You need a combination of sensors and algorithms to localize a robot in an unknown environment and reach a specific position.

Sensors:

1-Inertial Measurement Unit (IMU): An IMU sensor measures the robot's acceleration, angular velocity, and orientation, providing information for sensor fusion and motion estimation.

2-Lidar: (**li**ght **d**etection **a**nd **r**anging) uses eye-safe laser beams to see the world in 3D, providing machines and computers with an accurate representation of the surveyed environment.

How Does Lidar Work?

→A typical lidar sensor emits pulsed light waves into the surrounding environment. These pulses bounce off surrounding objects and return to the sensor. The sensor uses the time it took for each pulse to return to the sensor to calculate the distance it traveled.

3-Wheel Encoders: Wheel encoders can measure the rotation and displacement of the robot's wheels, which can be used for odometry and tracking the robot's motion.

Localization Algorithms:

1-Simultaneous Localization and Mapping (SLAM): SLAM algorithms enable a robot to build a map of its environment while simultaneously estimating its position within the map.

2-Particle Filter Localization: also known as Monte Carlo Localization (MCL). It is a probabilistic method that estimates the robot's position by maintaining a set of particles, which represent different hypotheses or possible poses of the robot.

3-**Extended Kalman Filter (EKF):** It is an extension of the Kalman Filter that is capable of handling non-linear motion and measurement models. Extended Kalman Filter is to linearize the non-linear motion and measurement models using a first-order Taylor series approximation. This linearization allows the use of the traditional Kalman Filter equations for state estimation and covariance update. The EKF assumes that the noise in the system is Gaussian and that the motion and measurement models are differentiable.

Once the robot knows its position, it can use path planning and navigation algorithms like A*, D*, or reactive navigation to plan and execute its movement toward the target position.