Problem Statement

- Develop a 2D Occupancy Grid Map of a Room using Overhead Cameras

- To develop a 2D occupancy grid map of a room using overhead cameras, similar to the map created by a ROS2-based SLAM algorithm typically used by autonomous mobile robots (AMRs).

Unique Idea Brief (Solution)

- .Use of Overhead Cameras

- Advanced Camera Synchronization and Calibration:

- mage Stitching for a Unified View:

- Sophisticated Feature Extraction and Landmark Detection:

- Efficient Occupancy Grid Mapping:

- Scalability and Flexibility:

Features Offered

- Overhead cameras provide top down view

- Multiple cameras enhance consistency and mapping accuracy

- Image Stitching enhances detail

- Efficient and cost-effective than LiDAR and RGB-D solutions

Process Flow

- Multi Camera data Aquisition

- Depth Estimation

- Individual FoV map generation

- Fusion of maps from multiple cams

- Composite Environment map

Architecture Diagram
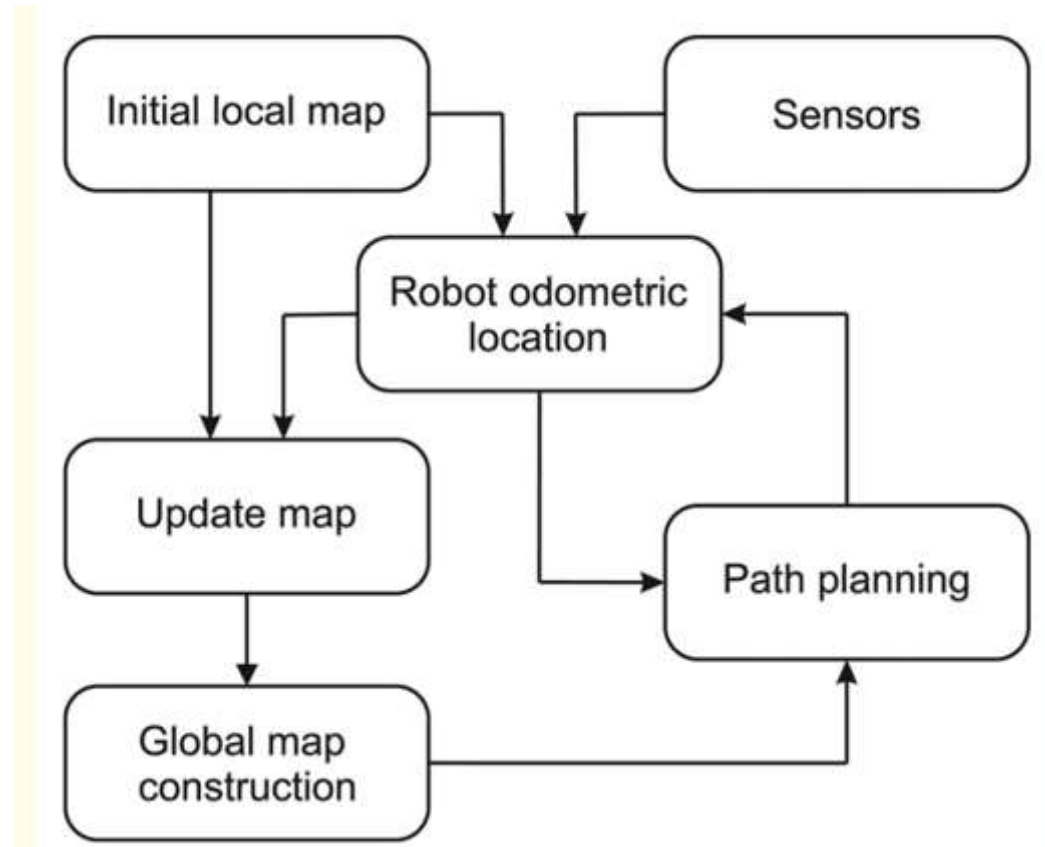
Technologies Used

- Ros2 Gazebo

- Linux

- Image Processing Algorithms

Team Members

- Lakshmi S Iyengar
- Ranjitha L

Conclusion

- This project has significantly enhanced our skills and understanding in the realm of autonomous systems and robotics.

- It has equipped us with some proficiency in image processing techniques, sensor fusion, and algorithm development necessary for creating precise 2D occupancy grid maps using overhead cameras and other sensors.