COD310
PRESENTATION

Topic: Implementing SLAM on AGV

Project Supervisor : Prof. Chetan Arora

Team

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2021ES10757

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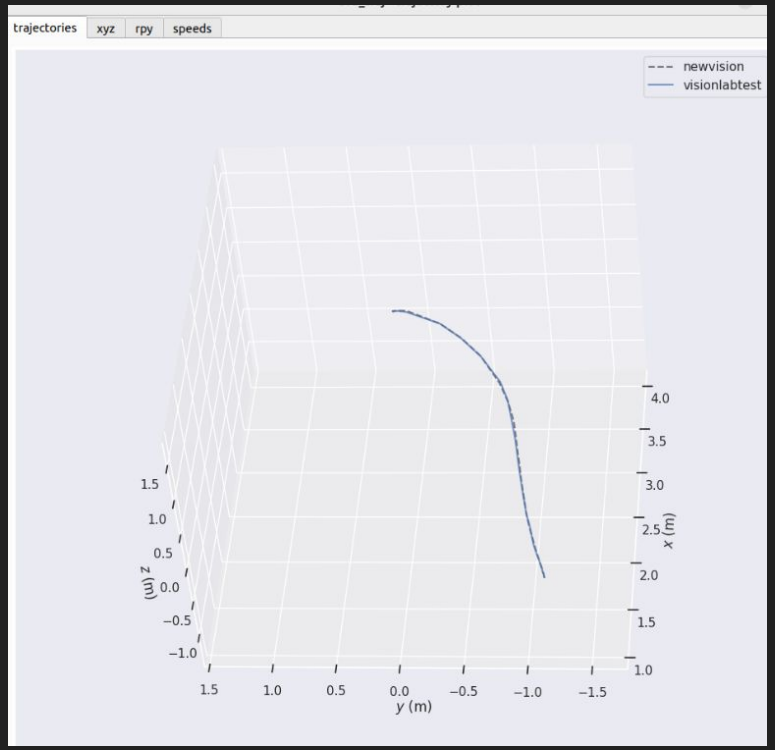
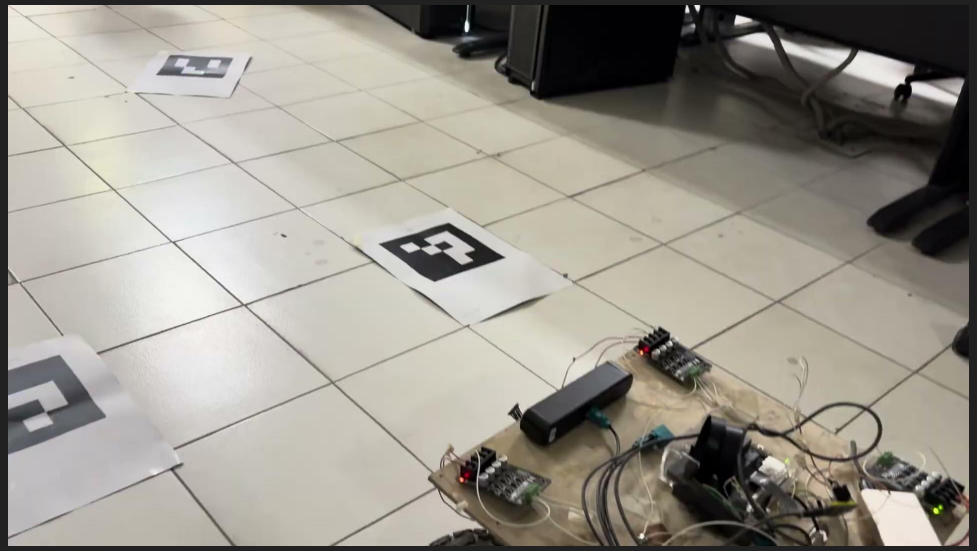
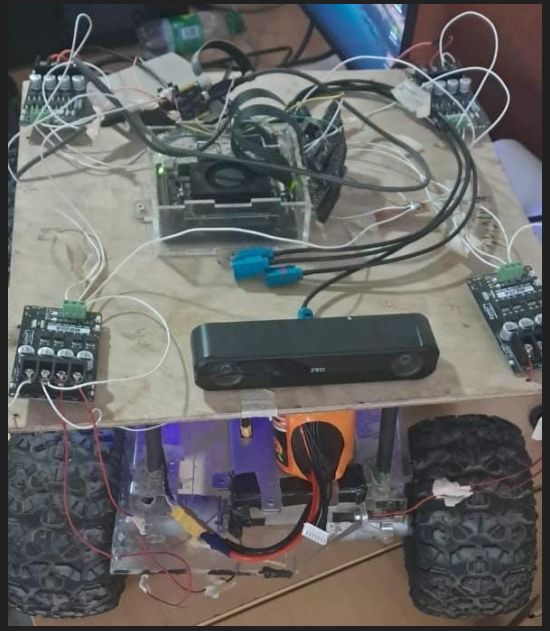

trajectories
xyz
rpy
speeds
newvision
visionlabtest
1.5
1.0
0.5
0.0
−0.5
−1.0
z (m)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
x (m)
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
y (m)



Contribution - Aditya

1) ORB-SLAM3 Integration on ROS2
2) Building of rover and implementing RC control on it.
3) Hyperparameter tuning of ORB-SLAM parameters using EuRoC dataset

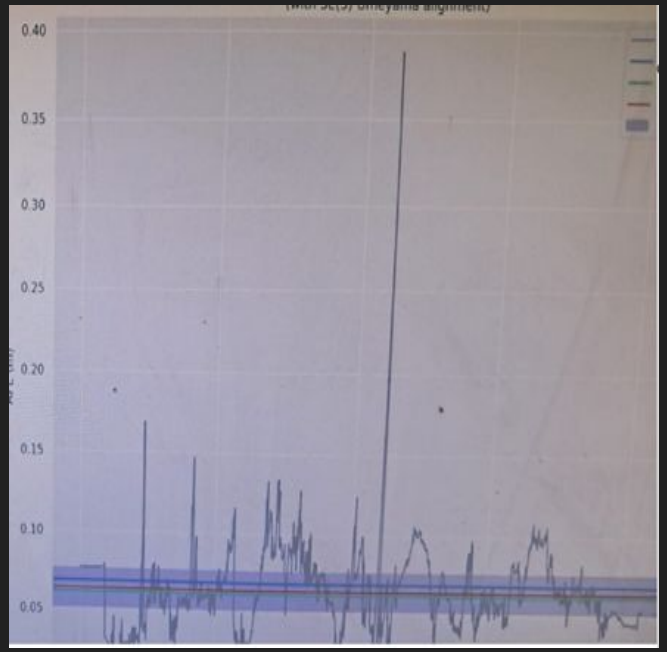
Building of Rover and implementing RC on it

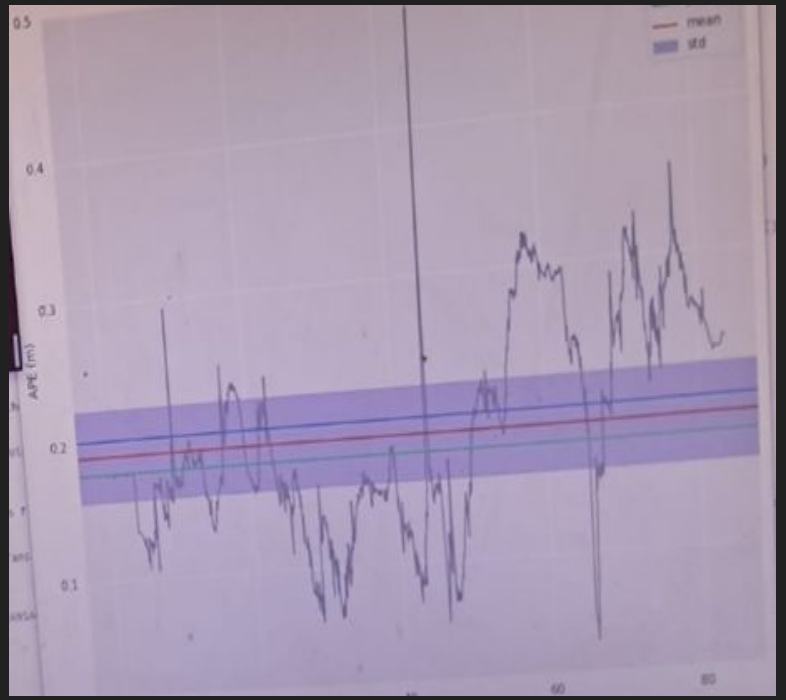


Challenges Faced

1) Previous Rover components were not working
2) Motor Driver stopped working and further procurement took time.

Challenges Faced during Hyper Parameter Tuning





Challenges Faced During Hyper Parameter Tuning

Orb SLAM gave different trajectories with the same hyper parameters on the same dataset.

Attempted to stop random number generation - led to high errors in sse .

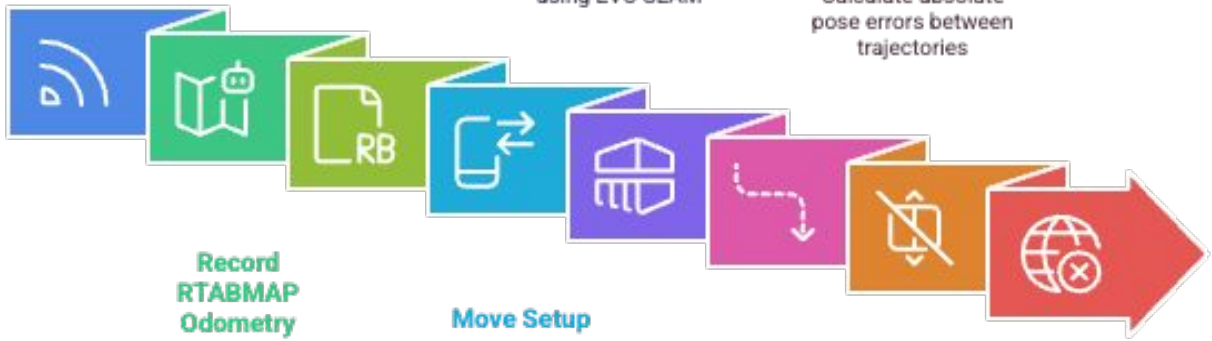
Contribution - Mayank

Generation of odometry via RTABMAP (plus Aruco) and OrbSlam 3 separately and evaluation using Evo Slam

Using Aruco markers to estimate Ground truth

Dataset collection in form of RosBags

Trajectory Comparison Process



Initiate ROS Nodes

Start ROS nodes remotely to begin data collection

Record RTABMAP Odometry

Save RTABMAP odometry data in TUM format

Save ORB Output

Save ORB output in TUM format

Move Setup

Move the setup forward and back to the initial position

Align Trajectories

Align the trajectories using EVO SLAM

Scale Mono Trajectory

Scale the mono trajectory using Umeyama's method

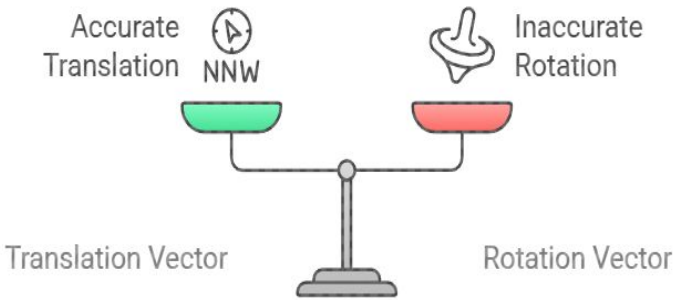
Compute Absolute Pose Errors

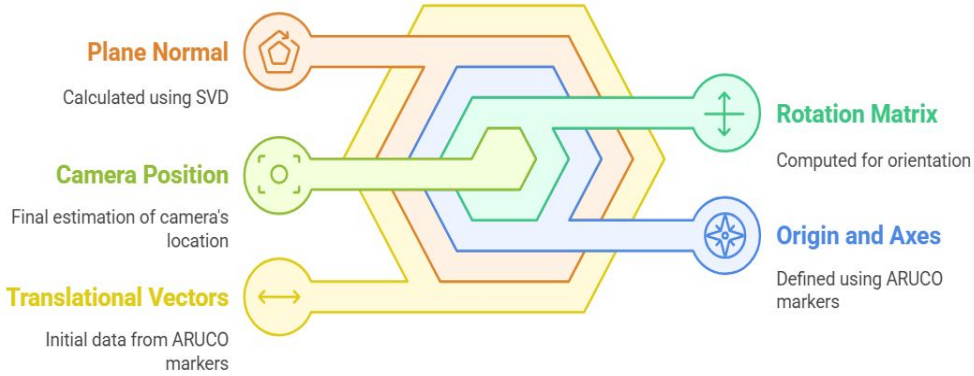
Calculate absolute pose errors between trajectories

Terminate ROS Nodes

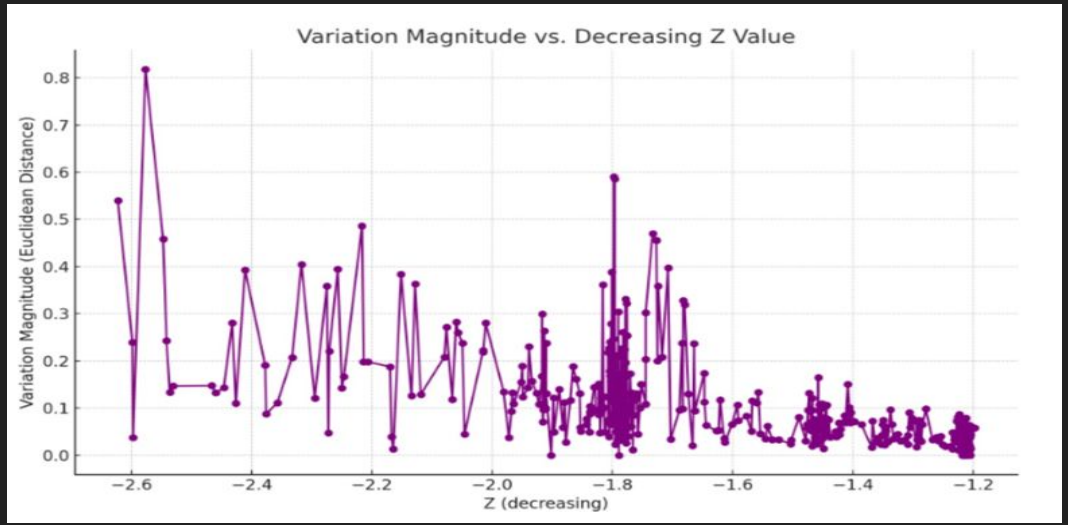
End ROS nodes remotely after data collection

Made with Napkin

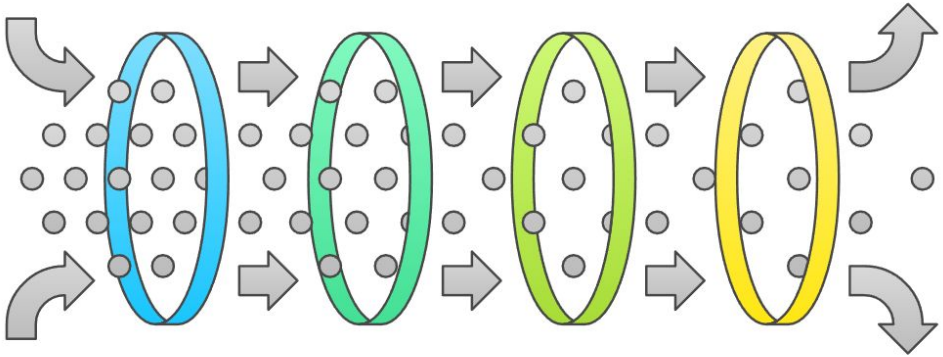

Accurate
Translation
NNW
Inaccurate
Rotation
Translation Vector
Rotation Vector


Plane Normal
Calculated using SVD
Camera Position
Final estimation of camera's location
Translational Vectors
Initial data from ARUCO markers
Rotation Matrix
Computed for orientation
Origin and Axes
Defined using ARUCO markers

Variation in camera position in global frame using ARUCO



Further improvements



Vary Marker Resolutions

Adjust marker distances for resolution diversity

Reduce Errors

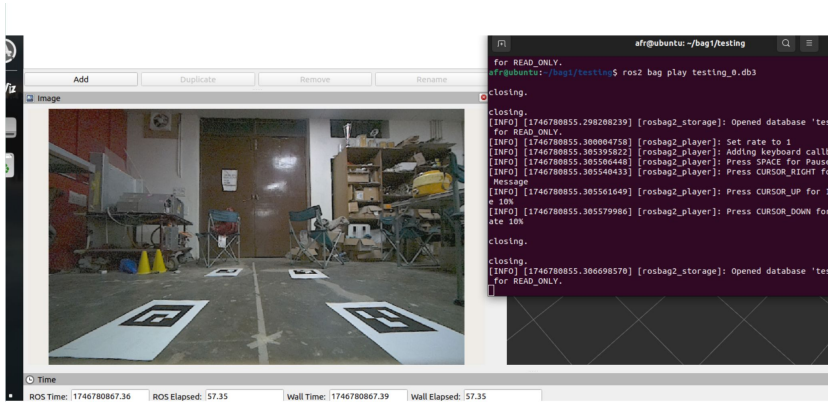
Achieve higher accuracy with resolution diversity

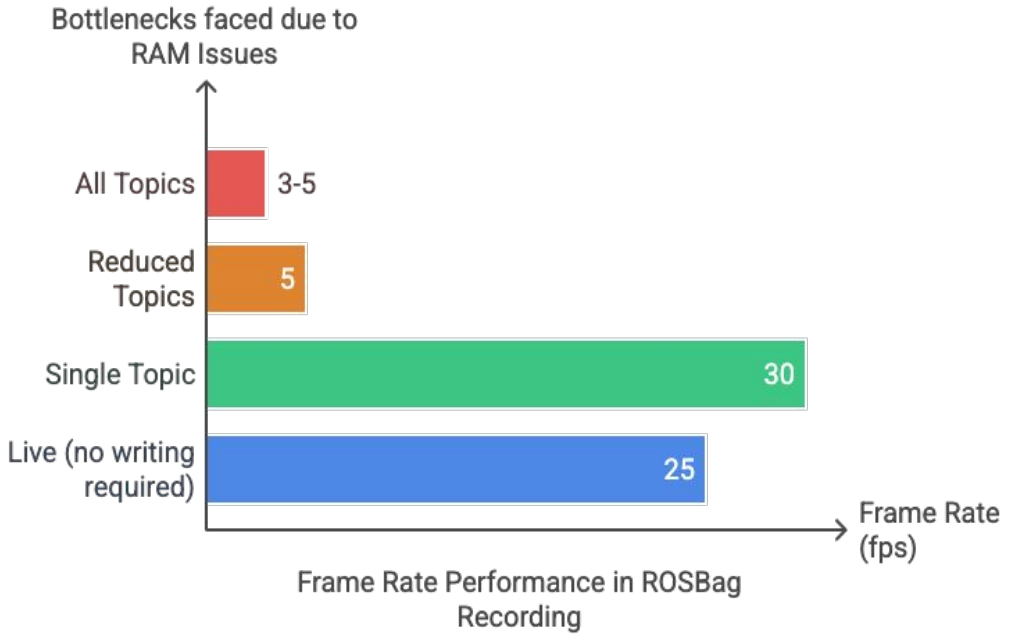
Minimize Jumps

Ensure smoother tracking with reduced jumps

Pre-computed Trajectory

Follow a marked path for data collection

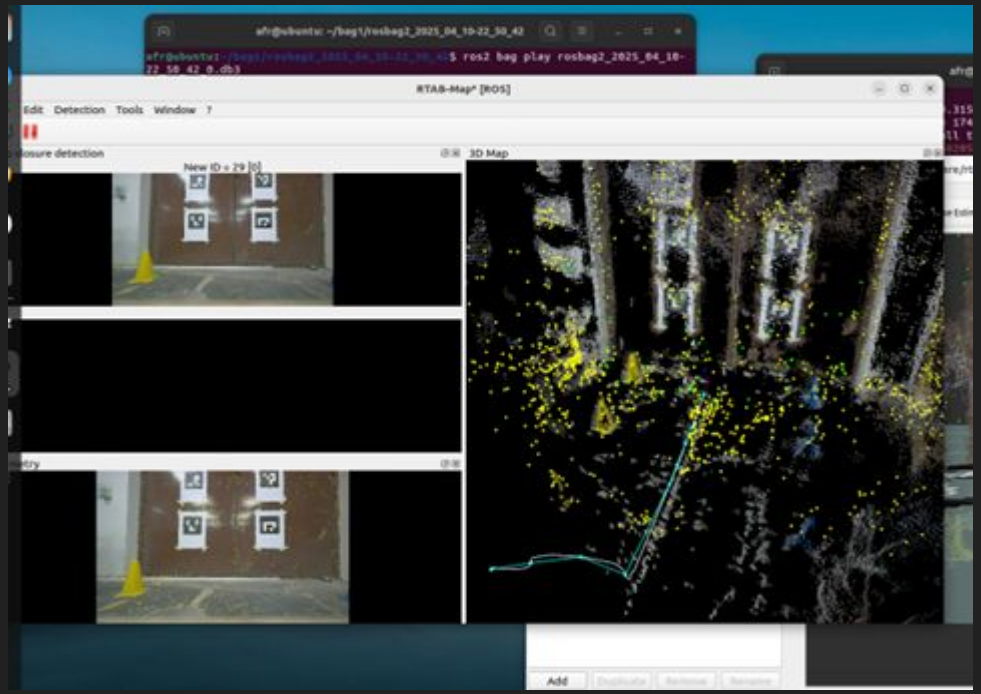




Made with Napkin

Image Comparison of the Trajectories

ORB



RTABMAP + ARUCO