Indian Institute of Technology Delhi

School of Interdisciplinary Research (SIRe)

SIRe Project Number

2023-01-20

(will be assigned by SIRe)

Project Proposal for Ph.D.

Project Details	
Project Title	**Autonomous Driving Using Computer Vision**
Project Summary (Minimum 500 and maximum 2000 characters)	Autonomous driving using computer vision is one of the emerging research topic in recent times. Cars can perceive the environment around them and navigate safely without human intervention using vision-based techniques. Computer vision is a subset of artificial intelligence that involves training machines to recognize and interpret images and videos. It can be used to analyse real-time data from sensors such as cameras, lidar, and radar. The data captured from these sensors is then processed by deep learning algorithms to understand the environment around the car and make decisions accordingly. One of the main challenges is ensuring the system's reliability and safety. These algorithms can sometimes misinterpret images, environmental factors such as bad weather conditions, glare, or low light can affect the accuracy of the system. Another challenge is dealing with the unexpected behaviour of other drivers and pedestrians. The aim of this project is to investigate vision-based techniques like object detection, recognition, tracking, and classification under challenging environments. We will investigate the integration of the computer vision system with other autonomous driving technologies, such as LiDAR, radar, GPS, and inertial sensors, to enhance the overall perception and decision-making capabilities of the autonomous vehicle. To achieve the objectives outlined above, we will conduct a comprehensive literature review of existing research on computer vision and autonomous driving and develop new sensor fusion algorithms to enhance driving safety. Eventually we will explore other potential applications of autonomous driving with computer vision technology, such as, smart agriculture, and transportation of goods and services.

Ph.D. Supervisors

Role	Faculty	Academic Unit in IITD/Institute/University	Email ID (Official)
Supervisor 1	Prof. Husain Kanchwala	CART	husaink@iitd.ac.in
Supervisor 2	Prof. Shahid Malik	SeNSE	**Shahid**.Malik@**sense.iitd**.ac.in

Project requirements (Student qualifications, experience required, etc)

- 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 funding

Role of Faculty Members involved:
HK will assist in problem formulation, experimental facility, vehicle modeling and control system integration. SM will assist in system development, sensor fusion algorithms, path planning and tracking strategies.