

**Study and analysis of various sensors and data fusion for pose estimation,  
mapping and localisation**

**SUCHISMITA TRIPATHY** (2<sup>nd</sup> YR) | **INFORMAL** Project | Prof-in-charge: Dr. Kaushal Kishore

**Objectives:**

- Comparative study of available sensors including LiDAR, stereo-vision cameras, GPS sensors, pose estimation encoders and IMU.
- Studying Kalman Filters (normal, extended, unscented) to be used in conjunction with pose estimation.
- Getting hands-on experience with rover pose estimation using packages like Robot Pose EKF.
- Research on rover pose correction in ROS and Gazebo.

Sr. No.	Task	Due Date
1	Starting with research and analysis of the above mentioned sensors and their relative merits and demerits	14/06
2	Study of the nature of the output data of these sensors and trying out basic SLAM to get used to them	21/06
3	Analysing and implementing pose estimation softwares like Robot Pose EKF for easy integration with ROS	15/07
4	Exploring prediction control models like normal, extended and unscented Kalman Filters	09/08
5	Research on the merits of using Real Time Kinematic positioning GPS	23/08
6	Studying the extent of functionality of GPS under different conditions and problems that it could pose regarding accuracy	10/09
7	Comparing the usability of LiDAR vs stereo-vision cameras for localisation and path planning based on accuracy, efficiency and ease of integration	24/09
8	Exploring the nature of LiDAR's point cloud data and further integration with GPS and IMU readings for complete localisation	08/10
9	Comparative analysis of wheel odometry using individual wheel encoders and visual odometry for pose estimation	05/11
10	Studying GPS/RTK data and odometry data and how it would need to be set up with the path planning system	31/12
11	Simulating rover pose correction along with sensor fusion in ROS and Gazebo	continuous