGPA and a valid GATE score card (GATE exmpted for CFTI as per institute norms). - ME/Mtech in mechanical, electrical, electronics or computer science with 7 CGPA.

Source of fellowship/funding (CSIR/UGC/DBT/ICMR/ICAR/NEET-PG/DST-INSPIRE/IRD/FITT Project details, if any)
Institute Fellowship/ Project Fellowship

Role of Faculty Members involved:	
Supervisor-1	Dr. Husain Kanchwala (Assistant Professor, CART, IIT Delhi)
Supervisor-2	Dr. Ankur Miglani (Associate Professor, Department of Mechanical Engineering, IIT Indore)