What is SLAM?

SLAM (Simultaneous localization and Mapping) is a techngique used in robotics. It provides a good solution and result for self-driving or autonomous robots. The idea behind SLAM is to make robot drive itself which has no idea about where and how it is located on a map and also it has no idea about how map looks like. In SLAM the map is not provided so the robot has to build the map with the sensors it has. After map building step it also needs to place itself correctly on a map so that it can make a movement. This is the fundementals of SLAM.

Where and why SLAM is used?

SLAM is widely used in self-driving cars, and robots that built to make investigation on unknown places to people(Such as MARS). SLAM is preffered because with no prior knowledge robots are still making good progress.

What are the SLAM Algorithms?

There are lots of algorithm introduced for SLAM such as EKF SLAM, Fast SLAM, L-SLAM, GraphSLAM, LSD-SLAM, S-PTAM, ORB-SLAM, MonoSLAM, CoSLAM. There are other algorithms used for SLAM but we will focues on three of them from here.

Explain one algorithm with some papers.

EKF-SLAM:

It is a class of algorithms that uses Extended Kalman Filter for SLAM problem. EKF is used to estimate the pose of robot and position of landmarks in the map robot moves. Extended Kalman Filter steps is as follows:

* State Prediction:

Estimate new position of the robot

* Measurement Prediction:

Predicting the observation

* Measurement:

Getting real observation with sensors

* Data Association:

Check the difference between predicted observation and real observation that gathered with sensors

* Update:

Change current state(position) of the robot to next state according to the estimation made in data association step.

References: [https://www.doc.ic.ac.uk/~ns5517/topicsWebsite/EKF-SLAM.html#](https://www.doc.ic.ac.uk/~ns5517/topicsWebsite/EKF-SLAM.html)