

# Trajectory (Motion) estimation of Autonomously Guided vehicle using Visual Odometry

By

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## 1. Motivation

In daily life, we use devices which are capable of telling us our location based on GPS. But we know GPS signal is very weak in INDOORS and some OUTDOOR places as well. GPS signal is also electromagnetic. So you may face some problems.

A Solution to this problem is visual odometry (VO). In one application of VO, It takes image sequence (Video) as input and estimates the trajectory covered by vehicle (subject). It also estimates the 3D map of the environment. Based on different operations we can obtain position data nearly as accurate as GPS.

I am keen of Robotics and I am in team of Mahindra Rise challenge of autonomous car. I want to apply this technique to unmanned aerial as well as ground vehicles. Its wide application is SLAM (Simultaneous localization and mapping). In which multiple robots share self location with each other. With GPS the whole system would be dependent but as you apply VO, system becomes totally independent, because subjects are estimating their position on their own.

## 2. Algorithm

1. Image preprocessing
2. Feature detection and Extraction (SIFT /SURF/FAST/BRIEF)
3. Removing Outliers(unwanted features) using RANSAC
4. Tracking features
5. Estimating 2D motion

## 3. Dataset

A lot of institutions are involved in Computer vision. So a lot of raw data is present. I will use raw data from "Karlsruhe institute of technology". Which is technological research institute of Toyota, Chicago.

## 4. References

1. Andreas Geiger, Philip Lenz, Christoph Stiller and Raquel Urtasun. Vision meets Robotics:The KITTI dataset. In Journal "International Journal of Robotics Research (IJRR); 2013
2. Scaramuzza, D., Fraundorfer, F., Visual Odometry: Part I - The First 30 Years and Fundamentals, IEEE Robotics and Automation Magazine, Volume 18, issue 4, 2011.