Robotics Corner

Robotics for Professionals Diploma

ROS

Project

Autonomous Mobile Robot

Implement an autonomous mobile robot using hardware and software OR only in software

Required Hardware Components:

1. Robot Kit
2. 2 Motors
3. 2 Encoders
4. LIDAR (optional)
5. Raspberry PI 3B+ or higher
6. Arduino UNO or NANO
7. IMU
8. Batteries/ power source and battery holder

Car Chasis: https://free-electronic.com/product/robot-car-chassis-kit-1-layer-2wd/

Encoder: https://www.ram-e-shop.com/shop/kit-photo-encoder-kit-photo-encoder-motor-speed-sensor-module-circuit-7319

LIDAR: https://uge-one.com/product/8-meter-range-360-degree-scanner-x2-lidar/?gad_source=1

Raspberry Pi 3B+: https://www.amazon.eg/-/en/Raspberry-Pi-3-Model-B/dp/B07BDR5PDW

Arduino NANO: https://www.ram-e-shop.com/shop/arduino-org-nano-328-arduino-nano-original-8662?search=arduino&order=name+asc

IMU: https://www.ram-e-shop.com/shop/kit-imu-gy87-10dof-imu-10-dof-gy87-3-axis-gyro-3-axis-acceleration-3-axis-magnetic-field-air-pressure-sensor-module-7684?search=imu&order=name+asc

Project Description:

1. Locomotion: Utilizes differential drive system for maneuverability.
2. Navigation: Implements A* algorithm, Dijkstra, or any path planning technique, and optimizing routes. Example: ROS (Robot Operating System) navigation stack.
3. Localization: Employs sensor fusion techniques such as odometry, IMU, LIDAR and GPS for accurate position estimation. Implements Kalman filters or particle filters for robust localization in dynamic environments. Example: AMCL (Adaptive Monte Carlo Localization) in ROS.
4. Mapping: Utilizes occupancy grid mapping for creating environment representations. Example: GMapping algorithm for 2D mapping
5. Control: Implements reactive control strategies for real-time response to dynamic environments.

The project should include a URDF file, a gazebo simulation, and an RViz visualization.