Alternative Methods

Saturday, October 7, 2023   8:33 AM

Search 2: 7-10-2023: Methods and Alternatives for Design:

1- Hardware connections	Most Common and reliable approach is to connect the sensors (encoders, gyroscope to the arduino) and the motor driver, then connect the arduino to the Raspberry pi via either I2c or USB communication protocols. By connecting the Lidar sensor to the Raspberry Pi and other sensors (gyroscope, encoders) to the Arduino, we can offload some of the data processing tasks to both devices. The Arduino can handle low-level motor control, encoder data processing, and basic sensor fusion, while the Raspberry Pi can focus on higher-

2- Alternative Software Methods and why	• ROS
	• ROS2
	• PyRobot: Simmulator
	• Robotnik's RB-1 Base: Designed for research.
	• V-REP (CoppeliaSim): Testing and simulation
	• Ardupilot/PX4:
	  (Lack of ground support and concentrate on Aerial Navigation)
	  ……..
	
	• Java Robotics: In Java and it is eductional and not meant to support complex
	              Also weak community support and resources
	• For LabView: Robotics: Industrial automation and uses graphical programming which has limitation to our project.
	
	• What do ROS or ROS2 provide?
	
	  ROS (Robot Operating System) offers a robust platform for robotics with extensive libraries and tools tailored for various applications. Key features include a navigation stack for autonomous robot movement, seamless sensor integration, strong community support, simulation capabilities for testing, adaptability to diverse hardware, localization and mapping support, efficient communication, and a mature ecosystem with a proven track record in robotics projects. ROS's comprehensive suite of resources makes it a go-to choice for
	
	• For our application the best choice is ROS since:
	  The capabilities of ROS align well with our goals. It provides a comprehensive framework for mapping, localization, and navigation, making it a strong choice to implement autonomous navigation from Room A to Room B based on
	
	• **Why can't I use Ubuntu terminal alone without going to frameworks like ROS?**
	
	1. Complexity in integration of codes from different sources
	2. Lidar 2d sensor difficulty in calibration and reading without help of ROS
	3. Testing and Debugging is mostly impossible to do from scratch

4. Reinventing the Wheel: ROS provides well-established solutions and packages for navigation and robotics tasks. Implementing everything from scratch may involve reinventing solutions that already exist within the ROS ecosystem.