**Literature review:**

Research 1: **Design and Development of Autonomous Delivery Robot [1]**

This research published by Visvesvaraya National Institute of Technology discusses the design of an autonomous delivery robot with some limitations. This project is capable of carrying a maximum weight of 2kg this low-bar line is due to the use of low torque motors. To carry higher weights the use of higher torque motors is essential. On the other hand, the motors used have 300rpm which increases the ability of moving the robot much faster ensuring it is within the road speed limits. For the main board the project uses Nvidia Jetson TX1 for controlling and running global and local planning algorithms. It also uses an Arduino Mega to control the motors and manage the sensors' readings. The two boards communicate using rosserial to publish the sensors' readings and to receive the moving commands controlling the motors. The design uses multiple components to provide much accurate localization and obstacles avoidance, one main component used is a RGBD camera which is used to get the front view with 3D depth map with addition to a laser range finder which gives a 2D depth map. Another component used for an accurate localization of the robot and for the purpose of determining the orientation of the robot is the inertial measurement unit (IMU) which includes an accelerometer, a gyroscope and magnetometer for a better estimate of the position. To avoid collision, an IR sensor with a range of 4-30 cm is used as the last option to save the robot from collision.

For this project, a map-based localization approach is implemented but however, this leads to some potential problems that could be a result of the accumulative errors of the used sensors (e.g., the GPS could produce a 10 meters error in some cases), For this reason the paper suggests the use of statistical filters for more accurate localization. The paper discusses another essential topic for navigating an autonomous robot which is the use of high-definition maps or simply ADAS maps, which could lead to an accuracy of 10 cm. Although the project did not use SLAM (Simultaneous Localization and Mapping), but the paper suggests the use of SLAM as a solution to improve the accuracy of mapping localization of the robot. The paper also discusses the used algorithm for path finding, in this case it is the A-star algorithm. Although it is not the best algorithm in finding the shortest path, but the researcher justifies that the project needs a fast algorithm more than an accurate but slow one to avoid getting stuck. however, the researcher suggests further research to be carried out for the optimization of the grid generation.

**Project Scope :**

For this project, the following must be clear for all parties:

* The design is targeted to be specific for the KAU Campus.
* The information gathering will be done with the guidance of the advisor and includes all the team members.
* Team members will provide all the required resources needed to implement the solution.
* Team members are responsible of any financial obligations that could be a result of purchasing a required component or subscribing to a license.

Resources :

This pdf 🡪 https://arxiv.org/pdf/2103.09229.pdf