Simultaneous Localization and Mapping: A General Approach to Different Methods  
\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Report II \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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**I. INTRODUCTION**

Robots in millenium era were always popular. They were popular among both users and researchers. In mobile robots, self driving or observing from outside and processing inside were important. Under heavy research years, Simultaneous Localization and Mapping (SLAM) became extremely popular among researchers. SLAM is a method that on an unknown location, the agent is creating a map concurrently keeping the data of agent’s location. This technique allows a robot to behave like an intelligent being. 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 preferred because with no prior knowledge robots are still making good progress. There are multiple SLAM algorithms on literature that are beneficial in particular case or not effective. Introduced algorithms for SLAM are as EKF SLAM, Fast SLAM, L-SLAM, GraphSLAM, LSD-SLAM, S-PTAM, ORB-SLAM, MonoSLAM, CoSLAM. There are other algorithms used for SLAM but in this paper, we will try to focus on three of them. At the end of this paper, the implementations will show their comparisons in terms of their efficiency, run time complexity etc.

**II.METHOD**

**2.1 Particle Filter SLAM**

Particle Filter is a method that computing the posterior behavior in limited Markov Chains within discrete time. In a given time *t,* a state of Markov Chain is xt . Clearly, the state of xt is bounded to state xt-1 under regards of probabilistic law

Another state kt, that will be a stochastic projection of xt. Eventually, it will be generated by probabilistic approach:

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